PRIMĂRIA MUNICIPIULUI BUCUREŞTI

Secretar General

Direcţia Asistenţă Tehnică şi Juridică a CGMB

Direcţia Asistenţă Tehnică şi Juridică a CGMB
Serviciul Transparenţă decizională

ANUNŢ

În conformitate cu prevederile Legii nr. 52/2003 privind transparenţa decizională în administraţia publică se aduce la cunoştinţă publică urmatorul proiect de act normativ:

- **Proiectul de hotărâre privind aprobarea studiului « *Strategia Energetică a Municipiului Bucureşti* ».**

Proiectul de act normativ, mai sus amintit, cu documentaţia de bază poate fi consultat:

- pe site-ul P.M.B. – www.pmb.ro;

Proiectul de act normativ se poate obţine, în copie, pe bază de cerere depusă la Centrul de Informare.

În conformitate cu prevederile art. 6, alin. 4 din Legea 52/2003 până la data de **14.05.2010** se pot trimite în scris, propuneri, sugestii, opinii cu valoare de recomandare privind proiectul de act normativ supus dezbaterii publice.

Propunerile, sugestiile, opiniile privind proiectul de act normativ se vor transmite:

- prin site-ul www.pmb.ro;
- prin poştă pe adresa P.M.B. – str. Splaiul Independenţei nr. 291-293, sector 6 – Directia Asistenţă Tehnică şi Juridică a C.G.M.B;
- depuse la Centrul de Informare – P.M.B.;

Materialele transmise vor purta menţiunea:

„Recomandare la proiect de act normativ"

P.M.B.
Bucureşti
28.04.2010

Consiliul General al Municipiului Bucureşti

proiect

HOTĂRÂRE

privind aprobarea studiului « *Strategia Energetica a Municipiului Bucuresti* »

Avand in vedere Expunerea de motive a Primarului General al Municipiului Bucuresti si Raportul de specialitate al Directiei Generale Utilitati Publice,

In temeiul articolului 6 aliniat (1), din HG nr.246/2006, pentru aprobarea Strategiei nationale privind accelerarea dezvoltarii serviciilor comunitare de utilitati publice, a articolului 8, aliniat (2), litera a, din Legea 51/2006 - Legea serviciilor comunitare de utilitati publice; in conformitate cu articolul 36, alin. 4, litera d si art. 45 din Legea nr.215/2001, privind administratia publica locala, republicata, cu modificarile si completarile ulterioare,

CONSILIUL GENERAL AL MUNICIPIULUI BUCURESTI

HOTARESTE:

Art.1 - Se aproba Studiul "*Strategia Energetica a Municipiului Bucuresti*", prezentat in anexa care face parte integranta din prezenta hotarare.
Art.2 - Planul de actiune orientativ, parte integranta a studiului, va fi revizuit periodic, in functie de etapele deja implementate si de conjunctura economica, de catre Comitetul Municipal al Energiei, iar varianta revizuita va fi supusa dezbaterii publice si aprobarii Consiliului General al Municipiului Bucuresti.
Art.3 - Directiile din cadrul aparatului de specialitate al Primarului General, Comitetul Municipal al Energiei, A.M.R.S.P si R.A.D.E.T. Bucuresti vor aduce la indeplinire prevederile prezentei hotarari.

Aceasta hotarare a fost adoptata in sedinta Consiliului General al Municipiului Bucuresti din data de ....

PRESEDINTE DE SEDINTA

SECRETAR GENERAL AL
MUNICIPIULUI BUCURESTI,

TUDOR TOMA

In conformitate cu prevederile contractului, prestarea serviciilor au inclus elaborarea a trei rapoarte corespunzator a trei etape de derulare si avizare, astfel: etapa 1 fiind supuse avizarii in CME si CUP din cadrul CGMB, etapa a 2-a, supus avizarii CME si CUP din cadrul CGMB, iar etapa a 3-a supus avizarii CME si aprobarii CGMB. Raportul aferent etapei a 3-a a fost transmis de consultant in data de 24.07.2009, a fost supus dezbaterii si avizarii in CME, iar varianta finala a raportului 3 a fost predata de consultant in 16.11.2009. In urma unor serii de intalniri ale CME, in data de 16.03.2010 a fost organizata sedinta de avizare a raportului 3. Astfel in urma votului exprimat de membrii prezenti ai CME, studiul a fost avizat cu 8 voturi pentru(din care 3 cu observatii), o abtinere si 5 voturi impotriva.

Studiul „Strategia Energetica a Municipiului Bucuresti" este structurat in 2 volume:

<u>Volumul 1</u> cuprinde:

Partea A: Sumar

Partea B: Raportul principal cuprinzand Notele tehnice. Notele tehnice sunt raspunsul consultantului la toate observatiile scrise primite din partea membrilor CME in perioada dintre 24.07.2009, data predarii variantei initiale a raportului 3 – strategia si 16.11.2009, data la care a fost redactata si predata varianta finala, cu modificarile generate de observatiile membrilor CME

<u>Volumul 2</u> cuprinde:

Partea C: Anexe. In aceste anexe sunt prezentate in detalii tehnice si calcule precum si modalitatile prin care obiectivele generale ale Strategiei pot fi atinse.

In atingerea cerintelor specificate in Termenii de referinta, consultantul a tratat pe langa problemele legate de sistemul de termoficare si o serie de probleme, care sunt provocari dificile in gestionarea problemelor energetice a municipiului, cum ar fi de exemplu: cele legate de protectia mediului, de imbunatatire a infrastructurii existente si ale serviciilor care nu mai corespund cu cresterea rezidentiala, de eficienta, de calitatea serviciilor energetice si de dezvoltare economica.

Strategia energetica elaborata se concentrează pe domeniile pentru care Primaria Municipiului Bucuresti este responsabila: energie pentru încălzire şi apă caldă de consum şi mai putin detaliat pentru energia utilizată de transportul public in interiorul oraşului si energia utilizată pentru iluminat public.

Strategia energetica a fost elaborata cu respectarea legislației naționala, a Strategiei energetice naționale şi a Directivelor şi politicilor UE relevante.

Atingerea obiectivelor va necesita un număr de masuri ce trebuie implementate de către Primaria Municipiului Bucuresti. Astfel, in acest raportul au fost incluse planuri de actiune pentru implementarea strategiilor.

Direcţia Utilităţi Publice

Strategiile elaborate se sprijina pe trei mari piloni:

- **Clima**. Furnizarea de energie termică va fi neutra din punct de vedere al emisiilor de CO_2 incepand cu 2020. Emisiile de CO_2 de la transport se vor reduce cu 50% până în 2020.
- **Sustenabilitate**. Condiţiile de furnizare de energie termică se bazează pe realizarea şi principiilor de piaţă deschise. Fondurilor necesare pentru infiinţarea de durabilitate trebuie să fie furnizate de către investitorii privaţi.
- **Calitate**. Nivelul de calitate şi serviciile adecvate privind furnizarea de energie termică, în acest secol, vor fi obţinute prin privatizare exploatarii si managementul pe baza de concesiuni.

CLIMA

Strategia privind clima vizeaza neutralitatea din punct de vedere al emisiilor de CO_2 pentru producerea de energie termica din anul 2020 si reducerea emisiilor de CO_2 generate de transport cu 50%, pana in 2020.

Emisii de CO_2 actuale provenite din arderea a 28.000 TJ / an de gaze naturale este de circa 1.500.000 t / an.

Obţinerea acestui obiectiv pentru sectorul de termoficare necesita conservarea energiei şi construirea de surse de producere neutre din punct de vedere al emisiilor de CO_2 :

- Economii de aprox. 45% din cererea aferenta anului 2007, prin conservarea energiei, scazand astfel cerererea la nivelul obiectivelor nationale de 50 kWh/m^2/an şi 100 kWh/m^2/an pentru cladirile noi respectiv cele existente.
- Aproximativ 40% din valoarea totală a cererii în 2020, se va asigura de la sistemele de încălzire solară
- Aproximativ 20% se va asigura din facilitatile de transformare a deseurilor in energie.
- Aproximativ 20% se va asigura de la centralele de cogenerare descentralizate pe baza de bio-combustibil
- Aproximativ 10% se va asigura de la cazanele pentru varf pe baza de bio-combustibil
- Aproximativ 10% se va asigura din alte surse, cum ar fi pompele de căldură cu acumularea de caldura, folosind surplusul de energie electrică, atunci când este disponibil, de la energia eoliană şi altele.

În ceea ce priveşte sectorul transporturilor, risipa de energie datorata ambuteiajelor in trafic va fi redusa prin introducerea unei taxe de aglomeratie, restrictiilor privind parcarea si masurilor de control a traficului.

SUSTENABILITATE

Sustenabilitatea furnizarii de energie termica va fi obtinuta prin implementarea:

1. Unui sistem de tarifare bazat pe costuri, până în 2010

   Pentru a pregăti sistemul de tarifare pentru schimbările viitoare, va fi necesar introducerea unui sistem bazat pe o taxă de administrare, un tarif de capacitate şi un tarif de energie.

2. O schema de subventii sustenabila, până în 2012
   În general, schema de subventionare cunoscuta astăzi va fi înlocuită de o schema care va avea la baza nevoile sociale.

3. Modificarea cadrului organizational până în 2012
   Masurile selectate sunt: infiintarea unei organizatii a serviciului public, PSO, in cadrul Municipalitatii şi functionarea sevicIului public se va asigura ca urmarea a stabilirii unui parteneriat –public/concesiune cu aport de capital.

CALITATE

Obţinerea neutralităţii din punct de vedere al emisiilor de CO_2 pentru energia termică necesita introducerea conectarii obligatoriu la sistemul de termoficare. Acest lucru poate fi impus doar prin implementarea:

- Unei calitatii a furnizarii egale cu nivelul de calitate intalnit in sistemele moderne de termoficare.

Îmbunătăţirea calităţii include, printre altele, introducerea unui concept de furnizare "la cerere" care sa inlocuiasca conceptul actual "cand este disponibil".

Imbunătăţirea calităţii va fi monitorizata prin introducerea valorilor de referinta (benchmarking).

Masurile şi actiunile descrise de aceasta strategie nu desconsidera investitiile facute pana in prezent in infrastructura, ci propune reproiectarea si redimensionarea acesteia, pe masura ce aceasta este uzata fizic si moral, dar intr-un mod coerent si unitar, avand in vedere obiectivele generale stabilite.

De asemenea, strategia deschide o perspectiva reale, prin introducerea utilizarii cu preponderenta a resurselor disponibile de energie regenerabila ale municipiului Bucuresti, constand in potentialul imens al energiei solare si al recuperarii energiei rezultate din incinerarea deseurilor, astfel fiind singura solutie care poate oferi bucurestenilor sansa de a avea intr-un orizont de timp masurabil, servicii de calitate, la cele mai mici preturi date de piata acestor servicii, precum si imbunatarirea conditiilor de mediu, care au o directa influenta asupra calitatii vietii.

Printre masurile propuse de Strategie trebuie evidentiata pe de o parte cea legata de eliminarea subventiei generale, aplicata tarifului la energia termica si inlocuirea acesteia cu o schema de subventii acordata pe criterii sociale. Aceasta masura, impreuna cu concesionarea cu aport de capital a serviciului de furnizare a energiei termice in Bucuresti si aducerea acestuia la un nivel de calitate comparabil cu un sistem performant, impreuna vor avea un impact pozitiv asupra bugetului Primariei, degrevandu-l de un efort investitional de aproximativ de 3 miliarde de Euro in urmatorii 10 ani.

PRIMĂRIA MUNICIPIULUI BUCUREŞTI

Direcţia Generală Infrastructură şi Servicii Publice

Direcţia Utilităţi Publice

Planul de actiune, inclus in volumul 1, descrie pasii care trebuie urmati de catre Municipalitate, datele de intrare necesare si cele de iesire care trebuie obtinute, precum si resursele care trebuie alocate pentru atingerea obiectivelor stabilite prin aceasta strategie. Implementarea strategiei, asa cum este mentionat in planul de actiune, trebuia inceputa inca de la sfarsitul anului 2009, insa este conditionata de aprobarea data de CGMB si astfel, trebuie considerat, ca data de incepere a implementarii este cea imediat obtinerii aprobarii.

Necesitatea implementarii accelerate a strategiei a fost justificata de catre consultant in Nota Tehnica din data de 26.08.2009(Volumul 1, Partea B), prin care a fost evaluat impactul financiar generat de intarzierea implementarii, astfel fiecare intaziere de 5 ani, in implementarea strategiei aduce costuri suplimentare egale cu valoarea totala a investitiei pentru atingerea obiectivelor.

In aceste conditii apreciem ca necesar si oportun promovarea proiectului de hotarare in vederea aprobarii in Consiliul General al Municipiului Bucuresti.

Direcţia Generală Infrastructură

şi Servicii Publice

Director General,

Madalin DUMITRU

Director Executiv,

Cosmin Flavius GHEORGHIU

Director Executiv Adjunct,

Dorel GEANA

PRIMĂRIA MUNICIPIULUI
BUCUREȘTI
Cabinet Primar General

EXPUNERE DE MOTIVE

privind aprobarea studiului "*Strategia Energetica a Municipiului Bucuresti*"

Prin HCGMB 278 din 02.11.2006 a fost aprobat Raportul de Recomandari pentru PPP elaborat in cadrul „Programul Multi-Sector al Municipiului Bucuresti - Subproiectul Incalzire Centralizata: Servicii de Consultanta Parteneriat Public Privat (PPP)". Astfel, punerea in aplicare a recomandarilor efectuate in cadrul Raportului de Recomandari pentru PPP, de catre Consiliul General al Municipiului Bucuresti a fost conditionata de elaborarea si aprobarea de catre Consiliul General al Municipiului Bucuresti a Strategiei Energetice a Municipiului Bucuresti si a Planului Investitional al RADET.

Studiului PPP a recomandat pentru sistemul centralizat de alimentare cu energie termica, aflat in proprietatea CGMB si operat de RADET, implementarea unui contract de concesiune cu o noua companie public-privata. Pentru ca acest lucru sa poata fi posibil, consultantul a aratat ca trebuie sa fie remediata lipsa unei strategii energetice si a unui plan investitional pentru acest serviciu de interes general, aceste lipsuri fiind considerate factori negativi externi.

Prin HCGMB 277/2006, anexa nr.1 au fost aprobati termenii de referinta ai Strategiei Energetice a Municipiului Bucuresti precum si constituirea Comitetului Municipal al Energiei (CME), avand ca atributii, in prima etapa, pana la elaborarea Strategiei Energetice a Municipiului Bucuresti (SEM), rolul de a urmari elaborarea strategiei, dezbatand si avizand rapoartele intermediare ale consultantului care elaboreaza strategia. La sfarsitul perioadei de elaborare, CME va aviza din punct de vedere tehnic lucrarea inainte de prezentarea ei in comisii si in fata CGMB. Dupa aprobarea SEM, CME va avea ca principala sarcina monitorizarea procesului de aplicare a Strategiei si de a actualiza periodic planul de actiune.

HCGMB 277/2006 a aprobat si organizarea unui grup de lucru al PMB pentru a sprijini pe consultant in obtinerea de date cat mai corecte si mai recente.

Pornind de la aceste recomandari, in acelasi an, au fost elaborati termenii de referinta pentru un contract de servicii, avand ca scop elaborarea acestei strategii energetice. Termenii de referinta au fost aprobati prin HCGMB 277/2006, si o procedura de achizitii publice a fost lansata in acest sens.

In data de 30.06.2009, prin HCGMB nr 251/2009, a fost completata si modificata HCGMB 277/2006, astfel componenta CME a fost modificata, adaugandu-se o serie de noi membri: in total 16 membri, un presedinte, un vicepresedinte si un secretar.

In urma procedurii a fost desemnat castigatorul si in decembrie 2007 a fost semnat contractul 4144/31.12.2007, cu firma daneza Grontmij | Carl Bro A/S.

In conformitate cu prevederile contractului, prestarea serviciilor au inclus elaborarea a trei rapoarte corespunzator a trei etape de derulare si avizare, astfel: etapa 1 fiind supuse avizarii in CME si CUP din cadrul CGMB, etapa a 2-a, supusa avizarii CME si CUP din cadrul CGMB, iar etapa a 3-a avizarii CME si aprobarii CGMB. Raportul aferent etapei a 3-a a fost transmis de consultant in data de 24.07.2009, a fost supus dezbaterii si avizarii in CME, iar varianta finala a raportului 3 a fost predata de consultant in 16.11.2009. In urma unor serii de intalniri ale CME, in data de 16.03.2010 a fost organizata sedinta de avizare a raportului 3. Astfel in urma votului exprimat de membrii prezenti ai CME, studiul a fost avizat cu 8 voturi pentru(din care 3 sunt grevate de observatii), o abtinere si 5 voturi impotriva.

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Volumul 2 cuprinde:

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In atingerea cerintelor specificate in Termenii de referinta, consultantul a tratat pe langa problemele legate de sistemul de termoficare si o serie de probleme, care sunt provocari dificile in gestionarea problemelor energetice a municipiului, cum ar fi de exemplu: cele legate de protectia mediului, de imbunatatire a infrastructurii existente si ale serviciilor care nu mai corespund cu cresterea rezidentiala, de eficienta, de calitatea serviciilor energetice si de dezvoltare economica.

Strategia energetica elaborata se concentrează pe domeniile pentru care Primaria Municipiului Bucuresti este responsabila: energie pentru încălzire şi apă caldă de consum şi mai putin detaliat pentru energia utilizată de transportul public in interiorul oraşului si energia utilizată pentru iluminat public.

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Atingerea obiectivelor va necesita un număr de masuri ce trebuie implementate de către Primaria Municipiului Bucuresti. Astfel, in acest raportul au fost incluse planuri de actiune pentru implementarea strategiilor.

Strategiile elaborate se sprijina pe trei mari piloni: clima, sustenabilitate si calitate.

Masurile si actiunile descrise de aceasta strategie nu desconsidera investitiile facute pana in prezent in infrastructura, ci propune reproiectarea si redimensionarea acesteia, pe masura ce aceasta este uzata fizic si moral, dar intr-un mod coerent si unitar, avand in vedere obiectivele generale stabilite.

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In raport de cele de mai sus, supunem spre dezbatere si aprobarea Consiliului General al Municipiului Bucuresti alaturatul proiect de Hotarare.

PRIMAR GENERAL

Prof. Dr. Sorin Mircea OPRESCU

1485 / 18.05.2010.

PREZENTARE

"STRATEGIA ENERGETICA A MUNICIPIULUI BUCURESTI"

In toamna anului 2007, Primaria Municipiului Bucuresti a lansat procedura pentru elaborarea Studiului privind Strategia Energetica a Municipiului Bucuresti. Aceasta strategie a fost elaborata de o firma de consultanta din Danemarca, fiind in prezent avizata din punct de vedere tehnic de catre Comitetul Municipal al Energiei desemnat de catre Consiliul General al Municipiului Bucuresti prin Hotararea CGMB nr.251/2009.

Studiul a fost intocmit in baza unei analize a situatiei existente in Municipiul Bucuresti, din punct de vedere energetic si in baza contextului energetic mondial.

Dupa cum bine stiti, pe plan mondial exista o masiva preocupare si ingrijorare privind epuizarea acestor resurse neregenerabile: petrolul, carbunele, gazele naturale, fiind intocmite la nivel mondial, ample studii si investigatii care anunta ca aceste resurse certe, in conditiile consumului de astazi, se vor consuma in urmatoarea perioada: petrolul in 2050, gazele naturale in 2070, iar carbunele in urmatorii 200 ani.

In acelasi timp utilizarea acestor resurse, genereaza gaze cu efect de sera si astfel temperatura medie globala a crescut in ultimele decenii. In consecinta, s-au luat o serie de masuri pentru limitarea acestor emisii, semnandu-se protocolului de la Kyoto. Din punct de vedere, global Romania este implicata in aceasta actiune ca semnatar al protocolului, asumandu-si responsabilitati in acest sens. La nivel european, Uniunea Europeana si-a stabilit ca obiectiv obtinerea independentei energetice fata de importul de combustibili fosili din tari ale fostei Uniunii Sovietice. Ca urmare a integrarii in Uniunea Europeana, acest obiectiv a devenit implicit si obiectivul Romaniei, avand astfel obligatii a lua masuri durabile.

In mod concret, aceste resurse se vor consuma, iar noi care reprezentam generatia de astazi, fiind constienti de responsabilitatea pe care o avem pentru generatiile viitoare, suntem datori sa luam masuri pentru satisfacerea nevoilor generatiei contemporane, fara a compromite sansa generatiilor viitoare de a-si satisface propriile nevoi, in care fiecare individ are oportunitatea de a se dezvolta in libertate, intr-o societate echilibrata si in armonie cu mediul inconjurator.

Astfel acest Studiu propune solutii pentru pregatirea din punct de vedere energetic a Bucurestiului pentru viitor, considerand ca resursele energetice actuale, vor deveni din ce mai scumpe si se vor termina, iar atentia trebuie sa ne o indreptam catre acele resurse disponibile, ieftine si nepoluante, care sunt din plin disponibile in Bucuresti si anume: energia solara si energia rezultata din incinerarea deseurilor menajere nepericuloase.

Astfel din punct de vedere climatic Romania are obligatii internationale de respectat, pentru intoducerea masurilor care conduc la reducerea incalzirii globale; din punct de vedere a sustenabilitatii avem responsabilitati pentru generatiile viitoare. Toate aceste aspecte sunt tratate, impreuna cu asigurarea calitatii furnizarii serviciilor de incalzire si apa calda de consum.

Astfel Studiul, ofera directii orientative pentru asigurarea incalzirii si a apei calde de consum in Bucuresti, pe termen mediu si lung, care implica regandirea si modernizarea , astfel incat in termen mediu sa se poata obtine o calitate superioara a furnizarii energiei termice. Atat prin legislatia europeana cat si prin legilatia romaneasca care transpune aceasta legislatie, sistemul de incalzire centralizata este considerat important, intrucat acest sistem ofera cele mai la indemana posibilitati pentru cresterea eficientei energetice.

In multe tari dezvoltate din Europa, cum ar fi; Germania, Tarile Scandinave, Tarile Baltice, sistemul de incalzire centralizata ofera servicii de calitate la preturi competitive. In Danemarca spre exemplu, o tara cu un nivel de viata ridicat, dar si pe primele locuri in ceea ce priveste eficienta energetica ridicata, tarifele practicate la distributia energiei termice sunt mai mici decat cele reale existente astazi in Bucuresti (informatie oferita de Studiu). Astfel cresterea eficientei energetice si utilizarea surselor de energie regenerabila, trebuie sa fie in beneficiul marii majoritati a cetatenilor orasului. Este inadmisibil sa nu investighezi si sa nu cauti solutii de aplicare a celor cele mai adecvate masuri de captare a energiei solare (energie practic gratuita si care poate fi folosita vara pentru producerea apei calde) si sa continui sa arzi gaze naturale la preturi din ce in ce mai mari.

De *se* sistem de incalzire centralizata? Pentru ca prin acest sistem, energia solara poate fi captata in sistem si oferita tuturor, nu numai celor care au apartamentele orientate catre sud.

In acelasi sens, incinerarea deseurilor produce caldura ieftina, cu mult mai ieftina (de 5 ori mai ieftina) decat cea produsa prin arderea gazelor naturale. Este absolut logic sa nu acceptam sa ne ingropam in gunoaie, ci sa facem tot ceea ce este tehnic posibil ca aceasta energie ieftina sa fie pusa la dispozitie tuturor, sigurul mod tehnic posibil fiind doar printr-un sistem de incalzire centralizata.

Se vorbeste de conectarea in viitor la sistemul de incazire centralizata a celor mai multi consumatori, iar acest aspect trebuie interpretat ca acest sistem va deveni atractiv si dorit de catre consumatori, prin prizma celor prezentate anterior: furnizarea de calitate si la preturi competitive a energiei termice.

Tocmai de aceea studiul nu interzice utilizarea centralelor de apartament, pentru ca sistemul de incalzire trebuie sa devina de la sine, o prima optiune a consumatorilor care sunt in prezent conectati la sistemul centralizat sau au centrale individuale.

Daca dorim ca incalzirea centralizata sa devina o solutie pe care Primaria sa o poata aplica in mai toate zonele de dezvoltare pentru noi locuinte sau sedii administrative si chiar in zone care in prezent nu sunt conectate, este necesar ca aceasta solutie sa ofere conditii normale de furnizare cel putin egale cu cele pe care le ofera centralele individuale.

Studiul ofera si o estimare a costurilor de racordare in viitor a unui bloc/cladire administrativa/casa individuala (1200 Euro-3500 Euro), in aceasi maniera in care orice cladire se branseaza la apa, canal, electricitate, gaze.

Pentru ca toate aceste transformari sa aiba loc, este necesar si un efort investitional adecvat, estimat prin Studiu la aprox. 3,2 miliarde de Euro, in urmatorii 10-15 ani, fonduri de care in prezent Municipiul Bucuresti nu dispune.

Tocmai de aceea, Studiul considera ca investitiile finantate din fonduri private sunt o alternativa viabila in acest sens, iar parteneriatul public–privat in conditiile legislatiei romanesti, poate fi o solutie.

Decizia strategica in viitor de a aplica aceasta propunere, este un subiect care trebuie validat numai prin Hotararea Consiliului General al Municipiului Bucuresti.

In concluzie, Strategia Energetica a Municipiului Bucureti, se bazeaza pe trei ,,pilon,, principali: Clima, Sustenabilitatea si Calitatea serviciului, care la randul lor au la baza Legislatia nationala, Legislatia si Politice Uniunii Europene, precum si conventiile internationale, la care Romania este parte semnatara.

Ceea ce Studiul propune si ceea ce ne dorim, este sa putem obtine un sistem modern de termoficare, nepoluant, cu eficienta energetica ridicata, un serviciu de calitate, la preturi competitive, furnizand clientilor sai energie termica, in baza cererii de caldura.

PRIMAR GENERAL

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http://www.pmb.ro

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Action Plan

Contract 4144 / 31.12.07

Strategia Energetica a Municipiului Bucuresti

Etapa III: Strategia

Plan de Actiune

4				
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Edition	Date	Changes	Prepared by:	Approved by:

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Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

This part of the Strategy Report presents a comprehensive Action Plan to follow by the Municipality of Bucharest for obtaining the goals of the strategy.

All actions should start in the autumn of 2009 and by the end of 2010 all actions should be completed or in progress.

1 INTRODUCERE

Acesta parte a raportului privind Startegia, prezinta un Plan de Actiune Comprehensiv, pe care Municipiul Bucuresti sa-l poata urmari, pentru a putea atinge obiectivele cuprinse in strategie.

Toate actiunile trebuie sa inceapa in toamna anului 2009, iar la sfarsitul anului 2020 aceste actiuni trebuie sa fie finalizate sau in desfasurare.

2 AUTUMN 2009

The actions to take in the autumn of 2009 are to initiate the following tasks:

- Benchmarking
- Redesign of the networks
- Institutionalise the Public Service Organisation (PSO) for heating
- Clarification of legal and political obstacles for changing the tariff structure (administration fee, connection fee, service fees, capacity tariff and energy tariff)
- Clarification of legal and political obstacles for change of the subsidise scheme

2.1 Benchmarking

Performer:	RADET
Start:	October 2009
End:	December 2009
Objective:	To immediately start a Benchmarking based on existing data and with improved data collection from 1.1.2010.
Purpose:	To establish benchmarking values for key-parameters describing the efficiency of the heat transmission and heat distribution and continue annual reporting on these values.
Input:	RADET resources with the possibility of technical assistance, if required.
Output:	The first preliminary Benchmarking Report based data from 2008 submitted in December 2009, together with a proposal of improvements for 2010 and 2011.

Description:

The Municipality shall request RADET to establish a benchmarking system as described in the Strategy Report.

A preliminary version of the benchmarking including data for 2008 shall be presented before 2009 together with a description of expected improvements of the benchmarking for 2010 and 2011.

The preliminary version shall as a minimum include reporting on:

- Heat losses (difference between heat input to the systems and sale from the systems).

2 TOAMNA 2009

Actiunile care trebuie luate in toamna anului 2009 sunt pentru a initia urmatoarele activitati:

- Benchmarking
- Reproiectarea retelelor
- Institutionalizarea Organizatiei Serviciului Public(OSP) pentru incalzire
- Identificarea obstacolelor legale si politice pentru modificarea structurii tarifului(taxa de administrare, taxa de conectare, taxa de setvicii, tarif pe capacitate si tarif de energie)
- Identificarea obstacolelor legale si politice pentru modificarea schemei de subventii.

2.1 Benchmarking

Executant:	RADET
Inceput:	Octombrie 2009
Sfarsit:	Decembrie 2009
Obiective:	Inceperea imediata a sistemului de Benchmarking pe baza datelor existente, iar din 01.01.2010 cu date colectate actualizate.
Scop:	Stabilirea valorilor de benchmarking pentru parametrii cheie care descriu eficienta sistemelor de transport, respective de ditribuie a caldurii si continuarea raportarii anuale ale acestor valori.
Intrari:	Resursele RADET cu posibilitatea de sprijin din partea unei asistente tehnice, daca este cazul .
Rezultat:	Raport preliminar de Benchmarking pe baza datelor din 2008, transmis in decembrie 2009, impreuna cu propuneri de imbunatatiri pentru 2010 si 2011.

Descriere:

Municipiul Bucuresti trebuie sa solicite RADET sa stabileasca un sistem de benchmarking asa cum este descris in Raportul privind Strategia.

Versiunea preliminara a raportului de benchmarking include datele din 2008, aceasta trebuie prezentata pana la sfarsitul anului 2009, impreuna cu propuneri de imbunatatire ale acestor valori pentru asteptate in 2010 si 2011.

Versiunea preliminara trebuie sa includa cel putin urmatoarele informatii:

Calculation of J/GJ sold and J/meter pipe system.

- Power consumption per system. Calculation of kWh/sold or transported GJ.
- Water losses per system. Calculation of m^3/sold GJ and m^3/meter pipe system.

2.2 Redesign of networks and substations

Performer:	RADET
Start:	October 2009
End:	March 2010 (Interim reporting Feb. 2010)
Objective:	Redesign the networks in respect of the future requirements and establishment of a comprehensive implementation plan.
Purpose:	To prepare the distribution systems for privatisation and establish a plan for installation of local and decentralised production.
Input:	RADET resources supported by technical assistance.
Output:	A plan establishing supply areas for privatisation and location of local, decentralised and centralised production facilities.

Description:

The redesign must consider:

- Changes in demand due to energy conservation.
- Connection of solar heating systems with heat accumulators and peak-load boilers in the distribution systems.
- Connection of new consumers
- Connection of decentralised CHP units in the transmission system – at the level of the redesigned substations
- Connection of waste-to-energy facilities to the transmission system and decommissioning of most of the present centralised production facilities.

As a first step it must be decided what existing substations to join establishing a reduced number (assumed about 100 – capacity of each about 15-20

- Pierderile de caldura (diferenta dintre cantitatea de caldura intrata in sistem si cantitatea de caldura vanduta). Calculele trebuie prezentate in J pe GJ vandut si J pe metru de conducta din sistem.
- Consumul de electricitate pe intreg sistemul. Calculele trebuie prezentate in kWh pe cantitate de energie vanduta sau transportata in GJ.
- Pierderi de agent termic in sistem. Calculele trebuie prezentate in m^3 pe cantitate de energie vanduta (GJ) si metru liniar de conducta in sistem

2.2 Reproiectarea retelelor si a punctelor termice

Executant:	RADET
Inceput:	Octombrie 2009
Sfarsit:	Martie 2010 (raportare intermediara in februarie 2010)
Obiective:	Inceperea imediata a sistemului de Benchmarking pe baza datelor existente iar din 01.01.2010 cu date colectate actualizate.
Scop:	Stabilirea valorilor de benchmarking pentru parametrii cheie care descriu eficienta sistemelor de transport, respective de ditribuie a caldurii si continuarea raportarii anuale ale acestor valori.
Intrari:	Resursele RADET cu posibilitatea de sprijin din partea unei asistente tehnice, daca este cazul .
Rezultat:	Raport preliminar de Benchmarking pe baza datelor din 2008, transmis in decembrie 2009, impreuna cu propuneri de imbunatatiri pentru 2010 si 2011.

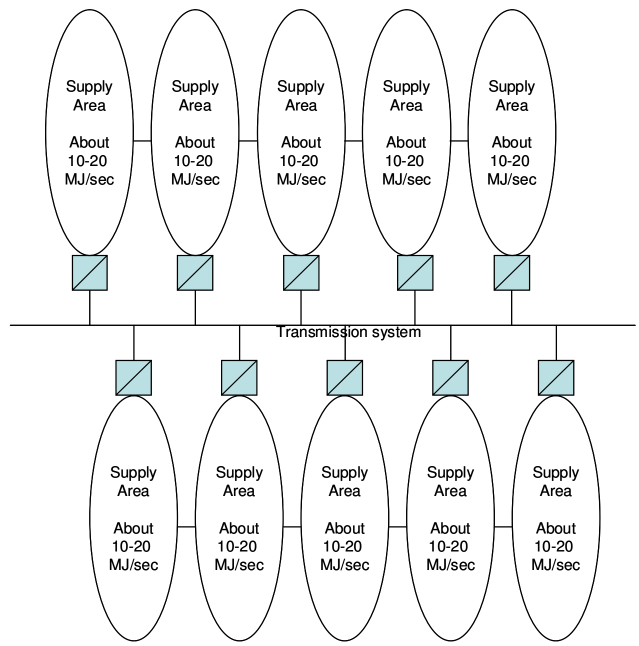
Descriere:

Reproiectarea trebuie sa ia in considerare:

- Modificarea cererii datorita masurilor de conservare a energiei
- Conectarea in sistemul de distributie a sistemelor de incalzire solara, impreuna cu acumulatoarele de caldura si cazanele pentru acoperirea varfului de consum.
- Conectarea noilor consumatori
- Conectarea unitatilor de cogenerare descentralizate in sistemul de transport si dezafectarea celor mai multe facilitati de producere existente.

Ca si prim pas, trebuie hotarat care sunt acele puncte

MJ/sec (2020 value)) of larger substations. After this, comprehensive supply areas in the size of about 100 – 150 MJ/s (2020 demand) can be established.



A plan for implementing the redesigned supply areas shall then be elaborated based on the principle “change when worn-out”.

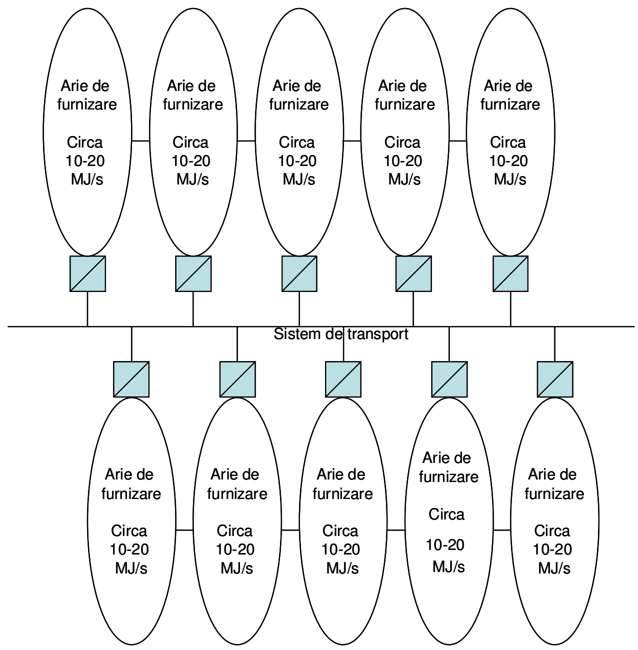
After establishing the supply areas and location of the of the redesigned substations for the about 10 distribution companies, the redesign can be performed base on a transmission capacity of about 400 MJ/sec from 2-3 waste-to-energy facilities.

The transmission system shall be with small diameters obtained by allocation of decentralised production and peak-load boilers in the system where the supply conditions are poor.

2.3 Institutionalise the PSO

Performer:	Bucharest Municipality
Start:	October 2009
End:	July 2010
Objective:	To establish a PSO inside the municipality organisation.
Purpose:	To prepare for privatisation (entering into concession agreements),

termice care se pot comasa stabilind un numar mai mic de puncte termice (sunt prevazute circa 100 de puncte termice cu capacitati intre 15-20 MJ/s, la nivelul anului 2020) cu capacitati instalate mai mari. Dupa aceasta, se pot stabili zone de furnizare a incalzirii bine definite, avand intre 100-150 MJ/s(necesar la nivelul anului 2020).



Va trebui elaborat un plan pentru implementarea actiunilor privind reproiectarea zonelor de furnizare a incalzirii pe baza principiului “inlocuire cand este uzat”.

Dupa ce au fost stabilite zonele de furnizare a incalzirii si amplasarea punctelor termice ce vor fi reproiectate, luand in considerare 10 companii de distributie, reproiectarea se va putea face considerand o capacitate de transport a energiei termice de aproximativ 400 MJ/s provenind de la 2-3 facilitati de incinerare a deseurilor.

Conductele din sistemul de transport vor trebui sa aiba diametre mai mici, rezultate ca urmare a alocarii in sistem a productiei descentralizate si a cazanelor pentru acopererirea varfului de consum acolo unde conditiile de furnizare sunt nesatisfacatoare.

2.3 Institutionalizarea OSP

Executant:	RADET
Inceput:	Octombrie 2009
Sfarsit:	Iulie 2010
Obiective:	Stabilirea unei organizatii a serviciului public la nivelul municipalitatii.
Scop:	Pregatirea privatizarii (atribuirea contractelor de concesiune),

	monitoring of performance and introduction of corrective measures, when needed.
Input:	Task-force appointed by Bucharest Municipality. Technical and legal assistance if/when required.
Output:	An established PSO organisation with basic staff and framework contracts for legal, economical/financial and technical support, when needed.

Description:

Bucharest Municipality will in the first place appoint a task-force for institutionalising the PSO. The task-force shall submit a proposal in Dec 2009.

After approval of the proposal from the task-force the PSO organisation is appointed and will immediately establish framework contracts with experienced Consultant Firms for providing legal, economical/financial and technical experts ad-hoc expertise in relation to establishment of concessions.

	monitorizarea indicatorilor de performanta si introducerea unor masuri corective, daca este cazul.
Intrari:	O echipa dedicata alocata de Municipalitate pentru indeplinirea sarcinilor, cu posibilitatea de sprijin din partea unei asistente tehnice si juridice, daca este cazul.
Rezultat:	O organizatie a serviciului public stabilita cu personal de baza si contracte cadru pentru sprijin juridic, economico-financiar si tehnic, daca este necesar.

Descriere:

In prima faza Municipalitatea va aloca o echipa dedicata indeplinirii saricinilor si anume pentru a institutionaliza OSP. Echipa dedicata va transmite o propunere in decembrie 2009.
Dupa aprobarea propunerii facuta de catre echipa dedicata alocata, se va nominaliza organizatia serviciului public, apoi in foarte scurt timp se vor incheia contracte cadru cu firme de consultanta specializate care sa poata oferi servicii juridice, economico/financiare si tehnice pentru atribuirea contractelor de concesiune.

2.4 Obstacles for change of tariff structure

Performer:	Bucharest Municipality
Start:	October 2009
End:	December 2009
Objective:	To verify possible political and legal obstacles for introduction of a cost related tariff structure.
Purpose:	To establish the conditions for privatisation by establishment of a cost related, transparent tariff structure.
Input:	Task-force appointed by Bucharest Municipality (When established this activities will be taken-over by the PSO)
Output:	A report describing the political and legal obstacles and actions to be taken to eliminate the obstacles.

Description:

Future concessions must be based on a transparent, cost related tariff system. Obstacles for implementing such a tariff structure exits both in legal and political terms. However, to enable entering concession agreements from 2012 present obstacles must be eliminated or at least reduced.

In the first place Bucharest Municipality must clarify the obstacles and establish a strategy for how to

2.4 Piedici in modificarea structurii tarifului

Executant:	Municipiul Bucuresti
Inceput:	Octombrie 2009
Sfarsit:	Decembrie 2009
Obiective:	Verificarea posibilelor piedici politice si juridice pentru introducerea unui tarif stabilit pe baza costurilor.
Scop:	Stabilirea conditiilor pentru privatizare prin stabilirea unei structuri transparente pe baza costurilor reale.
Intrari:	O echipa dedicata alocata de Municipalitate (odata stabilite aceste activitati vor fi preluate de catre OSP).
Rezultat:	Un raport care va descrie piedicile politice si juridice precum si actiunile care trebuie intreprinse pentru eliminarea piedicilor.

Descriere:

Viitoarele concesiuni trebuie sa se bazeze sisteme de tarif stabilite in baza costurilor reale. Piedicile in implementare unui asemenea tarif pot fi de natura juridica sau politica. Totusi, pentru a permite incheirea contractelor de concesiune, incepand din anul 2012, piedicile existente trebuie eliminate sau cel putin reduse.

approach the problems.

After clarifying the obstacles the Municipality of Bucharest must be aware what actions to take and initiate these actions.

2.5 Obstacles for change of the subsidise scheme

Performer:	Bucharest Municipality
Start:	Oct. 2009
End:	Nov. 2009
Objective:	To verify possible political and legal obstacles for introduction of a subsidise scheme based on social criteria.
Purpose:	To establish feasibility of investments in thermal energy rehabilitation and solar energy systems.
Input:	Task-force appointed by Bucharest Municipality (When established this activities will be taken-over by the PSO)
Output:	A report describing the political and legal obstacles and actions to be taken to eliminate the obstacles and political actions initiated.

Description:

With present general subsidises where the population pays only about 1/3 of the real costs of heat supply it will not be feasible to invest in energy rehabilitation and solar energy systems. Thus the general subsidises scheme must be replaced with a scheme based on social criteria.

In the first place Bucharest Municipality must clarify the obstacles for changing the subsidise scheme and establish a strategy for how to approach the problems.

After clarifying the obstacles the Municipality of Bucharest must what actions to take and initiate these actions.

In primul rand, Municipiul Bucuresti trebuie sa identifice aceste piedici si sa stabileasca o strategie asupra modului in care trebuie abordata problemele.

Dupa identificarea piedicilor, Municipiul Bucuresti trebuie cunoasca masuri sa intreprinda si sa initieze aceste actiuni.

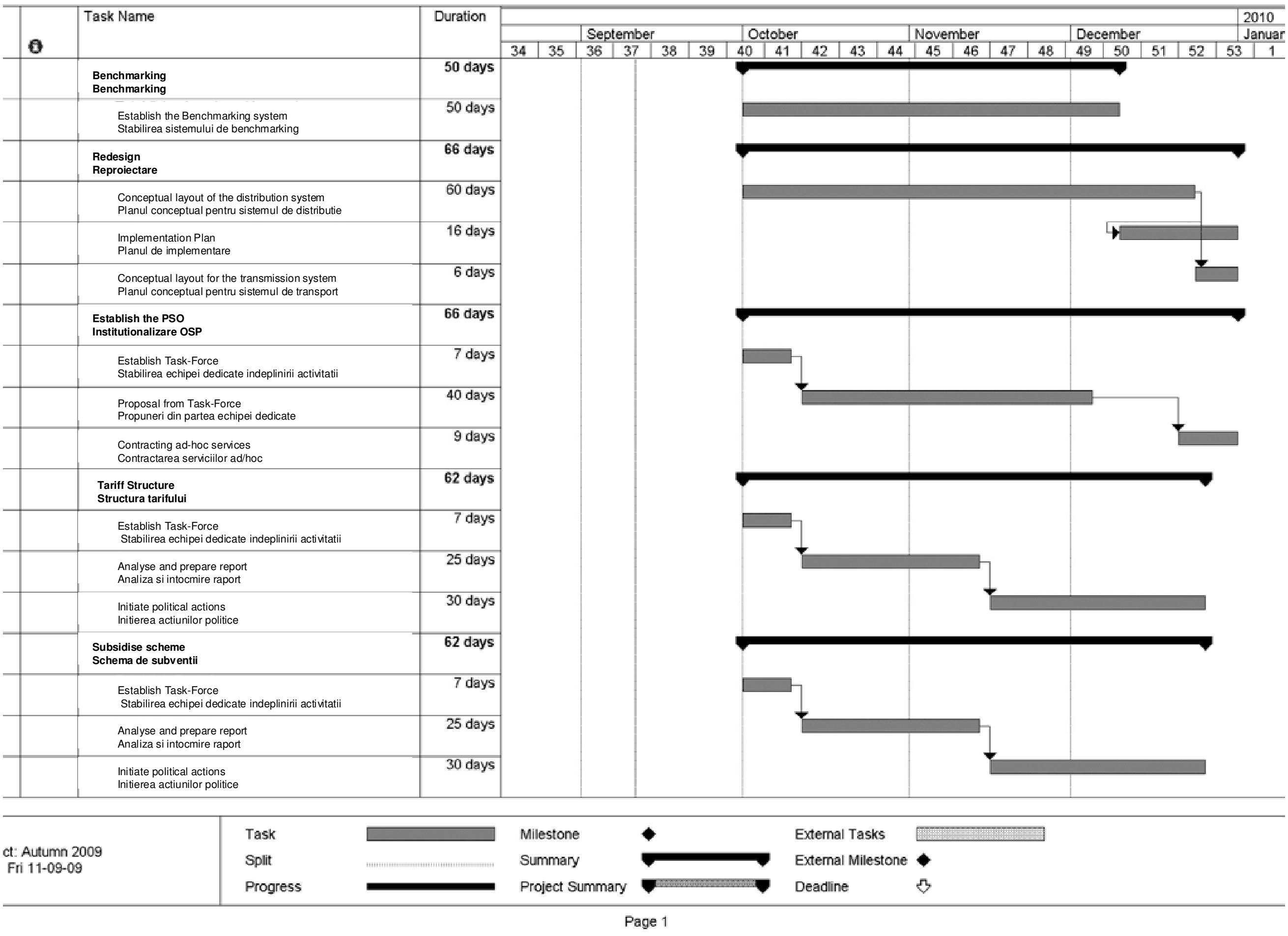
2.5 Piedici in calea modificarii schemei de subventii

Executant:	Municipiul Bucuresti
Inceput:	Octombrie 2009
Sfarsit:	Noiembrie 2009
Obiective:	Verificarea posibilelor piedici politice si juridice pentru introducerea scheme de subventii pe baza de criterii sociale.
Scop:	Stabilirea fezabilitatii investitiilor in reabilitarea termica si sisteme de energie solara.
Intrari:	O echipa dedicata alocata de Municipalitate (odata stabilite aceste activitati vor fi preluate de catre OSP).
Rezultat:	Un raport care va descrie piedicile politice si juridice precum si actiunile care trebuie intreprinse pentru eliminarea piedicilor.

Descriere:

In conditiile schemei existente de subventii prin care populatia plateste numai o treime din costurile reale ale furnizarii energiei termice, investitiile in reabilitarea termica si sistemele de energie nu sunt fezabile. Astfel, schema de subventie generala trebuie inlocuita cu una bazata pe criterii sociale.

In primul rand, Municipiul Bucuresti trebuie sa identifice piedicile in calea inlocuirii schemei de subventii generale si stabilirea unei strategii pentru modul de abordare a problemelor.


Task Name
Duration
2010
September
October
November
December
Januar
34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 1
Benchmarking
Benchmarking
50 days
Establish the Benchmarking system
Stabilirea sistemului de benchmarking
50 days
Redesign
Reproiectare
66 days
Conceptual layout of the distribution system
Planul conceptual pentru sistemul de distributie
60 days
Implementation Plan
Planul de implementare
16 days
Conceptual layout for the transmission system
Planul conceptual pentru sistemul de transport
6 days
Establish the PSO
Institutionalizare OSP
66 days
Establish Task-Force
Stabilirea echipei dedicate indeplinirii activitatii
7 days
Proposal from Task-Force
Propuneri din partea echipei dedicate
40 days
Contracting ad-hoc services
Contractarea serviciilor ad/hoc
9 days
Tariff Structure
Structura tarifului
62 days
Establish Task-Force
Stabilirea echipei dedicate indeplinirii activitatii
7 days
Analyse and prepare report
Analiza si intocmire raport
25 days
Initiate political actions
Initierea actiunilor politice
30 days
Subsidise scheme
Schema de subventii
62 days
Establish Task-Force
Stabilirea echipei dedicate indeplinirii activitatii
7 days
Analyse and prepare report
Analiza si intocmire raport
25 days
Initiate political actions
Initierea actiunilor politice
30 days
ct: Autumn 2009
Fri 11-09-09
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
Page 1

3 FIRST HALF OF 2010

The actions to take in the first half of 2010 are:

- Follow-up on on-going activities
- Privatisation of heat distribution
- Reconstruction of transmission system
- Installation of peak-load boilers
- Technical and administrative supply conditions
- Mandatory connection to the district heating system

3.1 Follow-up activities

It will be necessary to follow-up on the activities started in the autumn of 2009:

Benchmarking.

The reporting for 2008 a description of improvements to be introduced for the 2010 and 2011 reports will be received from RADET. Bucharest Municipality must determine if this is in-line with the expectations or introduce corrective measures.

Continued follow-up on improvements.

Redesign of networks and substations

The conceptual layout of the distribution systems is received from RADET and a plan for implementation is under elaboration. The Technical Committee must approve the conceptual layout of the distribution networks and the conceptual layout for the transmission system and implementation plans when these are received during January and February 2010.

Continued follow-up on implementation progress.

Establishing the PSO

The task-force has submitted its report and Bucharest Municipality must appoint the permanent staff of the PSO. Framework contracts for ad-hock legal, technical and economical/financial expertise must be established during the first half of 2010 following the provision of the Romanian legislation regarding public procurement.

Follow-up on negotiation of ad-hoc assistance.

Change of tariff structure

Bucharest Municipality initiated in December 2009 political actions to change the tariff structure. Follow-up on these activities must be performed in 2010 (by the PSO, when appointed).

Change of subsidise scheme

3 PRIMA JUMATATE A ANULUI 2010

Actiunile care trebuie intreprinse in prima jumatate a anului 2010 sunt:

- Urmarirea activitatilor in desfasurare
- Privaizarea distributiei energiei termice
- Reconstruirea sistemului de transport
- Instalarea cazanelor pentru acoperirea varfului de consum
- Conditii tehnice si administrative de furnizare
- Conectarea obligatorie la sistemul de incalzire centralizata.

3.5 Urmarirea activitatilor

Este necesara urmarirea activitatilor care trebuie sa inceapa in toamna anului 2009:

Benchmarking.

RADET va transmite raportarea parametrilor pentru anul 2008 impreuna cu o descriere a imbunatatirilor care trebuie introduse prin rapoartele din 2010 si 2011. Municipiul Bucuresti trebuie sa stabileasca daca aceste imbunatatiri sunt in conformitate cu asteptarile sau trebuie introduse masuri corective.

Urmarirea continua a imbunatatirilor.

Reproiectarea retelelor si a punctelor termice

Planul general conceptual pentru sistemul de distributie trebuie primit de la RADET si un plan de implementare este in curs de elaborare. Comitetul Tehnic trebuie sa aprobe planul general conceptual pentru reteaua de distributie si planul conceptual pentru sistemul de transport si planurile de implementare cand acestea vor fi primite in perioada ianuarie si februaie 2010.

Urmarirea continua a progresului implementarii

Stabilirea OSP

Echipa dedicata indeplinirii activitatii isi va transmite rapoartele, iar Municipiul Bucuresti trebuie sa-si nominalizeze personalul permanent pentru OSP. In prima jumatate a anului 2010 trebuie stabilite contracte cadru de asistenta juridica, tehnica si economico-financiara, in conformitate cu prevederile legale din Romanaia privind achizitiile publice.

Urmarirea continua a negocierii pentru asistenta ad-hoc.

Modificarea structurii tarifului

Municipiul Bucuresti va initia in decembrie 2009 actiuni politice pentru modificarea structurii tarifului. Urmarirea indeplinirii acestor activitati trebuie facuta

Bucharest Municipality initiated in December 2009 political actions to change the subsidise scheme from general subsidises to specific subsidises based on social needs. Follow-up on these activities must be performed in 2010 (by the PSO, when appointed)

3.2 Privatisation of heat distribution

Performer:	PSO
Start:	February 2010
Objective:	Privatisation of heat distribution
Purpose:	To obtain funding for reconstruction of the systems, introduction of a service concept for heat supply and improved efficiencies.
Input:	PSO, RADET staff and ad-hock consultancy services.
Output:	Concession agreements signed mid 2011 for concession start on January 2012.

Description:

The specific, about 10, distribution areas must be defined in terms of names of present substations and new supply areas by RADET.

The PSO initiate preparation of procurement documents for open international tendering on equal terms following the provisions of Romanian laws regarding entering concessions and procurement.

The concession must oblige the Concessionaire to:

- Reconstruct, operate and maintain the distribution system in respect of the reconstruction plan for the transmission system.
- Install, operate and maintain solar heating systems and related heat storages.
- Install, operate and maintain local peak-load boilers.
- Operate the distribution system according to the technical and administrative supply conditions approved by the PSO.
- Enter into contract with the transmission company for procurement of heat and production on peak-load boilers according to the technical-economical load dispatch.
- The Final Report – Recommendation for PPP includes a preliminary list of the indicators to ensure performance standard. The list is formed by 2 category:

in 2010 (de catre OSP, cand va fi nominalizata)

Modificarea schemei de subventii

Municipiul Bucuresti va initia in decembrie 2009 actiuni politice pentru modificarea schemei de subventii prin eliminarea subventiilor generale si inlocuirea cu subventii specifice acordate pe criterii sociale. Urmarirea acestor activitati trebuie realizata in 2010(de catre OSP cand va fi nominalizat)

3.2 Privatizarea distributiei energiei termice

Executant:	OSP
Inceput:	februarie 2010
Obiective:	Privatizarea distributiei incalzirii.
Scop:	Pentru a obtine finantarea necesara reconstructiei sistemelor, introducerea unui concept de furnizarea energiei termice si imbunatatirea eficientei.
Intrari:	OSP, personalul RADET si consultanti ad-hoc.
Rezultat:	Semnarea concesiunilor la mijlocul anului 2011 si inceperea in ianuarie 2012.

Descriere:

RADET va defini aproximativ 10 zone de distributie constand in numele punctelor termice si zonele noi de furnizare.

OSP va initia pregatirea documentatiei de atribuire pentru lansarea unor proceduri de licitatie internationale, deschise in conformitate cu prevederile legislatiei din Romania, privind achizitiile publice.

Prin concesiuni, concesionarii vor fi obligati sa:

- Reconstruiasca, opereze si sa intretina sistemul de distributie luand in considerare planul de reconstructie pentru sistemul de transport.
- Instaleze, opereze si sa intretina sistemele de incalzire solara si acumulatoarele lor de caldura.
- Instaleze, opereze si intretina cazanele pentru acoperirea varfului de consum
- Opereze sistemul de distributie in conformitate conditiile tehnice si administrative de furnizare aprobate de catre OSP.
- Semnarea unui contract cu compania care opereaza sistemul de transport pentru procurarea energiei termice si producerea in cazanele pentru acoperirea varfului de sarcina in conformitate cu cerintele dispeceratului tehnico-economic.

General indicators:

- Contracting
- Quality of the service provided by private partner
- Replay to written claims of the clients
- Stop of the system due to infringement of the contract clauses by the client

Technical indicators:

- Performance indicators requested by the licence for operation
- Performance parameters
- Quality of heat carrier
- Quality of heat sources
- Environmental protection

The final list of the performance indicators is subject to final approval of City Council.

The PSO publish the procurement forecast in April 2010.

3.3 Reconstruction of Transmission System

Performer:	PSO
Start:	February 2010
Objective:	To prepare for reconstruction of the transmission system
Purpose:	To establish the financial and technical conditions for reconstruction of the transmission system
Input:	PSO, RADET staff and ad-hock consultancy services.
Output:	Reconstruction plan (feasibility study) financing plan.

Description:

The specific location of the waste-to-energy facilities shall be decided followed by hydraulic calculations to determine the comprehensive locations of decentralised CHP units.

A reconstruction plan shall be elaborated showing the priorities for reconstruction determined by conditions of the present system and an assessment of remaining lifetime (approach: change when worn-out).

The financial requirements for implementing the reconstruction plan must be estimated and included in a Financing Plan to be presented for possible lenders

- In cadrul Raportului Final de Recomandari pentru PPP a fost intocmita o lista preliminara a indicatorilor pentru asigurarea standardului de performanta. Lista este impartita in doua categorii:

Indicatori generali:

- Activitatea de contractare
- Calitatea serviciilor furnizate de catre partenerul privat
- Raspunsuri la cererile in scris ale clientilor
- Intreruperi datorate nerespectarii prevederilor contractuale de catre client

Indicatori tehnici:

- Indicatori de performanta garantati prin licenta de operare
- Parametri de performanta
- Calitatea agentului termic
- Calitatea surselor de energie termica
- Protectia mediului

Lista indicatorii de performanta finali va trebui aprobata de asemenea de CGMB.

OSP va publica anunturile de intentie in aprilie 2010.

3.3 Reconstructia sistemului de transport

Executant:	OSP
Inceput:	Februarie 2010
Obiective:	Pregatirea reconstructiei sistemului de transport.
Scop:	Stabilirea conditiilor financiare si tehnice pentru reconstruirea sistemului de transport.
Intrari:	OSP, personalul RADET si consultanta ad-hoc
Rezultat:	Plan de reconstructie (studiu de fezabilitate) plan de finantare.

Descriere:

Locatia aleasa pentru facilitatile de incinerarea trebuie stabilita in baza unor calcule hidraulice care sa determine locatiile cele mai adecvate pentru unitatile de cogenerare descentralizate.

Planul de reconstructie trebuie elaborat stabilind prioritatile pentru fiecare activitate, in functie de conditiile sistemului actual si de asemenea de o evaluare a duratei de viata (abordarea: inlocuire cand este uzat fizic).

Cerintele financiare pentru implementarea planului de restructurare trebuie estimate si incluse intr-ul Plan de

(EIB, EBRD and others).

General technical specification for reconstruction of the system must be prepared.

3.4 Local Peak-load boiler programme

Performer: PSO

Start: February 2010

Objective: To establish a programme for installation of peak-load boilers.

Purpose: To move the peak-load production from the centralised plants to the local level enable reduction of capacity (reduction of length and diameters) of the transmission system.

Input: RADET staff and ad-hock consultancy services.

Output: Reconstruction plan, technical specifications and financing plan.

Description:

Waste-to-energy and decentralised CHP units will cover the based load up to about 50% of the capacity requirement (about 700 – 800 MJ/sec). Thus, other about 700 MJ/sec peak-load capacities must be installed as peak-load boilers in the distribution systems.

A comprehensive distribution of the decentralised CHP units will ensure equal supply conditions for all substations from the transmission system. Thus, the peak-load boiler production should also be equal distributed to the distribution systems (About 70 MJ/sec in each of the 10 distribution systems). The boilers shall be located in the systems where the supply conditions are critical and enable reduction of the distribution pipe diameters. However, the final decision of where to install the boilers is the concessionaires'.

Finantare care poate fi prezentat diferitilor finantatori (BEI,BERD sau altele).

Trebuie intocmite specificatiile tehnice generale pentru reconstructia sistemului.

3.4 Programul pentru cazanele de acoperire a varfului de sarcina

Executant: OSP

Inceput: Februarie 2010

Obiective: Pregatirea programului pentru instalarea cazanelor pentru acoperirea varfului de sarcina.

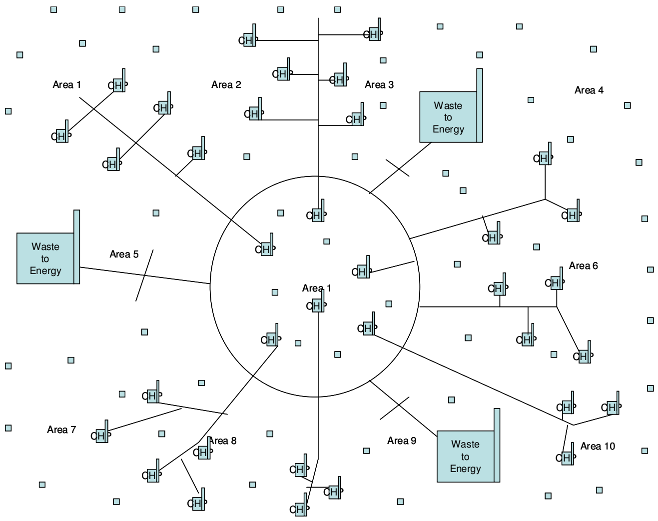
Scop: Mutarea productiei de energie termica pentru acoperirea varfului de sarcina de la amplasamentul CET-urilor, in apropierea consumatorilor permitand reducerea capacitatii sistemului de transport (reducerea lungimilor si a diametrelor).

Intrari: Personalul RADET si consultanta ad-hoc

Rezultat: Plan de reconstructie specificatii tehnice si plan de finantare.

Descriere:

Facilitatile de incinerare si unitatile de cogenerare descentralizate vor acoperi o sarcina de pana la 50% din cerintele de capacitate (circa 700-800 MJ/s). In acest sens, trebuie instalata o capacitate pentru acoperirea varfului de consum de aproximativ 700 MJ/s, in cazane pentru acoperirea varfului de consum amplasate la nivelul sistemului de distributie. Printr-o distributie larg raspandita provenind de la unitatile de cogenerare se vor putea asigura conditii de furnizare tuturor punctelor termice prin sistemul de transport. In acest sens, si productia din cazanele pentru acoperirea varfului de consum va fi distribuita in mod egal in sistemul de distributie (aproximativ 70 MJ/s in fiecare dintre cele 10 sisteme de distributie). Cazanele vor fi amplasate in acele locuri din sistemele de distributie, in care conditiile de furnizare sunt critice, permitand astfele reducerea diametrelor conductelor din sistemele de distributie. Totusi, decizia finala referitoare la amplasarea cazanelor va reveni concesionarilor:



3.5 Supply Conditions

Performer:	PSO
Start:	April 2010
Objective:	To establish general technical and economical supply conditions for heat supply
Purpose:	To establish the supply conditions the concessionaires must comply with.
Input:	RADET staff and ad-hock consultancy services.
Output:	General Technical Supply Conditions and General Administrative Supply Conditions.

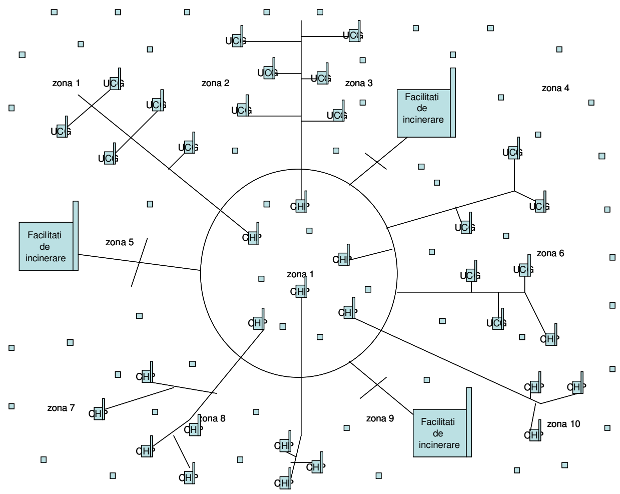
Description:

The Technical Supply Conditions must establish the minimum conditions for supply in terms of temperature and pressure drop. When application for connection to the district heating system the consumers will receive specific design condition describing max and min pressure and temperature supply concept and other parameters necessary for design of the consumer installations – it is not the purpose of this task to establish the specific conditions.

The Technical Supply Conditions must adopt a “heat and hot tap water on demand concept” and establish that the present direct supply concept will be replaced with a indirect supply concept (block heating units must be installed).

The Administrative Supply Conditions must establish the tariff system (connection fees, administrative fees, service fees, energy tariff and capacity tariff) and other administrative conditions for district heating supply. The actual tariffs are submitted in a tariff sheet and changed when new tariffs are approved.

The Consultant shall be requested to provide examples to be adapted to the conditions in



3.5 Conditii de furnizare

Executant:	OSP
Inceput:	aprilie 2010
Obiective:	Stabilirea unor conditii tehnice si economice generale de furnizare a energiei termice.
Scop:	Stabilirea conditiilor de furnizare pe care trebuie sa le indeplineasca concesionarul.
Intrari:	Personalul RADET si consultanta ad-hoc
Rezultat:	Conditii tehnice generale de furnizare si conditii administrative generale de furnizare.

Descriere:

Conditiile tehnice de furnizare trebuie sa stabileasca conditiile minime pentru furnizare referitoare la temperatura si disponibil de presiune. In situatia in care consumatorii vor transmite o solicitare pentru conectarea la sistemul de incalzire centralizata, acestia vor primi conditiile specifice de proiectarecare descriu valorile minime si maxime pentru presiune si temperatura, conceptul de furnizare si alti parametri necesari pentru proiectarea instalatiilor consumatorului. Nu este in scopul acestei activitati stabilirea conditiilor specifice.

Conditiile tehnice de furnizare trebuie sa adopte conceptul “caldura si apa calda de consum la cerere” si sa stabileasca ca in prezent conceptul de furnizare cu racordare directa va fi inlocuit cu cu un concept de furnizare cu racordare indirecta(se vor instala module termice la nivel de bloc).

Prin conditiile administrative de furnizare trebuie stabilit sistemul de tarifare (taxe de conectare, taxe administrative, taxe de servicii, tarif de energie si tarif de capacitate). Tariful initial este inaintat intr-un format stabilit si se modifica odata cu aprobarea

Bucharest.

3.6 Mandatory connection

Performer:	PSO
Start:	May 2010
Objective:	To establish mandatory connection to the district heating system.
Purpose:	To establish a sustainable future for the district heating system in Bucharest and reduce the environmental impact of heat and hot water consumption.
Input:	Consultancy services.
Output:	Heat plan prepared

Description:

Consumers disconnected from the district heating system shall be given a notice that they shall reconnect within a reasonable time limit (3-5 years).

For areas currently without district heating supply it must be establish if these areas in the future shall be supplied with district heating of individual heating based on renewable energy (solar energy, bio mass or bio fuels, heat pumps based on green electricity etc).

The heat plan must establish how and when the new areas shall be connected to the existing district heating system (and what system changes this option requires) or the area shall be established as an independent area.

The heat plan must also establish a time frame for implementing the plan.

noilor tarife.

3.1 Conectarea obligatorie

Executant:	OSP
Inceput:	Mai 2010
Obiective:	Stabilirea obligativitatii de conectare la sistemul de incalzire centralizata.
Scop:	Stabilirea unui viitor sustenabil pentru sistemul de incalzire centralizata in Bucuresti si reducerea impactului asupra mediului general de consumul de caldura si apa calda de consum..
Intrari:	Servicii de consultanta
Rezultat:	Elaborare planului de incalzire

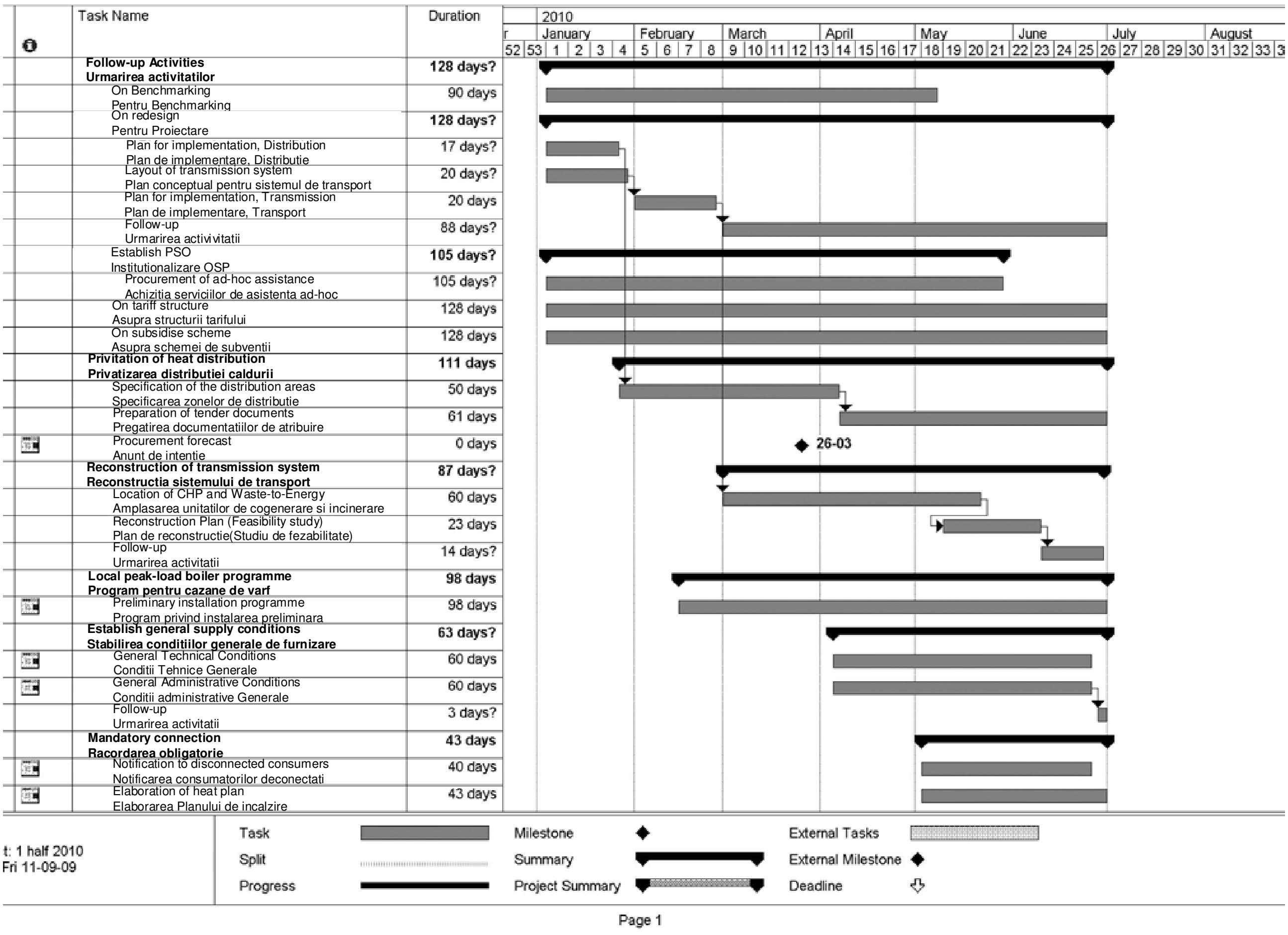
Descriere:

Consumatorii deconectati de la sistemul de incalzire centralizata trebui notificati ca trebuie sa se reconecteze intr-o perioada limita de timp rezonabila (3-5 ani).

Trebuie stabilit in care din zonele, in care in prezent nu exista sistem de incalzire centralizata, alimentarea cu energie termica se va face din surse individuale pe baza de energie regenerabila(energie solara, biomasa sau biocombustibil, pompe de caldura bazate pe electricitate verde) si in care dintre acestea alimentarea se va face prin conectarea la sistemul de incalzire centralizata.

Planul de incalzire trebuie sa stabileasca cum si cand zonele noi trebuie conectate la sistemul existent de incalzire centralizata(si ce modificari ale sistemului solicita aceste optiuni) sau daca aceste zone trebuie definite ca zone independente.

Prin planul de incalzire trebuie stabilit si graficul de implementare al acestuia.


Task Name
Duration
2010
January
February
March
April
May
June
July
August
Follow-up Activities Urmarirea activitatilor
128 days?
On Benchmarking Pentru Benchmarking
90 days
On redesign Pentru Proiectare
128 days?
Plan for implementation, Distribution Plan de implementare, Distributie
17 days?
Layout of transmission system Plan conceptual pentru sistemul de transport
20 days?
Plan for implementation, Transmission Plan de implementare, Transport
20 days
Follow-up Urmarirea activivitatii
88 days?
Establish PSO Institutionalizare OSP
105 days?
Procurement of ad-hoc assistance Achizitia serviciilor de asistenta ad-hoc
105 days?
On tariff structure Asupra structurii tarifului
128 days
On subsidise scheme Asupra schemei de subventii
128 days
Privitation of heat distribution Privatizarea distributiei caldurii
111 days
Specification of the distribution areas Specificarea zonelor de distributie
50 days
Preparation of tender documents Pregatirea documentatiilor de atribuire
61 days
Procurement forecast Anunt de intentie
0 days
26-03
Reconstruction of transmission system Reconstructia sistemului de transport
87 days?
Location of CHP and Waste-to-Energy Amplasarea unitatilor de cogenerare si incinerare
60 days
Reconstruction Plan (Feasibility study) Plan de reconstructie(Studiu de fezabilitate)
23 days?
Follow-up Urmarirea activitatii
14 days?
Local peak-load boiler programme Program pentru cazane de varf
98 days
Preliminary installation programme Program privind instalarea preliminara
98 days
Establish general supply conditions Stabilirea conditiilor generale de furnizare
63 days?
General Technical Conditions Conditii Tehnice Generale
60 days
General Administrative Conditions Conditii administrative Generale
60 days
Follow-up Urmarirea activitatii
3 days?
Mandatory connection Racordarea obligatorie
43 days
Notification to disconnected consumers Notificarea consumatorilor deconectati
40 days
Elaboration of heat plan Elaborarea Planului de incalzire
43 days
t: 1 half 2010
Fri 11-09-09
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
Page 1

4 SECOND HALF OF 2010

The actions to take in the second half of 2010 are:

- Follow-up on ongoing activities
- Installation of decentralised CHP
- Construction of waste-to-energy facilities
- Assistance to energy rehabilitation
- Privatisation of operation of heat transmission and load dispatch

4.1 Follow-up activities

It will be necessary to follow-up on previously started activities:

Benchmarking.

The benchmarking is now introduced. Follow-up activities by the PSO to ensure continuously improvements

Redesign of networks and substations.

The conceptual design is now approved. The PSO must ensure than RADET follow-up and ensure that the conceptual is continuously updated. The conceptual design is necessary for concession transparent negotiations.

Performance of the PSO

The performance of the PSO should be independent evaluated and corrective measures introduced if necessary.

Change of tariff structure

Follow-up on progress. It must be possible to introduce a new tariff structure by the end of the year when the concession negotiations starts.

Change of subsidise scheme

Follow-up on progress until a new subsidise scheme is introduced.

Privatisation of heat distribution

At the start of the period the tender documents in under elaboration. Thus, during second half of 2010 the tender documents must be approved and procurement process started.

Reconstruction of the transmission system

The reconstruction plan and the financing Plan will be submitted in the second half of 2010. Both must be approved.

Local peak-load boiler programme

The programme, preliminary technical specifications

4 A DOUA JUMATATE A ANULUI 2010

Actiunile care trebuie intreprinse in adoua jumatate a anului 2010 sunt:

- Urmarirea indeplinirii activitatilor in desfasuare
- Instalarea cogenerarii descentralizate
- Construirea facilitatilor de incinerare
- Asistenta pentru reabilitarea termica
- Privatizarea operarii sistemului de transport al energiei termice si a sistemului dispecer.

4.1 Urmarirea activitatilor

Este necesar urmarirea indeplinirii activitatilor incepute anterior:

Benchmarking

Benchmarking-ul se considera acum introdus. Urmarirea indeplinirii activitatilor de catre OSP are ca scop asigurarea unei imbunatatiri continui.

Reproiectarea retelelor si a punctelor termice

Proiectul conceptual se considera aprobat. OSP trebuie sa obtina asigurarea ca RADET urmareste si actualizeaza continuu acest proiect conceptual. Proiecul conceptual este necesar pentru negocierea in timpul negocierii transparente a concesiunilor.

Indeplinirea sarcinilor de catre OSP

Indeplinirea sarcinilor de catre OSP trebuie evaluata de catre o entitate independenta, iar daca se constata ca este necesar, introducerea masurilor corective.

Modificare structurii tarifului

Urmarirea activitatilor este in desfasurare. Este posibila introducerea unei noi structuri a tarifului pana la sfarsitul anului cand se presupune ca va incepe procedura pentru negocierea concesiunilor.

Modificarea schemei de subventii

Urmarirea activitatilor este in desfasurare pana cand o noua schema de subventii va fi introdusa.

Privatizarea distributiei energiei termice

La inceputul perioadei se vor elabora documentatiile de atribuire. Astfel, in a doua jumatate a anului 2010, documentatiile de atribuire trebuie aprobate si procedura de achizitie publica trebuie demarata.

Reconstructie a sistemului de transport

Planul de reconstructie si Planul de finantare trebuie transmis in a doua jumatate a anului 2010. Ambele trebuie sa fie aprobate.

Program pentru cazane de acoperirea varfului de

and financing plan will be submitted in the second half of 2010. All must be approved and included in the tender documents for privatisation of heat distribution.

General supply conditions

The PSO must follow-up and ensure implementation of the new supply conditions.

Mandatory connection

Follow-up on elaboration of heat plan and introduction of mandatory connection in district heating supplied areas.

consum

Programul, specificatiile tehnice preliminare si Planul de finantare vor fi transmise in a doua jumatate a anului 2010. Toate trebuie aprobate si incluse in documentatiile de atribuire pentru privatizarea distributiei energiei termice.

Conditii generale de furnizare

OSP trebuie sa urmareasca indeplinirea activitatilor si implementarea conditiilor noi de furnizare

Conectarea obligatorie

Urmarirea indeplinirii activitatilor din Planul de incalzire si introducerea conectarii obligatorii a ariilor de furnizare la sistemul de incalzire centralizat.

4.2 Installation of decentralised CHP

Performer:	PSO
Start:	August 2010
Objective:	To establish concession agreement for construction of decentralised CHP
Purpose:	To move the CHP production from the centralised plants to the decentralised level (substation level) enable reduction of capacity (reduction of length and diameters) of the transmission system.
Input:	RADET staff and ad-hock consultancy services.
Output:	Concession for installation of decentralised CHP units signed.

Description:

In total about 400 MJ/sec decentralised CHP productions shall be installed. The units shall be installed in the redesigned transmission system (Section 3.3).

The units are expected in the sizes from about 3 MJ/sec up to about 10 MJ/sec. The specific sizing shall be determined based on among others: Consumption at the substation, space available and supply conditions for natural gas.

4.2 Instalarea unitatilor de cogenerare descentralizate

Executant:	OSP
Inceput:	August 2010
Obiective:	Stabilirea contractelor de concesiune pentru construirea unitatilor de cogenerare descentralizate.
Scop:	Mutarea productiei prin cogenerare de la amplasamentul unitatilor centralizate la nivel descentralizat (la nivelul punctelor termice)
Intrari:	Personalul RADET si dervicii de consultanta ad-hoc
Rezultat:	Semnarea concesiunilor pentru instalarea unitatilor de cogenerare descentralizate

Descriere:

Se preconizeaza instalarea unei capacitati de producere de aproximativ 400 MJ/s in unitati de cogenerare descentralizat. Aceste unitati trebuie instalate in sistemul de transport reproiectat (Sectiunea 3.3).

Se asteapta ca unitatile care se vor instala sa aiba capacitati cuprinse intre 3 pana la 10 MJ/s. Stabilirea dimensiunii trebuie sa tina cont de ai multe conditii printre care: consumul la nivelul punctului termic, spatiul disponibil si conditiile de furnizare asigurate de reteaua de gaze naturale.

4.3 Construction of waste-to-energy facilities

Performer:	PSO
Start:	September 2010
Objective:	To establish concession agreement for construction of waste-to-energy facilities.

4.3 Construirea facilitatilor de incinerare a deseurilor

Executant:	OSP
Inceput:	Septembrie 2010
Obiective:	Stabilirea contractului de concesiune pentru construirea facilitatilor de incinerare a deseurilor.

Purpose: To utilise the heat content of the municipality waste

Input: Consultancy services

Output: Concession for installation of waste-to-energy facilities signed.

Description:

The waste-to-energy facilities shall be constructed preliminary to solve the waste problem in Bucharest and only secondly for supply of heat to the district heating system and power to the national grip.

The location of the facilities shall be determined based on the transport logistic for waste and the benefit of constructing the plants at existing locations where connection to water, heat, power, sewage, and electricity is already available.

Scop: Utilizarea continutului de energie din deseurile municipale.

Intrari: Servicii de consultanta

Rezultat: Semnarea concesiunilor pentru instalarea facilitatilor de incinerare a deseurilor.

Descriere:

Facilitatile de incinerare a deseurilor trebuie construite in primul pentru a rezolva problema deseurilor in Bucuresti si in aldoile rand pentru furnizarea caldurii in sistemul de incalzire centralizat si a electricitatii in reteaua nationala.

Amplasarea facilitatilor trebuie stabilita luand in considerare logistica necesara pentru transportul deseurilor si de asemenea avantajul de amplasare in locatiile existente in care exista racordare la utilitati: apa, electricitate, canalizare energie termica.

4.4 Energy rehabilitation

Performer: PSO

Start: September 2010

Objective: To promote energy rehabilitation of buildings

Purpose: To obtain the forecasted energy conservation and assist the population in obtaining an affordable heat bill.

Input: PSO resources

Output: Energy conservation progressing as forecasted

Description:

The biggest problem for obtaining the energy conservation of about 45% in 2020 will probably be to establish the private financing necessary.

The current supporting scheme for energy rehabilitation is mainly as follows:

- 80% from the total value of rehabilitation works is the contribution from state budget (50%) and local budget (30% - in case of Bucharest sectors municipalities)
- 20% from the total value of rehabilitation works is distributed between all owners, the distribution is done considering their each allocated surface . In case of owner's association or one or more owners cannot afford to pay their part, local municipality can decide to take over total or partially the costs and can establish the procedure to recover the related amount of money.

A scheme seen implemented in other countries is that the loan services are included in the heat bill to reduce the risk of consumers who cannot or will not pay their part of the rehabilitation costs.

These activities are expected continued for several

4.4 Reabilitarea termica

Executant: OSP

Inceput: Septembrie 2010

Obiective: Promovarea reabilitarii termice a cladirilor

Scop: Obtinerea conservarii energiei prognozate si asistarea populatiei pentru a avea facturi la energia termica supaotabile ca pret

Intrari: Personalul OSP

Rezultat: Conservarea energiei progreseaza asa cum a fost prognozat.

Descriere:

Cea mai mare problema pentru a se obtine conservarea energiei in procent de 45% in 2020 va fi in pricipal generata de finantarea privata.

Schema de finantare pentru reabilitarea termica este in mare parte in urmatoarea structura:

- **80%** din totalul lucrarii de reabilitare este asigurat de la bugetul de stat (50%) si cel local (30% - in cazul Bucurestiului primarii de sector).
- Procentul de 20% din totalul lucrarii de reabilitare se imparte intre toti proprietarii, fiecaruia revenindu-i o cota parte in functie de cota parte indiviza ce revine fiecarui proprietar. In cazul in care asociatia, unul sau mai multi proprietari nu isi pot achita partea ce le revine, primaria locala poate prelua partial sau integral costurile si poate decide modul in care se va recupera ulterior suma de bani**.**

O schema aplicata in alte tari este aceea prin care cheltuielile aferente creditelor sunt incluse in factura de energie termica, in scopul de a reduce riscurile legate de faptul ca anumiti consumatori nu vor putea years.

sau nu vor plati costurile aflate in dreptul lor pentru reabilitarea termica.

Se asteapta ca aceste activitati sa se intinda pe o perioada de mai multi ani.

4.5 Operation of transmission system

Performer:	PSO
Start:	September 2010
Objective:	To employ a private operator to perform operation and maintenance and technical / economical load dispatch.
Purpose:	To establish pooled operation, technical and economical load dispatch and a pooled price of the heat price paid by the distribution companies
Input:	Technical assistance
Output:	Efficient operation, maintenance and load dispatch obtained.

Description:

The transmission system shall be privatised to ensure that the goals are obtained but it will be operated by a private company, the operator shall be responsible for the operation and maintenance of the system and technical-economical dispatch (without investment obligations).

In a production system where the tariffs are based on cost related principles there will be large difference in operation costs and thus significant saving obtainable form a technical-economical load dispatch.

The procurement process for the concession starts in the autumn of 2010 initiated by the PSO.

4.5 Operarea sistemului de transport

Executant:	OSP
Inceput:	Septembrie 2010
Obiective:	Angajarea unui operator privat, care sa exploateze si sa intretina dispeceratul tehnico-economic.
Scop:	Stabilirea unei exploatari in inel, dispecerat tehnico-economic si un pret binomial pe care il vor plati companiile de distributie.
Intrari:	Asistenta tehnica
Rezultat:	Obtinerea unei exploatari eficiente, intretinere si dispecerat

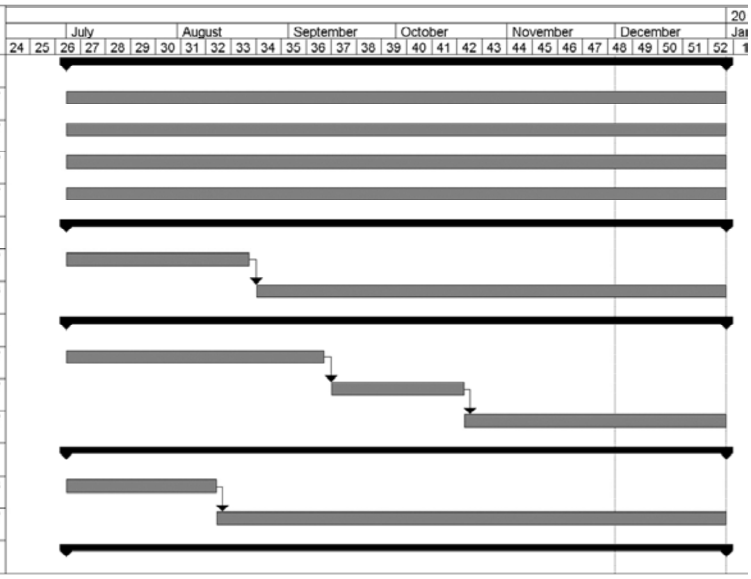
Descriere:

Sistemul de transport trebuie privatizat pentru a se asigura ca obiectivele sunt atinse dar va fi operat intr-un regim de concesiune fara aport de capital, operatorul fiind responsabil doar pentru exploatarea si intretinerea sistemului si operarea dispeceratului tehnico-economic.

Intr-un sistem de producere in care stabilirea tarifelor sunt bazate pe costuri, exista diferente mai in costurile de producere si in consecinta pot fi obtinute economii semnificative din dispeceratul tehnico-economic.

Procesul de achizitie publica pentru stabilirea concesiunilor incepe in toamna anului 2010 initiat de catre OSP.

Task Name	Duration
Follow-up activities **Urmarirea activitatilor**	**132 days?**
Benchmarking Benchmarking	132 days?
PSO performance Perfomanta OSP	132 days?
Change of tariff structure Modificarea structurii tarifului	132 days?
Change of subsidise scheme Modificarea schemei de subventii	132 days?
Privatisation of heat distribution Privatizarea distributiei caldurii	**132 days?**
Tender documents Documentatia de atribuire	37 days?
Procurement Achizitii publice	95 days
Reconstruction transmission system Reconstruirea sistemului de transport	**132 days?**
Reconstruction Plan (Feasibility Study) Planul de Reconstruire (Studiu Fezabilitate)	52 days?
Financing Plan Plan de Finantare	27 days?
Follow-up activities Urmarirea activitatilor	53 days?
Peak-load boiler programme Program pentru cazane de varf	**132 days?**
Preliminary programme Program preliminar	30 days
Follow-up on implementation Urmarirea implementarii	102 days?
General supply conditions Conditii generale de furnizare	**132 days?**



t: 2 half 2010 Thu 17-09-09	Task		Milestone	◆	External Tasks	
	Split		Summary		External Milestone	◆
	Progress		Project Summary		Deadline	⇩

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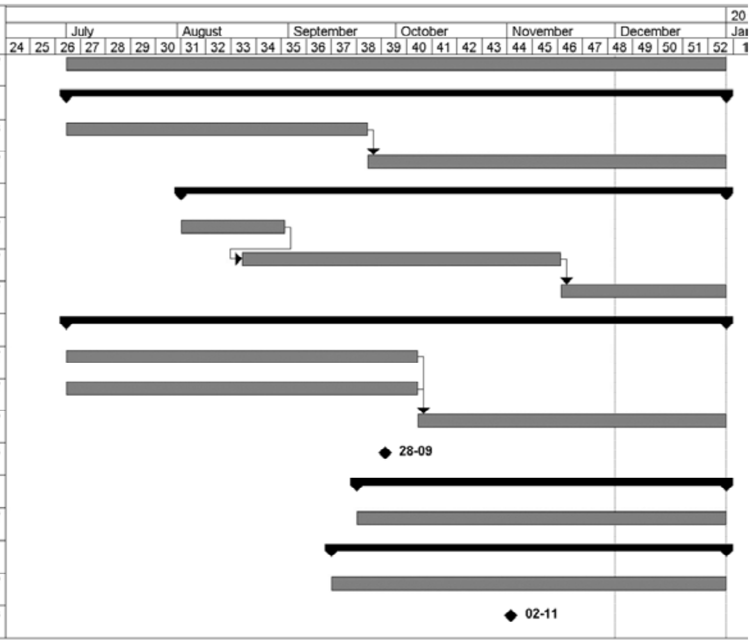
Task Name	Duration
Follow-up on implementation Urmarirea implementarii	132 days?
Mandatory connection Conectarea obligatorie	**132 days?**
Heat Plan Plan de incalzire	60 days
Follow-up on implementation Urmarirea implementarii	72 days?
CHP Programme **Program pentru cogenerare**	**110 days?**
Define requirements Definirea cerintelor	21 days?
Tender documents Documentatiilede atribuire	63 days?
Procurement Achizitii publice	34 days?
Waste-to-Energy Programme **Program pentru facilitati de incinerare**	**132 days?**
Establish waste properties Stabilirea proprietatii deseurilor	70 days?
Determine locations Stabilirea amplasamentelor	70 days?
Tender documents Documentatii de atribuire	62 days?
Procurement forecast Anunt de intentie	0 days
Energy rehabilitation **Reabilitarea termice**	**75 days?**
Assistance in obtaining financing Asistenta in obtinerea finantarii	75 days?
Operation of transmission system **Exploatarea sistemului de transport**	**80 days?**
Tender documents Documentatii de atribuire	80 days?
Procurement forecast Anunt de participare	0 days



Project: 2 half 2010 Date: Thu 17-09-09	Task	Milestone	◆	External Tasks	
	Split	Summary		External Milestone	◆
	Progress	Project Summary		Deadline	⇩

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5 ACTIONS IN 2011

All major activities are started before 2011 but a comprehensive follow-up will be necessary:

5.1 Benchmarking

The benchmarking should at this time be implemented and the obtained benchmark values used for establishing the starting point for the concessions during negotiations.

The concessionaires must be obliged to continue the benchmarking and to continuously improve it.

Reported benchmarking values are important for establishment of the performance of the concessionaires.

5.2 PSO Performance

Audit on the performance and working methods of the PSO should be continuously implemented according to the general audit scheme established according to the ISO 9001 certification of the Municipality of Bucharest.

5.3 Change of the tariff structure

It should be insured that the new tariff structure is approved and introduced as the commercial conditions in the concessions.

5.4 Change of subsidise scheme

The new subsidise scheme must be implemented.

5.5 Privatisation of heat distribution

The procurement process is ongoing at the start of 2011. The goal should be to sign the concessions in the first half of 2011 giving the concessionaires time to prepare for taking over by 1.1.2012

5 ACTIUNI IN 2011

Marea majoritate a activitatilor vor incepe inainte de anul 2011 dar va fi necesara urmarirea cuprinzatoare a acestora.

5.5 Benchmarking

Benchmarking-ul trebuie sa fie implementat la acest moment si valorile de benchmarking trebuie utilizate ca punct de pornire pentru consiuni in timpul negocierilor.

Concesionarii trebuie sa fie obligati ca continue aplicarea benchmarking-ului si sa imbunatateasca continuu valorile.

Raportarea valorilor de benchmarking sunt importante pentru stabilirea indeplinirii obligatiilor stabilite prin concesiuni.

5.2 Indeplinirea sarcinilor de catre OSP

Auditarea indeplinirii de catre OSP a sarcinilor precum si aplicarea procedurile de lucru trebuie sa se realizeze in mod continuu in conformitate cu programul de audit impus de certificare ISO 9001 obtinuta de catre Primaria Municipiului Bucuresti.

5.3 Modificarea structurii tarifului

Trebuie obtinuta asigurarea ca noua structura de tarif este aprobata si introdusa ca si conditie comerciala in contractele de concesiune.

5.4 Modificarea schemei de subventii

Noua schema de subventii trebuie implementata.

5.5 Privatizarea distributiei energiei termice

Procesul de achizitie publica este in desfasurare la inceputul anului 2011. Obiectivul este acela de a se realiza semnarea concesiunilor in prima jumatate a anului 2011, astfel incat concesionarii sa aiba timp suficient de pregatire pentru predarea-primirea la 01.01.2012.

5.6 Reconstruction of transmission system

Financing at least for the first phase of the reconstruction programme should be available in the first half of 2011 to start the reconstruction works later this year.

The reconstruction works will go on for the rest of the decade and the PSO must continuously follow-up on progress.

5.6 Reconstruirea sistemului de transport

Finantarea, cel putin pentru prima etapa a programului de reconstruire, trebuie sa fie disponibila in prima jumatate a anului 2011, pentru a se permite inceperea reconstruirii in acelasi an.

Lucrarile de reconstructie vor continua pana la sfarsitul decadei, iar OSP trebuie sa continue sa monitorizeze progresul implementarii.

5.7 Peak-load boiler programme

To enable reconstruction of the transmission system and connection of new consumers it might be necessary to start the installation of peak-load boilers in 2011, before the concessions for heat distribution are in place. The PSO must take the necessary actions in this respect in terms of obtaining financing, procurement and supervision etc.

The programme will be continued by the concessionaires after 2012 and continue for 4-6 years. The PSO must follow-up on the progress in this period.

5.7 Programul cazanelor pentru acoperirea varfului de consum

Pentru a fi posibilareconstruirea sistemului de transport si conectarea noilor consumatori, ar pute fi necesara instalarea in 2011 a cazanelor pentru acoperirea varfului de sarcina, inainte de intrarea in vigoare a concesiunilor pentru distributia energiei termice. OSP trebuie sa ia toate masurile necesare in acest sens pentru a obtine finantare, achizitii publice si supervizare, etc.

Programul va continua si in cadrul concesiunilor dupa 2012 si va dura 4-6 ani. OSP trebuie sa monitorizeze progresul in aceasta perioada.

5.8 General supply conditions

The implemented general technical and administrative supply conditions must continuously be adjusted to keep them updated. The PSO ensure that the distribution companies perform the updates and the PSO must endorse major changes in the conditions(City Council shall approve its).

The follow-up activities will continue for many years.

5.8 Conditii generale de furnizare

Conditiile tehnice si administrative generale implementate trebuie sa fie in mod continuu ajustate pentru ca in permanenta sa fie actualizate. OSP asigura ca actualizarile sunt facute de catre companiile de distributie, iar OSP trebuie sa avizeze modificarile majore ale conditiilor(aprobarea este data de catre CGMB).

Activitatile de monitorizarea vor continua pe o perioada de multi ani.

5.9 Mandatory connection

The PSO must follow-up on reconnection of consumers, connection of new consumers in the district heating areas and connection of consumers in the new district heating areas according to the heat plan.

Notification of the consumers indicating the date of possible connection to the district heating system and giving a reasonable deadline for the mandatory connection.

5.9 Conectarea obligatorie

OSP trebuie sa monitorizeze reconectarea consumatorilor la sistemul de incalzire centralizat, si conectarea noilor consumatori la noile arii ale sistemului centralizat stabilite prin Planul de incalzire.

Consumatorii vor fi notificati asupra posibilei date cand va fi posibila conectarea la sistemul de incalzire centralizat oferindu-le un termen limita rezonabil pentru obligativitatea conectarii.

5.10 Decentralised CHP programme

At the beginning of 2011 the procurement is in progress and during the first month of the year the concession agreement(s) negotiations must be completed. The concession(s) is assumed signed in May enable implementation of the programme from the beginning of 2012.

Implementation of the programme is expected to take 5-7 years.

The PSO must follow-up on the implementation and on the performance of the concessionaire(s).

5.10 Program pentru unitati de cogenerare descentralizate

La inceputul anului 2011 in luna mai, procedurile de achizitie publica sunt in desfasurare si in primele luni ale anului se preconizeaza ca se va incheia negocierea concesiunilor. Concesiunile se considera ca se vor semna permitand implementarea programului la inceputul anului 2012.

Implementarea programului este asteptata sa se desfasoare pe o perioada de 5-7 ani.

OSP trebuie sa monitorizeze implementarea si indeplinirea obligatiilor stabilite pentru concesionari.

5.11 Waste-to-energy programme

At the start of 2011 the tender documents are in preparation and the procurement about to start.

Signing of the concession is expected before the end of the year.

The PSO must actively participate in the negotiations and follow-up on the progress after the concession is signed.

After signing the concession the PSO must follow-up on implementation.

5.11 Program pentru facilitatile de incinerare

La inceputul anului 2011 documentatiile de atribuire sunt in proces de elaborare iar procedurile gata de incepere.

Semnarea concesiunilor este asteptata sa se realizeze pana la sfarsitul anului.

OSP trebuie sa participe in mod activ in negociere si in monitorizarea progresului dupa ce soncesiunea este semnata.

Dupa semnarea concesiunii, OSP trebuie sa monitorizeze implementare.

5.12 Energy Rehabilitation

Bucharest Municipality should follow-up to ensure the energy conservation is progressing as expected.

5.12 Reabilitarea termica

Municipiul Bucuresti trebuie sa monitorizeze implementarea masurilor de conservare a energiei pentru a se asigura ca se obtine progresul prognozat.

5.13 Operation of transmission system

The tender documents will be ready in January 2011 and the procurement process can start.

The PSO is indented an active role in the procurement process.

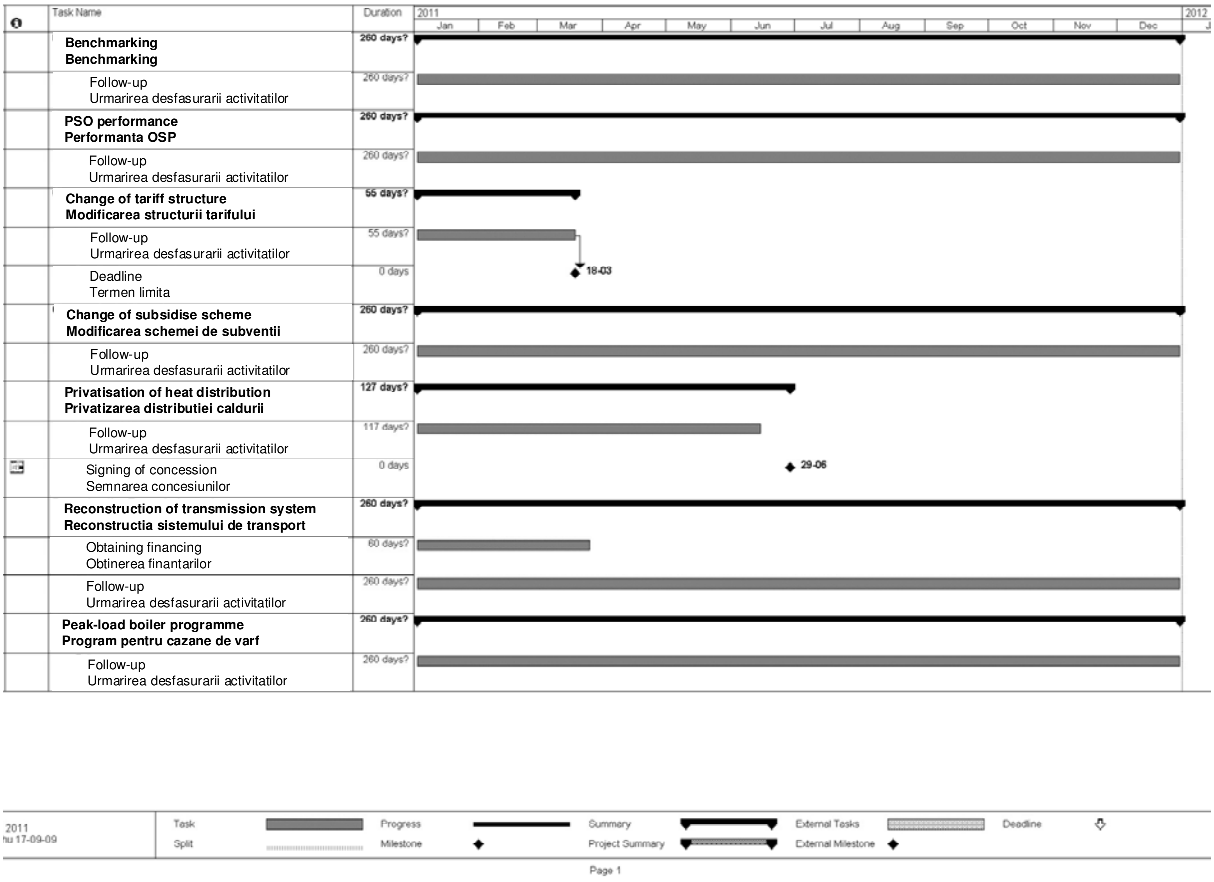
The concession it expected signed in august 2011 enable the concessionaire to take-over the operation of the transmission system from January 2012.

5.13 Exploatarea sistemului de transport

Documentatiile de atribuire vor fi gata in ianuarie 2011 iar procedura de achizitie poate incepe.

Se intentioneaza ca OSP sa aiba un rol activ in procesul de achiztie publica.

Se asteapta ca semnarea concesiunilor sa aiba loc in august 2011, permitand concesionarului sa poata prelua sistemul si sa-si inceapa activitatea din ianuarie 2012.


Task Name
Duration
2011
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2012
Benchmarking
Benchmarking
260 days?
Follow-up
Urmarirea desfasurarii activitatilor
260 days?
PSO performance
Performanta OSP
260 days?
Follow-up
Urmarirea desfasurarii activitatilor
260 days?
Change of tariff structure
Modificarea structurii tarifului
55 days?
Follow-up
Urmarirea desfasurarii activitatilor
55 days?
Deadline
Termen limita
0 days
18-03
Change of subsidise scheme
Modificarea schemei de subventii
260 days?
Follow-up
Urmarirea desfasurarii activitatilor
260 days?
Privatisation of heat distribution
Privatizarea distributiei caldurii
127 days?
Follow-up
Urmarirea desfasurarii activitatilor
117 days?
Signing of concession
Semnarea concesiunilor
0 days
29-06
Reconstruction of transmission system
Reconstructia sistemului de transport
260 days?
Obtaining financing
Obtinerea finantarilor
60 days?
Follow-up
Urmarirea desfasurarii activitatilor
260 days?
Peak-load boiler programme
Program pentru cazane de varf
260 days?
Follow-up
Urmarirea desfasurarii activitatilor
260 days?
2011
hu 17-09-09
Task
Progress
Summary
External Tasks
Deadline
Split
Milestone
Project Summary
External Milestone
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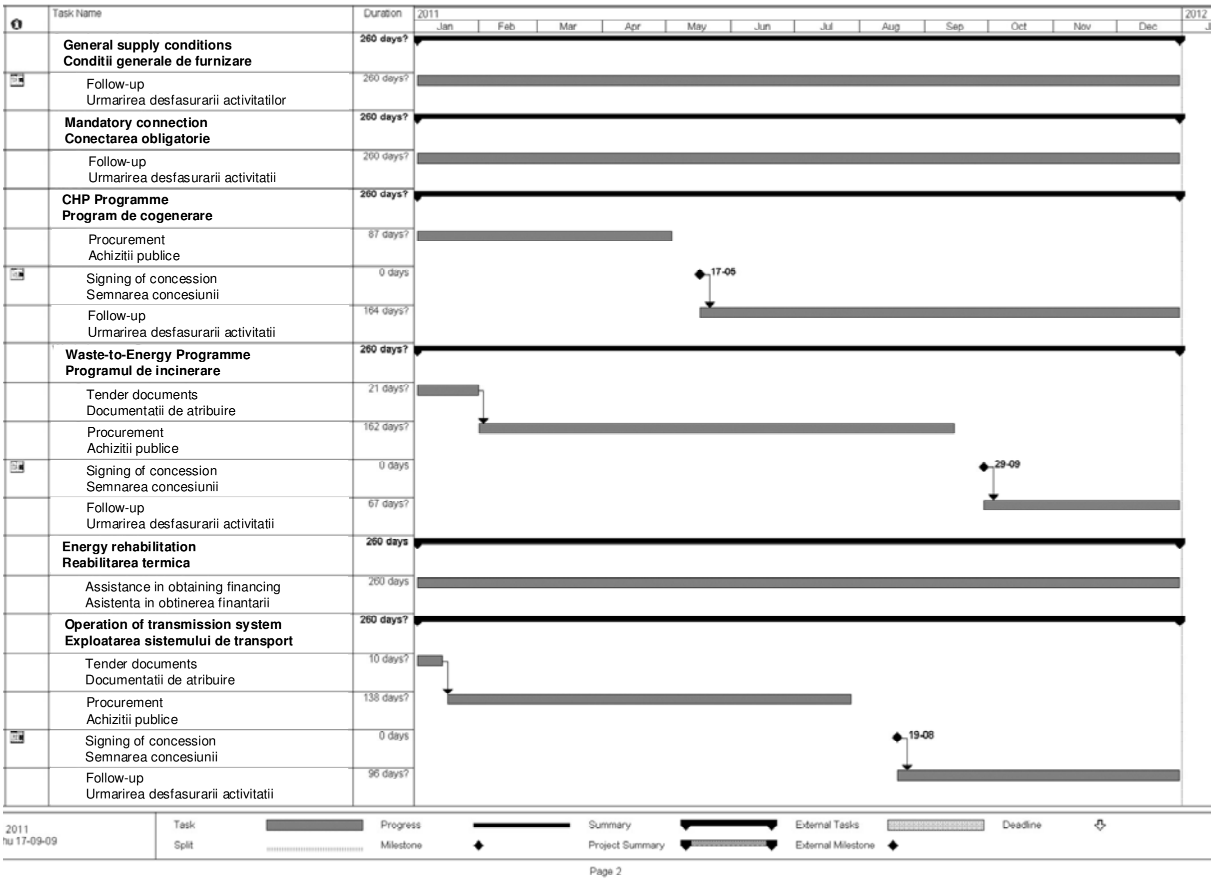
Task Name
Duration
2011
2012
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
General supply conditions
Conditii generale de furnizare
260 days?
Follow-up
Urmarirea desfasurarii activitatilor
260 days?
Mandatory connection
Conectarea obligatorie
260 days?
Follow-up
Urmarirea desfasurarii activitatii
260 days?
CHP Programme
Program de cogenerare
260 days?
Procurement
Achizitii publice
87 days?
Signing of concession
Semnarea concesiunii
0 days
17-05
Follow-up
Urmarirea desfasurarii activitatii
164 days?
Waste-to-Energy Programme
Programul de incinerare
260 days?
Tender documents
Documentatii de atribuire
21 days?
Procurement
Achizitii publice
162 days?
Signing of concession
Semnarea concesiunii
0 days
29-09
Follow-up
Urmarirea desfasurarii activitatii
67 days?
Energy rehabilitation
Reabilitarea termica
260 days
Assistance in obtaining financing
Asistenta in obtinerea finantarii
260 days
Operation of transmission system
Exploatarea sistemului de transport
260 days?
Tender documents
Documentatii de atribuire
10 days?
Procurement
Achizitii publice
138 days?
Signing of concession
Semnarea concesiunii
0 days
19-08
Follow-up
Urmarirea desfasurarii activitatii
96 days?
2011
hu 17-09-09
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
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Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Startegy Report

Part A: Executive Summary

Contract 4144 / 31.12.07

Strategia Energetica a Municipiului Bucuresti

Etapa a III-a: Strategia

Partea A: Sumar

5				
4				
3				
2				
1	27.10.2009	Correction in the text	GMCB	haa
0	23.06.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

The Municipality of Bucharest of Bucharest contracted in December 2007 the international consulting company Grontmij | Carl Bro with the Romanian subcontractor ATHenerg to elaborate an Energy Strategy for the city of Bucharest.

The Energy Strategy has been elaborated in three phases:

1. Analyse of the current situation
2. Preparing of recommendations
3. Preparing of the Energy Strategy

Report(s) for each phase has been submitted to the municipality, presented, discussed and approved by the Municipality Energy Committee.

The elaborated energy strategy focuses on areas for which the Municipality of Bucharest is responsible: Energy for heating and hot tap water and energy used for traffic inside the city limit and public lighting.

Three main pillars carries the elaborated strategies:

- Climate. The supply of heat and hot tap water shall be CO_2 neutral from 2020. The CO_2 emission from transport shall be reduced by 50% by 2020.
- Sustainability. The conditions for heat supply shall be based on competition and open market principles. Necessary funds for establishment of sustainability shall be provided by private investors based on concessions.
- Quality. A quality and service level appropriate for supply of heat in this century will be obtained by privatisation of operation and management based on concessions with minimum performance requirements.

The Energy Strategy has been elaborated in compliance with national legislation, the National Energy Strategy and relevant EU-directives and policies.

Obtaining the goals will require a number of actions implemented by the Municipality of Bucharest. Thus action plans for implementing the strategies are included in the Strategy Report.

The Strategy Report in submitted in two volumes:

Volume 1 comprises:

Part A: Executive Summary and Action Plan

Part B: Main Report

Volume 2 comprises:

Part C: Appendixes

1 INTRODUCERE

Primaria Municipiului Bucuresti a contractat, în decembrie 2007, firma internationala de consultanta Grontmij | Carl Bro, impreuna cu un subcontractant din Romania ATHenerg pentru a elabora o strategie energetica pentru Municipiul Bucuresti. Strategia energetica a fost elaborata în trei etape:

1. Analiza situației existente
2. Recomandări
3. Strategia energetica

Raportul (rapoartele) pentru fiecare etapa a fost inaintat Primariei, prezentat, discutat şi aprobat de către Comitetul pentru Energie din cadrul Primariei Municipiului Bucuresti.

Strategia energetica elaborata se concentrează pe domeniile pentru care Primaria Municipiului Bucuresti este responsabila: energie pentru încălzire şi apă caldă de consum şi energia utilizată pentru transportul public in interiorul oraşului, iluminat public.

Strategiile elaborate se sprijina pe trei mari piloni:

- Clima. Furnizarea de energie termică va fi neutra din punct de vedere al emisiilor de CO_2 incepand cu 2020. Emisiile de CO_2 de la transport se vor reduce cu 50% până în 2020.
- Sustenabilitate. Condițiile de furnizare de energie termică se bazează pe competitivitate şi principiile unei piețe deschise. Fondurile necesare pentru asigurarea durabilitatii trebuie să fie furnizate de către investitorii privați, pe baza concesiuni.
- Calitate. Nivelul de calitate şi serviciile adecvate privind furnizarea de energie termică, în acest secol, vor fi obținute prin privatizare exploatarii si managementul pe baza de concesiuni cu asigurarea cerintelor minime de performanta.

Strategia energetica a fost elaborata cu respectarea legislației naționala, a Strategiei energetice naționale şi a Directivelor şi politicilor UE relevante.

Atingerea obiectivelor va necesita un număr de masuri ce trebuie implementate de către Municipiul Bucuresti. Astfel, in acest raportul au fost incluse planuri de actiune pentru implementarea strategiilor.

Strategia este structurata in două volume:

Volumul 1 cuprinde:

Partea A: Sumar

Partea B: Raportul principal

Volumul 2 cuprinde:

Partea C: Anexe

2 OVERALL STRATEGIES

Three pillars carry the Energy Strategy:

- Climate
- Sustainability
- Quality

CLIMATE

The strategy regarding climate is CO_2 neutral heat and hot tap water production from 2020 and a reduction of CO_2 emission from transport by 50% by 2020.

The current CO_2 emission from combustion of about 28,000 TJ/y natural gas is about 1,500,000 t/y.

Obtaining CO_2 neutrality for the heating sector require energy conservation and construction of CO_2 neutral heat production sources:

- About 45% saving on the 2007 demand by energy conservation bringing the demand down to the national targets: 50 kWh/m^2/year and 100 kWh/m^2/year for new and existing buildings, respectively.
- About 40% of the total demand in 2020 supplied from solar heating systems
- About 20% supplied from waste-to-energy facilities
- About 20% supplied from decentralised CHP on bio-oil
- About 10% supplied from peak-load boilers on bio-oil
- About 10% supplied from other sources such as heat pumps with heat storage using surplus electricity, when available, from wind power and others.

Regarding the private transport sector the waste of energy due to traffic congestion will be reduced by introduction of congestion charges, parking restrictions and traffic control measures.

The Energy Strategy set targets for public energy consumption and outline related strategies:

- Public light shall be developed based on low energy light armatures. This development is already in progress.

2 STRATEGIA

Cei trei piloni pe care se sprijina Strategia energetica:

- Clima
- Sustenabilitate
- Calitate

CLIMA

Strategia privind clima vizeaza neutralitatea din punct de vedere al emisiilor de CO_2 pentru producerea de energie termica in anul 2020 si reducerea emisiilor de CO_2 generate de transport cu 50%, pana in 2020.

Emisii de CO_2 actuale, provenite din arderea a 28.000 TJ / an de gaze naturale este de circa 1.500.000 t / an.

Obținerea neutralitatii din punct de vedere al emisiilor de CO_2 pentru sectorul de termoficare, necesita conservarea energiei şi construirea surselor de producere, neutre din punct de vedere al emisiilor de CO_2:

- Economii de aprox. 45% din cererea aferenta anului 2007, prin conservarea energiei, scazand astfel cererea la nivelul obiectivelor nationale la 50 kWh/m^2/an şi 100 kWh/ m^2/an pentru cladirile noi, respectiv pentru cele existente.
- Aproximativ 40% din valoarea totală a cererii în 2020, se va asigura de la sistemele de încălzire solară
- Aproximativ 20% se va asigura din facilitatile de transformare a deseurilor in energie.
- Aproximativ 20% se va asigura de la centralele de cogenerare descentralizate pe baza de bio-combustibil
- Aproximativ 10% se va asigura de la cazanele pentru varf pe baza de bio-combustibil
- Aproximativ 10% se va asigura din alte surse, cum ar fi pompele de căldură cu acumularea de caldura, folosind surplusul de energie electrică, atunci când este disponibil, de la energia eoliană şi altele.

În ceea ce priveşte sectorul transporturilor, risipa de energie datorata ambuteiajelor in trafic va fi redusa prin introducerea unei taxe de aglomeratie, restrictiilor privind parcarea si a masurilor de control a traficului.

Strategia energetică stabileste obiective pentru consumul public de energie şi descrie strategiile aferente:

- Pumping of water. The consumption and losses shall be reduced and pump installations modernised. The operator provides benchmarking showing a constant annual decrease in electricity consumption for the sector.
- Busses transport shall be based on low energy busses and in the future hybrid concepts, natural gas busses and busses using bio diesel shall be introduced. A programme for replacing old low efficient busses with busses based on state-of-the-art technology is under implementation and shall be continued. Special bus lanes shall be introduced and the busses shall have priority in the traffic.
- Tram lines shall be extended and modernised. A modernisation programme introducing so-called light trams are under implementation and shall be continued. Trams shall have special lanes and where this is not possible other means of public transport should be introduced.
- Trolley lines shall be extended and modernised. A modernisation programme is under implementation and shall be continued. Trolleys shall, as busses, have special lanes and priority in the traffic.
- The Metro system shall be extended as already planned. A high efficient metro system, meaning an extended system, is the key to solving the traffic problems in Bucharest.

SUSTAINABILITY

Sustainable heat and hot tap water supply will be obtained by implementing:

1. A cost related tariff system by 2010

   To prepare the tariff system for future changes it will be necessary to introduce a transparent and cost related system based on an administration fee, a capacity tariff and an energy tariff.
2. A sustainable subsidise scheme by 2012

   The general subsidise scheme known today

- Iluminatul public va fi dezvoltat pe baza unor echipamente pentru iluminat cu consum redus de energie. Aceasta activitate este in curs de desfasurare.
- Pomparea apei. Consumul şi pierderile vor fi reduse si instalatiile de pompare modernizate. Operatorul asigura valori de referinta - benchmarking care vor arata o scădere anuală constantă în consumul de energie electrică pentru acest sector.
- Transportul cu autobuze va fi dezvoltat utilizand autobuze cu consum redus de combustibil si in viitor introducerea conceptelor cu autobuze hibride, alaturi de componenta electrica existand GPL si biocombustibil. In prezent, este in implementare un program de inlocuire a autobuzelor cu eficienta scazuta, introducandu-se autobuze de ultima generatie. Acest program va trebui sa continue. Trebuie introduse linii speciale pentru autobuze si autobuzele vor avea prioritate in trafic.
- Liniile de tramvai vor fi extinse şi modernizate. Un program de modernizare prin care se introduc asa-numitele tramvaie usoare este în curs de implementare şi va fi continuat. Tramvaiele trebuie să aibă culoare speciale iar acolo unde acest lucru nu este posibil să se introduca alte mijloace de transport public.
- Liniile de troleibuz trebuie să fie extinse şi modernizate. Un program de modernizare este în curs de implementare şi va fi continuat. Troleibuzele, la fel ca si autobuzele, vor avea au benzi speciale şi prioritate în trafic.
- Metro-ul va fi extins conform planificarii deja existente. Un sistem de transport subtern eficient, însemnand un sistem extins, este cheia pentru rezolvarea problemelor de trafic din Bucuresti.

DURABILITATE

Sustenabilitatea furnizarii de energie termica va fi obtinuta prin implementarea:

1. Unui sistem de tarifare bazat pe costuri, până în 2010

   Pentru a pregăti sistemul de tarifare pentru schimbările viitoare, va fi necesar sa se introduca un sistem transparent, raportat la costuri, bazat pe o taxă de administrare, un tarif de capacitate şi un tarif de energie.
2. O schema de subventii sustenabila, până în

will be replaced by a subsidise scheme based on social needs.

3. Change of the organisational set-up by 2012

   Institutionalising a Public Service Organisations, PSO within the organisation of the municipality and privatisation of operation based on concessions are the selected measures.

QUALITY

Obtaining CO_2 neutrality for heat and hot tap water supply will require mandatory connection to the district heating system. This can only be enforced when the district heating system can offer:

- A quality of supply equal to the quality level found in modern district heating system

Improving the quality includes among others introduction of a “on demand” supply concept replacing the current “when available” concept.

Improvement of the quality will be monitored by introduction of benchmarking,

2012

În general, schema de subventii cunoscuta astăzi, va fi înlocuită de o schema care va avea la baza nevoile sociale.

3. Modificarea cadrului organizational până în 2012

   Masurile selectate sunt: infiintarea unei organizatii a serviciului public, PSO, în cadrul Municipalitatii şi privatizarea operarii sistemului pe baza de concesiuni.

CALITATE

Obținerea neutralității din punct de vedere al emisiilor de CO_2 pentru energia termică necesita conectarea obligatorie la sistemul de termoficare. Acest lucru poate fi impus doar atunci cand sistemul de termoficare poate oferi:

- O calitate a furnizarii egale cu nivelul de calitate intalnit in sistemele moderne de termoficare.

Îmbunătățirea calității include, printre altele, introducerea unui concept de furnizare “la cerere” care sa inlocuiasca conceptul actual “cand este disponibil”.

Imbunătățirea calității va fi monitorizata prin introducerea valorilor de referinta (benchmarking).

3 INTEGRATED RESOURCE PLANNING

Integrated Resource Planning, IRP was used for selection of options to be included in the strategy. Using IRP it is possible to compare options on the demand side (energy conservation) with production options.

The following options were selected for evaluation:

- Internal building energy conservation
- External building energy conservation
- Solar heating systems
- Local peak-load boilers
- Decentralised CHP
- Existing centralised CHP
- Existing centralised heat-only-boilers
- Waste-to-energy facilities

The IRP values (EUR/GJ and possible energy volumes) was calculated for each option as short-term values, medium-term values and long-term values and options for implementation were selected based on the long-term values.

RANKING OF OPTIONS

Internal and external building energy conservation is ranked first and second. These options are relatively expensive in construction but have almost no operation and maintenance costs. An other aspect, which was not considered in the IRP values, is that the main costs are related to domestic costs creating a large number of jobs and business opportunities for contractors. The IRP value is constant over the years.

Solar heating systems are ranked third. The considerations regarding this option are as for the previous. The IRP value will increase slightly over the years due to increasing maintenance costs and increasing costs of electricity for pumping.

Waste-to-energy facilities are ranked forth but this option is only actual because the Municipality of Bucharest also has a waste problem to solve. Waste-to-energy facilities are expensive in construction and maintenance but the operation costs are low due to the "free" fuel. Necessary maintaining of a part of the transmission system increases the IRP value for this option.

3 PLANIFICAREA INTEGRATA A RESURSELOR

Planificarea integrata a resurselor, PIR a fost folosită pentru selectarea opțiunilor, care vor fi incluse în strategie. Utilizarea PIR este posibila pentru a compara opțiunile privind cererea (conservarea energiei), cu opțiunile privind producerea. Următoarele opțiuni au fost selectate pentru evaluare:

- Conservarea energiei in interiorul cladirilor
- Conservarea energiei la exteriorul cladirilor
- Sisteme de incalzire solara
- Cazane locale pentru varf de sarcina
- CET-uri descentralizate
- CET-uri centralizate existente
- CT-uri existente centralizate
- Facilitati de transformare a deseurilor in energie

Valorile PIR (EUR/GJ şi volumul posibil de energi) au fost calculata pentru fiecare opțiune ca valori pe termen scurt, valori pe termen mediu şi pe termen lung, şi opțiunile pentru implementare au fost selectate pe baza valorilor pe termen lung.

CLASIFICAREA OPTIUNILOR

Conservarea energiei in interiorul si la exteriorul caldirilor se afla pe primul si al doilea loc. Aceste opțiuni sunt relativ costisitoare din punct de vedere al construirii, dar aproape ca nu au nici un cost de exploatare si intretinere. Un alt aspect, care nu a fost luat in considerare la calcularea valorilor PIR, este faptul că principalele costuri sunt costurile interne legate de crearea unui număr mare de locuri de muncă şi oportunități de afaceri pentru contractanti. Valoare PIR este constantă in anii urmatori.

Sistemele de incalzire solara se afla pe locul trei. Considerațiile cu privire la această opțiune sunt asemanatoare cu cele exprimate anterior. Valoarea PIR va creşte uşor in anii urmatori datorită creşterii costurilor de întreținere şi costurilor energiei electrice pentru pompare.

Facilitatile de transformare a deseurilor in energie se afla pe locul patru, dar această opțiune este reala numai daca Municipiul Bucuresti are o problema legate de deseuri care trebuie rezolvata. Facilitatile de transformare a deseurilor in energie sunt scumpe in ceea ce priveste construirea şi întreținerea, dar costurile de exploatare sunt reduse datorita combustibilului "gratis". Necesitatea mentinerii unei

Decentralised CHP is ranked fifth being expensive in the long-term assessment due to increasing fuel costs and introduction of energy/environmental taxes.

Local peak-load boilers are selected as the last option being very expensive. However, there is no reasonable alternative for production to comply with the peak-load demand.

Current **centralised production** options (centralised CHP and centralised heat-only-boilers) are rejected being far too expensive in a medium- and long-term perspective. However, it will be necessary to maintain these options until alternatives are commissioned.

parti a sistemului de transport creste valoarea PIR pentru aceasta optiune.

CET-uri descentralizate se afla pe locul cinci, fiind costisitoare datorita cresterii preturilor combustibilului si introducerii taxelor de mediu si energie.

Cazanele locale pentru varf de sarcina sunt selectate pentru a fi ultima opțiune fiind foarte scumpe. Cu toate acestea, nu există nici o alternativă rezonabilă pentru producere pentru a asigura varful de sarcina.

Optiunile privind producerea centralizata curenta (CET-uri si CT-uri centralizate) sunt respinse fiind prea costisitoare intr-o perspectiva pe termen mediu si termen lung. Cu toate acestea, aceste optiuni trebuie mentinute pana cand alternativele sunt puse in functiune.

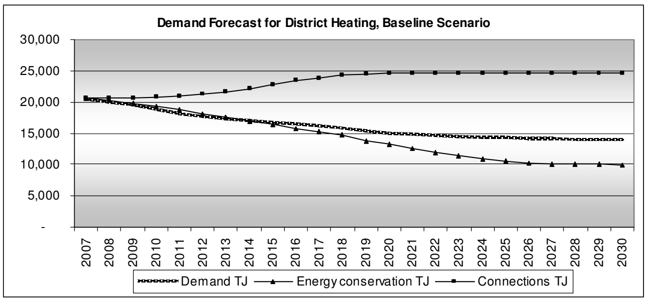
4 DEMAND SIDE STRATEGIES

Energy demand

Introducing the EU-norms as included in the National Energy Strategy to a heat consumption of about 100 kWh/m^2/year for existing buildings and about 50 kWh/m^2/year for new buildings will reduced the heat demand with at least 45%.

The measures for obtaining this reduction are implementation of the energy rehabilitation options (internal and external building energy conservation options) selected in the IRP.

Based on the expected energy conservation and connection of new consumers the energy demand is forecasted to develop as:



Strategies

The strategies related to the demand side are:

- Mandatory connection to the district heating system or individual supply from CO_2 neutral sources.

  CO_2 neutrality requires connection to the district heating network or alternatively establishment of CO_2 neutral individual sources.

- Establishment of a “on demand” concept replacing the current “when available” concept.

  Obtaining a “on demand” concept requires local preparation of heat and hot tap water. Thus, the current 4-pipe systems will be replaced with 2-pipe systems and local substations installed.

- Providing assistance in obtaining funds for energy conservation.

  A subsidise scheme for energy rehabilitation of buildings is implemented by the Government. The Municipality will play an active role in

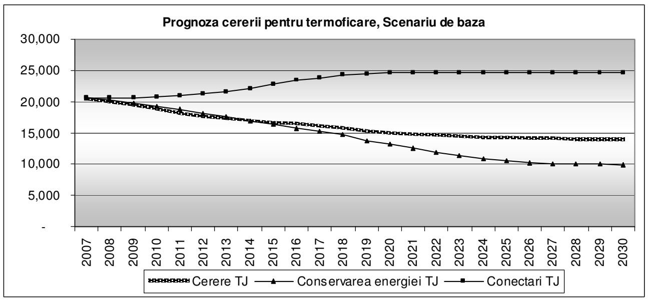
4 STRATEGIILE PRIVIND CEREREA

Cererea de energie

Introducerea normelor UE în Strategia Energetica Națională, si anume un consum de energie termică de aproximativ 100 de kWh/m^2/an pentru clădiri existente şi aproximativ 50 de kWh/ m^2/an pentru clădirile noi va reduce cererea de energie termică, cu cel puțin 45%.

Măsurile de obținere a acestei reduceri inseamna implementarea optiunile privind reabilitarea termica a cladirilor (optiunile privind conservarea energiei la interiorul si exteriorul cladirilor) selectate în PIR.

In functie de conservarea energiei estimata si conectarea de noi consumatori, cererea de energie este prognozata a evolua astfel:



Strategiile

Strategii pentru latura cererii, sunt:

- Conectarea obligatorie la sistemul de termoficare sau furnizare individuala de la surse neutre din punct de vedere al emisiilor de CO_2.

  Neutralitatatea necesita conectarea la reteaua de termoficare sau stabilirea unor surse individuale alternative, neutre din punct de vedere al emisiilor de CO_2.

- Stabilirea unui concept de furnizare “la cerere” care sa inlocuiasca conceptul actual “cand este disponibil”.

  Obținerea unui concept de caldura “la cerere” necesită prepararea locala a caldurii şi apei calde de consum. Astfel, sistemele existente cu patru conducte vor fi înlocuite cu sisteme cu 2 conducte si module termice locale.

- Acordarea asistenței pentru obținerea de fonduri in vederea conservarii energiei.

  Guvernul a implementat o schema de

assisting the building owners in obtaining subsidises and obtaining financing for own investments. However, the Municipality of Bucharest will not participate in the financing, only the Sector Municipalities.

subventionare a reabilitarii termice a cladirilor. Primaria va avea un rol activ prin sprijinirea proprietarilor la obtinerea subventiilor si finantarii pentru investitiile proprii. Totusi, Primaria Municipiului Bucuresi nu va participa cu fonduri, ci doar Primariile de Sector.

Environmental impact

Reduction of the demand with 45% will lead to a corresponding short-term reduction of 45% of current CO_2 emissions. However, in a long-term perspective when the main production sources will be CO_2 neutral the reduction due to reduced heat losses in the system will be insignificant.

Impactul asupra mediului

Reducerea cererii cu 45% va conduce, pe termen scurt, la o reducere corespunzătoare a emisiilor de CO_2 actuale, cu 45%. Cu toate acestea, într-o perspectivă pe termen lung în cazul in care, principalele surse de producere vor fi neutre din punct de vedere al emisiilor de CO_2, reducerea datorita pierderilor de energie termică din sistem va fi nesemnificativa.

5 DISTRIBUTION STRATEGIES

Strategies

The main strategies related to heat distribution are:

- Privatisation

  Privatisation is seen as the only way to obtain an efficient heat distribution and a service level as outlined in previous chapter.

  Providing the necessary funds for developing the current system into a modern district heating system will be out of reach for the Municipality of Bucharest. Thus, private financing is seen as the only possibility.

  The area of Bucharest will be divided in 10-15 logical supply areas and it is of importance that there are more operators/investors obtaining concessions for heat distribution in order to establish competition in measured performance.

- Redesign and reconstruction

  The current supply concept with direct supply in 4-pipe distribution systems cannot provide an “on demand” supply, is expensive in construction, has large heat losses and high operation costs.

  The future supply concept will be a 2-pipe system with local preparation of heat and hot tap water.

  The redesign shall consider the future distribution concept with solar heating, heat storages, local peak-load production a demand of about 60% of what the current systems are designed for and extension of the supply areas.

Environmental impact

Reconstruction will reduce the heat losses with about 50% from currently about 4,800,000 GJ/y to about 2,400,000 GJ/y corresponding to a reduction in CO_2 emissions with about 130,000 t/year. However, when the distribution system is extended to about the double size of current the heat losses will be at the same level as today.

5 STRATEGIILE PRIVIND DISTRIBUTIA

Strategiile

Principalele strategii privind distributia de energie termica sunt urmatoarele:

- Privatizarea

  Privatizarea este privita ca singurul mod de a obtine o distributie eficienta a energiei termice si un nivel al serviciilor mentionat in capitolul anterior.

  Asigurarea fondurilor necesare pentru transformare sistemului actual, într-un sistem modern de termoficare nu se afla la indemana Municipiului Bucuresti. Astfel, finanțarea privată este vazuta ca singura posibilitate.

  Municipiul Bucuresti va fi divizat în 10-15 zone de distributie şi este important să existe mai multi operatori / investitori care sa obtina concesiuni pentru distributia de energie termica, in vederea stabilirii unei competitii pe baza masurarii performantei.

- Reproiectare şi reconstrucție

  Conceptul actual de furnizare directa, cu un sistem de 4 tevi de distributie nu poate asigura furnizarea caldurii “la cerere”, este scump de realizat, are pierderi mari de căldură şi costuri de exploatare ridicate.

  Conceptul viitor de furnizare va avea la baza un sistem de 2 tevi cu preparea caldurii si a apei calde de consum la nivel local.

  Reproiectarea trebuie sa ia în considerare viitorul concept de distributie, energia solara, acumularea energiei termice, producerea locala a energiei termice in centrale pentru acoperirea varfului de consum, pentru care cererea fiind cu aproximativ 60% mai mica fata de sistemele existente si o extindere a zonelor de furnizare.

Impactul asupra mediului

Reconstrucția va reduce pierderile de căldură cu aproximativ 50% de la aproximativ 4.800.000 GJ/an cat sunt in prezent la aproximativ 2.400.000 GJ/an, avand ca rezultat o reducere a emisiilor de CO_2 cu circa 130.000 t/an. Totusi, atunci cand sistemul de distribuție va fi extins la aproape dublu fata de cel existent, pierderile de căldură vor fi la acelaşi nivel ca în prezent.

Cost of developing the distribution systems

The cost of reconstruction and extension of the distribution systems is calculated to about 1,183,800,000 EUR for the period 2009 to 2020 (about 100 MEUR/year).

This investment is assumed provided by private investors and from connection fees for new consumers.

When the current systems are reconstructed the savings in terms of heat losses will be about 72,000,000 EUR/year corresponding to about 50% of the annual loan services.

Costurile de dezvoltare a sistemelor de distribuție

Costul de reconstrucție şi extindere a sistemelor de distribuție este calculat la aproximativ 1.183.800.000 EUR pentru perioada 2009 - 2020 (aproximativ 100 MEUR/an).

Se presupune ca această investiție va fi facuta de către investitorii privați şi din taxele de conectare de la noii consumatori.

Atunci cand sistemele existente vor fi reconstruite, economiile obtinute din redeucerea pierderilor de de caldura vor fi de aproximativ 72.000.000 EUR / an, ceea ce corespunde cu aproximativ 50% din cheltuielile anuale pentru un credit.

6 TRANSMISSION STRATEGIES

Strategies

The main strategies regarding heat transmission are:

- Privatisation of operation

  The Municipality will maintain ownership of the transmission system and by this controlling the heat supply in Bucharest.

  Operation of the system including performance of technical-economical load dispatch will be privatised as the necessary experience/motivation is not available the current organisation.

  Maintenance of the transmission system will be privatised by establishing the necessary service contracts.

- Redesign and reconstruction

  The current transmission system is designed for centralised production of about 5,000 MJ/s. The future transmission system will be designed for transmission of heat produced from waste-to-energy facilities, about 300-400 MJ/s.

  The length of the system will be reduced from more than 500 km to about 100 km and the current about 650 substations will be replaced with about 100 heat exchanger stations.

  The diameter of the transmission pipes are today in average 600-700 mm with maximum 1,200 mm. The reconstructed system will have an average diameter of 350-400 mm with maximum 600 mm. Reconstruction will be performed when the current pipes are worn-out or when feasible.

Environmental Impact

Reconstruction will reduce the CO_2 emission from currently about 250,000 t/year to about 30,000 t/year.

Technical-economical load dispatch

The private operator of the transmission system must hold experience in load dispatch and implement a technical-economical load dispatch in Bucharest ensuring that the cheapest sources, solar heating and waste-to-energy, will produce maximum while expensive sources, peak-load boilers, will be produce

6 STRATEGIILE PRIVIND TRANSPORTUL

Strategiile

Principalele strategii privind transportul căldurii sunt:

- Privatizarea exploatarii

  Municipiul Bucuresti va menține dreptul de proprietate asupra sistemului de transport şi astfel va controla furnizarea de energie termică în Bucureşti.

  Funcționarea sistemului, inclusiv dispecerizarea tehnico-economica vor fi privatizate intrucat organizatia actuala nu dispune de experienta/motivatia necesara.

  Întreținerea sistemului de transport va fi privatizata, prin incheierea contractelor de servicii necesare.

- Reproiectarea şi reconstrucția

  Actualul sistem de transport este proiectat pentru producerea centralizata a aproximativ 5.000 MJ/s. Viitorul sistem de transport va fi proiectat pentru transportul energiei termice produsă de facilitatile de incinerare a deseurilor cu recuperarea caldurii, circa 300-400 MJ/s.

  Lungimea sistemului va fi redusa de la peste 500 de km, la aproximativ 100 de km, iar cele aproximativ 650 de puncte termice existente vor fi inlocuite de aprox. 100 de statii de schimbatoare de caldura.

  In prezent, diametrul conductelor de transport este, în medie, de 600-700 mm, cu maximum de 1.200 mm. Sistemul reconstruit va avea un diametru mediu de 350-400 mm, cu maximum de 600 mm. Reconstrucția va fi realizata cand tevile existente vor fi depreciate sau cand va fi fezabil.

Impactul asupra mediului

Prin reconstructie se vor reduce emisiile de CO_2 de la 250.000 t/an din prezent la aprox. 30.000 t/an.

Dispecerizarea tehnico - economica

Operatorul privat al sistemului de transport trebuie să aiba experiență in dispecerizare si trebuie sa implementeze un dispecer tehnico-economic in municipiul Bucuresti, pentru a se asigura ca sursa cea mai ieftina, energia solara si incinerarea deseurilor, va produce cantitatea maxima in timp ce sursele minimum.

The technical-economical shall establish a pool-price for heat production creating same tariff for all production companies and thus establish equal conditions for benchmarking comparison.

Costs of developing the transmission system

Reconstruction of the transmission system will cost about 415,000,000 EUR in the period 2009 to 2020 (about 40 MEUR/year). In addition a SCADA-system including a maintenance module and a load dispatch module will cost about 2,500,000 EUR.

The investments, apart from the SCADA-system, are assumed provided from the public sector as loans.

When fully reconstructed the saving in terms of reduced heat losses will be about 60,000,000 EUR/y, which can cover the loan services.

scumpe, cazanele pentru varf, vor produce cat mai putin posibil.

Raportul tehnico-economic va stabili un pret binom pentru producerea de energie termice creand astfel un tarif similar pentru toate companiile de producere, stabilind conditiile pentru compararea valorilor de referinta (benchmarking).

Costurile de dezvoltare ale sistemului de transport

Reconstrucția sistemului de transport va costa aproximativ 415.000.000 EUR în perioada 2009 - 2020 (aproximativ 40 MEUR / an). Suplimentar, un sistem SCADA, incluzand un modul de întreținere si un modul de dispecerizare va costa aproximativ 2.500.000 EUR.

Investițiile, cu exceptia sistemului SCADA se presupune ca vor fi acoperite din sectorul public sub forma de imprumuturi.

Când sistemul va fi complet reconstruit, economiile legate de reducerea pierderilor de caldura vor fi de aproximativ 60.000.000 EUR / an, care pot acoperi cheltuielile legate de acordarea de imprumuturi.

7 PRODUCTION STRATEGIES

The strategies for production in terms of selection of future production facilities is based on the IRP presented in chapter 3.

Strategies

- Privatisation of production

  It is unrealistic to believe that public funding can provide the capital necessary for reconstruction of the production system. Thus, the production must be privatised.

  Most of the existing production systems has passed its useful lifetime and is operated downgraded at low efficiencies. The existing system is based on technologies from the 1950'ties and energy efficiency and environmental concerns neglected.

  The private investments will establish:

  - Three waste-to-energy facilities with a total capacity of about 300 MJ/s, depending of the waste available.
  - About 400 MJ/s decentralised CHP production used for heat production in the winter period and cooling in the summer period.
  - About 600 MJ/s peak-load boiler production

  Other funding (public and private) will establish solar energy systems to cover about 45% of the energy demand and alternative renewable sources as for example heat pumps.

- Reconstruction of the production system

  Construction of the new capacity outlined above will enable decommissioning of most of the current production system and move production from centralised sources to decentralised and local sources significantly reducing the heat losses and other transmission and distribution costs.

  The future centralised production will be the new waste-to-energy facilities, only – about 300 MJ/s.

7 STRATEGIILE PRIVIND PRODUCEREA

Strategiile pentru producere considerand selectarea unitatilor de producere viitoare, au la baza planificarea integrata a resurselor prezentata in capitolul 3.

Strategiile

- Privatizarea producerii

  Este nerealist să credem că fondurile publice pot asigura capitalul necesar pentru reconstrucția sistemului de producere. Prin urmare, producerea trebuie să fie privatizata.

  Cea mai mare parte a sistemelor de producere existente are durata de viata depasita si functioneaza cu eficienta scazuta. Sistemul existent are la baza tehnologii din anii '50 si aspectele legate de eficienta energetica si mediul sunt neglijate.

  Prin investitii private se vor realiza:

  - Trei facilitati de incinerare a deseurilor cu recuperarea caldurii cu o capacitate totala de circa 300 de MJ/s, în funcție de deşeurile disponibile.
  - Producerea descentralizata in cogenerare - aprox. 400 MJ/s care se utilizeaza in sezonul de incalzire si racire in timpul verii
  - Cazane pentru acoperirea varfului de sarcina – aprox. 600 MJ/s.

  Din alte fonduri (publice şi private) se vor realiza sisteme de energie solară pentru a acoperi aproximativ 45% din necesarul de energie şi surse regenerabile alternative, cum ar fi pompele de căldură.

- Reconstrucția sistemului de producere

  Construirea noilor capacități, descrise mai sus va permite scoaterea din funcțiune a celei mai mari parti a sistemului de producere si va muta producerea de la sursele centralizate la sursele descentralizate si locale, reducand astfel, semnificativ, pierderile de caldura si alte costuri de transport si distributie.

  Producerea viitoare centralizata se va realiza in facilitatile de incinerare a deseurilor, numai circa 300 MJ / s.

Environmental impact

The fuel, preliminary natural gas, used for heat and hot tap water in Bucharest was in 2007 about 28,000 TJ corresponding to about 1,500,000 tonnes CO_2 per year.

Obtaining CO_2 neutrality form 2020 will reduce the emission of green house gasses with same 1,500,000 tonnes per year.

Impactul asupra mediului

Consumul de combustibilul, initial gaze naturale, folosit pentru producerea căldurii şi a apei calde de consum in Bucuresti a fost în 2007, aproximativ 28.000 TJ ceea ce corespunde cu aproximativ 1.500.000 de tone de CO_2 pe an.

Obținerea neutralității din punct de vedere al emisiilor de $CO_{2,}$ din 2020, va insemna reducerea emisiilor de gaze cu efect de sera tot cu 1.500.000 t pe an.

Cost of developing the production system

The cost of developing the production system as outlined will require an investment of about 1,701,000,000 EUR for the period 2010 to 2020 with about 407,000,000 EUR as public investment, preliminary in solar heating systems, and about 1.294,000 EUR as private investments.

Costurile de dezvoltare a sistemului de producere

Asa cum am mentionat, costurile de dezvoltare a sistemului de producere, reprezinta o investiție de circa 1.701.000.000 EUR pentru perioada 2010 - 2020 din care aproximativ 407.000.000 EUR investiții publice, initial in sisteme de incalzire solare, şi aprox. 1.294.000 EUR investiții private.

8 ORGANISATIONAL AND MANAGEMENT STRATEGIES

Following the analyses performed at organisational, structural and management level there are identified the main problems for the district heating system in Bucharest together the main responsibility for the system being one of the most expensive in the world.

The main problem areas identified are:

- RADET in bankruptcy
- Undecided future for the district heating system
- Huge investments necessary
- Lack of supervision by the Municipality of Bucharest
- Administration of public funds
- Lack of competition
- Inefficient organisational set-up

All these problems are detailed analysed in attached documents.

8.1 Strategies

The Municipality of Bucharest will take the necessary action to ensure:

Restructuring of the district heating sector

Privatisation of the district heating sector

The objective of these strategies is to establish an organisational and management framework for the sector suitable for, and capable of, implementing the strategies.

8.2 Actions required

The following actions main tasks are required:

- Breakdown of the current organization
- Restructuring of the production sector
- Restructuring of the transmission sector
- Restructuring of the distribution sector

8 STRATEGIILE PRIVIND MANAGEMENTUL ORGANIZATIONAL

Ca urmare a analizei efectuate la nivel organizational, structural si de management au fost identificate principalele probleme pentru sistemul de termoficare din Bucuresti impreuna cu responsabilitatea de a avea unul dintre cele mai scumpe sisteme din lume.

Principalele probleme identificate sunt:

- Falimentul RADET-ului
- Viitorul incert al sistemului de termoficare
- Necesitatea unor investitii uriase
- Lipsa de supervizare din partea Primariei Municipiului Bucuresti
- Administrarea fondurilor publice
- Lipsa competitivitatii
- Organizatie ineficienta

Aceste probleme sunt analizate detaliat in documentele atasate

8.1 Strategii

Municipiul Bucuresti va lua masurile necesare pentru a asigura:

Restructurarea sectorului de termoficare

Privatizarea sectorului de termoficare

Obiectivul acestor strategii este de a stabili un cadrul organizational si de management pentru sectorul de termoficare corespunzator si capabil sa implementeze strategiile.

8.2 Actiuni necesare

Urmatoarele actiuni sunt necesare:

- Divizarea organizatiei existente
- Restructurarea sectorului de producere
- Restructurarea sectorului de transport
- Restructurarea sectorului de distributie

9 HEAT TARIFF

Strategies

The strategies regarding the heat tariff are:

- To introduce a cost related tariff and fee system dividing the total costs into energy tariff, capacity tariff and administration fees.
- Remove general subsidises and introduce social subsidises based on social criteria.

9 TARIFUL ENERGIEI TERMICE

Strategii

Strategii privind tariful energiei termice sunt:

- Introducerea unui tarif stabilit pe baza costurilor, precum si un sistem de taxare prin care costurile totale sa fie structurate in : tarif pentru energie, tarif de capacitate si taxa de administrare
- Eliminarea subventiilor generale si introducerea unor subventii acordate pe criterii sociale.

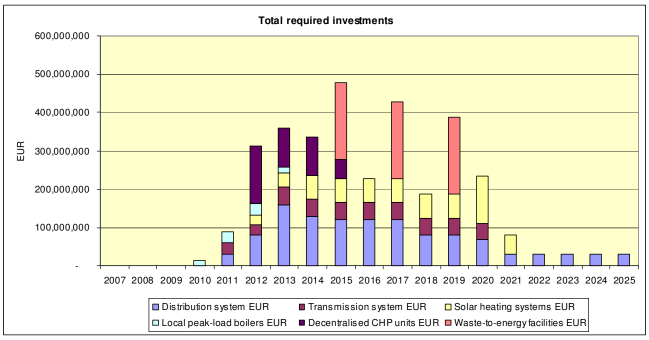
10 FINANCING

Strategy

The strategy regarding financing is to invite private investors/operators to obtain concessions and invest in the district heating system on commercial conditions.

Financial Requirements

The total financial requirement for redesign and reconstruction of the district heating system in Bucharest is huge, about 3,266,400,000 EUR:



About 546,926,000 EUR is public investment, mainly for installation of solar heating systems and reconstruction of the transmission system. About 2,719,474,000 EUR is private investments for reconstruction and development of the distribution and production systems.

Financial sources

Public investments are assumed provided as loan from international investment banks, preferable EIB due to the low interest. Funding from the municipality general budget is assumed very limited in the years to come.

How private investors will provide the necessary funds will be a competion matter in the open tendering procedure for obtaining concessions.

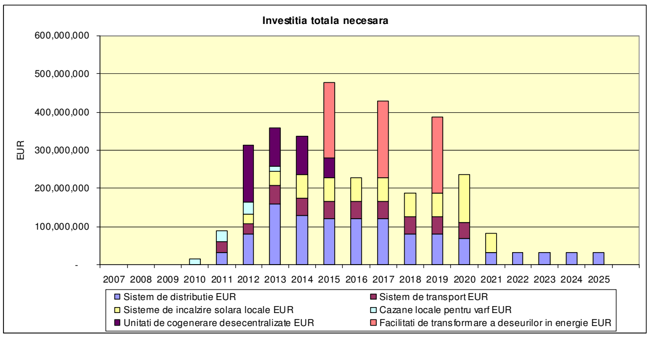
10 FINANTAREA

Strategia

Strategia privind finatarea este de a invita investitorii/ operatorii privati sa obtina concesiuni si sa investeasca in sistemul de termoficare in conditii comerciale.

Cerintele financiare

Cerinta totala privind finantarea reproiectarii si reconstructiei sistemului de termoficare din Bucuresti este enorma, aprox. 3.266.400.000 EUR:



Aproximativ 546.926.000 EUR reprezinta investitie publica, in principal pentru instalarea sistemelor de incalzire solare si reconstructia sistemului de transport. Aproximativ 2.719.474.000 EUR reprezinta investitii private pentru reconstructia si dezvoltarea sistemelor de producere si distributie.

Sursele de finantare

Se presupune ca investitiile vor fi asigurate dintr-un imprumut de la bancile de investitii internationale, de preferat BEI datorita dobanzii mici. Se estimeaza ca fondurile din bugetul general al Primariei vor fi foarte limitate in urmatorii ani.

Modul in care investitorii privati vor asigura fondurile necesare va fi o competitie concretizata prin proceduri de atribuire pentru obtinerea concesiunilor.

11 TRANSPORT SECTOR STRATEGIES

Strategies

The overall goal is to reduce the CO_2 emission from transport in Bucharest by 50% by year 2020.

About 20% energy efficiency and corresponding CO_2 reduction is expected resulting from general international measures aiming to improve the efficiency of cars (EURO 6, 7, 8 etc), introduction of electrical cars, hybrid cars and fuel cell (hydrogen) cars etc.

The Municipality of Bucharest will introduce measures to reduce the traffic congestion and thus reduce the emission. The main measures are:

- Improved, extended and faster public transport
- Introduction of parking fees in all areas where parking is a problem. Stronger law enforcement will be necessary.
- Introduction of congestion charges or road pricing.
- Improved traffic control by improving the traffic dispatch system.

11 STRATEGIILE PRIVIND TRANSPORTUL PUBLIC

Strategiile

Obiectivul general este de a reduce emisiile de CO_2 din Bucuresti cu 50% pana in 2020.

Se estimeaza ca aproximativ 20% din eficienta energetica precum si reducerea corespunzatoare a emisiilor de CO_2 poate rezulta in urma aplicarii masurilor internationale care urmaresc imbunatatirea eficientei autoturismelor(EURO 6, 7, 8 etc), introducerea autoturismelor electrice, celor hibride si cele pe baza de pile voltaice (hidrogen), etc.

Municipiul Bucuresti va introduce masuri care sa conduca la reducerea aglomerarilor din trafic si in consecinta reducerea emisiilor. Aceste masuri ar fi:

- Imbunatatirea, extinderea si cresterea rapiditatii transportului in comun
- Introducerea taxelor de parcare in toate zonele care sunt considerate cu probleme din acest punct de vedere. Va fi necesar ca prevederile legale sa fie aplicate cu rigurozitate.
- Introducerea taxelor de aglomerare si taxelor de drum
- Imbunatatirea controlului traficului prin extinderea sistemului dispecer.

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2	24.10.2009	Updated	GMCB	haa
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1 INTRODUCTION

This Energy Strategy is prepared by Grontmij | Carl Bro and ATHenerg after successfully having submitted a proposal in November 2007. The contract was awarded and entered into force on December 31, 2007.

The Energy Strategy has been prepared in three phases:

1. Data collection and data evaluation
2. Establishment of goals and recommendations
3. Elaboration of the Energy Strategy

This Strategy Report conclude Phase III and contain three parts:

Part A: Executive Summary

Part B: Main Report (this report)

Part C: Appendixes

1.1 Objective

In developing the Energy Strategy, Consultant priority followed the principles and obligations for services of general interest, as defined in the European Union. Energy Strategy in the form presented will be a tool to PMB for energy planning, providing for clean energy Bucharest, with affordable prices and high security of supply safety.
In elaborating this report, the consultant has promoted as a priority following general principles:

1. enhanced quality of life
2. accessibility of energy services
3. security of energy supply for consumers, obtained mainly through diversification of supply sources and technologies
4. saving energy and fuel
5. increase the efficiency of energy systems
6. environment protection by reducing, even eliminating CO2 emissions
7. permanent competition, considering concessions of the service as an important condition together with competition by comparison proposed the introduction benchmarking
8. effectiveness - to promote financial, institutional and regulatory framework solutions that will lead to the achievement of the objectives set
9. measures to be anticipated in order to mitigate the effects generated by the financial crisis a

1 INTRODUCERE

Strategia Energetica este elaborata de catre Grontmij Grontmij | Carl Bro si ATHenerg, in urma acceptarii de catre Autoritatea Contractanta a ofertei transmisa in noiembrie 2007. Contractul a fost atribuit si a intrat in vigoare la data de 31 decembrie 2007.

Strategia Energetica a fost realizata in trei etape:

1. Colectarea datelor si evaluarea acestora
2. Stabilirea obiectivelor si recomandari
3. Elaborarea Strategiei Energetice

Acest raport privind Strategia reprezinta etapa a treia si se compune din trei parti:

Partea A: Sumar

Partea B: Raportul principal(acest raport)

Partea C: Anexele

1.1 Obiective

La elaborarea Strategiei Energetice, Consultantul a urmarit cu prioritate respectarea principiilor si obligatiilor specifice pentru serviciile de interes general, asa cum sunt ele definite in documentele Uniunii Europene.

Strategia Energetica in forma prezentata va constitui un instrument pentru PMB pentru planificare energetica, asigurand pentru municipiul Bucuresti energie curata, la preturi accesibile si in conditii de cea mai mare siguranta in furnizarea acestui serviciu.

La intocmirea acestui raport, Consultantul a promovat cu prioritate urmatoarele principii generale:

1. cresterea calitatii vietii
2. accesibilitatea serviciilor energetice
3. securitatea alimentarii cu energie a consumatorilor, obtinuta in principal prin diversificarea surselor de alimentare si a tehnologiilor
4. economisirea energiei si a combustibilului
5. cresterea eficientei energetice a sistemelor
6. protectia mediului, prin reducerea, chiar eliminarea emisiilor de CO_2
7. Competitie permanenta, considerand concesionarea serviciului ca o conditie importanta, precum si competitia prin comparatie propunand introducerea benchmarking-ului

10. sustainable development

8. efectivitate – promovarea solutiilor financiare, institutionale si de reglementare care sa asigure atingerea obiectivelor stabilite
9. anticiparea masurilor de criza si masuri preventive pentru atenuarea efectelor generate de aceasta
10. dezvoltarea durabila

1.2 Scope

The consultants have carefully followed the scope of services as requested by the Terms of References with special focus on the areas of energy supply for which the Municipality of Bucharest can be hold responsible: heating, lighting and traffic.

The scope for the Municipality Energy Strategy is to provide the municipality an overview of the current energetic situation and prospects of long-term energy needs of consumers, giving the set of objectives of the Municipality and development goals to be achieved. This report contains recommendations for solutions to be implemented in order to achieve the goals. Energy Strategy, in the form presented, can be used as a tool for effective management of effective energy management, environmental protection and measures to promote sustainable development. The Consultants has included recommendations for short, medium and long terms to achieve the objectives, setting deadlines and responsibilities clearly defined financial resources, accompanied by sensitivity analysis.

1.2 Scop

Consultantul a urmarit cu atentie scopul serviciilor, asa cum au fost cerute prin Termenii de Referinta cu o atentie speciala in domeniile de furnizare a energiei, pentru care Primaria Municipiului Bucuresti este considerata ca fiind responsabila si anume sistemul de incalzire, iluminatul public si transportul urban.

Scopul realizarii Strategiei Energetice a Municipiului Bucuresti este acela de a furniza municipiului o privire de ansamblu asupra situatiei energetice actuale si a perspectivei pe termen lung a nevoilor energetice ale consumatorilor, cu indicarea setului de obiective ale Municipalitatii si a tintelor de dezvoltare care vor trebui atinse.

Prezentul raport contine recomandari de solutii care trebuie implementate in scopul atingerii obiectivelor stabilite.

Strategia Energetica, in forma prezentata, poate fi utilizata ca un instrument de management efectiv al gestionarii eficiente a energiei, protectiei mediului si promovarii masurilor pentru dezvoltare durabila.

Consultantul a inclus recomandari pe termen scurt, mediu si lung, pentru atingerea obiectivelor, stabilind termene responsabilitati si resurse financiare clar definite, insotite de analize de senzitivitate.

1.3 Overall conditions for the Strategy

The presented Municipality Energy Strategy is elaborated in respect of the National Energy Strategies and other relevant national strategies, EU-directives and strategies and relevant international conventions.

The main impact following these conditions are:

- Introduction of new production sources based solar energy, geothermal energy and utilisation of domestic renewable fuels such as waste, biomass, bio fuel.
- Energy rehabilitation of buildings reducing the consumption with about 45%.
- Improved energy efficiency in production, transmission and distribution by renewal of

1.3 Conditii generale pentru Strategie

Prezenta Strategie Energetica Municipala a fost elaborata tinand cont de prevederile Strategiei Energetice Nationale si a celorlalte strategii nationale relevante, Directivelor Europene si strategiilor, precum si conventiilor internationale relevante.

Impactul principal al acestor conditii se transpune prin urmatoarele conditii:

- Introducerea unor noi surse de producere pe baza de energie solare, energia geotermala si utilizarea combustibilului regenerabil casnic: de exemplu deseurile menajere, biomasa, biocombustibilul.
- Reabilitarea termica a cladirilor prin reducerea

the old production units and reduction of heat losses in the heating systems.

- Privatisation of the heating sector enables investments in the sector and improvement of the services.

consumurilor cu circa 45%.

- Imbunatatirea eficientei energetice in domeniul producerii, transportului si distributiei prin innoirea unitatilor vechi de producere si reducerea pierderilor de caldura in sistemele de incalzire.
- Privatizarea sectorul energetic, atunci cand nu exista resurse pentru investitii, precum si imbunatatirea acestor servicii.

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Edition	Date	Changes	Prepared by:	Approved by:

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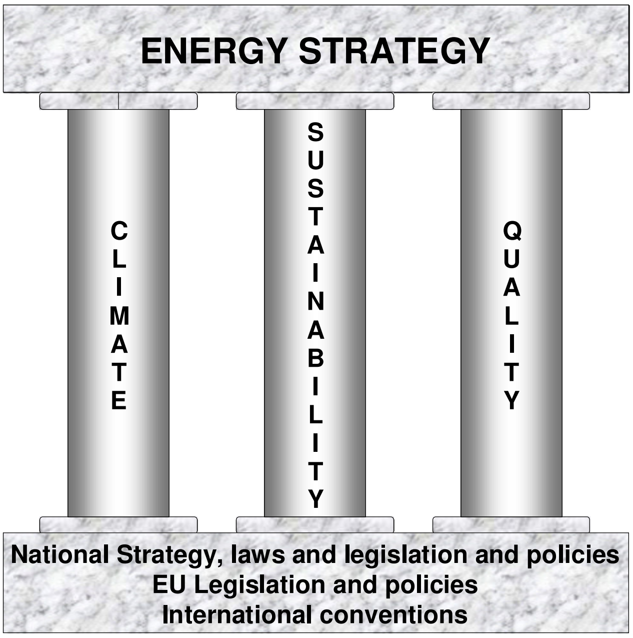
2 OVERALL STRATEGIES

2.1 Introduction

The elaborated strategy is carried on three pillows founded on Romanian legislation, the national energy strategy, EU directives and policies and international conventions:



Details regarding the overall strategies are found in Part C: Appendix 2.

2.2 Climate

The strategy is to reduce the emissions of greenhouse gasses by implementing actions to reach the goals of:

CO_2 neutrality in preparation of heat and hot tap water from 2020

CO_2 emissions related to transport reduced by 50% in 2020

The Municipality of Bucharest recognise its responsibility in relation to reducing the global warming and include in the Energy Strategy goals for

2 STRATEGIILE

2.1 Introducere

Strategia a fost dezvoltata pe baza a trei piloni ce se regasesc in legislatia nationala, in strategia energetica nationala, in directivele UE si policitice si conventiile internationale:

Detaliile privind strategia energetica se regasesc in Partea C: Anexa 2.

2.2 Clima

Strategia propusa este de a reduce emisiile de gaze cu efect de sera prin implementarea unor actiuni in vederea atingerii urmatoarelor tinte:

Producerea energiei termice pentru incalzire si apa calda de consum sa devina in anul 2020 neutra din punct de vedere a emisiilor de CO_2.

Emisiile de CO_2 din sistemul de transport sa se reduca cu 50% pana in anul 2020.

Municipiul Bucuresti isi recunoaste responsabilitatile pe care le are referitor la reducerea incalzirii globale si include printre obiectivele Strategiei Energetice reducing greenhouse gasses.

The Energy Strategy include the following main measures in respect of obtaining CO_2 neutrality:

- Mandatory connection to the district heating system or individual heating based no renewable energy.
- Energy conservation. Internal and external energy rehabilitation of buildings.
- Construction of solar heating systems.
- Construction of waste-to-energy facilities.
- Introduction of driving restrictions, parking restrictions, road pricing, congestion charges and traffic control.

reducerea emisiilor de gaze cu efect de sera.

Strategia energetica include urmatoarele masuri principale cu privire la obtinerea neutralitatii din punct de vedere al emisiilor de CO_2:

- Conectarea obligatorie la sistemul de termoficare sau sistemele de incalzire individuala sa fie alimentate din surse regenerabile.
- Conservarea energiei. Reabilitarea termica a cladirilor la interior si exterior.
- Construirea de sisteme de incalzire solara.
- Construirea facilitatilor de recuperare a energiei din deseuri.
- Introducerea restrictiilor privind conducerea autovehiculelor, restrictii legate de parcare, taxa de drum, taxe pentru aglomeratie si controlul traficului.

2.3 Sustainability

The strategy is to ensure sustainability in supply of district heating by implementing actions to reach the goals of:

A sustainable cost related heat tariffs introduced by 2010

A sustainable subsidise scheme introduced by 2012

A sustainable organisational and institutional set-up implemented by 2012

The Municipality of Bucharest recognises that the current conditions for heat supply are not sustainable in terms of subsidises, public investments, affordability and public service performance.

The Energy Strategy include the following main measures in respect of obtaining sustainability of the heat supply in Bucharest:

- Establishment of the current cost structure and introduction of a new tariff system based on an Administration Fee (Metering Fee), a Capacity Tariff and an Energy Tariff.
- Replacing the current general and indirect subsidise scheme with a subsidise scheme based on social criteria.
- Institutionalising the Public Service Organisation, PSO within the organisation of

2.3 Sustenabilitatea

Strategia consta in asigurarea sustenabilitatii furnizarii de energie termica prin implementarea unor masuri pentru a atinge urmatoarele tinte:

Un tarif al caldurii sustenabil bazat pe costuri care va fi introdus incepand cu 2010.

O schema de subventie sustenabila care va fi introdusa pana in 2012

O regandire sustenabila a sistemului organizational si institutional care sa fie implementata din 2012.

Municipiul Bucuresti isi recunoaste responsabilitatile pe care le are referitor la reducerea incalzirii globale si include printre obiectivele Strategiei Energetice reducerea emisiilor de gaze cu efect de sera.

Strategia energetica include urmatoarele masuri principale pentru a avea o furnizare a energiei termice sustenabila in municipiul Bucuresti:

- Stabilirea structurii costului actual si introducerea unui nou sistem de tarifare pe baza unei Taxe de Administrare (de contorizare), unui Tarif de Capacitate si un Tarif de Energie.
- Inlocuirea schemei actuale de subventii generale si indirecte cu o schema de subventii pe criterii sociale.
- Institutionalizarea Organizatiei Serviciului

the Municipality.

- Privatisation of installations inside the buildings including construction of small substations (heating modules).
- Privatisation of heat distribution in 10 – 15 private owned and operated companies.
- Privatisation of operation, including technical-economical load dispatch, of the transmission system.
- Privatisation of the heat production.

2.4 Quality

The overall strategy is:

To obtain quality of supply in 2015 equal to the average of modern district heating systems

To obtain this, the Municipality of Bucharest will implement actions to reach the goals of:

- A "supply on demand" concept introduced before 2015.
- Technical Supply Conditions introduced before 2012.
- A Benchmarking System introduced from 2009

The Municipality of Bucharest recognises that the current quality of supply of heating and hot tap water are not sustainable and will use the findings from benchmarking to establish specific actions to reach the goals.

The Energy Strategy include the following main measures in respect of obtaining a satisfactory quality of heat supply in Bucharest:

- Introduction of a "heat and hot tap-water on demand" concept. Installation of substations inside the buildings, establishment of recirculation of hot tap water and reconstruction of the networks.
- Establish Technical Supply Conditions defining the supply conditions at the location of the building (pressure, pressure drop and temperatures etc).
- Establishment of a Benchmarking system to compare the performance of the district heating companies as input for introduction of corrective measures.

Public, OSP in cadrul Municipalitatii.

- Privatizarea instalatiilor din interiorul cladirilor, inclusiv construirea de puncte termice mici (module termice)
- Privatizarea sistemului de distributie in 10-15 companii detinute si operate de operatori privati.
- Privatizarea functionarii, inclusiv dispecerizarea tehnico-economica, si privatizarea sistemului de transport
- Privatizarea producerii de energie termica.

2.4 Calitatea

In ansamblu, strategia este:

Obtinerea in anul 2015 a unei calitatii a furnizarii egala cu media din sistemele de termoficare moderne

Pentru a obține acest lucru, Municipiul Bucuresti va implementa urmatoarele masuri pentru a atinge obiectivele:

- Introducerea unui concept de furnizare "la cerere" înainte de 2015.
- Introducerea conditiilor tehnice de furnizare înainte de 2012.
- Introducerea unui sistem de benchmarking începand din anul 2009.

Municipiul Bucuresti isi recunoaste responsabilitatile pe care le are referitor la reducerea incalzirii globale si include printre obiectivele Strategiei Energetice reducerea emisiilor de gaze cu efect de sera.

Strategia energetica include urmatoarele masuri principale pentru a obtine o calitate satisfacatoare a furnizarii de energie termica in municipiul Bucuresti:

- Introducerea unui concept de "căldură si de apă caldă la cerere". Instalarea punctelor termice în interiorul clădirilor, punerea in functiune a recirculatiei pentru apa calda si reconstrucția retelelor.
- Stabilirea de condiții tehnice de furnizare care vor defini conditiile de furnizare pentru cladire (presiune, cădere de presiune si temperaturi etc.)
- Stabilirea unei sistem de referinta (benchmarking) pentru a compara performanța companiilor de termoficare in vederea introducerii de masuri corective.

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3 INTEGRATED RESOURCE PLANNING - IRP

3.1 Introduction

The strategies for the demand side, heat distribution, heat transmission and heat production are established based on an Integrated Resource Planning approach – IRP.

What is IRP?

Integrated Resource Planning (IRP) is a planning process for utilities that evaluates many different options for meeting future demands and selects the optimal mix of resources that minimises the cost of supply while at the same time meeting reliability needs and other objectives.

Purpose of the IRP

The specific purpose of the IRP in relation to elaboration of an Energy Strategy for Bucharest Municipality is to establish what options (demand side options, distribution options, transmission options and production options) to select for implementation.

The IRP Process

The IRP is performed in two phases (two screenings).

In the first phase different options influencing the production are selected and for each option the IRP-value (EUR/GJ and the related quantity of energy) is calculated on equal terms. The first screenings ranks the options and options are selected until there is obtained balance between demand and supply.

The first screening might very well select options, which will be impossible to utilise at the same time due to transmission/distribution limitations. In our case selection of solar energy will influence the production possibilities for other options as the solar heating will cover the demand 100% in the summer period while 100% capacity reserve must be maintained on other sources to cover the winter demand.

A second screening based on recalculated, more

3 PLANIFICAREA INTEGRATA A RESURSELOR - PIR

3.1 Introducere

Strategiile privind cererea, distributia energiei termice, transportul energiei termice si producerea sunt stabilite in baza realizarii unei planificarii integrate a resurselor – PIR.

Ce este PIR?

Planificarea integrata a resurselor (PIR) este o metoda de planificare pentru utilitati care analizeaza diferitele optiuni pentru asigurarea cerintei viitoare de energie termica si selecteaza mixul optim privind resursele in sensul minimizarii costului furnizarii, in acelasi timp asigurand necesitatile corespunzatoare si atingerea altor obiective.

Scopul PIR

Scopul specific al PIR cu privire la elaborarea strategiei energetice a municipiului Bucuresti este de a stabili optiunile (optiuni privind cererea, optiuni privind distributia, optiuni privind transportul si optiuni privind producerea) ce urmeaza a fi selectate pentru implementare.

Procesul PIR

Evaluarea PIR se realizeaza in doua etape (doua evaluari).

In prima etapa sunt selectate diferite optiuni care influenteaza productia si pentru fiecare optiune se calculeaza in conditii de egalitate valoare – PIR (EUR/GJ si cantitatea de energie aferenta). Prima evaluarea face o clasificare a optiunilor si optiunile sunt selectate pana cand se obtine un echilibru intre cerere si furnizare.

Prima evaluare ar putea foarte bine sa selecteze optiunile, care ar fi imposibil a fi utilizat in acelasi timp, din cauza limitarilor in transport/distributie. In cazul nostru selectia energiei solare va influenta, posibilitatile de producere pentru alte optiuni intrucat incalzire solara va acoperi cererea 100% in perioada de vara, in timp ce capacitatea de rezerva de la alte surse trebuie sa fie mentinuta 100% pentru a acoperi precise IRP-values is thus necessary to establish the final ranking of options.

cererea de iarna.

Astfel, este necesara o a doua evaluare, pe baza unor valori PIR mai exacte, recalculate, pentru a stabili clasificarea finala a optiunilor.

Reference to the Overall Goals

Climate

The IRP aim to obtain the goal of CO_2 neutrality from 2020 by including energy conservation options and production options based on renewable energy (solar heating and waste-to-energy). Energy and environmental taxes are included as they are known from other EU-countries and from 2020, when the taxes reaches 30%, it will be feasible to switch fuel from natural gas to bio heating oil (a product less refined than bio diesel).

Sustainability

The IRP assume a general modernisation (reconstruction) of the heating system in Bucharest and a sustainable future for the heat supply will be obtained when the options discussed in the IRP are implemented in 2020.

Quality

With a reconstructed district heating system designed according to best practise and introduction of modern management principles as known from North-European countries the quality of supply and services should be fully satisfactory to the consumers.

Referinte legate de obiectivele generale

Clima

Scopul PIR este de a obtine neutralitatea din punct de vedere al emisiilor de CO_2 incepand din 2020 prin includerea optiunile privind conservarea energiei si producerea din surse regenerabile (incalzire solara si recuperarea energiei din deseuri). Taxele de mediu si energie au fost incluse la valoarea cunoscuta in alte tari UE iar din 2020, pentru incalzire va fi fezabila, trecerea de la gaze naturale la bio combustibil (un produs mai putin rafinat decat biodiesel), cand taxele vor ajunge la 30%.

Sustenabilitatea

PIR ia in considerare modernizarea (reconstruirea) generala a sistemul de termoficare din Bucuresti si obtinerea unui viitor sustenabil pentru furnizarea de energie termica, cand optiunile luate in considerare vor fi implementate in anul 2020.

Calitate

Cu un sistem de termoficare reconstruit proiectat conform celor mai bune practici si introducerea unor principii de management cunoscute in tarile nord europene, calitatea furnizarii si a serviciilor ar trebui sa fie spre deplina satisfactie a consumatorilor.

References to the National Energy Strategy

Selection of IRP options is fully in-line with the national strategies and EU directives policies:

- The National Energy Strategy foresees that energy conservation will reduce the demand with about 45% compared to 2007 values and a support scheme with up to 70% Governmental support is expected introduced.

  From a socio-economic point of view it is difficult to compare option using imported fuel. Some findings show the socio-economic costs of constructing solar panes, and other fuel free energy resources, is only about 50% as the construction create domestic income and thus higher tax revenues.
- Waste shall according to the EU directive on waste be incinerated with heat recovering

Referinte legate de Strategia Energetica Nationala

Selectarea optiunilor PIR este pe deplin in concordanta cu strategia nationala si directivele si politicile UE:

- Strategia Energetica Nationala prevede reducerea cererii cu cca 45% comparativ cu 2007, datorita conservarii energiei si introducerea unei scheme de sprijin, cu pana la 70% sprijin guvernamental.

  Din punct de vedere socio-economic, este dificil sa se compare optiunile care folosesc combustibil importat. Anumite concluzii arata faptul ca prin construirea panourilor solare si a altor surse pe baza de energie regenerabila, costurile socio-economice de reprezinta cca 50%, intrucat construirea creaza venit si in consecinta pentru bugete, when not possible to recycle. The National Energy Strategy is fully in-line with the directive and foresees a part of the heat demand in cities with a waste quantity above 150.000 t per year covered by waste-to-energy facilities.

The IRP value is establish assuming that that heat energy for waste-to-energy facilities will be handled as renewable in coming legislation an thus be attempted for future energy and environmental taxes.

Attempted from taxes and with a gate fee corresponding to cost of disposal waste-to-energy will be very attractive.

- Construction of decentralised CHP units complies with the National Energy Strategy's provisions on high energy efficiency and the EU-directive on cogeneration. However, over time the heat from these CHP units will increase as energy and environmental taxes are introduced. In a long-term perspective (from about 2020 or later) the increase in production costs can be reduced by reconstruction of the unit for use of bio oil.

colectare ridicata din taxe pe venit.

- Deseurile, atunci cand nu este posibila reciclarea, in conformitate cu Directiva UE privind deseurile vor fi incinerate cu recuperarea caldurii. Strategia Energetica Nationala este pe deplin in conformitate cu directiva UE si prevede ca o parte a cererii de energie termica in orase, cu o cantitate de deseuri mai mare de 150.000 t pe an sa fie acoperita de facilitatile de transformare a deseurilor in energie.

Valoarea IRP este stabilita, plecand de la premiza ca energia termica produsa in facilitatile de transformare a deseurilor in energie va fi considerata ca fiind regenerabila in legislatia viitoare si de aceea trebuie scutita de la plata taxelor de mediu si energie.

Scutite de taxe si cu un tarif la poarta corespunzator cu costul depozitarii, transformarea deseurilor in energie va fi foarte atractiva.

- Construirea unitatilor de cogenerare descentralizate este in conformitate cu prevederile Strategiei energetice nationale privind inalta eficienta energetica si Directiva UE privind cogenerarea. Cu toate acestea, in timp, pretul energiei termice provenind de la aceste unitati va creste odata cu introducerea taxelor de mediu si energie. Intr-o perspectiva pe termen lung (din 2020 sau mai tarziu) cresterea costurilor de productie poate fi minimizata prin adaptarea unitatiilor la folosirea biocombustibilului.

References to appendixes

This chapter is prepared with reference to:

- Part C Appendix 3a: Integrated Resource Planning, IRP.
- Part C Appendix 3b: IRP second screening

Referinte privind anexele

Acest capitol este pregatit cu referire la:

- Partea C Anexa 3a: Planificarea Integrata a resurselor, PIR;
- Partea C Anexa 3b: A doua evaluare PIR.

3.2 Selected options

The following options are selected after the second screening:

Demand side options

Internal building energy conservation

External building energy conservation

Local production options

Solar heating systems

Local Peak-load boilers

Decentralised CHP

Centralised production options

Existing CHP

Existing heat-only boilers

Waste-to-energy facilities

Other production options such as heat pumps, fuel cells, biomass boilers and geothermal energy might be selected for specific purposes. It is estimated that production from such sources will be 5 -10 % in 2020.

3.2 Optiunile selectate

Urmatoarele optiuni sunt selectate dupa cea de-a doua evaluare:

Optiunii privind cererea

Conservarea energiei in interiorul cladirilor

Conservarea energiei la exteriorul cladirilor

Optiunile privind producerea la nivel local

Sisteme de incalzire solara

Cazane locale pentru varf

Centrale de cogenerare descentralizate

Optiuni privind producerea centralizata

CET-uri existente

CT-uri existente

Facilitati de transformare a deseurilor in energie

Alte optiuni de producere, cum ar fi pompele de caldura, pilele de combustie, cazane pe biomasa si energia geotermala pot fi selectate pentru scopuri specifice. Se estimeaza ca in 2020, productia obtinuta din astfel de surse va fi intre 5 si 10%.

3.3 First screening – ranking of options

The result of first screening was (long-term):

Rank 1: Internal building energy conservation
Rank 2: External building energy conservation
Rank 3: Waste-to-energy
Rank 4: Solar heating systems
Rank 5: Decentralised CHP
Rank 6: Centralised CHP
Rank 7: Local peak-load boilers

The selected options can produce about 28,000 TJ while the demand including losses will be below 20,000 TJ in 2020. This was considered in the second screening.

3.3 Prima evaluare – clasificarea optiunilor

Rezultatul primei evaluari a fost (pe termen lung):

Locul 1: Conservarea energiei in interiorul cladirii
Locul 2: Conservarea energiei la exteriorul cladirii
Locul 3: Transformarea deseurilor in energie
Locul 4: Sisteme de incalzire solara
Locul 5: Centrala de cogenerare descentralizata
Locul 6: Centrala de cogenerare centralizata
Locul 7: Cazane locale pentru varf

Optiunile selectate pot produce cca 28.000 TJ, in timp ce cererea, inclusiv pierderile, va fi mai mica de 20.000 TJ in anul 2020. Acest aspect a fost luat in considerare in a doua evaluare.

3.4 Second screening – ranking of options

The second screening excluded the Centralised CHP options as it become too expensive when the production was reduced establishing balance between demand and supply. Further, the heat production from waste-to-energy facilities was reduced in the summer period as the marginal costs of solar heating is much lower than from waste-to-energy.

The result of second screening is (long-term):

Rank 1: Internal building energy conservation

Rank 2: External building energy conservation

Rank 3: Solar heating systems

Rank 4: Waste-to-energy

Rank 5: Decentralised CHP

Rank 6: Local peak-load boilers

3.4 A doua evaluare – clasificarea optiunilor

Cea de-a doua evaluare a exclus optiunile privind centrala de cogenerare centralizata, care a devenit prea scumpa, in conditiile in care productia a fost redusa, iar echilibrul dintre cerere si oferta a fost stabilit. In plus, producerea de energie termica din facilitatile de recuperare a energiei din deseuri a fost redusa in perioada de vara, intrucat costurile marginale ale incalzirii solara sunt mult mai mici decat cele de la facilitatile de recuperare a energiei din deseuri.

Rezultatul celei de-a doua evaluari este (termen lung):

Locul 1: Conservarea energiei in interiorul cladirii

Locul 2: Conservarea energiei la exteriorul cladirii

Locul 3: Sisteme de incalzire solara

Locul 4: Facilitatile de recuperare a energiei din deseuri

Locul 5: Centrala de cogenerare descentralizata

Locul 6: Cazane locale pentru varf

3.5 Strategy

Based on the IRP the following strategy should be implemented:

- Most of the existing CHP and heat-only boilers should be decommissioned when replacement capacity is constructed and the energy conservation takes effect. If some capacity shall be maintained for the purpose of electricity generation must be decided by the authorities responsible for electricity supply.
- Building energy conservation (energy rehabilitation) should be implemented without delay.
- Solar heating should be constructed without delay. The solar panels should be integrated in the insulation envelopes.
- Waste-to-energy should be constructed as soon as possible. However, for practical, planning and financial reasons the first facility might not be commissioned before 2015.
- Decentralised CHP should be constructed without delay.
- Local peak-load boilers. Immediately construction is necessary as reconstruction of distribution and transmission systems cannot begin before a local production is established.

3.5 Strategia

Pe baza PIR urmatoarea strategie ar trebui sa fie pusa in aplicare:

- Cele mai multe dintre CET-uri si CT-uri existente ar trebui dezafectate, atunci cand capacitatea de inlocuire este construita si conservarea energiei produce efecte. In cazul in care anumite capacitati existente trebuie mentinute numai pentru a produce electricitate, acest lucru ar trebui decis de catre autoritatile nationale responsabile pentru furnizarea energiei electrice.
- Conservarea energiei (reabilitarea termica a cladirilor) ar trebui sa fie pusa in aplicare fara intarziere
- Incalzirea solara ar trebui sa fie construita fara intarziere. Panourile solare ar trebui sa fie integrate in anvelopa cladirii.
- Facilitatile de recuperare a energiei din deseuri ar trebui sa fie construite, cat mai curand posibil. Cu toate acestea, din motive practice, financiare si de planificare prima facilitate nu ar putea sa fie pusa in functiune inainte de 2015.
- Centrala de cogenerare descentralizata ar trebui sa fie construita fara intarziere.
- Cazane locale pentru acoperirea varfului de consum. Construirea imediata este necesara intrucat reconstructia sistemelor de distributie si transport nu poate incepe inainte de stabilirea producerii la nivel local.

3.6 Actions required

The actions required for implementing the strategy is discussed in the relevant following chapters for demand side strategies, distribution strategies, transmission strategies and production strategies.

3.6 Actiuni necesare

Actiunile necesare pentru punerea in aplicare a strategiei au fost considerate in urmatoarele capitole referitoare la strategiile privind cererea, distributia, transportul si producerea.

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4 DEMAND SIDE STRATEGIES

4.1 Introduction

Problem areas identified

The main problem areas identified are:

- High heat demand
- Poor comfort
- Lack of maintenance
- Lack of flow control
- Corrosion / Reduced lifetime

Heat demand

The heat demand for most buildings, new or old, exceed 180 kW/m^2/year, about double of what's found in EU-policies and the National Energy Strategy, which both establish a goal of 90 -100 kW/m^2/year for existing buildings and 50 kW/m^2/year for new buildings.

Comfort

The comfort level is low due to lack heat flow control and direct supply of heating and hot tap water often prepared far from the consumer. Waiting time for hot tap water is often several minutes.

Lack of maintenance

The lack of maintenance of internal installations is visible in many basements where sewage, heating water and cold tap water is flooding the basements.

A preventive maintenance programme is not established for nor the building neither for the district heating system. The installation and systems are simply maintained in operation until they break down.

Supply concept

The current supply concept is direct supply with the district heating system supplying the radiators and the taps without separation by heat exchangers. Thus, the ownership is confused from a practical point of view as the consumers hold RADET responsible for poor supply due to internal problems such as dirt in the radiators.

4 STRATEGII PRIVIND MANAGEMENTUL CONSUMULUI

4.1 Introducere

Problemele identificate

Principalele probleme identificate sunt:

- Necesar mare de energie termica
- Confortul scazut
- Lipsa de intretinere
- Lipsa reglajului de debit
- Coroziunea/ reducerea duratei de viata

Necesarul de caldura

Necesarul de caldura pentru majoritatea cladirilor, noi sau vechi, depaseste 180 kW/m^2/an, aproximativ dublu fata de specificatiile din politicile UE si Strategia Nationala, care stabilesc un obiectiv de 90 - 100 kW/m^2/an pentru cladirile existente si 50 kW/m^2/an pentru cladirile noi.

Confortul

Nivelul confortului este scazut datorita lipsei reglajului pentru debitul de agentul termic si datorita furnizarii directe a caldurii si apei calde de consum, adesea preparata la distanta mare de consumator. Timpul de asteptare pentru apa calda de consum este adesea de multe minute.

Lipsa de întreținere

Lipsa de întreținere a instalațiilor interne este vizibila, în multe subsoluri unde canalizarea, agentul termic si apă rece inunda subsolurile.

Nu s-a stabilit un program de întreținere preventivă nici pentru cladiri, nici pentru sistemul de termoficare. Instalatiile si sistemele sunt tinute in functionare pur şi simplu până când se sparg.

Conceptul de furnizare

Conceptul actual este alimentarea directa din sistemul de termoficare a radiatoarelor si a bateriilor de amestec fara o separare a circuitelor, prin schimbatoare de caldura. Astfel, limita de proprietate, din punct de vedere practic este confuza, intrucat consumatori considera RADET responsabil pentru furnizarea necorespunzatoare, in fapt problemele se regasesc in instalatiile interioare, cum ar fi de exemplu depunerile din radiatoare.

Lack of flow control

With more raisers inside each apartment block a flow control is necessary to ensure all raisers sufficient supplied. The flow control is also necessary to ensure a minimum and maximum pressure drop over the thermostatic valves on the radiators to obtain an appropriate function of the valves.

For most installations the pressure drop is too high due to the fix-flow concept maintained by RADET. With too high pressure drop the valves cannot close resulting in overheating. The pressure drop must in the future be controlled at the level of the apartment blocks and not from the thermal substations.

Lipsa reglajului de debit

Dat fiind numarul mare de utilizatori in blocurile de locuinte, este necesara reglarea debitului pentru a putea asigura furnizarea catre fiecare utilizator. Reglajul debitului este de asemenea necesar pentru se putea asigura o cadere minima si maxima de presiune la robinetele termostatate de pe radiatoare, pentru o functionare corecta a acestora.

Pentru cele mai multe dintre instalații, caderea de presiune este prea mare datorita conceptului de debit fix pastrat de RADET. Avand o cădere de presiune prea mare, robinetele nu se pot inchide conducand la supraincalzire. In viitor, caderea de presiune trebuie reglata la nivel de apartament de bloc si nu in punctul termic.

Corrosion problems / Reduced lifetime

The heating networks and internal installations are only maintained under pressure in the heating season and emptied in the off-heating season. The impact of this is a general low water quality and that corrosion of pipes and radiators starts every year in April and continues until October resulting in significant reduced lifetime of the installations.

Probleme legate de coroziune/ Durata de viata redusa

Retelele de încălzire şi instalatiile interne sunt mentinute sub presiune numai în sezonul de încălzire şi golite în regim de vara. Consecintele acestei situatii sunt: o calitate in general proasta a apei din retele si instalatii, iar in fiecare an in aprilie incepe corodarea conductelor si a radiatoarelor si continua pana in octombrie, reducand semnificativ durata de viata a acestora.

Demand side options

From a socio-economic point of view, most demand side options are feasible as they reduce the demand reducing import of fuels while promoting domestic employment and commercial activities.

The demand side options to be implemented are:

- Installation of local substations owned and operated by the building owners.
- Internal energy conservation options
- External energy conservation options

One of the main problems will be to establish financing for the options. While it is relatively easy, assuming attractive conditions, to find private investors for construction and operation of production units it is very difficult to establish attractive financing of energy conservation projects due to the huge number of lenders. Hence, to ensure that the demand side options are implemented the authorities must play an active role in obtaining financing by establishment of subsidise schemes and attractive loan conditions.

Optiuni privind necesarul de caldura

Din punct de vedere socio-economic, cele mai multe optiuni privind managementul consumului sunt fezabile, in conditiile in care: acestea reduc necesarul si corespunzator scaderea importului de combustibili si conduc la stimularea ocuparii forței de muncă, precum şi a activităților comerciale la nivel national.

Optiunile privind cererea ce urmeaza a fi implementate sunt:

- Instalarea modulelor termice deținute şi exploatate de către proprietarii cladirilor.
- Conservarea energiei in interiorul cladirilor
- Conservarea energiei la exteriorul cladirilor

Una din principalele probleme va fi aceea de a stabili solutii pentru finanțarea acestor opțiuni. Deşi, gasirea de investitorilor privati pentru construirea si exploatarea unitatilor de producere pare relativ usoara, luand in considerare conditiile atractive, finantarea proiectelor de conservare a energiei este dificila datorita numarului mare de creditori. Prin urmare, pentru a asigura implementarea optiunilor privind managementul consumului, autoritățile trebuie să joace un rol activ în obținerea finanțarii prin

References to the National Energy Strategy

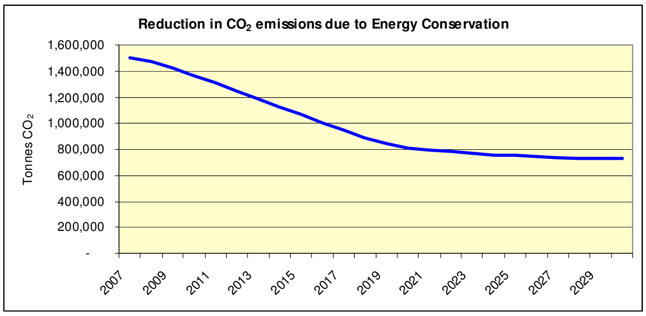
The National Energy Strategy forecast energy consumption reduced to about 100 kWh/year/m^2 for existing buildings.

This corresponds to the about 45% energy conservation as used when preparing the strategies found in this report.

References to the main coals

Climate

To obtain CO_2 neutrality from 2020 the demand side must contribute with at least 45% energy conservation calculated from the 2007 demand. The reduction in CO_2 emissions is forecasted as:



Support schemes for Energy Rehabilitation are in place and the Sectors Municipality will be the administrators of these schemes. The Municipality of Bucharest should act as a service organisation assisting the building owners in obtaining the support. Information and establishment of comprehensive procedures should be the key words in this respect.

Energy rehabilitation is assumed including at least:

- Internal energy conservation. Change of pipes when necessary, insulation of pipes, repair/change of windows and doors and insulation of common areas as basement staircases and roofs.
- External energy conservation. Concrete rehabilitation to the extent necessary and construction of an insulation envelope with solar heating panels integrated.
- Installation of local heating units and establishment of internal recirculation of hot-tap water.

stabilirea schemelor de sprijin şi a unor condiţii atractive de împrumut.

Referire la Strategia Energetica Nationala

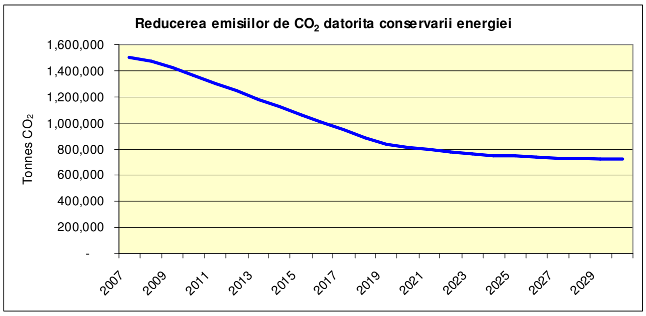
Strategia Energetica Nationala prevedere reducere consumului de energie la aproximativ 100 kWh/year/m^2 pentru cladirile existente.

Aceasta corespunde cu aproximativ 45% conservarea energiei, procent luat in considerare la elaborarea strategiilor din acest raport.

Referinte legate de principalele

Clima

Pentru a obtine neutralitatea din punct de vedere al emisiilor de CO_2 din anul 2020 trebuie sa se obtine o reducere a cererii cu cel putin 45% din necesarul pentru anul 2007. Reducerea emisiilor de CO_2 este preconizata astfel:



Schemele de sprijin pentru reabilitarea termica sunt în vigoare şi Primariile de sector vor fi administratorii acestor scheme. Primaria Municipiului Bucuresti ar trebui sa acţionează ca o organizaţie de servicii care asiste proprietarii cladirilor în obţinerea de sprijin. In acest sens, informarea si stabilirea unor proceduri comprehensive ar trebui să fie cuvintele-cheie.

Se presupune ca reabilitarea termica va include cel putin:

- Conservarea energiei la interior. Inlocuirea conductelor când este necesar, izolarea conductelor, repararea / inlocuirea usilor şi ferestrelor şi izolarea zonelor comune, cum ar fi subsolul, scărilor şi teraselor.
- Conservarea energiei la exterior. Refacerea betonului, în măsura necesară şi anveloparea cladirilor cu integrarea panourilor solare.
- Instalarea de module termice la nivel local şi recirculatia interna a apei calde de consum.

Sustainability

The demand side will contribute to obtaining sustainability for district heating by taking over the responsibility of heat and hot tap water supply inside the buildings both financial and operational. The responsibility of the public district heating company should be limited to supply heat at conditions (temperature, pressure and pressure drop) established in Technical Supply Conditions elaborated by the district heating company and approved by the PSO.

Sustenabilitatea

Managementul consumului va contribui la sustenabilitatea sistemului de termoficare prin preluarea responsabilităților privind furnizarea caldurii si a apei calde de consum, atat din punct de vedere financiar cat si operational. Responsabilitatea regiei autonome de distributie a energiei termice ar trebui să se limiteze la furnizarea energiei termice conform conditiilor (de temperatură, de presiune şi căderea de presiune), stabilite în Conditiile Tehnice de Furnizare elaborate de compania de termoficare si aprobata de OSP(Organizatia Serviciului Public).

Quality

Change of the supply concept from direct supply (4-pipe systems) to indirect supply (2-pipe system) by installation of local heating units will enable improvement of the quality of supply to a level decided by the consumers.

Calitatea

Inlocuirea conceptului de furnizare directă (sisteme cu 4 conducte) cu conceptul de furnizare indirecta (sistem cu 2 conducte), prin instalarea modulelor termice iar acestea vor permite îmbunătățirea calității furnizarii la un nivel decis de către consumatori.

References to appendixes

This chapter is prepared with reference to:

- Part C Appendix 4a: Reconstruction of networks
- Part C Appendix 4b: Demand forecast
- Part C Appendix 7a: Integration of solar panels in the district heating systems
- Part C Appendix 8a: Restructuring of the district heating sector

Referinte la anexe

Acest capitol face referire la:

- Partea C Anexa 4a: Reconstructia retelelor
- Partea C Anexa 4b: Prognoza cererii
- Partea C Anexa 7a: Integrarea panourilor solare in sistemul de termoficare
- Partea C Anexa 8a: Reconstructia sectorului de termoficare

4.2 Strategies

The strategies related to the demand side are:

Mandatory connection to the district heating system

Establishment of a “heat and hot tap-water on demand” supply concept

Establishment of administrative and technical supply conditions

Assistance in obtaining funds for energy conservation

The main actions necessary for implementing the strategies and obtaining the goals are described in the following sections:

4.2 Strategiile

Strategiile privind necesarul sunt:

Conectarea obligatorie la sistemul de termoficare

Stabilirea unui concept de furnizare “la cerere” a caldurii si apei calde de consum

Stabilirea conditiilor administrative si tehnice de furnizare

Sprijin in obtinerea fondurilor pentru conservarea energiei

Principalele actiuni necesare pentru implementarea strategiilor si atingerea obiectivelor sunt descrise in sectiunile urmatoare:

4.3 Actions reguired

Mandatory connection to district heating

The Municipality of Bucharest will implement the necessary actions to obtain:

> **All heat demands covered by district heating or individual heat supply based on CO_2 neutral sources in 2020.**

This strategy requires the Municipality of Bucharest to establish mandatory connection to the district heating system and extension of the district heating network to currently natural gas supplied areas.

The objective of this strategy is to ensure that all heat consumers after 2020 are supplied from CO_2 neutral sources.

Supply concept

The Municipality of Bucharest will implement the necessary actions to obtain:

> **A supply concept based on "heat and hot tap water on demand"**

Necessary action is to separate the supply systems inside the buildings from the distribution systems by installation of local substations. This concept enable recirculation of hot tap water inside the buildings, if decided by the building owner, which is not practical possible with the current direct supply concept.

The objective of this strategy is to ensure all heat consumers the same comfort level as found in most West-European district heating countries and comparable to the comfort obtainable if the consumers are individually supply by natural gas or other individual sources.

Supply conditions

The Municipality of Bucharest will ensure that:

4.3 Actiuni necesare

Conectarea obligatorie la sistemul de termoficare

Municipiul Bucuresti va implementa actiunile necesare pentru ca:

> **Necesarul de caldura va fi acoperit de sistemul de termoficare sau de sisteme individuale de incalzire care utilizeaza surse neutre dpdv al emisiilor de CO_2 in 2020.**

Această strategie implica stabilirea de catre Municipiul Bucuresti a obligativitatii conectarii la sistemul de termoficare şi extinderea reţelelor de termoficare în zonele care sunt alimentate in prezent cu gaze naturale.

Obiectivul acestei strategii este de a se asigura că toţi consumatorii de energie termică după anul 2020 vor fi alimentati de la surse neutre dpdv al emisiilor de CO_2.

Conceptul de furnizare

Municipiul Bucuresti va implementa acțiunile necesare pentru a obține:

> **Concept de furnizare de caldura si apa calda de consum "la cerere"**

Este necesar sa se separe sistemele de alimentare din interiorul cladirilor de sistemele de distributie prin instalarea de module termice locale. Acest concept permite recircularea apei calde de consum în interiorul clădirilor, daca proprietarul cladirii decide aceasta si care, in conditiile conceptul actual de furnizare directa, nu este practic posibil.

Obiectivul acestei strategii este de a asigura tuturor consumatorilor de energie termică acelaşi nivel de confort ca în alte tari vest-europene cu sisteme de termoficare si comparabil cu confortul care poate fi obținut în cazul în care consumatorii au surse individuale de incalzire pe baza de gaze naturale sau alte surse.

Conditii de furnizare

Municipiul Bucuresti se va asigura că:

The distribution companies establish General Supply Conditions approved by the Public Service Organisation (Bucharest Municipality)

The distribution companies established Technical Supply Conditions to be introduced after approved by the Public Service Organisation (Bucharest Municipality)

The General Supply Conditions must establish administrative procedures and the tariff structure and include as an attachment a tariff sheet with current approved tariffs.

The Technical Supply Conditions must establish the technical requirement regarding the local substations, metering and design conditions in terms of temperatures, pressure and pressure drop.

The objective of these strategies is to establish the responsibility of the consumers as well as of the district heating companies.

Energy conservation

The Municipality of Bucharest will actively:

Assist the building owners in obtaining subsidises and financing for energy rehabilitation

However, the Sectors Municipality will contribute partially to direct finance of the energy conservation in private buildings.

Support development of standard concepts for external building insulation integrating solar panels in the insulation envelope.

The objective of these strategies is to promote energy conservation, which is necessary if other strategies and related goals shall be successfully implemented and obtained.

Companiile de distributie vor stabili Condițiile Generale de Furnizare aprobate de către Organizatia Serviciului Public (Municipiul Bucuresti)

Companiile de distributie au stabilit condiții tehnice de furnizare care urmează să fie introduse după aprobarea primita din partea Organizația Serviciului Public (Municipiul Bucuresti)

Conditiile Generale de Furnizare trebuie să stabilească procedurile administrative şi structura tarifului şi vor include o anexa cu lista tarifelor curente aprobate.

Conditiile Tehnice de Furnizare trebuie să stabilească cerintele tehnice privind modulele termice locale, contorizarea şi conditiile de proiectare referitoare la temperatura, presiune şi de cădere de presiune.

Obiectivul acestor strategii este de a stabili responsabilitatea consumatorilor, precum şi cea a companiilor de termoficare.

Conservarea energiei

Municipiul Bucuresti va sprijini activ:

Proprietarii de cladiri la obtinerea subventiilor si finantarii pentru reabilitarea termica

Totusi, Primariile de sector vor finanta partial reabilitarea termica a cladirilor aflate in proprietate privata.

Dezvoltarea conceptelor standard pentru anveloparea cladirilor cu integrarea de panouri solare

Obiectivul acestor strategii este de a promova conservarea energiei, care este necesara pentru ca alte strategii si obiective aferente sa fie atinse si implementate cu succes.

4.4 Demand forecast

The demand forecast for district heating considers:

- An energy conservation of 45% of the 2007 demand
- About 40% reduction of thermal loses
- Connection of consumers (existing natural gas consumers and new consumers)
- Disconnection of consumers (buildings demolished)

The demand forecast is established in three scenarios:

- Baseline scenario. The goals of the strategy will be reached in 2020.
- Slow implementation scenario. The goals of the strategy will be reached in 2023.
- Accelerated implementation scenario. The goals of the strategy will be reached in 2017.

The energy demand will decrease from 20,580 TJ in 2007 to 14.040 TJ in 2030 in all scenarios.

The capacity demand will decrease from currently about 2,800 MJ/sec (Design capacity – the capacity realised in 2007 was 2,150 MJ/sec) to about 1.500 MJ/sec in 2030.

The demand forecast shall not be seen as estimation but as a goal to be obtained by implementing the necessary measures in terms of subsidises and taxes.

4.4 Prognoza cererii

Prognoza cererii pentru sistemul de termoficare considera:

- O conservare a energiei de 45% din cererea la nivelul anului 2007.
- Aprox. 40% reducerea pierderilor de caldura
- Conectarea consumatorilor (consumatorii actuali de gaze naturale si noii consumatori)
- Debransarea consumatorilor (cladiri demolate).

Prognoza cererii este stabilita in trei scenarii:

- Scenariul de baza. Obiectivele strategiei vor fi atinse in 2020.
- Scenariul cu implementare lenta. Obiectivele strategiei vor fi atinse in 2023.
- Scenariul cu implementare accelerata. Obiectivele strategiei vor fi atinse in 2017.

Cererea de energie va scadea de la 20.580 TJ in 2007 la 14.040 TJ in 2030 in toate scenariile.

Cererea de capacitate va scadea de la cca 2.800 MJ/sec in prezent (capacitate proiectata – capacitatea realizata in 2007 a fost de 2.150 MJ/s) la aprox. 1.500 MJ/sec in 2030.

Prognoza cererii nu va fi privita ca o estimare, ci ca un obiectiv care urmeaza sa fie atins prin implementarea masurilor necesare referitoare la subventii si taxe.

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5 DISTRIBUTION STRATEGIES

5.1 Introduction

Problem area identified

The main problem areas identified are:

- High heat losses
- High operation costs
- Low comfort level
- Lack of maintenance
- Lack of flow control
- Corrosion

High heat losses

The pipe systems are designed for more than double the capacity of what's needed today and for a 4-pipe supply concept. The large pipe surfaces and the many pipes lead to unnecessary high heat losses.

High operation costs

The operation costs in terms of pumping costs and make-up water consumption are very high.

Many distribution systems are still operated with fixed flow and those who have installed modern control systems are not optimised in terms of balancing the heat flow to the consumers.

Make-up water should be supplied from the transmission system or be prepared by water treatment in the substations. Both solutions are expensive considering the huge quantities lost in the networks and installations inside the buildings. However, in most substations the make-up water is none-treated cold tap water, which of cause is a cheap solution by damage the pipes and components as discussed in a later section.

Low comfort level

The comfort level, especially for hot tap water, is low for many consumers due to the centralised concept for preparation of heating and hot tap water.

5 STRATEGIA PRIVIND DISTRIBUTIA

5.1 Introducere

Problemele identificate

Problemele principale identificate sunt:

- Pierderi mari de caldura
- Costuri mari de exploatare
- Nivel scazut al confortului
- Lipsa de intretinere
- Lipsa reglarii debitului
- Coroziunea

Pierderi mari de caldura

Sistemele de conducte sunt proiectate pentru o capacitate aproape dubla fata de cat este necesar in prezent, in baza unui concept de furnizare cu 4 tevi. Suprafata mare a conductelor precum si numarul mare de conducte conduc la mari pierderi de caldura inutile.

Costuri mari de exploatare

Costurile de exploatare sunt foarte mari si ne referim la costurile de pompare si la cele cu apa de adaos.

Multe dintre sistemele de distributie functioneaza inca cu debit fix, chiar si cele in care au fost instalate sisteme de automatizare moderne, acestea nu sunt optimizate in sensul echilibrarii hidraulice.

Apa de adaos ar putea sa fie furnizata de sistemul de transport sau sa fie pregatita, prin tratarea apei in punctele termice. Ambele solutii sunt costisitoare luand in considerare cantitatile uriase ce se pierd in retele si in instalatiile din interiorul cladirilor. Cu toate acestea, in cele mai multe puncte termice apa de adaos este apa rece netratata, ceea ce reprezinta desigur o solutie ieftina, insa deterioreaza conductele si componetele asa cum este descris in sectiunea urmatoare.

Confort scazut

Nivelul de confort, in special pentru apa calda de consum, este mic, pentru multi consumatori ca urmare a conceptului de preparare centralizata a caldurii si apei calde de consum.

Lack of maintenance

RADET has no preventive maintenance programme implemented and in general the system runs until something break down and an emergency repair is performed. A reduced lifetime and poor system performance is the consequence.

Many distribution systems are operated without the recirculation system for hot tap water in operation. Obviously, it has been easier to stop the system than to repair it.

Lipsa de intretinere

RADET nu are implementat nici un program de intretinere preventiva si in general, sistemul functioneaza pana cand ceva se sparge si este reparat de urgenta. Consecinta acestui fapt este reducerea duratei de viata si eficienta scazuta a sistemului.

Multe dintre sistemele de distributie sunt exploatate, fara sistem de recirculare a apei calde de consum. In mod evident, a fost aleasa solutia cea mai simpla si anume scoaterea din functiune in locul reparatiei acesteia.

Lack of flow control

The idea of the control systems installed in many substations is to operate the heating circulation pumps according to the actual heat demand. However, as a sensor is placed at the most critical supplied block to send signals for the pump control and the system is not balanced the possible savings in terms of reduced flow (reduced pumping costs) and reduced temperature (reduced losses) is not obtained. A side effect is that overheating is seen in the apartment blocks near the substations as the pressure drop is too high for the thermostatic valves on the radiators.

Lipsa de reglare a debitului

Scopul sistemelor de automatizare instalate in multe puncte termice este de a actiona pompele de incalzire, in functie de cererea utila de energie termica. Cu toate acestea, chiar daca este instalat un senzor la blocul cel mai defavorizat pentru a trimite semnale si a actiona pompa, in conditiile in care sistemul nu este echilibrat, potentialele economii nu se pot obtine si anume reducerea debitului (reducerea costurilor de pompare) si scaderea temperaturii (reducerea pierderilor). Un efect secundar este acela ca blocurile aflate in apropierea punctelor termice sunt supraincalzite, situatie generata de caderea de presiune prea mare in robinetele termostate de pe radiatoare.

Corrosion

The heating pipes are emptied for water during the off-heating season and thus the corrosion aggressive progresses in the summer period every year.

The impact of corrosion is reduced lifetime of the heating system and problems with functioning of thermostatic valves, control valves, radiators and heat exchangers due to dirt in the system.

Coroziune

Conductele de incalzire sunt golite de apa in regimul de vara si, astfel, coroziunea progreseaza agresiv in perioada de vara, din fiecare an.

Impactul coroziunii este reducerea duratei de viata a sistemului de incalzire si aparitia problemelor legate de functionarea robinetelor termostate, a vanelor de reglare, radiatoarelor si a schimbatoarele de caldura, datorita mizeriei din sistem.

Need for redesign/reconstruction

The identified problems makes it necessary to redesign and reconstruct the distribution system:

- The current 4-pipe concept with centralised preparation of heat and hot tap water do not comply with the supply strategies. A 2-pipe concept must be established.
- The current systems are oversized and thus the thermal losses are unnecessary high. The system must over time be resized (change when worn out).
- Solar heating systems and heat storages will in the future be connected to the distribution

Nevoia de reproiectare/reconstructie

Problemele identificate fac necesara reproiectarea si reconstructia sistemului de distributie:

- Conceptul actual de prepararea centralizata a caldurii si a apei calde de consum, cu 4 tevi nu corespunde strategiilor de furnizare. Trebuie realizat un concept de furnizare cu 2 tevi.
- Sistemele existente sunt supradimensionate si in consecinta pierderile de caldura sunt prea mari. Sistemul trebuie sa fie redimensionat in timp, pe principiul inlocuire cand este “uzat fizic si moral”.

systems. The redesigned distribution systems must consider this.

- Operating and maintaining about 680 substations is not feasible. More substations should be merged establishing about 100 new heat exchanger stations.

Significant savings can be obtained by optimising the system layout and optimising the operation. Most of the substations have modern control systems but it will take a committed operator to obtain the possible savings from optimising the operation. The current organisation has demonstrated inefficiency in this respect. The Consultant droughts that the current organisation can establish the necessary engagement for obtaining the huge savings in terms of reduced pumping costs and thermal losses demonstrated obtainable.

- Sistemele de incalzire solara si acumulatoarele de caldura vor fi conectate in viitor la sistemele de distributie. Reproiectarea sistemelor de distributie trebuie sa ia in considerare acest fapt.
- Exploatarea si intretinerea a aprox. 680 de puncte termice nu este fezabila. Mai multe puncte termice trebuie unite si alimentarea trebuie asigurata de la aprox. 100 de statii de schimbatoare de caldura noi.

Prin optimizarea schemei sistemului si optimizarea functionarii se pot obtine economii semnificative. Majoritatea punctelor termice sunt dotate cu sisteme de automatizare moderne insa este nevoie ca operatorul sa aiba responsabilitati in acest sens, pentru a putea obtine economiile posibile in urma optimizarii functionarii. Actuala organizare a demonstrat ineficienta in acest sens. Consultantul se indoieste ca actuala organizare se poate angaja la obtinerea unor economii uriase, in sensul reducerii costurilor de pompare si a pierderilor de caldura, economii demonstrate ca fiind posibile.

References to the National Energy Strategy

Energy Strategy of Romania is with policy directions set out in the European Union and contribute to achieving the target set by the European Commission for all Member Community. In this way the national strategy have been set a series of specific objectives, relating to decisions of legislative and regulatory framework. For the proper functioning of the energy sector and its development under this strategy, it is necessary to create a stable and predictable climate in terms of the legislative and regulatory framework have been established in such a series of measures:

- Transposition into national legislation the provisions of Directive 2006/32/EC on energy efficiency to end users and energy services, by Ordinance 22/2008.
- Ensure by the law the facilities for private investors who will invest in technology supply systems with centralized heating systems.
- Ensure by the law the facilities for the population to encourage purchasing, installing and use of installations of heating and hot tap water through the use of renewable energy (solar panels, heat pumps, wind generators, geothermal sources, etc.)..
- Promoting by the state of investment programme and support local authorities for technology and modernization of centralized heating system.
- Promoting media campaigns and other means

Referinta privind Strategia Nationala

Strategia energetica a Romaniei este conforma directiilor politice stabilite la nivelul Uniunii Europene si contribuie la atingerea tintelor stabilite de Comisia Europeana pentru ansamblul statelor comunitare.
In acest sens prin strategia nationala au fost stabilite o serie de obiective specifice, referitoare la decizii de ordin legislativ si de reglementare. Pentru buna functionare a sectorului energetic si dezvoltarea acestuia conform prevederilor prezentei strategii, este necesara crearea unui climat stabil si predictibil in ceea ce priveste cadrul legislativ si de reglementare astfel au fost stabilit o serie de masuri:

- Transpunerea in legislatia nationala a prevederilor Directivei 2006/32/CE privind eficienta energetica la utilizatorii finali si serviciile energetice, prin Ordonanta 22/2008.
- Asigurarea prin lege a unor facilitati pentru investitorii privati care investesc in retehnologizarea sistemelor de alimentare centralizata cu energie termica a populatiei.
- Asigurarea prin lege a unor facilitati pentru populatie pentru incurajarea achizitionarii, montarii si utilizarii unor instalatii de incalzire si preparare a apei calde de consum prin utilizarea unor resurse energetice regenerabile (panouri solare, pompe de caldura, generatoare eoliene, surse geotermale etc.).
- Promovarea de catre stat a unor programe de investitii si sprijinirea autoritatilor

of informing the need for provision of the population of measures to increase energy efficiency, reduce energy consumption, conservation of fossil energy resources, using renewable resources, environmental protection and the threat generated by the phenomenon of global warming.

In terms of ensuring the affordability of the energy prices to the consumers there is needed:

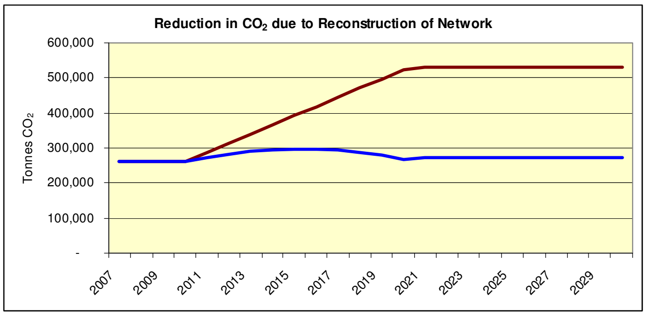
- Reducing the energy bill paid by the population and economic operators considering increasing energy efficiency on the entire chain (production, transmission, distribution, consumption), reduce consumption and use of specific technologies, performance in the energy sector
- Stimulate investments in improving energy efficiency on entire chain: resources, production, transmission, distribution and consumption.

Considering all above mentioned recommendations included in this chapter are closely related to the objectives set by the national strategy.

References to the main goals

Climate

The redesign and reconstruction of the distribution system will abandon the current 4-pipe system and introduction a modern 2-pipe system. This will reduce the heat losses and in spite of extension of the distribution networks the emissions can be kept almost constant at current level[1]:



administratiei publice locale pentru retehnologizarea si modernizarea sistemelor de alimentare centralizata cu energie termica a populatiei.

- Promovarea unor campanii de presa, precum si prin alte mijloace de informare a necesitatii acordarii de catre populatie a unor masuri de crestere a eficientei energetice, a reducerii consumului de energie, a conservarii resurselor fosile de energie, a utilizarii resurselor regenerabile, a protectiei mediului si a pericolului generat de fenomenul de incalzire globala.

In ceea ce priveste asigurarea unui grad de suportabilitate a preturilor energiei termice la consumatori sunt necesare urmatoarele:

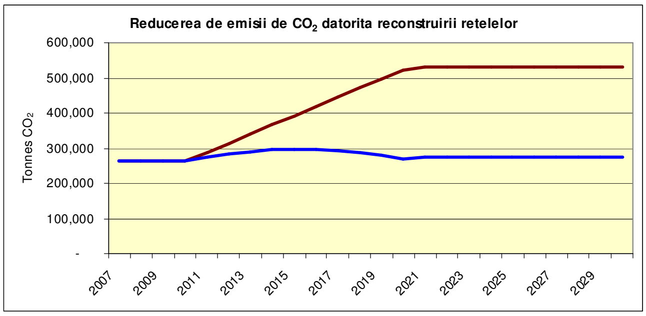
- reducerea facturii cu energia platita de populatie si de operatorii economici, prin cresterea eficientei energetice pe intregul lant (producere, transport, distributie, consum), reducerea consumurilor specifice si utilizarea de tehnologii noi, performante, in sectorul energiei
- stimularea investitiilor in imbunatatirea eficientei energetice pe intregul lant: resurse, productie, transport, distributie, consum.

Considerand cele de mai sus, recomandarile incluse in acest capitol sunt in stransa corelare cu obiectivele stabilite prin strategia nationala.

Referire la obiectivele principale

Clima

Prin reproiectarea si reconstructia sistemului de distributie se va abandona sistemul existent cu 4 tevi si se va introduce un sistem modern cu 2 tevi. Ca urmare a aceastei inlocuiri se vor reduce pierderile de caldura si in pofida extinderii retelelor de distributie, emisiile pot fi mentinute aproape constant, la nivelul actual[1]:



[1] If the production strategies are implemented, the CO_2 emission related to heat losses will, over time, be close to zero as no convensional fuels are used/ Daca strategiile privind producerea sunt implementate, emisiile de CO_2 legate de pierderile de caldura in timp vor ajunge la zero intrucat nu se vor mai folosi combustibilii conventionali.

The brown curve shown how the CO_2 emission will develop if current system layout is maintained. The blue curve show how the CO_2 emission will develop if the network is reconstructed.

Curba maro indica modul in care vor evolua emisiile de CO_2, in conditiile in care sistemul actual este mentinut. Curba bleu indica evolutia emisiilor de CO_2, in conditiile in care retelele vor fi reconstruite.

Sustainability

Once the distribution systems are redesigned and reconstructed one of the main conditions for a sustainable future for the district heating companies is establish. The distribution companies will have district heating systems with low operation costs (heat losses and electricity for pumping) and very low maintenance costs.

Sustenabilitatea

Dupa reproiectarea si reconstruirea sistemelor de distributie, se vor stabili principalele conditii pentru un viitor durabil pentru companiile de termoficare. Companiile de distributie vor avea sisteme de termoficare, cu costuri de exploatare mici (pierderi de caldura si energie electrica pentru pompare) si costuri de intretinere foarte mici.

Quality

The redesign and reconstruction must consider satisfactory supply conditions for all consumers and assuming appropriate operation of the local heating units by the building owner (his service contractor) the consumers will experience a high quality of supply.

Calitatea

Reproiectarea si reconstruirea trebuie sa ia in considerare conditii de furnizare satisfacatoare pentru toti consumatorii si in ipoteza ca modulele termice locale sunt exploatate corespunzator de proprietarii cladirilor (furnizorul de service), consumatorii vor avea o calitate ridicata a furnizarii.

References to appendixes

This chapter is prepared with reference to:

- Part C Appendix 4a: Reconstruction of networks
- Part C Appendix 5a: Benchmarking
- Part C Appendix 5b: Network heat losses
- Part C Appendix 7a: Integration of solar heating in the district heating systems
- Part C Appendix 7c: Reconstruction of the production system
- Appendix 8a: Restructuring of the district heating sector

Referire la anexe

Acest capitol face referire la:

- Partea C Anexa 4a: Reconstructia retelelor
- Partea C Anexa 5a: Benchmarking
- Partea C Anexa 5b: Pierderile pe retele
- Partea C Anexa 7a: Integrarea panourilor solare in sistemul de termoficare
- Partea C Anexa 7c: Reconstructia sistemului de producere
- Partea C Anexa 8a: Restructurarea sectorului de termoficare

5.2 Strategies

The strategies related to heat distribution are:

Privatisation

Redesign and reconstruction of the distribution systems

The main actions necessary for implementing the strategies are described in the following sections:

5.2 Strategiile

Strategiile privind distributia de energie termica sunt:

Privatizarea

Reproiectarea si reconstruirea sistemelor de distributie

Principalele actiuni necesare pentru implementarea strategiilor sunt descrise in sectiunile urmatoare:

5.3 Actions required

Privatisation

The Municipality of Bucharest will take the necessary actions to:

Privatisation of the heat distribution in Bucharest

The objective of this action is to ensure a sustainable future for the district heating supply in Bucharest and ensure the population a service and comfort level as found in most West-European and more rehabilitated East-European district heating systems without creating heavy financial burdens for the Municipality of Bucharest.

The necessary tasks in this respect will be:

a. To establish 10-15 logical/geographical selected distribution areas
b. To establish a Public Service Organisation (PSO)
c. Employ consultant(s)
d. Establish current benchmarks for the selected distribution areas (establish the starting point when privatised).
e. Establish the general concession conditions and general contractual framework
f. Invite private investors/operators for participation (Pre-qualification)
g. Approval of the concession contract and procedures by the CGMB
h. Transparent negotiation of the specific concessions conditions and specific contractual conditions with all tenderers, completion of the tender procedures and conclusion of the contract
i. Establish concession and contracts
j. Taking-over by the private operator/investor

a. It seems comprehensive to divide the supply area in 10-15 distribution areas. The task of establishing the new supply areas should be performed by RADET with consultant assistance. The selected supply areas should be approved by the CGMB (Municipality of Bucharest). The new distribution areas are established in the following action “Redesign and Reconstruction”.
b. The purpose of establishing a Public Service Organisation, PSO is to ensure that the obligations

5.3 Actiuni necesare

Privatizarea

Municipiul Bucuresti va intreprinde actiunile necesare pentru:

Privatizarea distributiei de energie termica in municipiul Bucuresti

Obiectivul acestei actiuni este de a asigura un viitor durabil pentru furnizarea de energie termica in Bucuresti si de a asigura populatiei un serviciu si un confort la nivelul celor intalnite in tarile vest europene si in tarile est europene cu sisteme de termoficare reabilitate, fara a crea poveri financiare grele pentru Primaria Municipiului Bucuresti.

Activitatile necesare, in acest sens, vor fi:

a. Stabilirea a 10-15 zone de distributie pe criterii logice/ geografice
b. Stabilirea unei Organizatii a Serviciului Public (OSP)
c. Angajarea unui consultant
d. Stabilirea valorilor de referinta (benchmarking) actuale pentru zonele de distributie selectate (punctul de pornire se va stabili la privatizare)
e. Stabilirea de conditii generale de concesiune si a unui cadrul contractual general
f. Invitarea investitorilor privati / operatorii la participare (pre-calificare)
g. Aprobarea contractului si procedurilor de catre CGMB
h. Negocierea transparenta a conditiilor specifice de concesionare si a conditiile contractuale specifice cu toti ofertantii si finalizarea procedurii de licitatie si incheierea contractului
i. Incheierea contractelor si stabilirea concesionilor
j. Preluarea de catre operatorul privat / investitor

a. Pare comprehensiv sa se imparta aria de furnizare in 10-15 zone de distributie. Stabilirea noilor zone de distributie ar trebuie facuta de catre RADET cu asistenta din partea consultantului. Zonele de distributie selectate ar trebui sa fie aprobate de catre CGMB (Municipiul Bucuresti). Zonele noi de distributie sunt stabilite of the municipality in terms of heat supply to the population is fulfilled as outlined in the approved policies. Establishment of the PSO is described in the Organisation and Management chapter.

c. The PSO must have the necessary consultancy services for the privatisation process. The consultancy services comprise technical, economical and legal expertises relevant for the privatisation process.

d. Benchmarking should be used to establish the baseline conditions at the time of taking-over by the concessionaires and the concessions should establish targets and conditions for improving on benchmark data. When in operation under the new distribution organisations the development in benchmarks should be followed carefully by the PSO to establish if the concessionaires comply with the conditions of the concession.

e. The General Conditions of the concessions and the contracts should be prepared by the consultant(s), endorsed by PSO and approved by the CGMB. The concessions define the right and obligations of both parties in relation to the concessionaires taking-over of the distribution systems and conditions for compensation if the concession is terminated. The contracts establish the conditions for procurement of heat (tariffs etc) and will be established between the distribution companies and the transmission company.

f. Private operators/investors should be invited to pre-qualification according the Romanian public procurement legislation and in compliance with the EU-directive 17/2004 for utility procurement. There are applicable the provisions Emergency Government Ordinance no 34/2006 and Government Decision 717/2008.

g. The tender procedure is completed when CGMB have approved its results and award notification is published.

h. The process of establishing the concessions include signing and legalising all documents by the Mayor in name of CGMB.

i. Taking-over by the concessionaires is expected to be a process where the concessionaires establish their organisation and step-by-step take over the operation of the system.

The timeframe for privatisation is about 2½ year with taking-over on January 1, 2012.

ca urmare a activitatii de "Reproiectare si Reconstructie".

b. Scopul stabilirii unei Organizatii a Serviciului Public (OSP), este de a se asigura ca obligatiile municipalitatii privind furnizarea de energie termica pentru populatie sunt indeplinite, asa cum este specificat in politicile aprobate. Stabilirea OSP este descrisa in capitololul Organizare si Management.

c. OSP trebuie sa dispuna de serviciile de consultanta necesare pentru procesul de privatizare. Serviciile de consultanta trebuie sa fie relevante pentru procesul de privatizare si anume, in domeniu tehnic, economic si juridic.

d. Sistemul de referinta (Benchmarking) ar trebui sa fie utilizat pentru a stabili conditiile de baza in momentul preluarii de catre concesionarii, iar contractele de concesiune ar trebui sa stabileasca obiectivele si conditiile pentru imbunatatirea valorilor de referinta. Evolutia parametrilor de benchmarking trebuie monitorizata cu atentie de catre OSP, dupa ce organizarea exploatarii in noi companii de distributie este functionala, pentru a stabili daca concesionarii respecta conditiile de concesionare.

e. Conditiile generale de concesionare si contractele ar trebui sa fie pregatite de consultant (i) avizate de catre OSP si aprobate de CGMB. Concesiunile definesc drepturile si obligatiile ambelor parti, in ceea ce priveste preluarea sistemelor de distributie de catre concesionari si conditiile de despagubire in cazul in care concesiunea este reziliata. Contractele stabilesc conditiile privind achizitia de energie termica (tarife, etc) si vor fi incheiate intre companiile de distributie si cele de transport.

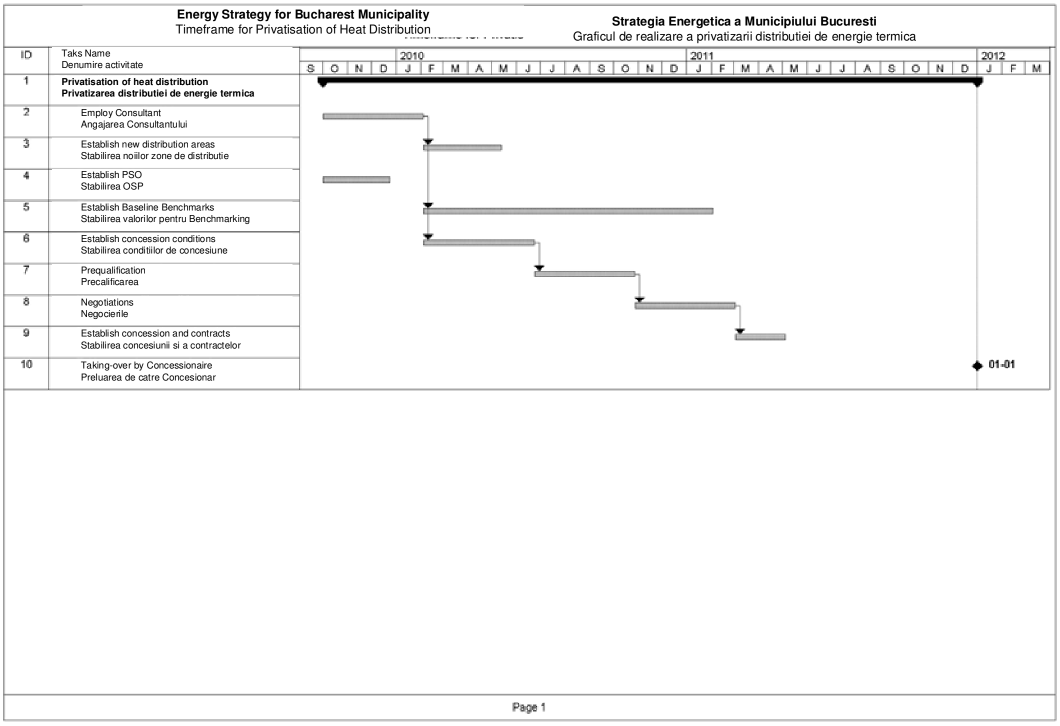
f. Operatorii/ investitorii privati ar trebui sa fie invitati pentru pre-calificare in conformitate cu legislatia române privind achizitiile publice si in conformitate cu Directiva 17/2004 UE privind achizitiile de utilitati. Sunt aplicabile in acest sens prevederile OUG 34/2006 si HG 717/2008.

g. Procesul de licitatie se incheie prin acceptarea de catre CGMB a rezultatelor acesteia si prin anuntarea atribuirii.

h. Procesul de concesionare include semnarea si legalizarea tuturor documentelor de catre primar, in numele concedentului (CGMB).

i. Preluarea de catre concesionarii se asteapta sa fie un proces in care concesionarii se organizeaza si pas-cu-pas preiau exploatarea sistemului, contractul urmand sa prevada o perioada de tranzitie.

Perioada cadru pentru realizarea privatizarii este de circa 2 ½ ani cu preluarea la 1 ianuarie, 2012.



Redesign/Reconstruction

The Municipality of Bucharest will take the necessary actions to ensure:

Redesign and reconstruction of the distribution systems

The objective of this action is to establish a modern district heating distribution concept as a foundation for a future sustainable development of the district heating supply.

The following main tasks are required:

a. Employment of consultant(s)
b. Establish the new distribution areas
c. Redesign and reconstruction of the new substations.
d. Redesign and reconstruction of the new distribution systems.
e. Strategy for installation of solar panels
f. Installation of solar panels
g. Installation of peak-load production

Redesign and reconstruction is detailed discussed in Part C Appendix 4a: Reconstruction of Networks

a. Municipality will be responsible for implementing the redesign and reconstruction. Municipality should be assisted by PSO and consultants within areas where the PSO lacks internal expertise.
b. The area of Bucharest must be divided into natural geographical supply areas each to be offered for privatisation. About 10-15 distribution areas (future independent distribution companies) each connected to the transmission system at 6-12 heat exchanger and pumping stations is recommended by the Consultant.
c. RADET currently operates and maintains 682 substations, 32 centralised stations for preparation of hot tap-water and 160 heating modules. The future number of heat exchanger and pumping stations will be about 100.

   Reconstruction should start as soon as possible but is not expected completed before 2015.

d. Redesign and reconstruction of the distribution systems considering the reduced number of substations and connection of solar heating systems, heat storages and heat only boilers to the

Reproiectarea/reconstructia

Municipiul Bucuresti va intreprinde actiunile necesare pentru:

Reproiectarea si reconstruirea sistemelor de distributie

Obiectivul acestei actiuni este de a stabili un concept modern de distributie a energiei termice ca baza pentru o dezvoltare durabila in viitor a furnizarii de energie termica

Sunt necesare urmatoarele activitati:

a. Angajarea unui (mai multor) consultant (i)
b. Stabilirea noilor zone de distributie
c. Reproiectarea si reconstruirea noilor puncte termice.
d. Reproiectarea si reconstruirea de noi sisteme de distributie.
e. Strategia pentru instalarea de panouri solare
f. Instalarea panourilor solare
g. Instalare centralelor pentru acoperirea varfului de sarcina.

Reproiectarea si reconstruirea sunt prezentate detaliat in Partea C Anexa 4a: Reconstructia retelelor

a. PMB va fi responsabil pentru reproiectare si reconstructie. PMB ar trebui sa fie asistata de catre OSP si consultanti in domeniile in care expertiza din interiorul OSP lipseste.
b. Aria municipiului Bucuresti ar trebuie impartita in zone geografice de alimentare, fiecare pentru a fi privatizate. Consultantul recomanda stabilirea a cca 10-15 zone de distributie (companii de distributie independente in viitor), fiecare conectata la sistemul de transport prin 6-12 statii de pompare si de schimbatoare de caldura.
c. In prezent, RADET exploateaza si intretine 682 de puncte termice, 32 statii centralizate pentru prepararea caldurii si apei calde de consum si 160 module de module termice. Numarul viitoarelor statii de pompare si de schimbatoare de caldura va fi de circa 100.

   Reconstructia ar trebui sa inceapa cât mai curând posibil, dar nu este de asteptat sa se finalizeze inainte de 2015.

d. Reproiectarea si reconstructia sistemelor de distributie va lua in considerare reducerea numarului de puncte termice si conectarea sistemelor de incalzire solara, a acumulatoarelor de caldura si a centralelor termice la sistemele de distribution systems.

Redesign and reconstruction cannot await privatisation but must be started immediately in order to enable redesign and reconstruction of the transmission and production systems. Hence, the concessionaires must be obliged to take-over the reconstructed systems, solar panels and boilers etc and compensate the Municipality of Bucharest for the investments.

e. Solar energy is in the future expected to produce 30-45% of the energy demand in Bucharest at very attractive prices. However, as solar panels capacity value might be as high as 100% in the summer period it will be 0% in periods in the winter period. Thus, the distribution company must maintain full capacity of networks and production sources.

If solar energy shall benefit all district heating consumers or only the consumers living on the “south side” must be politically considered and decided. As the coming subsidise scheme for installation of solar panels is expected to cover the main part of the construction costs it must be political difficult to accept that the “south side” consumers take all the benefits. The answer to this problem is to let the distributing companies install, operate and maintain the solar panels and related heat storages and connect them to the distribution systems for re-distribution to all consumers; This will also be far the cheapest solution.

Installation of solar panels should be integrated in the building external insulation.

Utilisation of solar energy is detailed discussed in Part C Appendix 7a: Solar Panels

f. Expected being heavily subsidised the design and construction of solar energy systems is expected to start as soon as the subsidise scheme enter into effect. The construction is not expected completed before 2020 or even later.

g. Peak-load production currently takes place at centralised plants. This concept requires large diameter transmission pipes with consequently high heat losses. A thump-rule is transport of energy as hot water cost about 10 times transport of energy as natural gas. Thus, the production strategy is to move the peak-load boilers to decentralise location in the distribution systems.

distributie.

Reproiectarea si reconstructia nu pot astepta privatizarea, ci ar trebuie demarate imediat pentru a permite reproiectarea si reconstructia sistemelor de transport si de producere. Prin urmare, concesionarii trebuie sa fie obligati sa preia sistemele reconstruite, panourile solare si cazanele etc si sa compenseze Primaria pentru aceasta investitie.

e. Se asteapta ca, in viitor energia solara sa produca 30-45% din necesarul de energie in Bucuresti, la preturi foarte atractive. Cu toate acestea, valoarea capacitatii panourilor solare ar putea fi de 100%, in perioada de vara si de 0% in perioada de iarna. Astfel, compania de distributie trebuie sa-si mentina capacitatea maxima a retelelor si surselor de producere.

Daca beneficiarii energiei solare vor fi toti consumatorii de energie termica sau doar consumatorii care locuiesc pe "partea de Sud" trebuie decis la nivel politic. Intrucat schema de sprijin viitoare pentru instalarea de panourilor solare se presupune ca va acoperi costurile principale de constructie este politic dificil sa se accepte faptul ca doar consumatorii de pe "partea de sud" vor fi beneficiari. Raspunsul la aceasta problema este ca instalarea, exploatarea si intretinerea panourilor solare si a acumulatoarelor de caldura aferente sa fie date in intretinere companiilor de distributie, ca de altfel si conectarea acestora la sistemul de distributie pentru a fi ca energia sa poata fi redistribuita catre toti consumatorii. De asemenea, aceasta va fi de departe cea mai ieftina solutie de producere a caldurii.

Instalarea de panouri solare ar trebui sa fie integrata in anvelopa cladirilor.

Utilizarea energiei solare este prezentata detaliat in Partea C Anexa 7a: Panouri solare

f. Intrucat sistemele de energie solara vor fi puternic subventionate se asteapta ca proiectarea si construirea lor sa inceapa imediat ce schema de subventionare va intra in vigoare. Finalizarea constuirii nu se estimeaza a fi mai devreme de 2020 sau chiar mai târziu.

g. Acoperirea varfului de consum se face in prezent in centralele centralizate. Acest concept necesita conducte de transport cu diametre mari si in consecinta, cu pierderi mari de caldura. Este cunoscut faptul ca transportul de energiei ca si apa calda costa in jur de 10 de ori mai mult decat transportul de energie, ca si gaze naturale. Astfel, strategia este de a muta cazanele de varf in locatii descentralizate in sistemele de distributie.

Un plan pentru mutarea a circa 700 MJ / sec din

A plan for moving the about 700 MJ/sec from the centralised to decentralised locations should be establish immediately as the boilers (at least the main part of these) must be moved before reconstruction of the transmission system can begin.

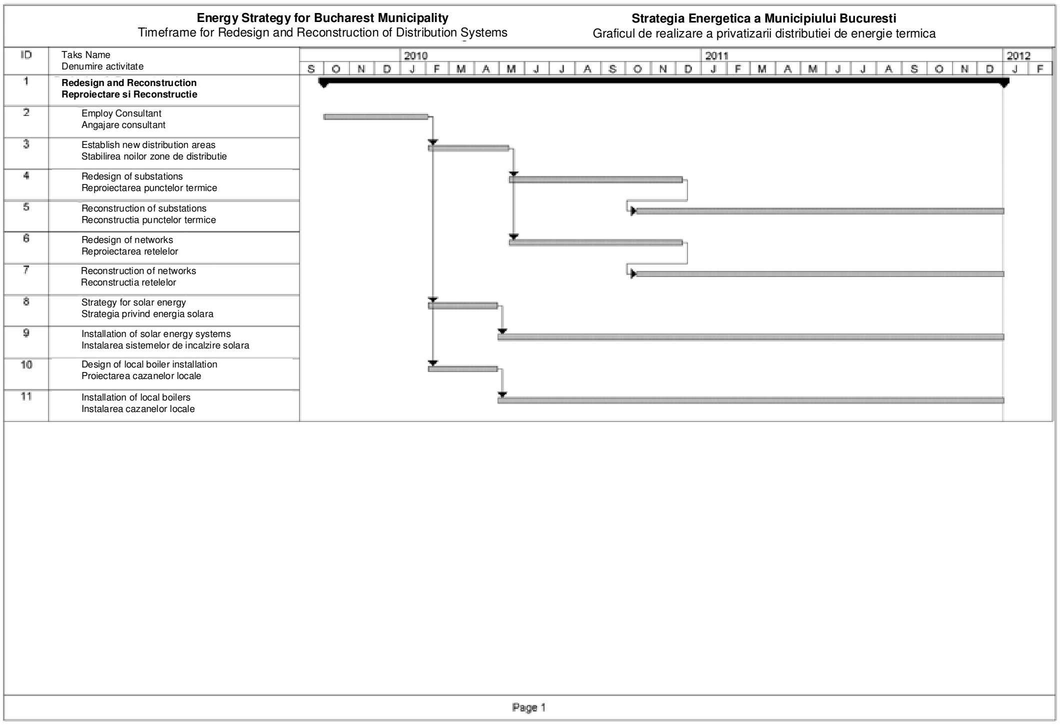
Construction of the new local peak-load capacity must start as soon as possible and be completed before 2015.

locatiile centralizate in locatii descentralizate trebuie stabilit imediat intrucat cazanele (cel putin o mare parte dintre acestea) trebuie sa fie mutate inainte de demararea reconstructiei sistemului de transport.

Construirea unei capacitati locale pentru acoperirea varfului de consum trebuie sa inceapa cât mai curând posibil si trebuie sa fie finalizata inainte de 2015.

The timeframe for the tasks is shown in the figure below. Please note that reconstruction tasks continue until 2015 and construction of solar heating system is not expected completed before 2020.

Perioada de executie este prezentate in figura de mai jos. Va rugam sa retineti ca activitatile de reconstructie vor continua pâna in 2015 si constructia sistemului de incalzire solara nu se asteapta sa fie realizata inainte de 2020.



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6 TRANSMISSION STRATEGIES

6.1 Introduction

Problem areas identified

The main problem areas identified are:

- Over-sizing and high heat losses
- High operation costs
- Lack of maintenance
- Corrosion

Over-sizing and high heat losses

The existing transmission system (primary system) is designed for transmission of about 45,000,000 GJ/y (About 10,000,000 Gcal/y) and a capacity of more than 5,000 MJ/sec. Currently, the energy demand is about 22,000,000 GJ/y (about 5,000,000 Gcal/y) and the capacity requirement is about 2,800 MJ/sec (Peak-load about 2,100 MJ/s). In the future the energy demand is expected to be about 15,000,000 GJ/y (About 3,500,000 Gcal/y) and the capacity requirement about 1,500 MJ/sec. The over-sizing of pipes results in unnecessary huge thermal losses.

High operation costs

The production concept is centralised production on few large plants. Thus, heat must be transported over long distances to reach the consumers requiring unnecessary huge pumping.

Old-fashioned operation concept

The existing operation concept is “fixed flow – variable temperature” with the system divided in supply areas allocated to each production plant. Thus, no economical load dispatch is possible in the daily operation. It was established in the PHARE Project “Study on Bucharest District Heating System” from 1995 that a saving of at least 7.5 MEUR/y was possible when pooled operation was introduced. With current energy prices this correspond to about 20 MEUR/y but still the transmission system is operated at the concept establish when the system was constructed in the late 1950’s – 1970’ties.

6 STRATEGIILE PRIVIND TRANSPORTUL

6.1 Introducere

Problemele identificate

Principalele probleme identificate sunt:

- Supradimensionarea si pierderile mari de caldura
- Costuri de exploatare mari
- Lipsa de intretinere
- Coroziunea

Supra-dimensionarea si pierderile mari de caldura

Sistemul de transport (sistem de primar) existent este proiectat pentru transportul a aproximativ 45.000.000 GJ/an (cca 10.000.000 Gcal/an), si are o capacitate mai mare de 5.000 MJ/sec. In prezent, cererea de caldura este de aproximativ 22.000.000 GJ/an (aproximativ 5.000.000 Gcal/an) si cerinta de capacitate este de aproximativ 2.800 MJ/sec (varf de sarcina circa 2.100 MJ/s). Se estimeaza ca in viitor, cererea de caldura va fi de circa 15.000.000 GJ/an (aprox. 3.500.000 Gcal/an) iar capacitatea necesara va fi de 1.500 MJ/s . Supradimensionarea conductele conduce la mari pierderi de caldura inutile.

Costuri mari de exploatare

Conceptul de producere are la baza producerea centralizata in cateva centrale mari. Astfel, energia termica trebuie sa fie transportata pe distante lungi pentru a ajunge la consumatori, necesitand pompare inutila.

Concept de exploatare demodat

Conceptul existent de exploatare este “debit fix – temperatura variabila”, sistemul fiind impartiti in zone de furnizare alocate fiecarei centrale de producere. Astfel, nu este posibila dispecerizarea, in exploatarea de zi cu zi. In cadrul proiectului PHARE “Studiu privind sistemul de termoficare din Bucuresti” din 1995, s-a stabilit ca este posibila o economie de cel putin 7,5 milioane EUR/an daca s-ar fi introdus functionarea in inel. In conditiile preturilor actuale ale energiei aceasta economie ar fi insemnat aproximativ 20 milioane Euro/an si totusi, in continuare sistemul de transport este exploatat pe baza conceptului stabilit la construirea acestuia in perioada anilor 1950

- 1970.

Lack of maintenance

In spite of huge investments during the last decade serious breakdowns are still seen every year.

Separation valves were installed about 10 years ago aiming to limit the consequence of breakdown and ease repair works. However, these valves are not maintained and are today not functional and the same problem is seen with other components such as temperature sensors and pressure sensors.

Perhaps most serious problem is lack of drainage from the classic pipe system in concrete ducts. The steam coming from the man-holes to the ducts demonstrate the flooding problems.

Lipsa de intretinere

In ciuda investitiilor uriase din ultimul deceniu, in fiecare an apar avarii grave.

Vanele de separare au fost instalate in urma cu aproximativ 10 de ani cu scopul de a limita consecintele avariilor si de a executa lucrarile de remediere mai usor. Cu toate acestea, aceste vane nu mai sunt intretinute si azi nu sunt functionale, in aceeasi situatie fiind si alte componente, cum ar fi senzori de temperatura si cei de presiune.

Probabil, cea mai grava problema este lipsa de drenaj de la sistemul clasic de conducte in canale de beton. Aburul care iese din aerisirile canalelor demonstreaza inundarea acestora.

Corrosion

The general water quality of the district heating water in the transmission systems is far from the quality recommended due to lack of water treatment capacity and lack of high efficient water treatment systems at the production plants to cope with the very high losses in the district heating system.

The result is corrosion and a lifetime far below the 50+ year found in systems with appropriate water quality and even below the 30 year design lifetime.

Coroziunea

In general, calitatea apei agentului termic primar este departe de a fi cea recomandata, datorita lipsei capacitatii de tratare a apei si lipsei sistemelor de tratare a apei de eficienta ridicata, in centralele de producere, pentru a face fata pierderilor foarte mari din sistemul de termoficare.

Rezultatul este coroziunea si o durata de viata cu mult de mai mica de cea de +50 ani intalnita la sistemele cu o calitate corespunzatoare a apei si chiar mai mica decat durata de viata proiectata de 30 de ani.

Need of redesign and reconstruction

It will never be feasible to operate a transmission system with a capacity of about 5,000 MJ/s when the demand is below 400 MJ/s.

The need of redesign and reconstruction is seen from the following comparison:

	Bucuresti	**Copenhaga**
Energy transmitted	21.000.000 GJ	19.000.000 GJ
Network	510 km	57 Km
Distribution companies	1	5
Substations	682	0
Heat exchanger stations	0	26
Centralised plants	9	3
Decentralised plants	0	12
Booster pump stations	0	3
Heat losses	>15%	<1%
Cost transport (€/GJ)	**7.60**	**2.60**

Necesitatea reproiectarii si reconstructiei

Exploatarea unui sistem de transport cu o capacitate de aprox. 5.000 MJ/s nu va fi niciodata fezabila in cazul in care cererea este mai mica de 400 MJ/s.

Necesitatea reproiectarii si reconstruirii apare din urmatoarea comparatie:

	Bucuresti	**Copenhaga**
Vanzare en. termica	21.000.000 GJ	19.000.000 GJ
Retele de transport	510 km	57 Km
Companii de distributie	1	5
Puncte termice	682	0
Statii de schimbatoare de caldura	0	26
Centrale centralizate	9	3
Unitati descentralizate	0	12
Statii de pompare de reactivare	0	3
Pierderi de caldura	>15%	<1%
Cost transport (€/GJ)	**7.60**	**2.60**

References to the National Energy Strategy

Energy Strategy of Romania is in line with policy directions set out in the European Union and contribute to achieve the target set by the European Commission for all member states. Accordingly, the national strategy have set a series of specific objectives, establishing the future necessary legislation and regulatory framework. For the proper functioning of the energy sector and its development under this strategy, it is necessary to create a stable and predictable conditions in terms of the legislation and regulatory framework. In this respect there have been established in such of measures:

- Ensure by the law, some facilities for private investors who will invest in technology supply systems with centralized heating systems.
- Promotion by the Government of investment programme and support of the local authorities in rehabilitation and modernization of centralized heating system.

In terms of ensuring the affordability of the energy prices for the consumers there is requested:

- Reducing the energy bill paid by the population and economic operators by increasing energy efficiency on the entire chain (production, transmission, distribution, consumption), reducing the consumption and using specific technologies, increasing the performance in the energy sector
- Stimulation the investments in improving energy efficiency on the entire chain: resources, production, transmission, distribution, consumption.

Considering all above mentioned recommendations included in this chapter are closely related to the objectives set by the national strategy.

Referinte la Strategia Energetica Nationala

Strategia energetica a Romaniei este conforma directiilor politice stabilite la nivelul Uniunii Europene si contribuie la atingerea tintelor stabilite de Comisia Europeana pentru ansamblul statelor comunitare.
In acest sens, prin strategia nationala au fost stabilite o serie de obiective specifice, referitoare la decizii de ordin legislativ si de reglementare. Pentru buna functionare a sectorului energetic si dezvoltarea acestuia conform prevederilor prezentei strategii, este necesara crearea unui climat stabil si predictibil in ceea ce priveste cadrul legislativ si de reglementare astfel au fost stabilite o serie de masuri:

- Asigurarea prin lege a unor facilitati pentru investitorii privati care investesc in retehnologizarea sistemelor de alimentare centralizata cu energie termica a populatiei.
- Promovarea de catre stat a unor programe de investitii si sprijinirea autoritatilor administratiei publice locale pentru retehnologizarea si modernizarea sistemelor de alimentare centralizata cu energie termica a populatiei.

In ceea ce priveste asigurarea unui grad de suportabilitate a preturilor energiei termice la consumatori este necesara:

- reducerea facturii cu energia platita de populatie si de operatorii economici, prin cresterea eficientei energetice pe intregul lant (producere, transport, distributie, consum), reducerea consumurilor specifice si utilizarea de tehnologii noi, performante, in sectorul energiei
- stimularea investitiilor in imbunatatirea eficientei energetice pe intregul lant: resurse, productie, transport, distributie, consum.

Considerand cele de mai sus recomandarile incluse in acest capitol sunt in stransa corelare cu obiectivele stabilite prin strategia nationala.

Reference to main goals

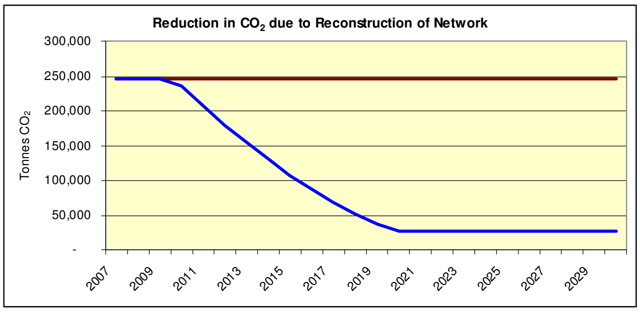
Climate

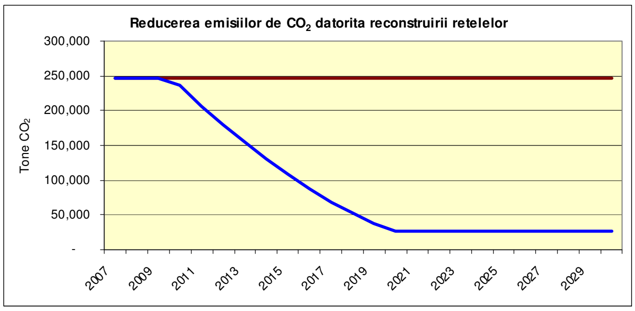
Redesign and reconstruction of the transmission system will over time reduce the heat losses and CO_2 emissions due to losses with almost 90%:

Referinte privind obiectivele principale

Clima

Reproiectarea si reconstruirea sistemului de transport va reduce, in timp, cu aproximativ 90% pierderile de caldura si emisiile de CO_2 generate de acestea:





Sustainability

A reconstructed transmission system with low operation costs (heat losses and electricity for pumping) and very low maintenance costs will establish a sustainable future for the district heating system in Bucharest.

The reduced operating and maintenance costs and introduction of technical-economical load dispatch will lead to a lower transmission tariff. We estimate that the tariff over time will be reduced from currently about 7.60 EUR/GJ to about 5.00 EUR/GJ (About the same level as found for transmission systems submitting benchmark values).

Sustenabilitatea

Un sistem de transport reconstruit, cu un nivel scazut al costurilor de exploatare (pierderi de caldura si energie electrica pentru pompare) si costuri de intretinere foarte mici, va crea un viitor sustenabil pentru sistemul de termoficare din Bucuresti.

Costurile de exploatare si intretinere mici si introducerea dispecerizarii tehnico-economice vor avea ca rezultat un tarif de transport mai mic. Estimam ca in timp, tariful va fi redus de la 7,60 EUR/GJ, cat este astazi, la aproximativ 5,00 EUR/GJ (aproximativ la acelasi nivel intalnit in sistemele de transport care raporteaza valori de referinta-benchmarking).

Quality

The quality of supply to the substations will only be improved insignificant as the supply conditions are appropriate today.

Calitatea

Calitatea furnizarii catre punctele termice va fi imbunatatita nesemnificativ in conditiile de furnizare existente.

References to appendixes

This chapter is prepared with reference to:

- Part C Appendix 4a: Reconstruction of networks
- Part C Appendix 5a: Benchmarking
- Part C Appendix 6a: Network heat losses
- Part C Appendix 7c: Reconstruction of the production system

Referinte privind anexele

Acest capitol se refera la:

- Partea C Anexa 4a: Reconstructia retelelor
- Partea C Anexa 5a: Benchmarking
- Partea C Anexa 6a: Pierderile de caldura din retele
- Partea C Anexa 7c: Reconstructia sistemului de producere

6.2 Startegies

The strategies related to heat transmission are:

Privatisation of operation

Redesign and reconstruction of the transmission system

The main actions necessary for implementing the strategies are described in the following sections:

6.2 Strategiile

Strategiile privind transportul energiei termice sunt:

Privatizarea explotareii

Reproiectarea si reconstructia sistemului de transport

Principalele actiuni necesare pentru implementarea strategiilor sunt descrise in sectiunile urmatoare:

6.3 Actions required

Privatisation of operation

The Municipality of Bucharest will take the necessary actions to:

Privatisation of the operation and management of the transmission system

The objective of the action is to ensure a technical and economic optimised heat transmission in Bucharest and establishment of a management based on modern management principles.

The necessary task to implement are:

a. Establish the Public Service Organisation, PSO
b. Employ consultant(s)
c. Establish current benchmarks
d. Establish the general concession conditions and general contractual framework
e. Invite private investors/operators for participation (Pre-qualification)
f. Approval of the concession contract and procedures by the CGMB
g. Transparent negotiation of the specific concessions conditions and specific contractual conditions with all tenderers, completion of the tender procedures and conclusion of the contract
h. Establish concession and contracts
i. Taking-over by the private operator/investor

a. The PSO should be established in order to ensure that the obligations of the municipality in term of heat supply and that the Concessionaire complies with the concession conditions. Establishment of the PSO is more detailed discussed in the Operation and Management chapter.
b. The PSO will be in charge of the privatisation but must be supported by consultants regarding legal, technical and economical aspects of privatisations. The consultant must among others have experience in technical-economical load dispatch.
c. Current benchmark must be establish and used as a baseline to which the performance of the Concessionaire will be monitors. Thus, the baseline benchmarks and the target for improvement must

6.3 Actiuni necesare

Privatizarea

Municipiul Bucuresti va intreprinde actiunile necesare pentru:

Privatizarea exploatarii si gestionarii sistemului de transport

Obiectivul acestei actiuni este de a asigura optimizarea tehnica si economica a transportului de energie termica in Bucuresti si stabilirea unui management bazat pe principii moderne.

Activitatile necesare, in acest sens, vor fi:

a. Stabilirea unei Organizatii a Serviciului Public (OSP)
b. Angajarea unui consultant
c. Stabilirea valorilor de referinta (benchmarking) actuale pentru zonele de distributie selectate
d. Stabilirea de conditii generale de concesiune si a unui cadrul contractual general
e. Invitarea investitorilor privati / operatorii la participare (pre-calificare)
f. Aprobarea contractului si procedurilor de catre CGMB
g. Negocierea transparenta a conditiilor specifice de concesionare si a conditiile contractuale specifice cu toti ofertantii si finalizarea procedurii de licitatie si incheierea contractului
h. Incheierea de contracte si stabilirea concesiunilor
i. Preluarea de catre operatorul privat / investitor

a. Organizatia Serviciului Public (OSP), trebuie stabilita cu scopul de a se asigura ca obligatiile municipalitatii privind furnizarea de energie termica pentru populatie sunt indeplinite si de asemenea Concesionarul respecta conditiile de concesiune. Stabilirea OSP este descrisa in detaliu in capitolul Organizare si Management.
b. OSP va fi responsabil pentru privatizare cu sprijinul unor consultanti in domeniu juridic, tehnic si economic. Consultantii, printre altele, trebuie sa aiba experienta privind dispecerizarea tehnico-economica.

be included in the concession.

The PSO will monitor the performance of the Concessionaire and enforce corrective measures if necessary.

d. General conditions of concession and contracts should be prepared by the consultant(s), endorsed by PSO and approved by CGMB.

   The concession establishes the rights and obligations of the Municipality of Bucharest and the concessionaire and should establish the conditions for operation of the transmission system. Targets for benchmark values to reach should be defined and the targets adjusted according to the improvements seen in other transmission systems.

   The contractual framework should be:

   - Contract regarding procurement of heat from the production units.
   - Contracts regarding sale of heat to the distribution companies
   - Service contracts regarding maintenance of the system components and emergency repairs.

e. Pre-qualification of possible concessionaires should be arranged according to the Romanian legislation for public procurement. There are applicable the provisions of Emergency Government Ordinance no 34/2006 and Government Decision 717/2008.

f. The PSO submit the Employer's requirements in the general conditions for concession and contracts and start transparent negotiation with pre-qualified tenderers. Negotiation rounds will then establish the specific condition for concessions and contracts. The procedures and negotiated contracts shall be approved by CGMB.

g. The PSO announces the award of contract.

h. All documents must be signed and legalised.

i. Taking-over is a process where the Concessionaire establishes his organisation and tools needed for performing technical-economical load dispatch.

The timeframe for privatisation is about 2½ year.

c. Se va stabili sistemul de referinta (Benchmarking) actual si va fi utilizat pentru monitorizarea activitatii desfasurate de catre concesionar. Astfel, valorile de referinta de baza si obiectivul pentru imbunatatire trebuie incluse in contractul de concesiune.

d. OSP va monitoriza activitatea Concesionarului si va impune masuri corective cand este necesar.

Conditiile generale de concesionare si contractele ar trebui sa fie pregatite de consultant (i) avizate de catre OSP si aprobate de CGMB. Concesiunile definesc drepturile si obligatiile ambelor parti si trebuie sa stabileasca conditiile pentru exploatarea sistemului de transport. Se vor defini obiectivele privind valorile de referinte si acestea vor fi ajustate conform imbunatatirilor intalnite in alte sisteme de transport.

Cadrul contractual ar trebuie fie urmatorul:

- Contract pentru achizitia de energie termica de la unitatile de producere
- Contracte pentru vanzarea de energie termica companiilor de distributie
- Contracte de servicii de intretinere a componentelor sistemului si reparatii.

e. Precalificarea posibililor concesionari trebuie sa fie conform legislatiei privind achizitiile publice din Romania. Sunt aplicabile in acest sens prevederile OUG 34/2006 si HG 717/2008.

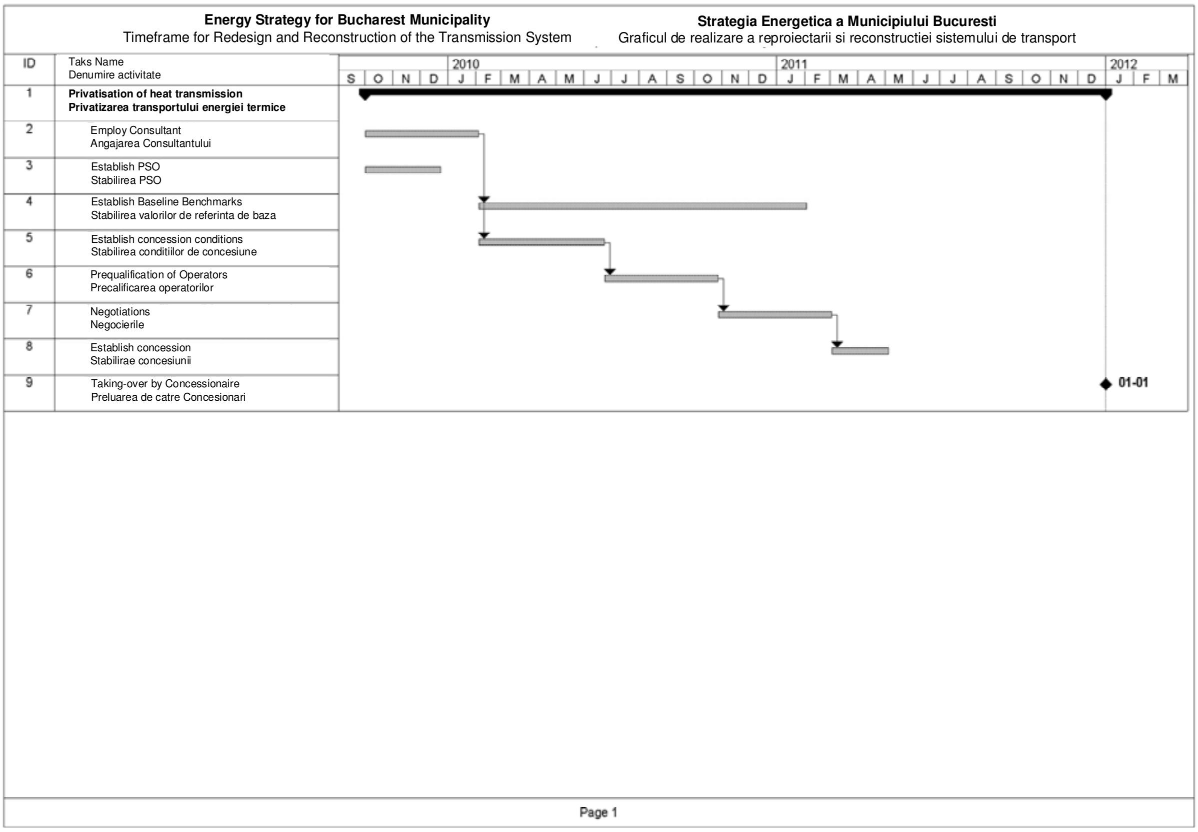
f. OSP intocmeste cerintele Angajatorului in conditiile generale pentru concesiune si va intra in negocieri transparente cu toti ofertantii precalificati. Negocierile vor stabili conditiile specifice ale concesiunii si contractelor. Contractele astfel negociate se aproba de catre CGMB. Aprobarea contractului si a procedurilor trebuie facuta de catre CGMB.

g. OSP anunta atribuirea contractului.

h. Toate documentele trebuie semnate si legalizate.

i. Preluarea este un proces in care Concesionarul se organizeaza si stabileste instrumentele necesare pentru realizarea dispecerizarii tehnico-economice.

Perioada de privatizare este de circa 2 ½ ani.



Redesign and Reconstruction

The Municipality of Bucharest will take necessary actions to ensure:

Redesign and reconstruction of the transmission system

The objective of this action is to redesign and reconstruct a new transmission system comprehensive for the future production concept with limited centralised production.

The following main tasks are required:

a. Employ Consultant
b. Establish the Public Service Organisation, PSO
c. Redesign of the transmission system
d. Reconstruction of the transmission networks
e. Installation of decentralised CHP units

Reproiectarea si reconstructia

Municipiul Bucuresti va intreprinde actiunile necesare pentru:

Reproiectarea si reconstruirea sistemului de transport

Obiectivul acestei actiuni este de a reproiecta si reconstruit un sistem nou comprehensiv pentru viitorul concept de producere cu limitarea producerii centralizate.

Sunt necesare urmatoarele activitati:.

a. Angajarea unui (mai multor) consultant (i)
b. Stabilirea Organizatiei Serviciului Public, OSP
c. Reproiectarea sistemului de transport
d. Reconstructia retelelor de transport
e. Instalare unitatilor de cogenerare descentralizate.

Redesign and reconstruction is discussed and a concept outlined in Part C Appendix 4a: Reconstruction of networks.

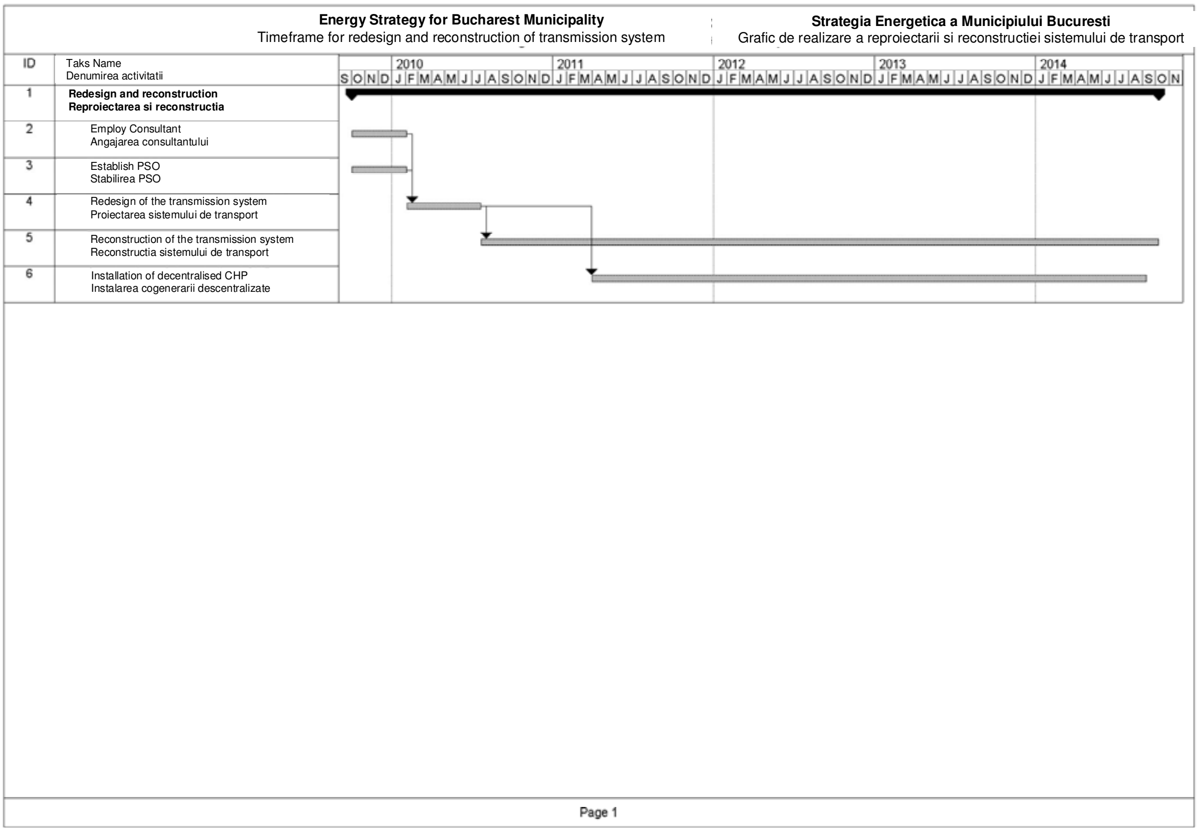
a. The PSO should be responsible for redesign and reconstruction of the transmission system. A Consultant should be employed to assist the PSO within areas where the expertise is not available within the PSO organisation.
b. The PSO organisation should be established within the organisation of the Municipality of Bucharest. The establishment and function of the PSO is discussed in Chapter 8: Organisation and management.
c. The redesign should consider the capacity of the centralised plants connected to the system, three waste-to-energy facilities with a capacity of about 3 x 100 MJ/sec and about 100 substations. Thus, the future transmission system will be very different from the current system designed for a transmission capacity of more than 5,000 MJ/sec.
d. The new transmission system should be established as a part of the existing primary system and will be about 100 km with a much smaller diameter than current. However, the strategy for replacing the pipes should be “change when worn-out” and the change will thus not be completer before after 2020.

   Reconstruction should be planned and coordinated with changes in the production system and establishment of the new distribution areas (the reconstructed substations) and installation of local boilers and decentralised CHP capacity.
e. Installation of the decentralised CHP units should be at the level of the reconstructed substation, on the transmission side or on the distribution side depending of size of the units and operation conditions. Installation of the decentralised CHP units is discussed in Chapter 7: Production Strategies.

Reproiectarea si reconstruirea, precum si un concept viitor sunt prezentate detaliat in Partea C Anexa 4a: Reconstructia retelelor

a. OSP va fi responsabil pentru reproiectarea si reconstructia sistemului de trabsport. OSP ar trebui sa fie asistat de catre consultanti in domeniile in care expertiza din interiorul OSP lipseste.
b. Organizatia Serviciului Public – OSP trebuie creata in cadrul Primariei. Stabilirea si functionarea OSP este descrisa in detaliu in capitolul 8: Organizare si Management.
c. Reproiectarea va lua in considerare capacitatea centralelor centralizate conectate la sistem, trei facilitati de transformare a deseurilor in energiei cu o capacitate de circa 3 x 100 MJ/sec si aprox. 100 de puncte termice. Astfel, sistemul de transport viitor va fi foarte diferit fata de sistemul existent, proiectat pentru transportul a mai mult de 5.000 MJ/s.
d. Noul sistem de transport va fi realizat ca o parte a sistemului primar existent si va fi de aproximativ 100 Km si cu diametre mai mici decat in prezent. Totusi, strategia de inlocuire a conducte ar trebui sa fie “inlocuirea cand s-au depreciat” si aceasta nu va fi finalizata inainte de anul 2020.

   Reconstructia trebuie planificata si coordonata cu inlocuirea sistemului de producere si stabilirea noilor zone de distributie (reconstructia punctelor termice) si instalarea cazanelor locale si a capacitatilor de cogenerare descentralizate.
e. Instalarea unitatilor de cogenerare descentralizate ar trebui sa urmareasca reconstructia punctelor termice, pe partea de transport sau distributie, in functie de dimensiunea unitatilor si conditiile de functionare. Instalarea unitatilor descentralizate este prezentata in capitolul 7: Strategii privind producerea .


Energy Strategy for Bucharest Municipality
Timeframe for redesign and reconstruction of transmission system
Strategia Energetica a Municipiului Bucuresti
Grafic de realizare a reproiectarii si reconstructiei sistemului de transport
ID
Taks Name
Denumirea activitatii
2010
2011
2012
2013
2014
1 Redesign and reconstruction
Reproiectarea si reconstructia
2 Employ Consultant
Angajarea consultantului
3 Establish PSO
Stabilirea PSO
4 Redesign of the transmission system
Proiectarea sistemului de transport
5 Reconstruction of the transmission system
Reconstructia sistemului de transport
6 Installation of decentralised CHP
Instalarea cogenerarii descentralizate
Page 1

4				
3				
2	26.10.2009	Small corrections in the text. District cooling added.	GMCB	haa
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Edition	Date	Changes	Prepared by:	Approved by:

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Cuprins

7 PRODUCTION STRATEGIES

7.1 Introduction

Problem areas identified

The main problem areas identified are:

- Age of the production system
- High production costs
- Centralised production
- Huge investments necessary

Age of the production system

Most of the current production system is has passed its useful lifetime, is operated downgraded and with low efficiencies.

High production costs

The real production tariffs considering the real price of natural gas and value of the production system are significant higher than the 8.60 EUR/GJ found per September 2007.

A private investor paying the real natural gas tariff would charge about 14 EUR/GJ. The different is indirect subsidises paid by the Government of Romania.

Centralised production

Designing a new production system must consider the production costs as well as the transmission costs. With current transmission costs probably being the highest in the world a very cheap centralised production is required to compete with decentralised production. Only waste-to-energy facilities are cheap enough to carry the transmission costs. Production based on natural gas or bio-fuel should be decentralised.

Huge investments necessary

The main reason that the production system has not been continuously renewed is lack of financial sources. This problem can only be solved by establish possibilities of private participation, which in reality means privatisation of the production.

7 STRATEGII PRIVIND PRODUCEREA

7.1 Introducere

Domenii identificate cu probleme

Principalele domenii identificate a avea probleme sunt urmatoarele:

- Varsta sistemului de producere
- Costuri mari de producere
- Producerea centralizata
- Investitii necesare foarte mari

Vechimea sistemului de producere

Cele mai multe sisteme de producere aflate in prezent in functiune si-au depasit durata normata de viata, fiind exploatate cu eficienta scazuta.

Costuri mari de productie

Tarifele reale de producere sunt semnificativ mai mari decat 8.60 Euro/GJ (tarif la nivelul lunii septembrie 2007) daca se ia in consideratie pretul real al gazelor naturale si valoarea sistemului de producere.

Un investitor privat care ar plati tariful real pentru gazele naturale ar solicita aproximativ 14 Euro/GJ. Diferenta este reprezentata de subventii indirecte platite de catre Guvernul Romaniei.

Producerea centralizata

La proiectarea unui nou sistem de producere trebuie sa se ia in consideratie atat costurile de producere cat si costurile pentru sistemul de transport. Avand in vedere costurile curente din sistemul de transport, foarte probabil fiind cele mai mari din lume, pentru ca sistemul centralizat sa poata intra in competitie cu cel descentralizat este obligatoriu ca sursa de producere in sistemul centralizat sa fie foarte ieftina.Producerea pe baza de gaze naturale sau bio-combustibil trebuie sa functioneze in sistem descentralizat.

Necesitatea unor investitii imense

Motivul principal pentru care sistemul de producere nu a fost reinnoit continuu il constituie lipsa surselor de finantare. Aceasta problema poate fi rezolvata doar prin stabilirea conditiilor pentru participarea investitorilor privati, care in realitate inseamna privatizarea sistemului de producere.

Need of redesign and reconstruction

New production sources in terms of solar heating systems, waste-to-energy and high efficient CHP to comply with provisions of EU-directives, EU-policies and the National Energy Strategy.

Considering the transmission costs of district heating it will not be feasible to construct new centralised capacity based on natural gas and/or bio fuels – transport of energy as natural gas cost only about 10% of transport of energy as hot water. Thus, peak-load boilers and CHP units should be constructed decentralised at the level of the heat exchanger stations and local at strategically locations in the distribution networks.

Necesitate reproiectarii si a reconstruirii

Trebuie luate in considerare surse noi de producere reprezentate de sistemele solare, facilitati de incinerare a deseurilor si unitati de cogenerare de inalta eficienta, in vederea conformarii cu prevederile Directivelor si Politicilor UE, precum si a Strategiei Energetice Nationale.

Avand in vedere costurile de transport in sistemul de termoficare nu va fi fezabil sa se construiasca capacitati noi producand in sistem centralizat bazat pe gaze naturale/bio-combustibil, transportul energiei ca si gaze naturale este aproximativ 10% din costul de transport al energiei utilizand agent termic, apa fierbinte. In acest sens cazanele pentru acoperirea varfului de consum si unitatile de cogenerare trebuie construite descentralizat, la nivelul statiilor de schimbatoare de caldura si amplasate local in sistemul de distributie, in locatii strategice.

References to main goals

Climate

Construction of new non-greenhouse gas emitting production units is required for obtaining the goal of CO_2 neutrality from 2020.

From the selected production sources only the decentralised CHP units will use natural gas but the production from these plants will be reduced when the last waste-to-energy and solar heating systems are commissioned in 2020 and the plants will at that time be reconstructed for use of bio oil as energy and environmental taxes will make use of natural gas too expensive at that time. Heat-only-boiler might be constructed for natural gas but will be converted to bio heating oil (a less refined product than bio oil) for the same reasons as for decentralised CHP.

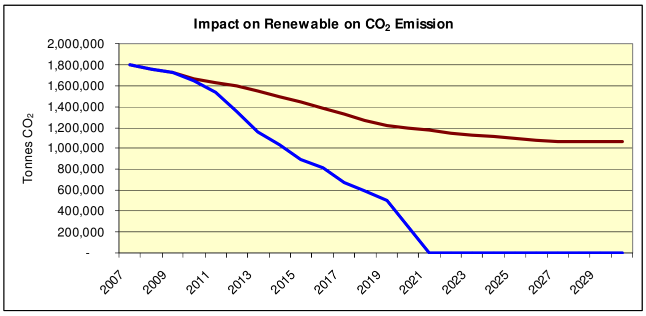
The saving in CO_2 compared to a scenario based on natural gas is:

Referinte pentru principalele obiective

Clima

Construirea unor unitati de producere noi considerate neutre din punct de vedere al emisiilor este necesara pentru atingerea obiectivului privind obtinerii neutralitatii dpdv a emisiiilor de CO_2, incepand cu anul 2020.

Dintre toate sursele de producere selectate numai unitatile de cogenerare descentralizate vor utiliza gaze naturale, insa productia acestora se va reduce, atunci cand ultima facilitate de incinerare a deseurilor si sistemele de incalzire solara vor fi puse in functiune in 2020, in acelasi timp centralele vor fi reconstruite pentru a putea utiliza bio-combustibil. Introducerea taxelor pe energie si de mediu vor face ca utilizarea gazelor naturale sa devina foarte scumpa. Cazanele ar putea fi construite pe baza de gaze naturale, dar vor fi convertite catre bio-combustibil pentru incalzire (un produs mai putin rafinat decat bio-combustibilul), din acelasi motiv ca si unitatile de cogenerare descentralizate. Economiile in emisii de CO_2 in comparatie cu scenariul bazat pe gaze naturale vor fi:



Sustainability

Construction of new modern production facilities will establish a sustainable future for the district heating system in Bucharest

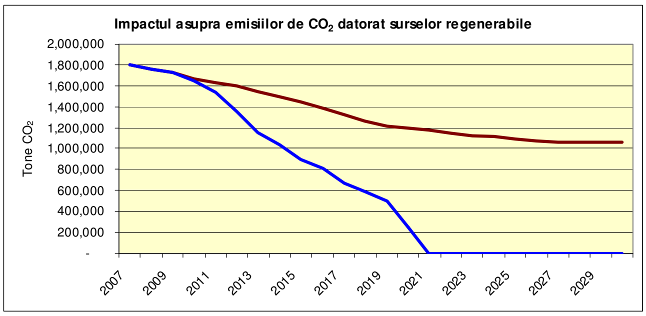
Quality

The quality of supply is expected very high from the new production facilities and the consumers will see less interruption in quality of supply with a diversity of production sources each backing-up each other.

References to the National Energy Strategy

Production strategies are in full accordance with the national strategy. The overall objective of the strategy is that the energy sector to meet energy both now, and medium and long term at a lower price as appropriate for a modern market economy and a civilized standard of living, in terms of quality, safety in supply with the principles of sustainable development. Strategic objectives, national strategy consider the following:

- energy security that is based on:
  - an increase of energy security by providing the necessary energy resources and limit dependence on energy import
  - a diversification of import sources, energy resources and transport routes of these
- Critical Infrastructure Protection
- Sustainable Development which is based on:
  - An increase of energy efficiency
  - Promotion of energy production based on renewable resources
  - Promotion of the combine production of electricity and heat cogeneration in the cogeneration plant, especially in installations of high efficiency
  - Support activities of a research development and dissemination of



Sustenabilitatea

Construirea facilitatilor moderne de productie va reprezenta un viitor durabil pentru sistemul de termoficare din Bucuresti.

Calitate

Calitatea furnizarii energiei termice se asteapta sa fie foarte ridicata, provenind de la noile facilitati de producere, iar consumatorii vor nu vor mai resimti intreruperi in calitatea furnizarii in conditiile in care va exista o diversitate de surse de producere, fiecare reprezentand o solutie de rezerva pentru celalalta.

Referinte la Strategia Energetia Nationala

Strategia privind productia prin recomandarile formulate este in deplina conformitate cu prevederile strategiei nationale. Obiectivul general al strategiei sectorului energetic il constituie satisfacerea necesarului de energie atat in prezent, cat si pe termen mediu si lung, la un pret cat mai scazut, adecvat unei economii moderne de piata si unui standard de viata civilizat, in conditii de calitate, siguranta in alimentare, cu respectarea principiilor dezvoltarii durabile.
Ca obiective strategice, strategia nationala considera urmatoarele:

- Siguranta energetica, care se bazeaza pe:
  - Cresterea sigurantei energetice prin asigurarea necesarului de resurse energetice si limitarea dependentei de resursele energetice de import
  - Diversificarea surselor de import, a resurselor energetice si a rutelor de transport al acestora
- Protectia infrastructurii critice
- Dezvoltare durabila care se bazeaza pe:
  - Cresterea eficientei energetice
  - Promovarea producerii energiei pe baza de resurse regenerabile
  - Promovarea producerii de energie electrica si termica in centrale cu cogenerare, in special in instalatii de

research results for

Referring to the centralized heating, the national strategy highlights that they are faced with a worn-out facilities and equipment, insufficient financial resources for maintenance, rehabilitation and modernization, loss in transmission and distribution and, last but not least, with an inadequate thermal insulation of existing housing stock. These factors have led to higher costs of production and distribution of heat, decreasing quality and increasing the value of the energy bill to the population.

References to appendixes

This chapter is prepared with reference to:

- Part C Appendix 7a: Integration of solar heating in the district heating system
- Part C Appendix 7b: Peak-load boiler production
- Part C Appendix 7c: Reconstruction of the production system
- Part C Appendix 7d: Strategy for waste-to-energy facilities
- Part C Appendix 7e: Alternative production
- Part C Appendix 8a: Restructuring of the district heating sector

cogenerare de inalta eficienta

  - Sustinerea activitatilor de cercetare-dezvoltare si diseminare a rezultatelor cercetarilor aplicabile

Referitor la sistemele centralizate de incalzire urbana, strategia nationala evidentiaza ca acestea se confrunta cu o uzura fizica si morala accentuata a instalatiilor si echipamentelor, resurse financiare insuficiente pentru intretinere, reabilitare si modernizare, pierderi mari in transport si distributie si, nu in ultimul rand, cu o izolare termica necorespunzatoare a fondului locativ existent. Acesti factori au condus la costuri mari de productie si distributie a energiei termice, scaderea calitatii serviciilor si cresterea valorii facturii energetice pentru populatie.

Referinte la anexe

Acest capitol este intocmit facand referire la:

- Partea C Anexa 7a: Integrarea panourilor solare in sistemul de termoficare
- Partea C Anexa 7b: Cazane pentru acoperirea varfului de consum
- Partea C Anexa 7c: Reconstructia sistemului de producere
- Partea C Anexa 7d: Strategia pentru facilitati de incinerare a desurilor
- Partea C Anexa 7e: Producerea din surse alternative
- Partea C Anexa 8a: Restructurarea sectorului de termoficare.

7.2 Strategies

The Municipality of Bucharest will take the necessary action to ensure:

Privatisation

Redesign and reconstruction

The objective of these strategies is to replace the current centralised production system with waste-to-energy facilities, decentralised CHP units, local peak-load boilers and solar heating systems.

The following actions main tasks are required:

7.2 Strategii

Municipiul Bucuresti va lua toate masurile necesare sa se asigura ca:

Privatizarea

Reproiectarea si reconstructia

Obiectivul acestei strategii este acela potrivit caruia sistemul de producere centralizat sa fie inlocuit de facilitati de incinerare a deseurilor, unitati de cogenerare descentralizate, cazane pt. acoperirea varfului de consum si sisteme de incalzire solara.

Urmatoarele actiuni si principale activitati sunt necesare:

7.3 Actions required

Privatisation

The Municipality of Bucharest will take the necessary actions to:

Privatisation of heat production in Bucharest

The objective of this action is to release the Municipality of Bucharest for the heavy burden it will be to finance construction of the new production facilities and at the same time obtain competitiveness in construction and operation of the new facilities. (A rough estimate of the construction costs is EUR 1,701,000,000 or EUR/y 150,000,000 from now until 2020)

The necessary tasks to be implemented in this respect are:

a. Employ Consultant
b. Establish a Reconstruction Plan
c. Establish the general conditions for concession and contracts
d. Invite private investors/operators to prequalification
e. Negotiate the specific concession conditions and the specific contract conditions
f. Appoint the Concessionaires
g. Establish concessions and contracts
h. Follow-up activities

a. The PSO should be responsible for elaboration of reconstruction plan and the privatisation process. The Plan shall be approved by CGMB. The PSO should be provided the necessary legal, technical and economical/financial assistance from an independent consultant.

b. The Reconstruction Plan should be elaborated in cooperation with the current producers to establish the decommission schedule of existing facilities and ensure timely construction of replacement capacity.

   The Reconstruction Plan should also consider (be input for) the reconstruction plan for the transmission system.

   The first new units to be privatised should be local peak-load boilers and decentralised CHP units. Construction of these production facilities is urgent as the reconstruction of networks cannot be started

7.3 Actiuni necesare

Privatizarea

Municipiului Bucuresti va lua urmatoarele actiuni ca fiind necesare:

Privatizarea producerii energiei termice in Municipiul Bucuresti

Principalul obiectiv al acestei actiuni este sa elibereze Primaria de efortul imens generat de necesarul de finantare pentru a construi noi facilitati de producere si in acelasi timp obtinerea competitivitatii si construirea si exploatarea noilor facilitati.(O estimare grosiera pentru costurile de construire inseamna 1,701,000,000 Euro sau in medie 150,000,000/an de acum pana in 2020).

Principalele sarcini care trebuie implementate in acest sens sunt urmatoarele:

a. Angajarea unui consultant
b. Stabilirea unui Plan de reconstruire
c. Stabilirea conditiilor generale pentru concesiuni si contracte
d. Invitarea investitorilor/operatorilor privati pentru competitie, etapa de precalificare.
e. Negocirea conditiilor specifice pentru concesiuni si a conditiilor specifice pentru contracte
f. Atribuirea concesiunilor
g. Stabilirea concesiunilor si a contractelor
h. Activitati de verificare post implementare

a. Organizatia Servciului Public(OSP) trebuie sa fie responsabila pentru elaborarea unui plan de reconstruire si al procesului de privatizare, ce trebuie aprobat de catre CGMB. OSP trebuie sustinuta cu asistenta tehnica, economica, financiara si juridica din partea unui consultant independent.

b. Planul de Reconstruire trebuie elaborat in cooperare cu producatorii actuali pentru a stabili un grafic de scoatere din functiune a facilitatilor existente si de construire in timp util a capacitatilor de inlocuire.

   Planul de Reconstruire trebuie sa ia in considerare (sa fie input pentru) planul de reconstructie a sistemului de transport.

   Primele unitati noi privatizate trebuie sa fie cazanele pentru acoperirea varfului de consum si unitatile de cogenerare descentralizate. Construirea acestor facilitati de producere este before the local and decentralised capacity is established.

The peak-load boilers should be included in privatisation of the distribution system. However, as taking-over by the private investor/operator cannot be expected before 2012 the Municipality of Bucharest must due to the urgency start the construction and negotiate the concessionaires taken-over of the boilers when the systems are privatised.

c. The general conditions of concessions and contracts should be established by the PSO (the Consultant) and after approval of CGMB to be included in the tender documents.

d. Private investors/operators should be invited for prequalification according to the provisions of the Romanian public procurement law and the EU-directive regarding utility procurement and also the provision of Emergency Government Ordinance no 34/2006 and Government Decision 717/2008.

e. The requirements of the Employer are issued in the tender documents and the tenderer response with their requirements in their technical and financial proposals. The difference in requirement must be transparent negotiated with pre-qualified tenderers and settled. Final version of the concession contract shall be approved by CGMB.

The concession should include the agreed payments in terms of capacity payment and energy payment. While the capacity payment (EUR/y) is established based on the capital costs (far the largest amount) and fixed O&M costs (a minor part of the capacity payment) is relatively easy to establish it is more difficult to establish the conditions for energy payments as these must be adjusted according to fuel prices and development in others from outside coming costs.

The actual payment conditions should be established in a heat sale contract, which can be change continuously following the provisions of the concession but without changing the concession.

f. The beneficiary public the award of contract following the provisions of the Romanian public procurement law.

g. The final version of the concession is signed and legalised.

h. The PSO (represented by the consultant) should follow-up on the concessionaire's performances in term of time schedule and technical compliance with the conditions of the concession (cost is not the beneficiary's problem). The representative of the beneficiary should participate in the final testing

urgenta in conditiile in care reconstructia retelelor nu poate sa inceapa inainte de stabilirea capacitatilor de producere locale si descentralizate.

Cazanele pentru acoperirea varfului de consum trebuie incluse in privatizarea sistemului de distributie. Totusi, preluarea de catre un investitor privat nu este preconizata mai devreme de 2012, Municipiul Bucuresti trebuie sa inceapa de urgenta construirea si negocirea concesiunilor pentru preluarea cazanelor atunci cand sistemul se va privatiza.

c. Conditiile generale pentru concesiuni si contractele trebuie pregatite de catre OSP(Consultant) si dupa aprobarea data de CGMB, acestea trebuie incluse in documentia de atribuire.

d. Investitori/operatori privati ar trebui invitati pentru precalificare in conformitate cu prevederile legislatiei privind achizitiile publice in Romania si a Directivelor Europene privind utilitatile publice precum si prevederile OUG 34/2006 si HG 717/2008.

e. Cerintele Angajatorului sunt formulate in documentatia de atribuire, iar ofertantii raspund cu cerintele lor in propunerile tehnice si financiare. Diferentele trebuie negociate transparent cu toti ofertantii precalificati si stabilite. Varianta finala a contractului de concesiune va fi aprobata de catre CGMB.

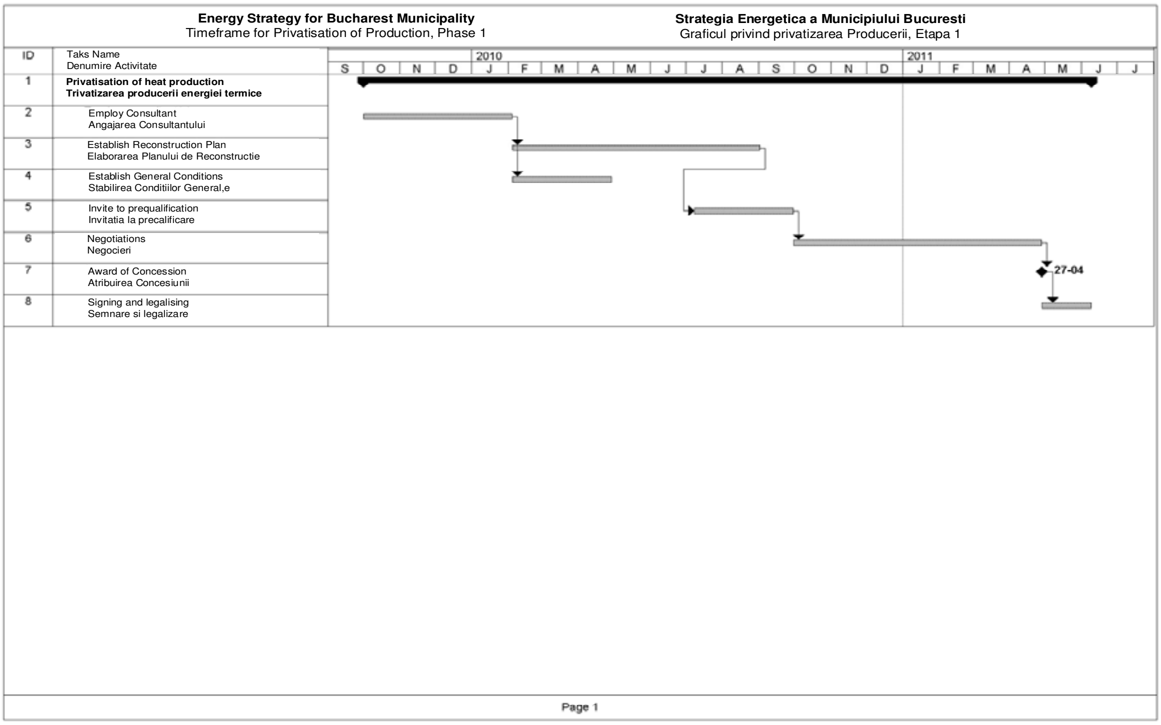
Concesiunea trebuie sa includa si platile agreate in ceea ce priveste plata capacitatii si plata energiei. Plata pentru capacitate (Euro/an) se stabileste pe baza costurilor de capital (suma de departe cea mai mare) si fixeaza costurile de exploatare si intretinere (o componenta minora a platii de capacitate) fiind relativ simplu, in timp mai dificil, va fi de stabilit plata pentru energie, in conditiile in care aceastea se ajusteaza in conformiate cu pretul combustibilului si evolutia in altor componente, provenind din costuri indirecte.

f. Beneficiarul publica anuntul de atribuire in conformitate cu prevederile legislatiei nationale in domeniul achizitiilor publice.

g. Varianta finala a concesiunii este semnata si legalizata

h. OSP(reprezentata de consultant) va trebui sa verifice performatele concesionarului in ceea ce priveste graficul si conformitatii tehnice cu prevederile concesiunii (costul nefiind o problema a beneficiarului). Reprezentantul beneficiarului trebuie sa participe la prestarea finala a facilitatilor, verificand faptul ca acestea indeplinesc cerintele concesiunii (capacitate of the facility to verify that the facility fulfil the requirements of the concession (available capacity and emission restrictions etc).

disponibila si restrictii asupra emisiilor, etc)



Redesign and reconstruction

Reproiectare si reconstruire

The Municipality of Bucharest will take the necessary action to:

Municipiul Bucuresti va lua urmatoarele masuri necesare pentru:

Redesign and reconstruct the production system

Reproiectarea si reconstruirea sistemului de producere

The objective of this action is to redesign and reconstruct the production system in accordance with the future demand and obtain reduced production costs and transmission costs.

The necessary tasks to be implemented in this respect are:

a. Employ consultant
b. Elaborate detailed Reconstruction Plan
c. Elaborate pre-feasibility study for the new facilities
d. Establish technical conditions for the new facilities
e. Establish the technical requirements

Obiectivul acestei actiuni este acela de a reproiecta si reconstrui sistemul de producere in conformitate cu necesarul viitor de caldura si obtinerea unor costuri de producere si transport reduse.

Principalele actiuni care trebuie implementate sunt urmatoarele:

a. Angajarea unui consultant
b. Elaborarea Planului de Reconstructie detaliat
c. Elaborarea studiilor de pre-fezabilitate pentru noile facilitati
d. Stabilirea conditiilor tehnice pentru noile facilitati

The output from these tasks should be included as information during the privatisation process.

a. The Municipality should be responsible for redesign and reconstruction of the production system assisted by PSO and an experienced consultant within legal, technical and economical/financial matters.

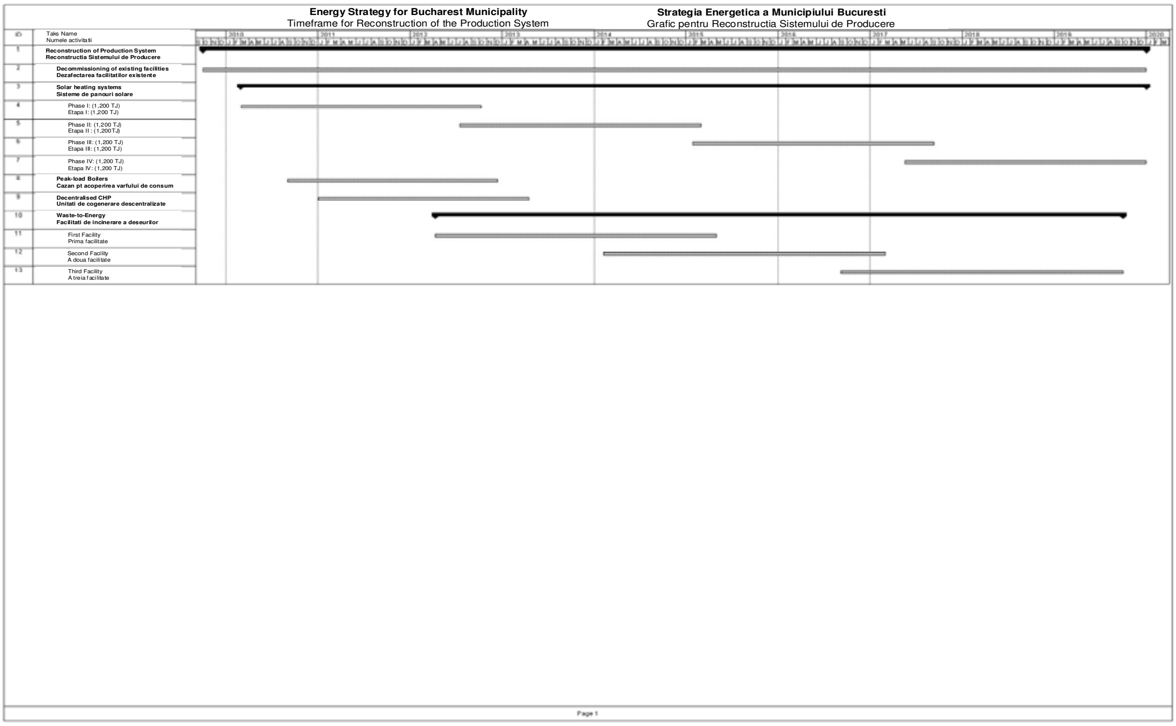
b. The Reconstruction Plan must coordinate decommissioning of existing capacities, construction of new capacities and reconstruction of the networks. The Reconstruction Plan is outlined below:

e. Stabilirea cerintelor tehnice

Rezultatele obtinute in urma implementarii actiunilor ar trebui incluse ca informatii in procesul de privatizare.

a. PMB ar trebui sa fie responsabil pentru reproiectarea si reconstructia sistemului de producere, asistata de catre OSP si un consultant cu experienta in domeniile: juridic, tehnic si economico-financiar.

b. Prin Planul de Reconstructie trebuie coordonate dezasamblarea capacitatilor instalate, construirea noilor capacitati si reconstruirea retelelor. Planul de Reconstructie este prezentat mai jos:



Further, the Reconstruction Plan should establish the locations for the new facilities in respect of:

- Waste-to-energy facilities should be constructed at the current locations where infrastructure is available. Transport of waste to the facilities is also important to consider
- Decentralised CHP units should be construction at the level of the new substations and in areas where a cooling demand is present (at malls, hospitals, large administration buildings etc)
- Local peak-load boilers should be constructed at strategically locations in the distribution system where they will enable reduced sizing of pipes and the supply conditions for critical

In continuare, prin Planul de Reconstructie trebuie stabilite locatiile pentru noile facilitati tinand cont de:

- Facilitatile de incinerare a deseurilor trebuie construite in amplasamentele actuale, in care infrastructura este disponibila. Transportul deseurilor catre facilitatile de incinerare trebuie de asemenea luat in consideratie.
- Unitatile de cogenerare descentralizate trebuie construite la nivelul noilor puncte termice si in zonele unde exista o cerere de racire (in mall-uri, spitale, cladiri administrative mari etc.)
- Cazanele pentru acoperirea varfului de consum trebuie construite in amplasamente strategice, in sistemul de distributie, astfel

supplied consumers.

- Solar panel should be installed on buildings where the production potential is high (many sunshine hours per day). (The location of the solar panels might not necessary be a part of the Reconstruction Plan)

c. A feasibility study for each indented project must be elaborated and approved by the PSO and Bucharest Municipality. This study should in addition to the normal content of a feasibility study address the feasibility of privatisation.

d. The selected technical conditions for each project must be establish in relation to the construction sizes intended taken-over by the private investor/operator. The description should among others include drawings and specify:

- Connection to natural gas network
- Connection to water network
- Connection to district heating system
- Connection to sewage system
- Access road / railroad
- Existing buildings
- Pollution of the site (contamination)
- Current permissions and approvals
- Political statement re. prospect for obtaining construction permits and necessary approvals

The limits of the project (interfaces to other utilities/properties) should be clearly established.

e. The technical requirements should address the input/output conditions for the facility but leave to the tenderer to select the technical detailed solutions. Thus, the requirements should among others address:

- Type of facility
- Capacity requirement
- Energy requirement (production forecast)

incat sa fie posibila reducerea dimensiunii conductelor si asigurarea furnizarii cu energie termica a consumatorilor din zonele critice.

- Panourile solare trebuie instalate pe cladirile in care potentialul de captare este mare(multe ore de insorire/zi). (Amplasarea panourilor solare nu trebuie obligatoriu sa fie inclusa in Planul de Reconstructie)

c. Pentru fiecare proiect se va elabora un studiu de fezabilitate care va fi avizat de catre OSP si Municipiul Bucuresti. Fata de continutul normal al acestui studiu, trebuie inclusa suplimentar si evaluarea fezabilitatii aferenta procesului de privatizare.

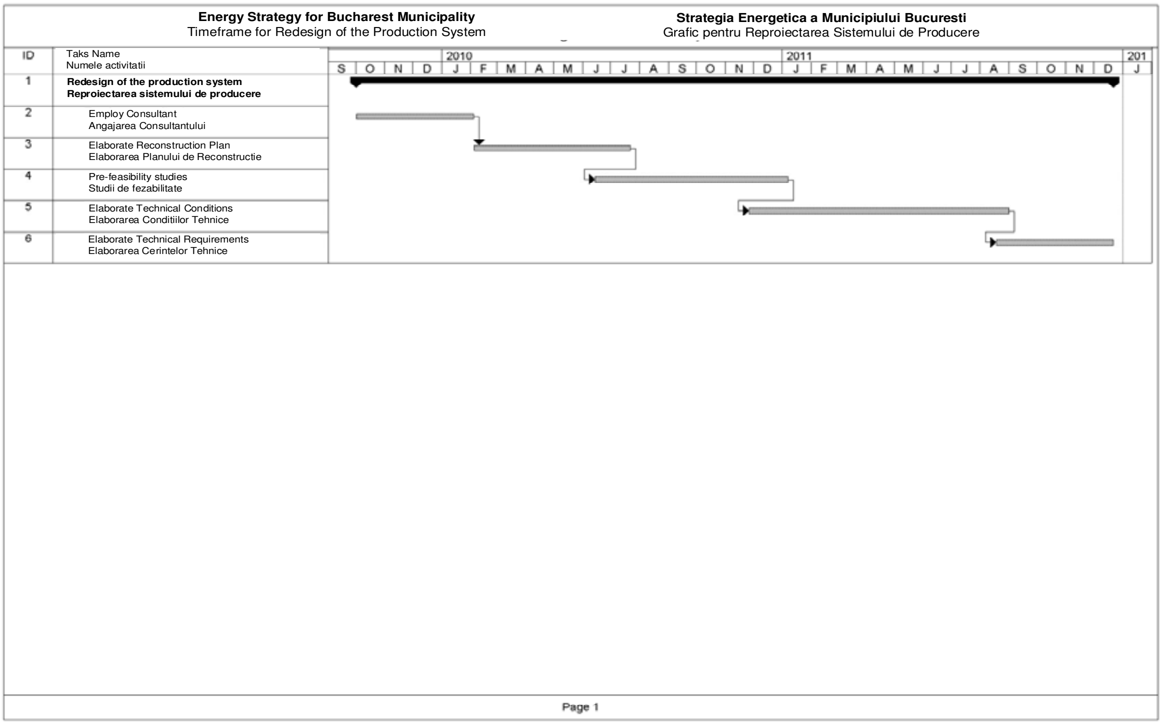
d. Conditiile tehnice selectate pentru fiecare proiect trebuie stabilite luand in considerare dimensiunea constructiei pe care investitorul/operatorul privat intentioneaza sa o preia. Descrierea trebuie sa includa printre altele, planuri si specificarea urmatoarelor:

- Racordul la gazele naturale
- Bransamentul la reteaua de apa
- Racordarea la sistemul de termoficare
- Racordul la reteaua de canalizare
- Accese drumuri/cai ferate
- Cladiri existente
- Poluarea (contaminarea) amplasamentului
- Avize si acorduri obtinute
- Declaratiile politice de ex. Strategiile pentru obtinerea autorizatiei de construire si alte aprobari

Limitele proiectului (interfata cu alte utilitati/proprietati) trebuie clar descrise.

e. Cerintele tehnice trebuie sa se refere la datele de intrare/iesire pentru facilitati, insa ofertantul trebuie lasat sa selecteze si sa propuna solutiile tehnice detaliate. In acest sens, cerintele ar trebui sa se refere la:

- Tipul facilitatii
- Capacitatea ceruta
- Cerinte privind energia(prognoza producerii)


Energy Strategy for Bucharest Municipality
Timeframe for Redesign of the Production System
Strategia Energetica a Municipiului Bucuresti
Grafic pentru Reproiectarea Sistemului de Producere
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1 Redesign of the production system
Reproiectarea sistemului de producere
2 Employ Consultant
Angajarea Consultantului
3 Elaborate Reconstruction Plan
Elaborarea Planului de Reconstructie
4 Pre-feasibility studies
Studii de fezabilitate
5 Elaborate Technical Conditions
Elaborarea Conditiilor Tehnice
6 Elaborate Technical Requirements
Elaborarea Cerintelor Tehnice
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8 ORGANISATION AND MANAGEMENT STRATEGIES

8.1 Introduction

Main problem areas identified

The analyses presented in appendixes identify organisational, structural and management weaknesses as the main problems for the district heating system in Bucharest and having the main responsibility for the system being one of the most expensive in the world.

The main problem areas identified are:

- RADET in bankruptcy
- Undecided future for the district heating system
- Huge investments necessary
- Lack of supervision by the Municipality of Bucharest
- Administration of public funds
- Lack of competition
- Inefficient organisational set-up

RADET in Bankruptcy

RADET is today declared bankrupt. The attitude of the Municipality of Bucharest has so far been rather relaxed and we still see most of the managers who brought RADET in this situation holding on to their positions.

The Municipality of Bucharest will have to bailout RADET from this situation and thus, subsidises will not be about 75% anymore but significant higher. It should not be difficult to see that this is not a sustainable situation.

RADET's dept problem are considered historical and they should thus have been negotiated away years ago.

It will be absolutely necessary to bring RADET into a normal operation situation before privatisation can be established.

Undecided future

Development of the district heating system has been halted since the 1990'ties with almost all new buildings

8 STRATEGII DE ORGANIZARE SI MANAGEMENT

8.1 Introducere

Probleme principale identificate

Analizele prezentate in anexe identifica punctele slabe la nivel organizational, structural si de management ca fiind principalele probleme pentru sistemul de termoficare din Bucuresti, impreuna cu responsabilitatea de a avea unul dintre cele mai scumpe sisteme din lume.

Principalele probleme identificate sunt:

- Falimentul RADET-ului
- Viitorul incert al sistemului de termoficare
- Necesitatea unor investitii uriase
- Lipsa de supervizare din partea Primariei Municipiului Bucuresti
- Administrarea fondurilor publice
- Lipsa competitivitatii
- Organizatie ineficienta

Falimentul RADET-ului

In prezent, RADET este declarat în stare de faliment. Atitudinea Primariei Municipiului Bucuresti a fost pana acum destul de relaxata si putem vedea ca majoritatea directorilor, care au adus RADET-ul în aceasta situatie, sunt inca in functie.

Primaria Municipiului Bucuresti, va trebui sa scoata RADET-ul din aceasta situatie si astfel, subventiile nu vor mai fi aproximativ 75%, ci semnificativ mai mari. Nu ar trebui sa fie greu de vazut ca aceasta situatie nu este durabila.

Datoria RADET-ului este considerata istorica si ar fi trebuit negociata în urma cu multi ani.

Este absolut necesar aducerea RADET-ului intr-o situatie normala de functionare, înainte de privatizare.

Viitor incert

Dezvoltarea sistemului de termoficare a fost stopata inca din anii '90, aproape toate cladirile noi fiind since then being supplied by natural gas for individual heating. This development continues today even though EU-directives request improved efficiency and cogeneration (district heating) selected for new developments.

This development has lead to the situation where the commercial consumers and private consumers who can afford to pay more than 2,500 EUR/m^2 in new buildings and can afford a heat bill without subsidises to connect to natural gas while leaving the population with low income to be supplied by district heating.

It has also leaded to a situation where Bucharest has a poor energy efficiency performance and it has not been significantly improved during the last decades where other capitals in Europe have demonstrated improvements of 5-10% per year.

Apart from sufficient district heating supply today, which is mainly do to sufficient fuel procurement, the population has seen little improvements in the comfort as the main part of the investments has focused on make-up for lack of maintenance of the existing system.

alimentate cu gaze naturale pentru încalzire individuala. Aceasta dezvoltare continua si astazi, chiar daca directivele UE impun imbunatatirea eficientei si cogenerarea (incalzire centralizata) fiind selectate pentru noile dezvoltari urbanistice.

Aceasta evolutie a condus la situatia în care consumatorii comerciali si consumatorii privati, care îsi pot permite sa plateasca mai mult de 2.500 EUR/m^2 pe suprafata construita în cladirile noi, îsi pot permite o factura de energie termica fara subventii, opteaza pentru incalzirea pe baza de gaze naturale lasand populatia cu venituri mici sa fie alimentata de la sistemul de termoficare.

De asemenea, în municipiul Bucuresti s-a ajuns la o situatie de slaba performanta din punct de vedere al eficientei energetice, nefiind îmbunatatita semnificativ în ultimele decenii, in timp ce in alte capitale s-au inregistrat îmbunatatiri de 5-10% pe an.

Cu exceptia faptului ca in prezent nu exista probleme de furnizare, in principal acestea se datoreaza asigurarii achizitiei de combustibil, populatia a vazut putine îmbunatatiri în ceea ce priveste confortul. Acest lucru s-a intamplat pentru ca investitiile facute pana acum s-au concentrat pe reabilitari ale sistemului datorate lipsei de intretinere.

Huge investments necessary

Redesign and reconstruction of the district heating system as described in the previous chapters will require investments in a level out-of-reach for the public sector – an investment of about 3,300,000,000 EUR - is estimated required for the period 2009 to 2020. This is recognised in the National Energy Strategy where private participation and private investments are seen as the only possibility for reaching the necessary investments.

Many private investors have turned their back on Romania as the secondary legislation is not fully in place and do to corruption problems. There is “homework” to do for the Romanian authorities especially on the Governmental level.

Necesitatea unor investitii uriase

Asa cum este descris si in capitolele anterioare, reproiectarea si reconstruirea sistemului de termoficare necesita investitii in perioada 2009 – 2020 de aprox. 3.300.000.000 EUR, care depasesc cu mult posibilitatile sectorului public. Acest lucru este recunoscut si în Strategia Energetica Nationala unde participarea sectorului privat si investitiile private sunt vazute ca singura posibilitate de a atinge nivelul investitiilor necesare.

Multi investitori privati au intors spatele Romaniei intrucat legislatia secundara nu este pe deplin stabilita si de asemenea, datorita problemelor de coruptie. In acest sens, autoritatile romane trebuie sa-si faca “temele”, in special la nivel guvernamental.

Lack of supervision

Being the single owner of RADET the Municipality of Bucharest should, not only on paper but by active actions, be the supervising authority setting strategies and goals for the development of the district heating system. However, for the last decades, perhaps due to lack of understanding, the Municipality of Bucharest seems to have given up developing the district heating sector to be what the sector is in many countries: “a sector providing relatively cheap heat with high comfort and low environmental impact to the

Lipsa de supraveghere

Fiind singurul proprietar al RADET, Municipiul Bucuresti ar trebui, nu numai pe hartie, ci si prin actiuni efective, sa fie autoritatea de supraveghere, care stabileste strategiile si obiectivele de dezvoltare ale sistemului de termoficare. Cu toate acestea, în ultimele decenii, probabil din cauza lipsei de întelegere, Primaria Municipiului Bucuresti pare sa fi renuntat la dezvoltarea sectorului de termoficare, de a deveni ceea ce este în multe tari: “un sector care furnizeaza populatiei energie termica relativ ieftina, cu un grad ridicat de confort si cu un impact scazut population".

Supervision will be even more important when areas of operation are privatised. A strong Public Service Organisation, PSO with internal and external expertise will be necessary to establish concessions, approval of contracts, monitoring of operation and introduction of corrective measures where problems are not solved by the market. The market must be controlled and the PSO must ensure that the private operates comply with the conditions of the concessions but also that all parties rights are respected.

Administration of public funds

For many years subsidises has been a sleeping pill for the management of RADET. Subsidises has not only been distributed to private consumers but also given as investment subsidises, payment of loan services and direct subsidises to the general budget of RADET.

Perhaps it takes the current financial crises where the Municipality of Bucharest and the Romanian Government realise that a subsidise of about 75% of the real heat bill is not sustainable while the population at the same time see that there is lack of funding for medicine for elderly people and lack of toilet paper for the school children.

The Municipality of Bucharest should, to the extent the municipality shall provide investment subsidises in the future, ask three simple questions:

- What is the impact on the heat tariff/subsidise level?
- What is the environmental impact?
- What is the impact on security and comfort of supply?

Only if a positive answer to all three questions can be given and guaranteed (verified by monitoring) Municipality of Bucharest should consider investment subsidises. If RADET fails to obtain the guaranteed benefits it must have serious consequences in terms of removal of responsible persons from their positions and return of the investment.

Lack of competition

In a subsidised and cross-subsidised market with tariffs fixed by the government and the municipality covering the difference between the governmental fixed tariff and RADET's real costs there is no competition.

A district heating market will never be a perfect market driven by free completion. District heating is, and will

asupra mediului".

Supravegherea va fi chiar mai importanta, atunci cand zonele de exploatare sunt privatizate. Va fi necesara o Organizatie a Serviciului Public – OSP puternica, cu expertiza interna si externa pentru a stabili concesiuni, pentru a aproba contracte, pentru monitorizarea exploatarii si introducerea masurilor corective acolo unde problemele nu sunt rezolvate de piata. Piata trebuie sa fie controlata si OSP trebuie sa se asigure ca operatorii privati respecta conditiile de concesiune dar in acelasi timp drepturile tuturor partilor sa fie respectate.

Administrarea fondurilor publice

Timp de mai multi ani subventiile au fost un somnifer pentru conducerea RADET. Subventiile nu au fost distribuite doar la consumatorii privati, ci si in investitii, reprezentand plata ratelor la credite si de asemenea subventii directe pentru bugetul general al RADET.

Poate ca este nevoie de criza financiara actuala pentru ca Primaria Municipiului Bucuresti si Guvernul sa realizeze ca subventionarea a aproximativ 75% din factura de energie termica nu este durabila, în timp ce populatia, în acelasi timp, vede ca nu exista fonduri pentru medicamente, pentru varstnici si pentru hartie igienica pentru scoli.

Primaria Municipiului Bucuresti ar trebui, în masura în care trebuie sa furnizeze subventii, sa adreseze trei întrebari simple:

- Care este impactul asupra tarifului energiei termice/nivel subventie?
- Care este impactul asupra mediului?
- Care este impactul în materie de securitate si confort a furnizarii?

Numai în cazul în care la toate cele trei întrebari se poate da si garanta un raspuns pozitiv (verificat prin monitorizare) Primaria Municipiului Bucuresti trebuie sa ia în considerare subventiile pentru investitii. Daca RADET nu reuseste sa obtina beneficiile garantate, acest lucru ar trebui sa aiba consecinte grave, in sensul îndepartarii persoanelor responsabile de pe pozitia lor si recuperarea investiilor.

Lipsa de competitivitate

Într-o piata cu subventii si subventii incrucisate, cu tarife fixate de Guvern si Primarie, cu acoperirea diferentei dintre tariful fixat si costurile reale ale RADET, nu exista competitie.

O piata a energiei termice nu va fi niciodata o piata condusa de libera concurenta. Termoficarea este, si va fi si in viitor, o piata de monopol.

also in the future be a, highly monopoly market.

In absent of free market mechanism another form of completion based on measuring of performance is introduced in many countries. Benchmarking as it is developed in Scandinavia is probably the best system for measuring performance and we see today the world largest companies in the field of energy services as Vattenfall, e-on, Suez, RWE compete on performance parameters such as water losses, heat losses, administration costs, pumping costs and of cause on the heat price.

Benchmarking is especially used for comparison of performance for transmission and distribution companies. It is more difficult to use Benchmarking for the production side as the performance will depend of type of plant, age of plan and operation pattern etc.

În absenta unui mecanism de piata libera, este introdusa în multe tari o alta forma de concurenta, care se bazeaza pe masurarea performantei. Sistemul de referinta – Benchmarking - asa cum este dezvoltat în Scandinavia este probabil cel mai bun sistem de masurare a performantelor si astazi putem vedea cum cele mai mari companii din lume in domeniul serviciilor energetice ca Vattenfall, E-on, Suez, RWE concureaza la parametri de performanta, cum ar fi pierderile de apa, pierderile de caldura, costurile de administrare, costuri de pompare si desigur pretul energiei termice.

Benchmarking-ul este utilizat mai ales pentru compararea performantelor companiilor de transport si distributie. Este mult mai dificil de utilizat pentru producere, intrucat performanta depinde de tipul centralei, varsta si regimul de functionare etc.

Inefficient organisation

The RADET organisation covering own production (local boilers), transmission and distribution reached in the 1990'ties more than 6,000 employees and although the staff has been reduced since then the RADET organisation still has a size where the organisation is more or less self-sufficient.

What are all this persons doing? Probably nobody knows. Investigating the organisation chart it seems obviously that it is developed with the purpose of finding high level positions to as many as possible rather than establish an efficient organisation.

An efficient organisation for operating and maintaining is a small organisation (few hundred persons) assisted by ad-hock service contractors. Private service contractors perform a number of the services necessary from cleaning in the offices to maintaining of the heat exchangers and meter reading and billing. The operation organisation should focuses on providing the service obligations in front of the consumers and ensures that services contractors perform according to the services contracts.

Organizatie ineficienta

Regia Autonoma de Distributie a Energiei Termice care include productia proprie (cazane locale), transportul si distributia a ajuns în anii '90 la un numar mai mare de 6.000 de angajati si cu toate ca personalul a fost redus de atunci, dimensiunea organizatiei o face mai mult sau mai putin auto-suficienta.

Ce fac toate aceste persoane? Probabil ca nimeni nu stie. Analizand organigrama este evident ca aceasta a fost stabilita cu scopul de a gasi posturi de nivel înalt pentru cat mai multe persoane, mai degraba decat sa stabileasca o organizatie eficienta.

O organizatie eficienta pentru exploatare si intretinere este o organizatie mica (cateva sute de persoane) sprijinita de furnizorii de servicii ad-hoc. Furnizorii de servicii private asigura o serie de servicii necesare de la curatenie în birouri, la intretinerea schimbatoarelor de caldura, citirea contoarelor si facturare. Functionarea organizatiei trebuie sa se concentreaza pe furnizarea serviciilor catre consumatori si sa se asigura ca furnizorii de servicii isi presteaza serviciile conform conditiilor din contract.

Need of restructuring

The organisational and management setup for district heating system has demonstrated its incapability of coping with the challenges of today and there is no reason to believe that it will be able to cope with the challenges of tomorrow. The current management has successfully obtained to have probably the most expensive district heating system in the world and at the same time investing a huge amount of money without improving the efficiency of the system.

Nevoia de restructurare

Modul de organizare si conducere a sistemului de termoficare a demonstrat incapabilitatea de a se confrunta cu provocarile de astazi si nu exista nici un motiv sa credem ca va fi în masura sa faca fata provocarilor de maine. Conducerea actuala a reusit succesul de a avea probabil, cel mai scump sistem de termoficare din lume si în acelasi timp, investind o mare suma de bani, fara a îmbunatati eficienta sistemului.

References to main goals

Climate

Obtaining CO_2 neutrality from 2020 requires attraction of capital from private investors and obtaining the necessary improvement in efficiencies will also require private participation in operation.

Attracting the necessary capital might be possible if the organisational and management setup is changed as proposed later in this chapter.

Sustainability

Obtaining sustainability for the district heating system requires development of the system in terms of extension to new areas and redesign and reconstruction of the existing system. Leaving the district heating system as it is today is not an option.

Development of the district heating system requires capital from private investors. Attracting the necessary capital might be possible if the organisational and management setup is changed as proposed later in this chapter.

Quality

Mandatory connection to the district heating system, which is necessary if the CO_2 goal shall be reached, is only possible if the service and comfort level of district heating supply is improved to a level at least the same as obtained by individual heating based on natural gas.

Obtaining a quality level as expected in this century requires investment in supply systems and in internal installations. Thus, the major part of the required investments must be provided by the apartment owners (as it is when individual heating is installed).

In spite of investments from the owners of the apartments large investments on the supply side is also necessary and might only be obtainable from private investors. Attracting the necessary capital might be possible if the organisational and management setup is changed as proposed later in this chapter.

References to the National Energy Strategy

Referinte cu privire la obiectivele principale

Clima

Obtinerea neutralitatii din punct de vedere al emisiilor de CO_2, incepand din 2020, impune atragerea de capital de la investitorii privati si obtinerea îmbunatatirii eficientei va necesita, de asemenea, participarea privata la exploatare.

Atragerea de capital necesar ar putea fi posibila daca cadrul organizational si managementul vor fi modificate asa cum a fost propus în acest capitol.

Durabilitate

Obtinerea durabilitatii pentru sistemul de termoficare necesita dezvoltarea sistemului în sensul extinderii in zone noi si reproiectarea si reconstructia sistemului existent. Pastrarea sistemului de termoficare asa cum este astazi nu este o optiune.

Dezvoltarea sistemului de termoficare necesita capital de la investitorii privati. Atragerea de capital necesar ar putea fi posibila, daca managementul si cadrul organizational vor fi modificate asa cum a fost propus în acest capitol.

Calitate

Conectarea obligatorie la sistemul de termoficare, necesara pentru ca obiectivul privind emisiile de CO_2 sa fie atins, este posibila numai în cazul în care nivelul serviciilor si al confortului asigurat de sistemul de termoficare este imbunatatit cel putin pana la nivelul asigurat de incalzirea individuala pe baza de gaze naturale.

Obtinerea unui nivel de calitate corespunzator pentru acest secol, necesita investitii în sistemele de alimentare si în instalatiile interne. Astfel, cea mai mare parte a investitiilor necesare trebuie sa fie asigurata de catre proprietarii apartamentelor (asa cum se intampla atunci cand incalzirea individuala este instalata).

În pofida investitiilor facute de proprietarii apartamentelor sunt necesare investitii mari in sistemul de alimentare, care pot fi obtinute doar de la investitori privati. Atragerea de capital necesar ar putea fi posibila daca vor fi modificate cadrul organizational si managementul asa cum a fost propus în acest capitol.

Referinte legate de Strategia Nationala

Organisation strategies are in full accordance with the national strategy.

Strategic objectives included in the National Energetic Strategy refers to:

- Energy Safety
- Sustainable Development
- Competitiveness. In terms of competitiveness are established the following sub-objectives:
  - Developing a competitive market for electricity, natural gas, oil, uranium, green certificates, emission of greenhouse gas emissions and energy services
  - A liberalization of energy transit and ensuring permanent and non-discriminatory access of market participants in the networks of transport, distribution and international interconnections
  - Continuing the process of restructuring and privatization in the electricity, heating and natural gas sectors.

Strategia privind organizarea prin recomandarile formulate este in deplina conformitate cu prevederile strategiei nationale.

Obiective strategice incluse in Strategia Energetica nationala se refera la :

- Siguranta energetica
- Dezvoltare durabila
- Competitivitate. Din punct de vedere al competitivitatii sunt stabilite urmatoarele sub-obiective:
  - Dezvoltarea pietelor concurentiale de energie electrica, gaze naturale, petrol, uraniu, certificate verzi, certificate de emisii ale gazelor cu efect de sera si servicii energetice
  - Liberalizarea tranzitului de energie si asigurarea accesului permanent si nediscriminatoriu al participantilor la piata la retelele de transport, distributie si interconexiunile internationale
  - Continuarea procesului de restructurare si privatizare in sectoarele energiei electrice, termice si al gazelor naturale

References to appendixes

This chapter is prepared with reference to:

- Part C Appendix 8a: Restructuring of the district heating sector
- Part C Appendix 8b: SWOT Analyse
- Part C Appendix 8c: Institutional Analysis

Referinte cu privire la anexe

Acest capitol face referire la:

- Partea C Anexa 8a: Restructurarea sectorului de termoficare
- Partea C Anexa 8b: Analiza SWOT
- Partea C Anexa 8c: Analiza institutionala

8.2 Strategies

The Municipality of Bucharest will take the necessary action to ensure:

Restructuring of the district heating sector

Privatisation of the district heating sector

The objective of these strategies is to establish an organisational and management framework for the sector suitable for, and capable of, implementing the strategies.

The following actions are required:

8.2 Strategiile

Municipiul Bucuresti va lua masurile necesare pentru a asigura:

Restructurarea sectorului de termoficare

Privatizarea sectorului de termoficare

Obiectivul acestor strategii este de a stabili un cadrul organizational si de management pentru sectorul de termoficare corespunzator si capabil sa implementeze strategiile.

Urmatoarele actiuni sunt necesare:

8.3 Actions required

Breakdown of the current organisation

Only three main actors are found on the market today:

- The Municipality of Bucharest owning the transmission system, the distribution systems and 40 local boilers.
- ELCEN producing about 90% of the heat for the system. The remaining production comes from the 40 local boilers and some minor private producers.
- RADET operates (and should maintain) the transmission system, the distribution systems and the 40 local boilers.

The Municipality of Bucharest must strengthen the monitoring and supervision of the performance of the actors on the market and establish conditions for competitive performance. The Municipality of Bucharest must establish a competent Public Service Organisation, PSO.

The monopoly in production must be removed by inviting independent produces to participate in development. The decentralised CHP programme and the waste-to-energy programme must be tendered in lots ensuring competition in obtaining concessions and in the operation. However, do to the limited number of operators and the fact there it will not be feasible to establish a necessary surplus capacity a full market driven competition cannot be established and there must be compensated for this by establishment of performance goals, monitoring of these goals and introduction of corrective measures by the PSO when necessary.

The monopoly in heat transmission cannot be removed and it is proposed that ownership of the transmission system stays at the Municipality of Bucharest. Being owner of the vital heat transmission, connecting the cheap production sources to the distribution systems, will establish a controlling position of the Municipality of Bucharest which is necessary to protect the interest of the consumers. Operation of the transmission system including technical-economical load dispatch is proposed privatised as RADET for many years have demonstrated lack of capability in this respect.

A number of independent distribution companies should be established ensuring “competition by comparison”.

Initially the PSO should ensure establishing of a benchmarking for the existing distribution systems and

8.3 Actiuni necesare

Divizarea organizatiei existente

In prezent, pe piata se gasesc doar trei actori:

- Municipiul Bucuresti detinator al sistemului de transport, a sistemelor de distributiei si a 40 de CT-uri.
- ELCEN care produce aprox. 90% din energia termica pentru sistem. Restul provine de la 40 de CT-uri locale si cativa producatori mici privati.
- RADET care exploateaza (si ar trebui sa intretina) sistemul de transport, sistemele de distributie si cele 40 de CT-uri.

Municipiul Bucuresti trebuie sa intareasca monitorizarea si supervizarea performantei actorilor pe piata si sa stabileasca condiitile pentru performanta in conditii de competitivitate. Municipiul Bucuresti trebuie sa stabileasca o Organizatie a Serviciului Public –OSP.

Monopolul privind producerea trebuie eliminat prin invitarea producatorilor privati sa participe la dezvoltare. Programele privind centralele de cogenerare descentralizate si programul pentru facilitati de incinerare a deseurilor cu recuperarea energiei trebuie supuse licitatiei publice in loturi pentru asigurarea concurentei la obtinerea concesiunilor si exploatarii. Totusi, datorita numarului limitat de operatori si faptului ca nu este fezabil sa se stabileasca o capacitate suplimentara nu se poate stabili o piata pe deplin condusa pe criterii de concurenta, acest lucru trebuie compensat prin stabilirea obiectivelor legate de performanta, prin monitorizarea acestor obiective si introducerea de masuri corective de catre OSP cand este necesar.

Monopolul privind transportul energiei termice nu poate fi îndepartat si se propune ca Municipiul Bucuresti sa ramana proprietarul sistemului de transport. In calitate de proprietar al sistemului vital de transport, luand in considerare conectarea la surse de producere ieftine, va instaura o pozitie de control pentru Municipalitate, care este necesara pentru a proteja interesul consumatorilor. Se propune ca functionarea sistemului de transport, inclusiv dispecerizarea tehnico-economica sa fie privatizate, intrucat RADET a demonstrat incapabilitate in acest sens.

Se va stabili un numar de companii independente de distributie asigurand “concurenta prin comparatie”.

Initial OSP ar trebui sa se asigure de instituirea unui the transmission system identifying the starting position in terms of performance form a new distribution organisational structure.

Restructuring of the production sector

The ownership of the production facilities should in the future be:

- Existing production facilities planned in operation after 2015 should be operated by ELCEN and other private operators based on concessions for heat production to the heat transmission system and electricity generation to the national grid. These concessions should replace the current non-negotiated contract.
- Waste-to-energy facilities should be established by private investors/operators based on concessions for heat production to the transmission system, waste incineration of municipality waste and electricity generation to the national grid.
- Decentralised CHP units should be established by private investors/operators based on concessions for heat production to the transmission system (or the distribution system if located there), sale of chilled water for cooling purposes and electricity generation to the national grid.
- Local peak-load boilers and solar heating systems should be established by the private distribution companies based on concessions for heat production to the district heating system.

All production facilities should be available for technical-economical load dispatch performed by the transmission system operator. The transmission company will calculate the average pool tariffs (energy and capacity tariffs) and all distribution companies will thus pay the same for heat supplied to the system.

Each private investor/operator will determine his own organisational set-up.

The private operators should undertake to supply all technical-economical data necessary for the load dispatch and for benchmarking.

The Municipality of Bucharest (represented by the PSO) should play the main role in establishing the concessions and later follow-up on agreed performance parameters. The PSO should hold the necessary power to introduce corrective measures in case of lack of performance or if the market is not functioning as expected.

sistem de referinta - benchmarking pentru sistemele de distributie si de transport existente, identificand punctul de plecare pentru noua structura organizatorica de distributie.

Restructurarea sectorului de producere

Proprietatea facilitatilor de producere, ar trebui sa fie in viitor dupa cum urmeaza:

- Facilitati de producere existente planificate a fi in functiune dupa 2015 ar trebui sa fie exploatate de catre ELCEN si alti operatori privati, pe baza de concesiuni pentru producerea de energie termica în sistem de transport si pentru generarea de energie electrica pentru reteaua nationala. Aceste concesiuni ar trebui sa înlocuiasca contractul existent ne-negociabil.
- Facilitatile de incinerare a deseurilor cu recuperarea energiei ar trebui sa fie stabilite de catre investitorii/ operatori privati, pe baza de concesiuni pentru producerea de energie termica catre sistemul de transport, pentru incinerarea deseurilor si pentru generarea energiei electrice catre reteaua nationala.
- Unitatile de cogenerare descentralizate ar trebui sa fie stabilite de catre investitorii/ operatori privati, pe baza de concesiuni pentru producerea de energie termica in sistemul de transport (sau sistemul de distributie in functie de amplasare), vanzarea de apa rece pentru racire si pentru generarea energiei electrice catre reteaua nationala.
- Cazanele locale pentru varf si sistemele de incalzire solara trebuie sa fie stabilite de catre companiile private de distributie, pe baza de concesiuni pentru producerea de energie termica pentru sistemul de termoficare.

Toate facilitatile de producere ar trebui sa fie pregatite pentru dispecerizarea tehnico-economica realizata de operatorul sistemului de transport. Compania de transport va calcula media tarifului binom (tarifele de energie si de capacitate) si astfel, toate companiile de distributie, vor plati la fel pentru energia termica furnizata în sistem.

Fiecare investitor/operator privat va stabili propriul sau cadru organizational.

Operatorii privati ar trebui sa se angajeze sa furnizeze toate datele tehnico-economice necesare pentru dispecer si pentru benchmarking.

Municipiul Bucuresti (reprezentata prin OSP) ar trebui sa joace rolul principal în stabilirea de concesiuni si

It is important that the concession agreement motivate the operator to perform better than minimum agreed by allowing the investor an increased profit. This will also motivate additional investment in energy efficiency improvement measures etc.

It is not unusual to see a private producer paying an annual royalty for the rights of concession. This should be considered introduced by the Municipality of Bucharest.

mai tarziu, sa monitorireze parametrii de performanta. OSP ar trebui sa aiba autoritatea necesara de a introduce masuri corective, în cazul lipsei de performanta sau în cazul în care piata nu functioneaza conform asteptarilor.

Este important ca acordul de concesiune sa motiveze operatorul sa performeze mai bine decat cerintele minime acceptate prin a permite investitorilor sa aiba un profit in crestere. Aceasta va constitui o motivatie pentru investitii suplimentare in masuri de imbunatatire a eficientei energetice etc.

Nu este neobisnuit ca un producator privat sa plateasca o redeventa anuala pentru drepturile de concesiune. Introducera acestui lucru ar trebui sa fie luat in considerare de Municipiul Bucuresti.

Restructuring of the transmission sector

The Municipality of Bucharest should maintain the ownership of the transmission system but employ an experienced operator to operate the system and perform the technical-economical load dispatch.

Maintaining the transmission system should be subcontracted to the distribution companies and thus the staffing of the transmission operation company could be limited to the 30-40 persons known from the Danish transmission companies.

The private operator should obtain concession for operation the system and establishment of the necessary SCADA system/load dispatch system based on open tendering on equal terms. It is important that the concession agreement motivate the operator to perform better than minimum agreed by allowing the operator an increased profit (profit sharing agreement).

Performance parameters should be agreed, monitored and supervised by the PSO. In case of lack of performance the PSO should have the power to introduce corrective measures.

Restructurarea sectorului de transport

Municipiul Bucuresti ar trebui sa mentina proprietatea asupra sistemului de transport, insa va angaja un operator cu experienta pentru a exploata sistemul si pentru a realiza dispecerizarea tehnico-economica.

Intretinerea sistemului de transport ar trebui sa fie subcontractata companiilor de distributie si, prin urmare, personalul companiei de transport ar putea fi limitat la 30-40 de persoane asa cum se intalneste in cadrul companiilor de transport daneze.

Operatorul privat ar trebui sa obtina concesiunea pentru exploatarea sistemului si sa stabileasca un sistem SCADA / dispecer necesar in baza unei licitatii deschise in conditii de egalitate. Este important ca acordul de concesiune sa motiveze operatorul sa performeze mai bine decat cerintele minime acceptate, permitand obtinerea unui profit in crestere (acord de impartire a profitului).

Parametrii de performanta ar trebui sa fie conveniti, monitorizati si controlati de catre OSP. În caz de lipsa de performanta, OSP ar trebui sa aiba competenta de a introduce masuri corective.

Restructuring of the distribution sector

10-15 (perhaps more) distribution companies should be established and private investors/operators invited to take-over and further develop of the systems.

The systems are today public property and it will be necessary to establish the value and dept for each system having the same starting points for all systems the day of start of concession. It will also be necessary to establish the legal framework for concession of public property.

At the start of the concession the private

Restructurarea sectorului de distributie

Se vor stabili 10-15 (poate chiar mai multe) companii de distributie si trebuie invitati investitori/operatori privati sa preia si sa dezvolte in continuare sistemele.

In prezent, sistemele sunt proprietate publica si va fi necesar sa se stabileasca valoarea si datoria pentru fiecare sistem luand in considerare aceleasi puncte de pornire pentru toate sistemele, in ziua concesiunii. De asemenea, va fi necesar sa se stabileasca cadrul legal pentru concesionarea proprietatilor publice.

La începutul concesiunii investitorul/operatorul privat investor/operator should pay the value of the system minus the debts the investor/operator will take-over. It is important that the concession agreement motivate the operator to perform better than minimum agreed by allowing the operator an increased profit (profit sharing agreement).

The private investor/operator will establish the organisation he finds comprehensive.

The Municipality of Bucharest should consider requesting an annual royalty for the right of concession.

All information listed above is in line with the provisions of Law no. 22 of 11/01/2007 (Law 22/2007) for approval of Government Emergency Ordinance no. 54/2006 on the concession of public ownership of property.

ar trebui sa plateasca valoarea sistemului pe care il preia minus datoriile. Este important ca acordul de concesiune sa motiveze operatorul sa performeze mai bine decat cerintele minime acceptate, permitand obtinerea unui profit in crestere (acord de impartire a profitului).

Investitorul/operatorul privat va stabili cadrul organizational pe care il considera comprehensiv.

Primaria Municipiului Bucuresti ar trebui sa ia în considerare o redeventa anuala pentru dreptul de concesiune.

Toate informatiile mentionate mai sus sunt in corelare cu prevederile Legii nr. 22 din 11/01/2007 (Lege 22/2007) pentru aprobarea Ordonantei de urgenta a Guvernului nr. 54/2006 privind regimul contractelor de concesiune de bunuri proprietate publica.

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9 HEAT TARIFF

9.1 Introduction

Problem areas identified

The main problems identified are:

- Heavy subsidises
- Different cost and tariff structure
- Subsidise structure

Heavy subsidises

The heat tariff paid by domestic consumers only covers about ⅓ of the costs. Commercial consumers pay about ⅔ of the costs.

This information is not public known and not recognised politically in the public bookkeeping as subsidises. The general believe is that the domestic tariff is subsidised about ⅓.

The hidden subsidises are discovered when the tariff structure is analysed:

- The natural gas price paid by the production plants is only covering the marginal costs. Capacity costs for using the Romanian natural gas system is not included.
- The conversion costs (natural gas converted to heat and hot water) only cover the marginal costs. Capacity cost for using the production system is not included.
- The transmission and distribution costs only cover RADET variable costs. Capacity cost for using the transmission system is not included – the Municipality of Bucharest pay loan services and annual direct investment contributions from the general budget.
- Energy metering at the apartment blocks is paid by the Municipality of Bucharest and there is no meter rental fee etc.

It will be almost impossible to privatise systems with such heavy subsidises as nobody will understand why a private investor/operator shall be paid about ⅓ more than today's public operator.

9 TARIFUL ENERGIEI TERMICE

9.1 Introducere

Problemele identificate

Principalele probleme identificate sunt:

- Subventiile mari
- Structuri diferite ale costului si tarifului
- Structura subventiei

Subventiile mari

Tariful energiei termice plătit de consumatori casnici acoperă doar cca ⅓ din costuri. Consumatorii comerciali platesc cca ⅔ din costuri.

Această informație nu este cunoscuta publicului şi nu este recunoscuta la nivel politic ca subventie în contabilitatea publica. În general se stie ca tariful pentru consumatorii casnici este subventionat cu aprox. ⅓.

Subventiile ascunse sunt descoperite atunci cand se analizeaza structura tarifului:

- Prețul gazelor naturale plătit de către centralele de producere acopera doar costurile marginale. Costurile de capacitate pentru utilizarea sistemului românesc de gaze naturale nu sunt incluse.
- Costurile de conversie (gazele naturale convertite in căldură ca apa calda) acoperă doar costurile marginale. Costurile de capacitate pentru utilizarea sistemului de producere nu sunt incluse.
- Costurile de transport şi distribuție acoperă doar costurile variabile ale RADET. Costurile de capacitate pentru utilizarea sistemului de transport nu sunt incluse – Primaria Municipiului Bucureşti plateste rate de imprumut si contributii pentru investitii anuale directe din bugetul general.
- Contorizarea energiei la blocurile de apartamente este plătita de către Primarie şi deci nu există nici o taxă pentru inchirierea contorului etc.

Privatizarea sistemelor va fi aproape imposibila considerand astfel de subventii mari, intrucat nimeni nu va intelege de ce un investitor/operator privat va fi platit cu aproximativ ⅓ mai mult decat operatorul public de astazi.

Different cost and tariff structure

The current consumer tariff is an energy tariff only (EUR/GJ) while the real cost structure in a modern district heating system is about 50% energy related (variable costs) and about 50% capacity related (fixed costs).

The current over-sizing of most components can be related to the lack of a capacity tariff. As about 50% of the tariff is related to the installed capacity a capacity tariff would have encourage designers to optimise the installations.

Structura diferita a costurilor şi tarifelor

Actualul tarif la consumator este doar un tarif de energie (EUR / GJ), în timp ce structura costului real într-un sistem modern de termoficare este circa 50% energie (costuri variabile) şi aproximativ 50% capacitatea (costuri fixe).

Supradimensionarea multor componente existente poate fi legata de lipsa unui tarif de capacitate. Luand in consideratie faptul ca circa 50% din tarif este legat de capacitatea instalata, acest tarif de capacitate ar fi trebuit sa incurajeze proiectantii sa optimizeze instalatiile.

Subsidise structure

The current subsidise structure subsidise everybody. Subsidises are known in all countries but mostly given based on social criteria – the declared income and family structure etc are used to determine the need of subsidises.

The main problem in Romania where about 50% of the income is unofficial will be to establish the social criteria for subsidises as the declared income not always tells the standard of living.

Structura subventiei

Structura actuala a subventiei conduce la acordarea generala a acesteia. Subventiile sunt cunoscute în toate țările, dar de cele mai multe ori sunt date pe baza de criterii sociale – venitul declarat si structura familiei etc. sunt factorii pentru determinarea nevoii de subventii.

Problema principală în România, cand aproximativ 50% din venituri sunt neoficiale, va fi de a stabili criteriile sociale pentru subventii, intrucat venitul declarat nu reflecta intotdeauna standardul de viață.

Need for a new tariff system

In a competitive business setup it is very important that the tariff system is transparent and reflect the real cost structure.

A modern tariff system is composed by three main components:

- Fees covering the cost of services provided by the distribution company, among others, connection fee (cost of connecting the building to the district heating system) and administration fee (cost of meter reading and billing etc).
- Capacity fee related to the size of the installation and the layout of the installation.
- Energy fee related to the energy metered.

To be transparent the concessions and contracts for heat distribution, heat transmission and heat production must have a breakdown of the payments related to the real cost structure. This structure of fixed costs (EUR/MJ/s) and variable cost (EUR/GJ) must be passed through in the system from production to transmission to distribution and to the consumers.

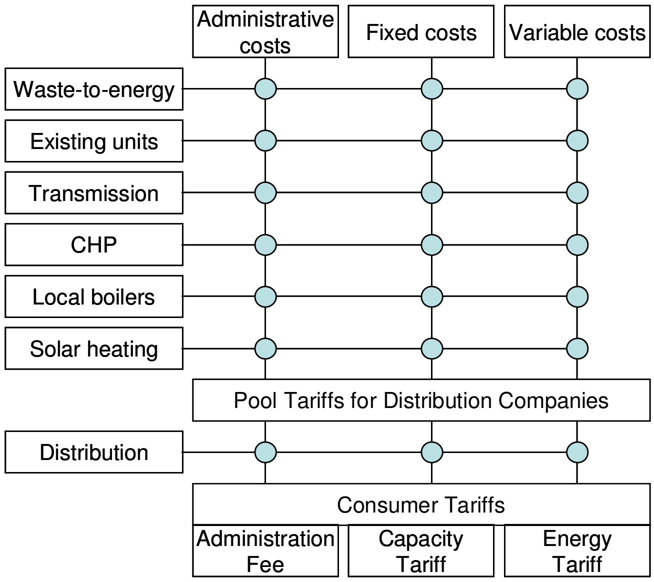
Necesitatea unui sistem nou de tarifare

Într-un cadru de afaceri competitiv, este foarte important ca sistemul de tarifare sa fie transparent şi să reflecte structura costurilor reale.

Un sistem modern de tarifare este compus din trei componente principale:

- Taxe pentru acoperirea costurilor serviciilor oferite de compania de distribuție, printre altele, taxa de conectare (costul de racordare al cladirii la sistemul de termoficare) şi taxa de administrare (costul citirii contorului si facturare, etc.)
- Taxa de capacitate este legata de dimensiunea si schema instalatiilor.
- Taxa pe energie aferenta citirii contoarelor.

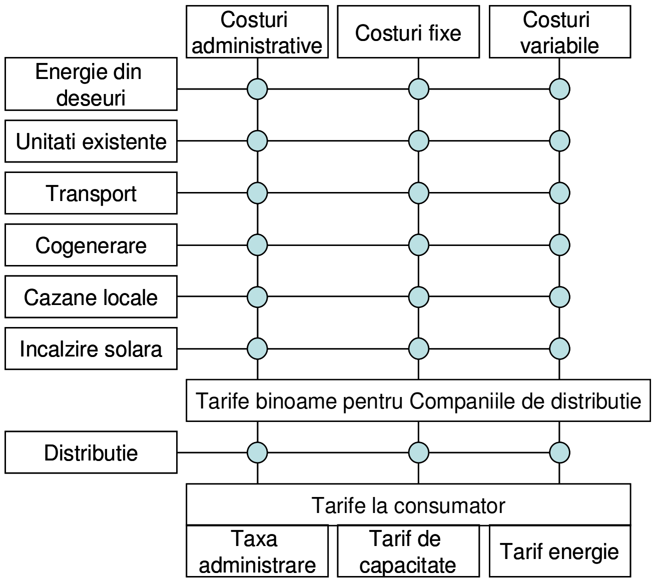
Pentru transparenta, concesiunile şi contractele pentru distribuția, transportul şi producerea de energie termică trebuie să includa o defalcare a plăților in functie de structura costurilor reale. Această structură a costurilor fixe (EUR/MJ/s) şi a costurilor variabile (EUR/GJ) trebuie sa se regaseasca in sistem pornind de la producere, transport, distributie si la consumatori.



Introduction of solar heating will make introduction of a capacity tariff necessary. When private solar heating systems are installed the energy sale from the district heating system will be reduced by 40-50% but the district heating system must still maintain 100% capacity for supply of heat when the solar heating has no capacity value on the coldest days of the year. It should be obvious that consumers with private solar heating should pay for the capacity requirement.

References to the National Energy Strategy

Regarding the pricing of energy, National Energy Strategy provides the following:
The system of ensuring access to energy must correspond to the European paradigm of supply and financing services of general interest (SGI) and the Lisbon Strategy of modernization of social protection systems. The White Book on SGI, COM (2004) 374 and document SEC 2005 (1781) give to Member States the opportunity and the practical aspects of SGI funding, provided that these are regulated by law, introduced mechanisms not affect competition in the market, be applied non-discriminatory and transparent. A basic principle of EU rules allows public financing of the fixed costs of the SGI. Public financing of fixed cost of the service, primarily to maintenance and investments, requires users to pay the variable component of the bill, depending on consumption. Access to energy for social groups with low incomes, vulnerable consumers, must be provided in the conditions in which energy markets are decoupled from the public funding of this service of general



Introducerea încălzirii solare va face necesara introducerea tarifului de capacitate. Când sistemele de incalzire solara private vor fi instalate, vânzarea energiei din sistemul de termoficare va fi redusă cu 40-50%, dar sistemul de termoficare trebuie să mențină în continuare o capacitate de 100% pentru asigurarea energiei termice cand energia solara nu are valoare de capacitate si anume in zilele cele mai reci din an. Ar trebui să fie evident faptul că acei consumatori avand incalzire solara privata ar trebui să plătească pentru cerinta de capacitate.

Referinte la Strategia Energetica Nationala

In ceea ce priveste tarifarea energiei, Strategia Energetica Nationala prevede urmatoarele:

Sistemul de asigurare a accesului la energie trebuie sa corespunda paradigmei europene a furnizarii si finantarii serviciilor de interes general (SIG), precum si Strategiei Lisabona de modernizare a sistemelor de protectie sociala. Cartea Alba asupra SIG, COM (2004) 374 si documentul SEC 2005 (1781) lasa la latitudinea statelor membre oportunitatea si modalitatea concreta de finantare a SIG, cu conditia ca acestea sa fie reglementate prin lege, mecanismele introduse sa nu afecteze concurenta in piata, sa fie aplicate nediscriminatoriu si transparent. Un principiu de baza al normelor europene admite finantarea publica a costurilor fixe ale SIG. Finantarea publica a costului fix al serviciului, in primul rand a mentenantei si investitiilor, impune ca utilizatorii sa plateasca partea variabila a facturii, dependenta de consum.

Accesul la energie pentru grupurile sociale cu venituri reduse, consumatori vulnerabili, trebuie asigurat in interest. To increase efficiency and confidence in energy markets, subsidies should be eliminated from the state budget to companies in the sector.

The current system of public assistance for access to energy

System support for public access to existing energy level of 2007 is fragmented, with authority dispersed and multiple public funding. Besides direct aid, including increasing energy efficiency in households with low incomes, the system also includes another form of energy prices through subsidies. Welfare for energy as "reference price", and subsidize part of the fuel for central heating systems are variable, unpredictable and train competition heating technologies. Subsidies through prices for conventional heating and natural gas interests have not motivated providers for efficiency. Public funds for energy aid do not maintain a sufficient interest for efficient use of energy by consumers, because the variable costs of service, not fixed. Except for components managed Ministry of Labour resources in the whole system does not assign priority to the poor.

The coverage is still limited. The most important financing of subsidies to consumers connected networks (electricity, gas and central heating), while for 50% of the population are still not fulfilled obligations towards the Romanian EU cohesion policy (Article 158 of the EC Treaty, former art. 130a).

Unitary system of social assistance for energy

There is necessary an uniform system of social assistance for energy, which contain two basic components:

Social payments for energy for low-income consumers of power networks, established according to the size of fixed costs of service (fixed tariff component of pool tariff) for the entire period of the year;

Integration of low-income households in national programs to increase energy efficiency: thermal rehabilitation of apartment living, other measures to increase energy efficiency and using alternative energy sources.

To build the public health unit for access to electricity, gas and heat are necessary the following measures:

conditiile in care pietele energiei sunt decuplate de efectul finantarii publice a acestui serviciu de interes general. Pentru cresterea eficientei si increderii in pietele de energie, trebuie eliminate subventiile de la bugetul de stat catre societatile din sector.

Sistemul actual de asistenta publica pentru accesul la energie

Sistemul de asistenta publica pentru accesul la energie existent la nivelul anului 2007 este fragmentat, cu autoritate dispersata si multiple finantari publice. Pe langa ajutoarele directe, inclusiv pentru cresterea eficientei energiei in gospodariile cu venituri reduse, sistemul mai include inca forme de subventii prin pretul energiei.

Ajutorul social pentru energie de tipul "pret de referinta", precum si subventionarea unei parti din valoarea combustibilului pentru sistemele centralizate de incalzire sunt variabile, impredictibile si nu antreneaza concurenta tehnologiilor de incalzire. Subventiile prin preturi conventionale pentru caldura si gaze naturale nu au motivat interesul furnizorilor pentru eficientizare. Fondurile publice pentru ajutoarele de energie nu mentin un interes suficient pentru folosirea eficienta a energiei de catre consumatori, deoarece acopera costuri variabile ale serviciului, si nu costuri fixe. Cu exceptia componentelor administrate de MMSSF, resursele sistemului in ansamblu nu se aloca cu prioritate saracilor.

Sistemul are inca o acoperire redusa. Partea cea mai importanta a subventiilor finanteaza consumatorii conectati la retele (de electricitate, gaz si incalzire centralizata), in timp ce pentru peste 50% din populatie nu sunt inca indeplinite obligatiile Romaniei fata de politicile UE de coeziune (art. 158 al Tratatului CE, fostul art. 130a).

Sistemul unitar de asistenta sociala pentru energie

Este necesar un sistem unitar de asistenta sociala pentru energie, care sa cuprinda cele doua componente de baza:

- platile sociale pentru energie pentru consumatorii cu venituri reduse alimentati din retele, stabilite in functie de marimea cheltuielilor fixe ale serviciului (componenta fixa a tarifului binom) pe intreaga perioada a anului;
- integrarea gospodariilor cu venituri reduse in programele nationale de crestere a eficientei energiei: reabilitarea termica a blocurilor de locuit, alte masuri de crestere a eficientei energiei si folosirea surselor alternative de energie.

Establishment of effective mechanisms to oversee energy markets, to increase their efficiency and encouraging investments in modernizing the sector as a result of increasing confidence in markets. Required continuous monitoring and supervision of the functioning of electricity, gas and heat, possibly made by a competent, independent and specialized;

Clear separation of powers and responsibilities of regulatory authorities in the energy ministry responsible for social assistance;

The public support for access to energy budget will be transparent and will focus on social groups with low incomes;

Development of a specific component of care for public access to energy, aiming at increasing the efficiency of energy consumers with low incomes, both in urban as in rural and, focusing on the thermal rehabilitation of buildings and facilities in household heating.

Prices affordability

To ensure a degree of price affordability of electricity, heat and gas to consumers following steps are necessary:

Strengthening the competitive energy markets;

Connecting the regional market of electricity and natural gas;

Optimal use of domestic energy resources;

Improvement of prices and tariffs, reducing the energy bill paid by the population and economic operators by increasing energy efficiency on the entire chain (generation, transmission, distribution, consumption), reduce consumption and use of specific technologies, performing in the energy;

Switch to a system of social protection of population with direct financial opportunities reduced the replacement rate for social power and grants awarded to heat with only welfare of vulnerable groups of consumers;

Increase security in energy supply

Recommendations contained in this chapter are in close relation with the provision of National Energy

Pentru edificarea sistemului unitar de asistenta publica pentru accesul la energie electrica, gaze naturale si caldura sunt necesare urmatoarele masuri:

- instituirea unor mecanisme eficiente de supraveghere a pietelor de energie pentru cresterea eficientei acestora si incurajarea investitiilor in modernizarea sectorului ca urmare a cresterii increderii in piete. Sunt necesare monitorizarea si supravegherea continua a functionarii pietelor energiei electrice, gazelor naturale si caldurii, eventual realizate de o institutie competenta, independenta si specializata;
- separarea clara a competentelor si responsabilitatilor autoritatilor de reglementare in domeniul energiei de cele ale ministerului responsabil cu asistenta sociala;
- intreaga asistenta publica pentru accesul la energie se va bugeta transparent si se va focaliza pe grupurile sociale cu venituri mici;
- dezvoltarea unei componente speciale a asistentei publice pentru accesul la energie, vizand cresterea eficientei energiei la consumatorii cu venituri mici, atat din mediul urban, cat si din cel rural, cu accent pe reabilitarea termica a cladirilor si a instalatiilor de incalzire din gospodarii.

Suportabilitatea preturilor

Pentru asigurarea unui grad de suportabilitate a preturilor energiei electrice, energiei termice si gazelor naturale la consumatori sunt necesare urmatoarele masuri:

- consolidarea pietelor concurentiale de energie;
- racordarea la piata regionala de energie electrica si gaze naturale;
- utilizarea optima a resurselor energetice interne;
- perfectionarea sistemelor de preturi si tarife; reducerea facturii cu energia platita de populatie si de operatorii economici, prin cresterea eficientei energetice pe intregul lant (producere, transport, distributie, consum), reducerea consumurilor specifice si utilizarea de tehnologii noi, performante, in sectorul energiei;
- trecerea la un sistem de protectie sociala directa a populatiei cu posibilitati financiare reduse, prin inlocuirea tarifului social pentru energie electrica si a subventiei acordate pentru energie termica cu ajutoare sociale destinate numai categoriilor vulnerabile de

Strategy.

consumatori;

- cresterea sigurantei in alimentarea cu energie

Recomandarile cuprinse in acest capitol sunt in stransa legatura cu prevederile Strategiei Energetice Nationale.

Reference to main coals

Climate

A comprehensive heat tariff system will over time change the design of systems and installations in terms of capacities and consumption. A problem in respect of climate is that the energy related part of the tariff can be very low and thus the motivation for energy conservation is thus reduced. To compensate for this most countries have introduced energy and environmental taxes.

Sustainability

Introduction of a tariff system based on the real cost structure is one of the main conditions for obtaining sustainability for the district heating system in Bucharest

Quality

A cost related tariff structure will ensure that the consumers obtain the quality of supply they pay for.

Referinte la principalele obiective

Clima

Un sistem comprehensiv de tarifare al energiei termice va schimba în timp proiectarea sistemelor şi a instalaţiilor din punctul de vedere al capacităţilor şi consumului. O problemă în ceea ce priveşte clima este că o parte din tarif legata de energie poate fi foarte mica, şi, astfel, motivaţia pentru conservarea energiei este redusă. Pentru a compensa acest lucru cele mai multe ţări au introdus taxe de energie şi de mediu.

Sustenabilitatea

Introducerea unui sistem de tarifare bazat pe costuri reale este una din principalele condiţii pentru obţinerea sustenabilitatii pentru sistemul de termoficare din Bucureşti.

Calitate

O structura a tarifului pe baza costurilor va asigura faptul că toti consumatorii obtin calitatea pentru care platesc.

References to appendixes

This chapter is prepared with reference to the following appendixes:

- Part C Appendix 9a: Production cost structure
- Part D Appendix 9b: Heat tariff analyse

Referinte la anexe

Acest capitol face referire la urmatoarele anexe:

- Partea C Anexa 9a: Structura costurilor de producere
- Partea D Anexa 9b: Analiza tarifului energiei termice

9.2 Strategies

The strategy related to heat tariff is:

To introduce a cost related heat tariff system by 2012

The action necessary for implementing the strategy is described in the following section:

9.2 Strategiile

Strategia privind tariful energiei termice este:

Introducerea sistemului de tarifare pe baza costurilor pana in 2012

Actiunile necesare pentru implementarea strategiei sunt descrise in sectiunile urmatoare:

9.3 Actions required

The Municipality of Bucharest will take the necessary action to:

Introduce a cost related tariff system for district heating

The objective of the action is to establish a transparent tariff structure and a related tariff system ensuring the consumers a quality of supply and services in accordance with the payments.

The necessary tasks to implement are:

a. Institutionalise a Public Service Organisation, PSO
b. Employ consultant
c. Establish the cost structure
d. Analyse and establishment of the production cost structure and recommended corresponding tariff structure.
e. Analyse and establishment of the transmission cost structure and recommended corresponding tariff structure.
f. Analyse and establishment of the distribution cost structure and recommended corresponding tariff structure.

a. The PSO should be responsible for establishment of the new tariff system. Establishment of the PSO is discussed in chapter 8.

b. The PSO must be assisted by a consultant within areas where the required expertise is not available within the PSO-organisation within the municipality organisation. Employment must be performed according to legislation regarding public procurement.

c. The first task of the consultant should be to establish the cost structure according to which the tariff structure should be established.

Companies who currently report benchmarks uses the following structure:

- Fees for services. Inspection and connection payment, extra meter testing, closing and opening in case of non-payment etc.
- Administrative costs. Meter reading, billing and general administrative costs.
- Capacity costs (fixed costs). Costs of having the necessary capacities of production, transmission and distribution

9.3 Actiuni necesare

Municipiul Bucuresti va intreprinde actiunile necesare pentru

Introducerea unui sistemul de tarifare pe baza costurilor pentru sistemul de termoficare

Obiectivul actiunii este de a stabili o structura a tarifului transparenta si un sistem de tarifare aferent pentru a asigura consumatorilor o calitate a furnizarii si serviciilor in conformitate cu ceea ce platesc.

Sarcinile necesare pentru a fi implementate sunt:

a. Institutionalizarea unei Organizatii a Serviciului Public, OSP
b. Angajarea unui consultant
c. Stabilirea structurii costurilor
d. Analizarea şi stabilirea structurii costurilor de producere si a structurii recomandate a tarifului aferent.
e. Analizarea şi stabilirea structurii costurilor de transport si a structurii recomandate a tarifului aferent.
f. Analizarea şi stabilirea structurii costurilor de distributie si a structurii recomandate a tarifului aferent.

a. OSP ar trebui să fie responsabil pentru stabilirea noului sistem de tarifare. Stabilirea OSP este detaliata în capitolul 8.

b. OSP trebuie să fie asistata de un consultant, în domenii în care expertiza necesară nu este disponibilă în cadrul acestei organizatii. Angajarea acestuia se va face în conformitate cu legislația în domeniul achizițiilor publice.

c. Prima sarcină a consultantului ar trebui să fie stabilirea structurii de cost pe baza careia se va stabili structura tarifului.

Companiile care în prezent raporteaza valori de referinta (benchmarking) utilizeaza urmatoarea structura:

- Taxe pentru servicii. Plata verificarilor si bransarii, verificarea suplimentara a contoarelor, inchiderea si deschiderea in caz de neplata etc.
- Costuri administrative. Citirea contoarelor, facturare si costuri administrative generale.
- Costurile de capacitate (costurile fixe). Costurile pentru a avea capacitățile de producție, transport şi distribuție necesare

available.

- Energy costs (variable costs). Cost of producing the energy demanded by the consumers.

d. The consultant must analyse the bookkeeping and accounting for the production companies and establish the cost structure for each company. Based on analyse the consultant should recommend a tariff structure to be enforced for all companies. Companies reporting benchmarks have agreed to use the following structure:

Expenditures

- Capital costs.
- Administrative costs.
- Operation and management costs
- Fuel costs
- Other costs

Incomes

- Sale of power
- Sale of heat
- Gate fee
- Other incomes

All costs and incomes are separated in fixed and variable and included in a tariff structure comprising:

- Administrative tariff
- Capacity tariff (fixed costs)
- Energy tariff (variable costs)

Production companies participating in a technical-economical load dispatch submit in addition a breakdown of costs:

- Start cost (hot start and cold start)
- Hourly running costs
- Efficiency curve
- Fuel price

This information and information regarding transmission costs is used by the load dispatcher to determine start and stop of units and the production from each unit.

e. The consultant must analyse the bookkeeping and accounting for the transmission company and establish the cost structure. Based on the findings the consultant should recommend a tariff structure. Transmission companies submitting benchmark values have agreed to use the structure:

- Administrative costs (own administrative costs and administrative costs paid to production companies)

disponibile.

- Costurile energiei (costurile variabile). Costul de producere a energiei cerute de consumatori.

d. Consultantul trebuie să analizeze evidențele si inregistrarile contabile pentru companiile de producere si va stabili structura costurile pentru fiecare companie. Pe baza analizei, consultantul va trebui sa recomande o structura a tarifului care va fi impusa tuturor companiilor. Companiile care raporteaza valori de referinta (benchmarking) au fost de acord să utilizeze următoarea structură:

Cheltuieli

- Costuri de capital.
- Costuri administrative.
- Costuri de exploatare si management
- Costuri cu combustibilul
- Alte costuri

Venituri

- Vanzarea de energie electrica
- Vanzarea de energie termică
- Taxa la poarta
- Alte venituri

Toate cheltuielile şi veniturile sunt separate în fixe şi variabile şi sunt incluse într-o structură a tarifului care cuprinde:

- Tarif administrativ
- Tarif de capacitate (costuri fixe)
- Tarif la energie (costuri variabile)

Suplimentar, companiile de producere participante la dispecerizarea tehnico-economica prezinta o defalcare a costurilor:

a. Cost de pornire a sistemului (la cald si la rece)
b. Costurile de functionare pe ora
c. Curba randamentului
d. Pretul combustibilului

Aceste informații şi informațiile privind costurile de transport sunt utilizate de către dispecer pentru a determina pornirea şi oprirea unităților precum si productia de la fiecare unitate.

e. Consultantul trebuie să analizeze evidențele contabile ale companiei de transport şi va stabili structura costurilor. Pe baza concluziilor consultantul ar trebui sa recomande o structura a tarifului. Companiile de transport care raporteaza valori de referinta au fost de acord să utilizeze următoarea structură:

- Costuri administrative (costurile

- Capacity costs (own capital costs, fixed costs and capacity costs paid to the production companies
- Energy costs (own variable costs and energy costs paid to production companies).

f. The consultant must analyse the bookkeeping and accounting for the distribution companies and establish the cost structure for each company. Based on the findings the consultant should recommend a tariff structure. Distribution companies submitting benchmark values have agreed to use the structure:

- Administrative costs (own administrative costs and administrative costs paid to the transmission companies)
- Capacity costs (own capital costs, fixed costs and capacity costs paid to the transmission companies
- Energy costs (own variable costs and energy costs paid to production companies).

The timeframe for establishing the new tariff system is about one year. However, the legal aspects of changing the tariff system might delay the implementation.

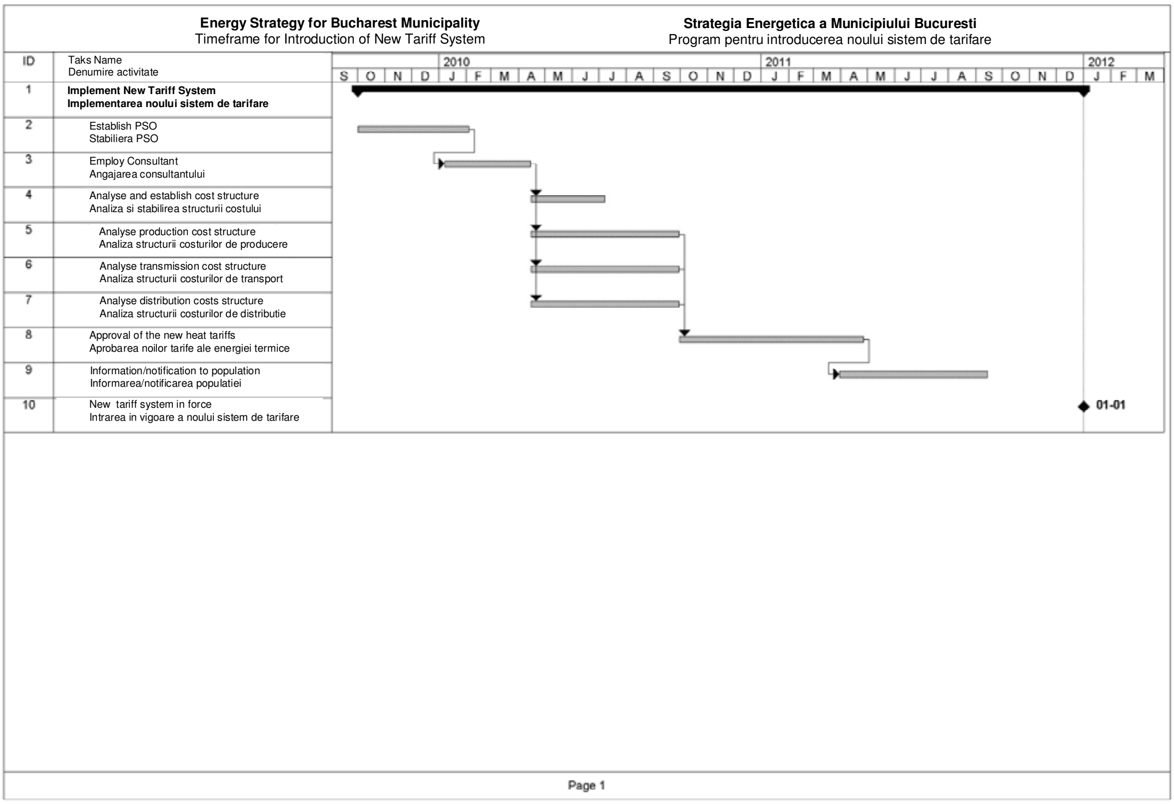
administrative proprii şi costurile administrative plătite companiilor de producere)

- Costurile de capacitate (costurile de capital proprii, costurile fixe şi costurile de capacitate platite companiilor de producere)
- Costurile energiei (costurile variabile proprii si costurile legate de energie, platite companiilor de producere).

f. Consultantul trebuie să analizeze evidențele contabile ale companiilor de distributie şi va stabili structura costurilor pentru fiecare companie. Pe baza concluziilor consultantul ar trebui sa recomande o structura a tarifului. Companiile de distributie care raporteaza valori de referinta au fost de acord să utilizeze următoarea structură:

- Costuri administrative (costurile administrative proprii şi costurile administrative plătite companiilor de transport)
- Costurile de capacitate (costurile de capital proprii, costurile fixe şi costurile de capacitate platite companiilor de transport)
- Costurile energiei (costurile variabile proprii si costurile legate de energie platite companiilor de transport).

Perioada pentru stabilirea noului sistem de tarifare este de aproximativ un an. Cu toate acestea, aspectele legale privind schimbarea sistemul de tarifare ar putea duce la intarzierea implementarii.


Energy Strategy for Bucharest Municipality
Timeframe for Introduction of New Tariff System
Strategia Energetica a Municipiului Bucuresti
Program pentru introducerea noului sistem de tarifare
ID
Taks Name
Denumire activitate
2010
2011
2012
S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M
1 Implement New Tariff System
Implementarea noului sistem de tarifare
2 Establish PSO
Stabiliera PSO
3 Employ Consultant
Angajarea consultantului
4 Analyse and establish cost structure
Analiza si stabilirea structurii costului
5 Analyse production cost structure
Analiza structurii costurilor de producere
6 Analyse transmission cost structure
Analiza structurii costurilor de transport
7 Analyse distribution costs structure
Analiza structurii costurilor de distributie
8 Approval of the new heat tariffs
Aprobarea noilor tarife ale energiei termice
9 Information/notification to population
Informarea/notificarea populatiei
10 New tariff system in force
Intrarea in vigoare a noului sistem de tarifare
01-01
Page 1

Preliminary analyse of cost structure

The consultant has tried to establish a tariff structure as it is described in previous section. However, it has been almost impossible as a lot of information has not been available such as the investment contributions from the Municipality and other Romanian authorities, the interest of these and the pay-back condition.

Where only total costs have been informed we have distributed these with same percentages as found for companies submitting benchmark-values and a replacement costs approach and age information has been used for establishment the values of plants and installations.

The costs structure and related tariff structure is established for 2015.

Analiza preliminara a structurii costurilor

Consultantul a încercat să stabilească o structura a tarifului, aşa cum s-a descris în secțiunea anterioară. Totusi, acest lucru a fost aproape imposibil, intrucat multe informații, cum ar fi contributiile Primariei Municipiului Bucuresti la investitii si din partea altor autoritati din Romania, dobanda si conditiile de rambursare, nu au fost disponibile.

In conditiile în care doar costurile totale au fost comunicate, aceste costuri au fost distribuite utilizand aceleasi procente utilizate de companiile care raporteaza valori de referinta, luandu-se in considerare aceeasi abordare pentru stabilirea costurilor de inlocuire si a vechimii centralelor si instalatiilor.

Structura costurilor şi structură tarifară aferenta sunt stabilite pentru anul 2015.

Administration fee

Production		
Administration costs	EUR/y	957,367
Existing CHP	EUR/y	158,346
Existing HOB	EUR/y	119,913
Solar heating	EUR/y	185,926
Local HOB	EUR/y	66,505
Decentralised CHP	EUR/y	202,683
Waste-to-energy	EUR/y	223,994
Transmission		
Administration costs	EUR/y	1,356,128
Own costs	EUR/y	398,760
Costs paid to production	EUR/y	957,367
Distribution		
Administration costs	EUR/y	2,620,446
Own costs	EUR/y	1,264,318
Costs paid to transmission	EUR/y	1,356,128
Number of connections	No	19,510
Administrastion fee	EUR/con	134.31

Taxa de administrare

Producere		
Costuri administrative	EUR/an	957,367
CET Existente	EUR/an	158,346
CT existente	EUR/an	119,913
Incalzire solara	EUR/an	185,926
CT local	EUR/an	66,505
CET descentralizat	EUR/an	202,683
Energie din deseuri	EUR/an	223,994
Transport		
Costuri administrative	EUR/an	1,356,128
Costuri proprii	EUR/an	398,760
Costuri platite la producere	EUR/an	957,367
Distributie		
Costuri administrative	EUR/an	2,620,446
Costuri proprii	EUR/an	1,264,318
Costuri platite la transport	EUR/an	1,356,128
Numarul de conectari	No	19,510
Taxa de administrare	EUR/con	134.31

Capacity tariff

Production		
Capacity tariff	EUR/y	170,050,306
Existing CHP	EUR/y	26,135,050
Existing HOB	EUR/y	17,249,133
Solar heating	EUR/y	9,578,297
Local HOB	EUR/y	18,491,835
Decentralised CHP	EUR/y	61,625,831
Waste-to-energy	EUR/y	36,970,161
Transmission		
Capacity tariff	EUR/y	262,695,609
Own costs	EUR/y	92,645,303
Costs paid to production	EUR/y	170,050,306

Tarif de capacitate

Producere		
Tarif de capacitate	EUR/an	170,050,306
CET Existente	EUR/an	26,135,050
CT existente	EUR/an	17,249,133
Incalzire solara	EUR/an	9,578,297
CT local	EUR/an	18,491,835
CET descentralizat	EUR/an	61,625,831
Energie din deseuri	EUR/an	36,970,161
Transport		
Tarif de capacitate	EUR/an	262,695,609
Costuri proprii	EUR/an	92,645,303
Costuri platite la producere	EUR/an	170,050,306

Distribution		
Capacity tariff	EUR/y	387,863,104
Own costs	EUR/y	125,167,495
Costs paid to transmission	EUR/y	262,695,609
Connected capacity	MJ/s	7,324
Capacity tariff	EUR/kW	52.96

Energy tariff

Production		
Energy tariff	EUR/y	219,622,791
Existing CHP	EUR/y	44,749,152
Existing HOB	EUR/y	113,494,332
Solar heating	EUR/y	1,028,791
Local HOB	EUR/y	84,804,599
Decentralised CHP	EUR/y	10,312,410
Waste-to-energy	EUR/y	(34,766,494)

Transmission		
Energy tariff	EUR/y	259,498,818
Own costs	EUR/y	39,876,027
Costs paid to production	EUR/y	219,622,791

Distribution		
Energy tariff	EUR/y	313,683,880
Own costs	EUR/y	54,185,063
Costs paid to transmission	EUR/y	259,498,818
Energy sale	GJ	18,017,000
Energy tariff	EUR/GJ	17.41

Distributie		
Tarif de capacitate	EUR/an	387,863,104
Costuri proprii	EUR/an	125,167,495
Costuri platite la transport	EUR/an	262,695,609
Capacitate conectata	MJ/s	7,324
Tarif de capacitate	EUR/kW	52.96

Tarif la energie

Producere		
Tarif la energie	EUR/an	219,622,791
CET Existente	EUR/an	44,749,152
CT existente	EUR/an	113,494,332
Incalzire solara	EUR/an	1,028,791
CT local	EUR/an	84,804,599
CET descentralizat	EUR/an	10,312,410
Energie din deseuri	EUR/an	(34,766,494)

Transport		
Tarif la energie	EUR/an	259,498,818
Costuri proprii	EUR/an	39,876,027
Costuri platite la producere	EUR/an	219,622,791

Distributie		
Tarif la energie	EUR/an	313,683,880
Costuri proprii	EUR/an	54,185,063
Costuri platite la transport	EUR/an	259,498,818
Vanzarea de energie	GJ	18,017,000
Tarif la energie	EUR/GJ	17.41

4				
3				
2	26.10.2009	Small changes in the text	GMCB	haa
1	20.07.2009	First edition	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

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Cuprins

10 FINANCING

10.1 Introduction

A total investment in the period 2009 to 2020 of about 3,200,000,000 EUR will be necessary if the goals of the strategy shall be reached.

The investments are distributed as follows (rounded values):

Distribution systems	1,200,000,000 EUR
Transmission system	420,000,000 EUR
Production facilities	1,700,000,000 EUR

The strategy assumes that distribution and production are privatised and the required investments are provided by the private concessionaires. How the concessionaire provide the investment shall be his own business.

The transmission system is assumed remaining under public ownership and the Municipality of Bucharest must provide the necessary funding. It is assumed that the possible contribution from the general municipality budget will be limited in the years to come and thus, most of 420 MEUR required must be provided as loan guarantees – a later section analyse the possibilities of obtaining financing.

In addition to the 3,200 MEUR public funding is assumed supporting energy rehabilitation of building (energy conservation measures) and installation of solar panels according to conditions currently discussed under the Ministry of Environmental (Environmental Fund). How the necessary funds will be provided will be a matter for the government to decide and allocate. We have estimated that the public support for solar system will be in the level of 410 MEUR for Bucharest. As far as we know, nobody has estimated the costs of energy conservation but if a standard of 100 KWh/m^2/year for existing buildings and 50 KWh/m^2/year about 200 mm insulation in/on the walls (after rehabilitation of the concrete), thermo windows and doors and internal insulation of pipes are needed and internal building losses must be reduced. Thus, the investment will be huge and far exceed the 4,000 EUR/apartment heard in the debate.

10 FINANTAREA

10.1 Introducere

In perioada 2009 - 2020 va fi necesara o investitie de aproximativ 3.200.000.000 EUR pentru a atinge obiectivele strategiei.

Investitiile sunt distribuite dupa cum urmeaza (valori rotunjite):

Sisteme de distributie	1.200.000.000 EUR
Sistem de transport	420.000.000 EUR
Facilitati de producere	1.700.000.000 EUR

Strategia presupune ca distributia si producerea vor fi privatizate, iar investitiile necesare vor fi asigurate de catre concesionarii privati. Concesionarii vor asigura investitiile in conformitate cu planul fiecaruia de afaceri.

Se presupune ca sistemul de transport va ramane proprietate publica si Primaria Municipiului Bucuresti trebuie sa asigure finantarea necesara. Se estimeaza ca finantarea asigurata din bugetul general al Primariei va fi limitata în anii care vor urma si astfel, cea mai mare din cei 420 MEUR necesari trebuie sa fie furnizata din împrumuturi – intr-o sectiune urmatoare se analizeaza posibilitatile de a obtine finantarea.

În plus fata de cei 3.200 MEUR reprezetand finantare publica se presupune ca se va sprijini si reabilitarea termica a cladirilor (masuri de conservare a energiei) si instalarea de panouri solare în conformitate cu conditiile discutate în prezent în Ministerul Mediului(Fondul de mediu). Modul in care fondurile necesare vor fi furnizate va fi o problema asupra careia guvernul va decide si aloca.

Am estimat ca sprijinul public pentru sistemul solare va fi la nivelul de 410 MEUR pentru Bucuresti. Din cate stim noi, nimeni nu a estimat costurile legate de conservarea energiei, insa, daca consideram ca este necesar un standard de 100 KWh/ m^2/an pentru cladirile existente si 50 KWh/ m^2/an, aproximativ 200 mm de izolatie (dupa reabilitarea betonului), usi si ferestre termopan, izolarea tevilor si reducerea pierderilor in interiorul cladirilor, investitia va fi imensa si va depasi cu mult 4.000 EUR/apartament, conform dezbaterilor.

10.2 Investment sources

The following sources are identified:

- Public funds (tax money)
- Consumer financing (as a part of the tariff)
- Private funds (funds provided by the concessionaires)
- Loan from institutional investment banks
- Structural funds from the EU
- Supplier credits
- Carbon trading
- Feed-in tariff
- Credit line in local bank

Public funds

It is difficult to see how a public sector who cannot provide dissent health care for the population and toilet paper for school children can think about using tax income for reconstruction of the district heating system. Thus, the public investment from the general municipality budget will be insignificant.

Bucharest Municipality can apply for partial financing from the Governmental financed programme “District Heating 2006 – 2015, heat and comfort”. The total budget for the programme is 2,120 MRON ~ about 500 MEUR. However, as this amount if for all district heating systems in Romania only a fraction can be expected approved for Bucharest.

Support schemes for “Energy Rehabilitation of Buildings” and installation of “Solar Heating Systems and other Renewable Heating Sources” are currently under public debate. Implementing of such schemes is included in the agreement between the EU and Romania signed prior to Romania’s membership of the union. The funding provided via these schemes is not included in the estimated investment needs for the district heating system.

Consumer financing

At the end of the day it wills be the consumers who have to pay for the financing of the reconstruction as a part of the tariff (fixed tariff). The only way to avoid increase in tariff is to invest in options as included in the strategy that will have a relatively short pay-back time.

10.2 Sursele de finantare

Urmatoarele surse au fost identificate:

- Fonduri publice (venituri din taxe)
- Finantarea de catre consumatori (o parte din tarif)
- Fonduri private (fonduri furnizate de catre concesionari)
- Fonduri structurale de la UE
- Credit furnizori
- Comercializarea unitatilor de reducere a emisiilor
- Feed-in tariff (sustinere in tarif)
- Linie de credit intr-o banca locala

Fondurile publice

Este dificil de vazut cum sectorul public care nu poata asigura un nivel decent pentru sanatatea publica si hartie igienica in scoli se poate gandi sa utilizeze veniturile din taxe pentru reconstructia sistemului de termoficare. Astfel, investitiile publice de la bugetul general al primariei vor fi nesemnificative.

Primaria Municipiului Bucuresti poate aplica pentru finantare partiala de la Guvern in cadrul Programului “Termoficare 2006 - 2015, caldura si confort”. Bugetul total pentru acest program este de 2.120 MRON ~ aproximativ 500 MEUR. Totusi, pentru ca aceasta suma a fost prevazuta pentru toate sistemele de termoficare din Romania este de asteptat ca doar o parte sa fie aprobata pentru Bucuresti.

Schemele de sprijin pentru “Reabilitarea termica a cladirilor” si instalarea de “Sistemelor de incalzire solare si surselor de incalzire regenerabile” sunt în prezent, in dezbatere publica. Punerea în aplicare a unor astfel de programe este inclusa în acordul dintre UE si Romania semnat inainte de intrarea Romaniei in UE. Finantarea oferite prin intermediul acestor scheme nu este inclusa în estimarile privind investitiile necesare pentru sistemul de termoficare.

Finantarea de catre consumatori

In final, consumatorii vor fi cei care vor trebui sa plateasca pentru finantarea procesului de reconstructie, ca o parte din tarif (tarif fix). Singura modalitate de a evita cresterea tarifelor este de a investi în optiunile incluse în strategie care au o perioada de rambursare relativ scurta.

It is found unrealistic at the current standard of living to expect the consumer up-front to finance the investments.

Private funds

Private funds provided based on a concession will be available if the concession conditions are satisfactory to the private concessions and if the Romanian legislation (and the secondary legislation) is in place.

Private investors such as for example Suez, e-on and Vattenfall have own funds but they also obtain funds from the international loan market, typically from investment banks and pension funds etc.

As mentioned in the introduction, private investment is expected to cover about 85% of the total invest requirement.

Loan from institutional investment banks

The Municipality of Bucharest has already obtained financing for rehabilitation projects from EIB (European Investment Bank) and EBRD (European Bank for Reconstruction and Development) and it might be possible to obtain additional loans based on a municipality guarantee.

Loan financing from EIB should be preferable as the lending costs (interests and fees etc) is only about half of EBRD.

EIB and EBRD can lend up to 50% of the total investment. The remaining must be financed by other sources.

Structural funds from the EU

Certain private small- and medium-scale project developing new renewable energy sources can obtain financing from the structural funds. However, it is difficult to see how concessionaires in Bucharest can comply with the definition of small- and medium-scale companies.

Dat fiind standardul de viata actual nu este realist sa ne asteptam ca un consumator sa asigure intreaga finantare o data.

Fonduri private

Fondurile private furnizate in baza unei concesiuni vor fi disponibile doar daca conditiile de concesiune sunt satisfacatoare pentru domeniu privat si numai în cazul în care exista o legislatie (inclusiv legislatie secundara) in acest sens in Romania.

Investitori privati, cum ar fi de exemplu Suez, E.ON si Vattenfall au fonduri proprii, dar pot de asemenea, sa obtina fonduri de pe piata internationala a creditelor, de obicei, de la banci de investitii si fonduri de pensii, etc.

Asa cum am mentionat în introducere, se estimeaza ca investitiile private vor acoperi aproximativ 85% din valoarea totala a investitiei necesara.

Imprumut de la bancii de investitii

Primaria Municipiului Bucuresti a obtinut deja finantare pentru proiecte de reabilitare de la BEI (Banca Europeana de Investitii) si BERD (Banca Europeana pentru Reconstructie si Dezvoltare) si ar putea fi posibil sa obtina împrumuturi suplimentare, pe baza unei garantii din partea Primariei.

Finantarea sub forma de imprumut de la BEI, ar trebui sa fie de preferat intrucat costurile de creditare (dobanda si comisioanele etc) sunt aproape jumatate fata de cele de la BERD.

BEI si BERD pot finanta pana la 50% din valoarea totala a investitiei. Restul trebuie sa fie asigurat din alte surse.

Fonduri structurale de la UE

Anumite proiecte micii si mijlocii care dezvolta surse noi de energie regenerabila pot fi finantate din fonduri structurale. Cu toate acestea, este greu de vazut cum concesionarii din Bucuresti pot respecta definitia intreprinderii micii si mijlocii.

Supplier credits

Many supplier of components for district heating are able to provide credit by own financing or via national export funds.

A supplier credit is normally short-term (maximum 3-5 years). Public owned district heating systems will in most situations require municipality guarantee.

A supplier credit is normally limited to 80% of the procurement. Hence, about 20% must be provided by other sources. It will in some situations be possible to obtain 80% financing of the total invest costs (goods + works).

Carbon trading

At the time of preparing this report the conditions for carbon trading after 2012 are not known. Hopefully the Copenhagen Summit in the autumn of 2009 will outline the conditions. A prolongation of the current scheme is expected.

Emission Reduction Units (ERU's) are today traded at 8-12 EUR/unit providing a significant income for the facilities eligible for sale of ERU's.

ERU's can be sold up-front to the carbon funds (World Bank, EIB and EBRD has jointly a carbon fund and EIB and EBRD together has an alternative fund. The benefit of selling the ERU's up-front is that an investment contribution can be obtained (typically 2-4% of the investment).

Feed-in tariff

A feed-in tariff is an extra payment on top of the market payment obtainable if the production is based on renewable sources.

Many alternative energy projects such as for example wind power is not feasible without a feed-in tariff and most bio-mass facilities will be constructed for heat-only production if there is no feed-in tariff supporting electricity generation.

A Green Certificate scheme as already implemented in many countries is under implementation in Romania. The discussed scheme includes a minimum price for selling green certificates which can be considered being a feed in tariff.

A green certificate scheme with a guaranteed

Creditul de la furnizori

Multi furnizori de componente pentru termoficare pot oferi credit din surse proprii sau prin intermediul fondurilor nationale de export.

Un credit furnizor este în mod normal, pe termen scurt (maxim 3-5 ani). Sistemele de termoficare aflate in proprietatea publica vor necesita, in multe situatii, garantia Primariei.

Un credit furnizor este, în general, limitat la 80% din achizitiile publice. Prin urmare, aproximativ 20% trebuie sa fie asigurat din alte surse. In unele situatii ar putea fi posibila finantarea a 80% din totalul costurilor de investitii (bunuri + lucrari).

Comercializarea unitatilor de reducere a emisiilor

La momentul pregatirii acestui raport, conditiile de comercializare a unitatior de reducere a emisiilor dupa 2012 nu sunt cunoscute. Speram ca Summit-ul de la Copenhaga din toamna anului 2009 va schita aceste conditii. O prelungire a schemei actuale este de asteptat.

Unitatile de reducere a emisiilor (URE) sunt in prezent tranzactionate la 8.12 EUR/ unitate, asta insemnand un venit semnificativ pentru o unitate de producere eligibila pentru vanzarea de URE.

URE pot fi vandute direct fondurilor de carbon (Banca Mondiala, BEI si BERD au în comun un fond de carbon si BEI si BERD au impreuna un fond alternativ). Avantajul privind vanzarea directa a URE este posibilitatea obtinerii unei contributii la investitie (de obicei 2-4% din investitii).

Feed-in tariff(sustinere in tarif)

Sustinerea in tarif este un o plata suplimentara fata de pretul pietei care poate fi obtinute în cazul în care productia se bazeaza pe surse regenerabile.

Multe proiecte de energie alternative, cum ar fi de exemplu, energia eoliana, nu sunt fezabile fara un tarif adaugat, iar unitatile de producere pe biomasa vor fi construite doar pentru producerea de energie termica daca nu exista tariful adaugat pentru a sustine generarea de energie electrica.

Schema de aplicare a Certificatelor Verzi este deja implementata în mai multe tari si este în curs de implementare si în Romania. Schema amintita prevede un pret minim de vanzare a certificatelor verzi care poate fi considerata o sustinere intarif.

minimum value will make it much easier to attract private investors and will for public projects contribute to the loan services and thus make it easier and cheaper to obtain the necessary financing.

O schema de aplicare a certificatelor verzi cu o valoare minima garantata va face mult mai usoara atragerea de investitori privati, iar pentru proiectele publice va contribui la serviciile de împrumut, fiind astfel mai ieftin si mai usor sa se obtina finantarea necesara.

Credit line in local bank

It is normally possible to open a credit line in the level of 5-10% of the annual turnover (money passing through the bank). Considering the huge amount, more than 400 MEUR annually, passing through the bank is should be no problem obtaining a credit line of 20-40 MEUR. A part of this credit line can be used for investment.

Linie de credit intr-o banca locala

In mod normal, este posibil, sa se deschida o linie de credit de circa 5-10% din cifra de afaceri anuala (banii care trec prin banca). Avand în vedere suma uriasa, mai mult de 400 MEUR pe an, care trec prin banca, ar trebui sa fie nici o problema in a obtine o linie de credit de 20-40 MEUR. O parte din aceasta linie de credit poate fi folosita pentru investitii.

10.3 A financing model

Based on the sources identified in the previous section we can construct the following model for financing of public projects:

Source	%	Interest
Loan from investment bank	50	6-7%
Supplier credit	30	8-10%
Carbon trading	5	
Credit line in local bank	15	12-14%

10.3 Un model financiar

Pe baza surselor identificate in sectiunie anterioare putem realiza urmatorul model pentru finantarea proiectelor publice:

Sursa	%	Dobanda
Imprumut de la banca investitii	50	6-7%
Credit de la furnizor	30	8-10%
Comercializarea URE	5	
Linie de credit de la o banca locala	15	12-14%

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11 TRANSPORT SECTOR

11.1 Introduction

As is known in the media, currently Bucharest Municipality has launched a series of steps in terms of aligning public transport in Bucharest, in line with the requirements of **the European Territorial Cooperation Pogramme for 2007-2013**

Priority 2: Environment and risk prevention Subthema: Energy and sustainable transport

In this sense is under implementation the project "CAPRICE - Regions capitals integrating transport group to increase energy efficiency".

CAPRICE is aimed to improve, public transport, to an efficient energy system, by sustainable organizational and technical. Based on exchanges between the public transport (PTAs s) important and successful in states with old European (Paris, Berlin) and representatives from the capitals of regions important in fast-growing (Budapest, Ljublijana , Prague, Riga and Warsaw), CAPRICE partners to develop and describe the common strategy and the first steps of implementation of Integrated Public Transport, in the capitals of participating. This matter is closely related to the priority of the Regional Interreg IV C "environment and risk prevention," the sub "Energy and sustainable transport.

CAPRICE partners will exchange experiences and knowledge, will identify and transfer best practices and promote good practices and policy recommendations among the regions participating in the capital out.

Adoption of sustainable environmental strategies in transport sector.

Promote low consumption vehicles and new propulsion technologies

Promoting the use of collective improved transport modes and non-motorized, combined with mobility management scheme

Improved information systems for better traffic management

Knowing the above, the Annex 11c of Part C of present report, intend to enlarge the areas of information, describing the experience encountered

11 SECTORUL TRANSPORT

11.1 Introducere

Asa cum este cunoscut din media, in present Primaria Municipiului Bucuresti a demarat o serie de demersuri in sensul alinierii transportului public din Bucuresti in corelare cu cerintele **Programului European Teritorial de Cooperare pentru perioada 2007-2013 Prioritatea 2: Mediul inconjurator si prevenirea riscurilor**

Subtema: Energie si transport durabil

In acest sens se afla in implementare proiectul “CAPRICE - Regiuni de capitale care integreaza transportul colectiv in vederea cresterii eficientei energetice”

CAPRICE este orientat spre imbunatatirea Transportului Public, spre un sistem eficient energetic, prin actiuni durabile de ordin organizatoric si tehnic. Pe baza schimburilor de experienta intre sistemele de transport public (PTAs-uri) importante si de succes din statele-membre europene cu state vechi (Paris, Berlin) si reprezentanti din partea unor regiuni de capitale importante, aflate in dezvoltare rapida (Budapesta, Ljublijana, Praga, Riga si Varsovia), partenerii CAPRICE intentioneaza sa dezvolte si sa descrie strategii comune si primii pasi ai implementarii unui Transport Public integrat, in regiunile de capitale participante. Aceasta chestiune este in relatie stransa cu prioritatea Programului Regional Interreg IV C "mediul inconjurator si prevenirea riscurilor", la subtema "energie si transport durabil".

Partenerii CAPRICE vor face schimb de experienta si cunostinte, vor identifica si transfera bunele practici si vor promova bunele practici si recomandarile de politici printre regiunile de capitale participante si in afara.

Adoptarea de strategii durabile de mediu in sectorul transporturilor.

Promovarea vehiculelor cu consum redus si a noilor tehnologii de propulsie

Promovarea utilizarii modurilor de transport colectiv imbunatatite si nemotorizate, conjugata cu scheme de management a mobilitatii

Imbunatatirea sistemelor de informatii pentru un mai bun management al traficului

Cunoscand cele de mai sus, prin Anexa 11c din partea C a prezentului Raport, s-a dorit largirea ariilor de informare, prezentandu-se experienta intampinata into European capitals or cities other than those participating in the CAPRICE project, above mentioned. Also, it is known the intention of the Bucharest Municipality to develop new parking spaces, about 7,500 parking spaces underground, which will be built in the next three years, in Piata Presei Libere (1633 seats) - 3 levels, Dorobanti (360 seats) - 2 levels, Piata Alba Iulia (2190 seats) - 3 levels, Valer Maracineanu (276 seats) - 2 floors, Revolution Square, the Athenaeum (1650 seats) - 3 levels, Piata Charles de Gaulle (831 seats) - 3 levels, Edgar Quinet (405 seats) - 2 levels and Esplanada Gara Baneasa (100 seats) - 2 levels.

Also, the Municipality intend to encourage the use of public transport, against the in private one. Thus, it is planned to develop and systematization of public transport network by upgrading the tramway from the boulevards Chisinau, Ion Mihalache, Bessarabia, Calea Calarasi, Aerogarii, Lacul Tei, Alexander Sebanescu and Barbu Vacarescu.
In Bucharest will be errected 10 parking RATB connection, known as "parking deterrent".

in capitale sau orase europene, altele decat cele participante in cadrul proiectului CAPRICE, mai sus mentionat.

De asemnea, este cunoscuta intentia Primariei Municipiului Bucuresti de a construi noi locuri de parcare, circa 7.500 de locuri de parcare subterane, ce vor fi construite in urmatorii trei ani, in Piata Presei Libere (1633 locuri) - 3 nivele, Dorobanti (360 locuri) - 2 nivele, Piata Alba Iulia (2190 locuri) - 3 nivele, Valer Maracineanu (276 locuri) - 2 etaje, Piata Revolutiei, la Ateneu (1650 locuri) - 3 nivele, Piata Charles de Gaulle (831 de locuri) - 3 nivele, Edgar Quinet (405 locuri) - 2 nivele si Esplanada Gara Baneasa (100 locuri) - 2 nivele.

De asemenea, primaria isi doreste sa incurajeze folosirea transportului in comun, in detrimentul celui privat. Astfel, se intentioneaza dezvoltarea si sistematizarea retelei de transport public prin modernizate unor linii de tramvai de pe arterele Chisinau, Ion Mihalache, Basarabiei, Calea Calarasilor, Aerogarii, Lacul Tei, Alexandru Sebanescu si Barbu Vacarescu.
In Capitala se vor realiza si 10 parcari conectate la reteaua RATB, denumite "parcari de descurajare".

References to the National Strategy for Sustainable Development of Romania Horizons 2013-2020-2030

With reference to the National Strategy for Sustainable Development of Romania, in the transport sector in general has been established on time horizons: short, medium and long. This for:

- **Horizon 2013**. National Objective is considered: Promote a transportation system in Romania to facilitate the safe movement, rapid and efficient people and goods nationally and internationally, in accordance with European standards.
- **Horizon 2020.** National Objective is considered**:** Achieving the average current EU on economic efficiency, social and environmental transport and achieve substantial progress in the development of transport infrastructure.
- **Horizon 2030.** National Objective is considered: Approaching the EU average that year to all the basic parameters of sustainability in transport

The strategic objective proposed by this report and the actions has taken into account the objectives set out in this national strategy.

Referinte la Strategia Nationala pentru Dezvoltare Durabila a Romaniei Orizonturi 2013-2020-2030

Cu referire la Strategia Nationala pentru Dezvoltare Durabila a Romaniei, in sectorul transporturi in general au fost stabilite orizonturi pe termene: scurt, mediu si lung. Astfel pentru:

- **Orizont 2013.** Obiectivul national este: Promovarea unui sistem de transporturi in Romania care sa faciliteze miscarea in siguranta, rapida si eficienta a persoanelor si marfurilor la nivel national si international, in conformitate cu standardele europene.
- **Orizont 2020.** Obiectivul national este: Atingerea nivelului mediu actual al UE in privinta eficientei economice, sociale si de mediu a transporturilor si realizarea unor progrese substantiale in dezvoltarea infrastructurii de transport.
- **Orizont 2030.** Obiectivul national este: Apropierea de nivelul mediu al UE din acel an la toti parametrii de baza ai sustenabilitatii in activitatea de transporturi.

Obiectivul strategic propus prin prezentului raport precum si actiunile catre trebuie intreprinse au tinut cont de obiectivele nationale stabilite in aceasta strategie.

References to appendixes

This chapter is prepared with reference to:

Part C Appendix 11a: Posibilities of reducing energy consumption for the transport sector

Referinte la anexe

Acest capitol este intocmit facand referire la:

Partea C Anexa 11a: Posibilitati privind reducerea consumului de energiei in sectorul transport

11.2 Strategy

From climate point of view, on transport sector, as it was proposed and endorsed in the previous stage, of the elaboration of the strategy, there is recommended as strategig objective 50% reduction of transport emissions.

Obtaining the goal of 50% reduction of CO_2 emission before 2020 will depend on:

- **An increase in efficiency of motors and battery technologies.**
- **Actions taken by the municipality to reduce the private transport in Bucharest.**

11.2 Strategia

Din punct de vedere climatic in sectorul transportului, asa cum a fost propus si avizat in etapa anterioare in intocmirea strategiei energetice a fost recomandat ca obiectiv strategic reducerea cu 50% a emisiilor rezultate din transport

Atingerea acestui obiectiv si anume reducerea cu 50% a emisiilor rezultate din sectorul transport depinde de:

- **Cresterea eficientei motoarelor si tehnologiilor utilizand baterii**
- **Actiuni pe care trebuie sa le ia Municipalitatea in Bucuresti pentru a reduce utilizarea transportului privat in Bucuresti.**

Increased efficiency

The present cars seen in Bucharest have a consumption between 20 l/100 km for the 4-wheel driven large MPW's and 8 l/100 km for the small modern family cars. This is far from the factory declarations of about 15 and 5 l/100 km and is related to the traffic situation in Bucharest.

Hybrid cars are just a little more efficient but most of the benefit of the hybrid system disappears when the car is sitting in a traffic jam only moving few meters per minute with light and air conditions or heating fans on.

Electrical driven cars are very few but as the battery technology improves and prices will drop more and more such cars must be expected in the years to come.

As long as the traffic jam situation continues the increased efficiency and development of hybrids and electrical car will on contribute limited percentages to reduction of emissions

Cresterea eficientei

Autoturismele intalnite in prezent in Bucuresti se situeaza in plaja de consum de combustibil intre 20 l/100 km pentru motoare mari si dubla tractiune 4X4 pana la 8 l/100km pentru masini mici moderne de familie. Situatia reala este complet diferita de declaratiile producatorilor, consumul variaza de fapt intre 15 si 5 l/100km si are stransa legatura cu situatia traficului din Bucuresti.

Autoturismele hibrid sunt cu putin mai eficiente pentru ca tot beneficiul sistemelor hibrid se pierde in situatia in care autoturismul este prins in trafic si se deplaseaza doar cativa metri intr-un minut, in conditiile in care sunt aprinse luminile si functioneaza si aerul conditionat/sistemul de incalzire. Autoturismele cu motoare electrice sunt foarte putine astazi, dar in conditiile in care tehnologiile pentru baterii se imbunatatesc continuu si preturile vor scadea din ce in ce mai mult, acest tip de autoturisme se asteapta sa se inmulteasca in anii care urmeaza.

Atat timp cat situatiile cu blocaje in trafic vor continua, cresterea eficientei si dezvoltarea modelelor de autoturisme hibrid si electrice vor contribui cu un procentaj limitat la reducerea emisiilor.

Actions taken by the municipality to reduce the private transport in Bucharest

The most efficient measure to reduce the private transport which is leading to the traffic congestion is to reduce the number of cars. Second best option is to increase the road capacity but this is only possible to

Actiuni propuse pentru reducerea transportului privat

Cea mai eficienta masura de reducere a transportului privat si implicit a blocajelor in trafic este aceea de a reduce numarul de masini. Cea de-a doua optiune considerata eficienta este aceea de a creste very limited extent inside the Bucharest city limit where the congestion is worst.

Known measures are:

- Congestion pricing
- Road pricing
- Traffic control

capacitatea de trafic a drumurilor, dar aceasta este foarte limitata in interiorul Bucurestiului in zonele in care blocajele sunt cele mai dificile.

Masurile cunoscute sunt:

- Taxa de aglomeratie
- Taxa de drum
- Controlul traficului

11.3 Actions required

In order to meet the goal proposed for the transport sector the main problem areas were identified for which recommendation were made. These recommendations were prepared knowing the positive results obtained in other EU countries as well as the steps taken to achieve it. Thus, the main problem area identified in respect of transport sector are:

- Illegal parking
- Bad driver behaviour
- Lack of law enforcement
- Too many cars (congestion)

11.3 Actiuni necesare

Pentru atingerii obiectivului propus in sectorul transport, in primul rand au fost identificate domeniile cu probleme pentru rezolvarea carora au fost elaborate recomandari. Aceste recomandari au fost elaborate cunoscand rezultatele pozitive obtinute in unele tari din Uniunea Europeana precum si etapele parcurse pentru obtinerea acestora. Asadar, domeniile cu probleme identificate sunt:

- Parcarea ilegala
- Comportamentul neadecvat al soferilor
- Lipsa de fermitate in aplicarea legilor
- Prea multe masini

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 8a: Restructuring of the District Heating sector

Anexa 8a: Restructurarea sistemului de termoficare

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2	01.09.2009	Corrections	GMCB	haa
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ATH energ Grontmij | Carl Bro

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1 INTRODUCTION

The strategy for restructuring is inspired by the restructuring, which has taken place for the electricity sector in Romania, and recommendation found in other reports.

The restructuring aims to establish an effectively operated and managed modern organisation fulfilling the environmental goals, security and service standards defined in the concessions and reconstruct the systems while keeping a moderate heating tariff.

Privatisation (private partnership) is foreseen in the national energy strategy and this is also the objective for the restructuring initiated as a result of approving this Strategy Report. However, privatisation is not just something you do, it is something you consider carefully and prepare for, considering the special requirements of public services (as defined in the law 51/2006, respective services for general interest, according EU documentation). Thus, the immediately result of this Strategy should be establishment of a organisation responsible for preparing the privatisation.

1 INTRODUCERE

Strategia pentru restructurare este inspirata de restructurarea realizata in sectorul de electricitate in Romania precum si recomandarile care se regasesc in alte rapoarte.

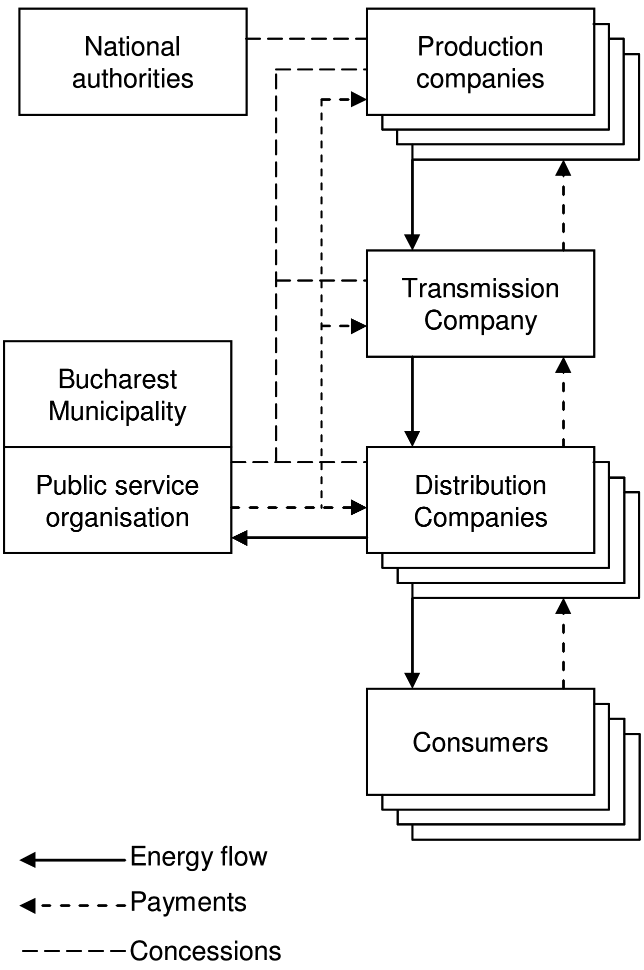
Scopul restructurarii este de a stabili o organizatie moderna, capabila sa exploateze si sa gestioneze sistemele, cu respectarea obiectivelor de mediu, standardele de siguranta si servicii, definite in concesiuni si reconstructia sistemelor, pastrand un tarif moderat al energiei termice.

Privatizarea (parteneriat public privat) este prevazuta in strategia nationala privind energia si acesta este de asemenea obiectivul pentru restructurare initiat ca urmare a aprobarii acestui raport. Totusi, privatizarea nu trebuie facuta pur si simplu, trebuie considerata si pregatita cu atentie, tinand seama de specificul serviciilor in cauza (servicii comunale de utilitate publica – conform definitiei din Legea 51/2006, respectiv servicii de interes general, conform documentelor UE). Astfel, rezultatul imediat al acestei strategii ar trebuie sa fie stabilirea unei (unor) organizatii responsabile pentru pregatirea privatizarii.

2 GENERAL DESCRIPTION OF THE STRUCTURE

The current centralized, one-company is organised as department of production, transmission and distribution.

To monitor the function of competitions and to implement corrective measures when required, the Municipality shall start by splitting the production, transmission and distribution, organizing separate companies operating at commercial conditions (the Municipality shall establish contracts for delegation of responsibilities). At the same time, a Public Service Organisation shall be established by the municipality.



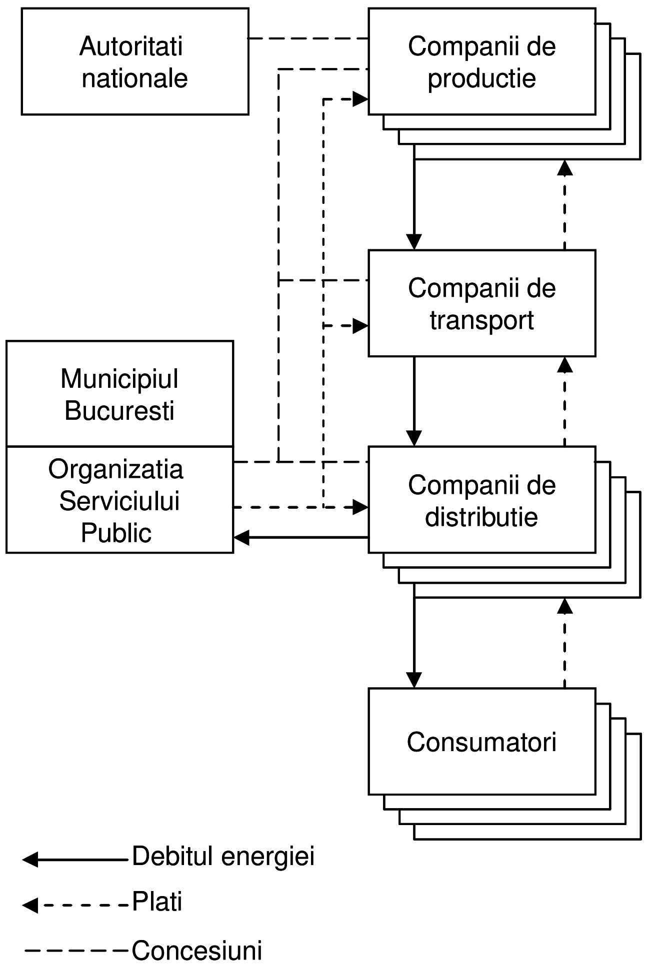
The new structure for district heating is inspired by the already implemented structure for electricity. However, the structure cannot be copied due to lack of real competition.

It is important that Bucharest Municipality maintain the overall control and regulate the heat market by the

2 DESCRIEREA GENERALA A STRUCTURII

Regia autonoma de termoficare actuala este organizata pe sectii de productie, transport si distributie.

In vederea monitorizarii functiilor de competitivitate si de implementare a masurilor corective, cand este necesar, Municipalitatea trebuie sa demareze cu separarea productiei, transportului si distributiei, organizand operatorii pe principii comerciale (societati comerciale) cu care Municipalitatea stabileste relatii contractuale (contracte de delegare de gestiune). In acelasi timp, Municipalitatea trebuie sa stabileasca o Organizatie a Serviciului Public.



Noua structura pentru termoficare este inspirata din structura deja implementata pentru electricitate. Totusi, structura nu poate fi copiata datorita lipsei unei competitii reale.

Este important ca Municipiul Bucuresti sa mentina un

PSO together with the national regulating authorities. Maintaining ownership of the transmission system will ensure the controlling and responsibilities roles of the municipality.

There is considered that the main controlling role is based on delegation contract/ concession contract and PSO. In case of missing the delegation contracts, a PSO organisation working efficient (independent) and efficient mechanisms regarding representation of the interests of Municipality in the management organisation of the operator (shall not missed the lack of specific regulation) , the property cannot be considered as a control tool. Having in mind, the scope of the responsibilities and in the same time the contradiction between the position of Municipality on one hand, as the Owner of a property under concession and on other hand as controller of the operator, in some other countries, is renounced on the concept the property, as a control tool. According to the provisions of Romanian legislation in force, the Municipality cannot renounce on his position as Owner, as far the related property is considered public property.

control general si sa reglementeze piata energiei termice prin OSP, impreuna cu autoritatile de reglementare nationale. Mentinerea proprietatii asupra sistemului de transport va asigura un rol si responsabilitati de control din partea municipalitatii.

Se poate considera ca principalul rol de control il are contractul de delegare / concesiune si OSP. In lipsa contractului de delegare si a unui OSP care sa functioneze eficient (independent), precum si in lipsa – actuala, a unor mecanisme eficace de reprezentare a intereselor Municipalitatii in conducerea operatorului (precum si in lipsa altor reglementari specifice), proprietatea nu are rol de parghie de control. Avand in vedere responsabilitatile pe care o implica, precum si o anumita contradictie intre calitatea de proprietar al bunurilor cesionate operatorului si cea de controlor al operatorului, in unele tari se opteaza pentru eliminarea acestui tip de control – prin proprietate. Prevederile legale actuale, din Romania nu permit renuntarea la calitatea de proprietar al Municipalitatii – atat timp cat infrastructura constituie bun public.

3 PRODUCTION COMPANIES

The current centralised heat production and transport over long distances will be replaced with production located much closer to the consumers.

Production companies are private companies producing heat to the transmission system and electricity to the national grid. The production companies will be:

- 1-3 concessionaires for the three waste-to-energy facilities.
- One or more concessionaires for the about 40 decentralised CHP units

Local production, solar heating and heat-only-boilers will be installed by the distribution companies or others in agreement with the distribution companies.

3.1 Waste-to-energy facilities

Three facilities will be constructed each for a capacity of about 35 t waste per hour. As initially location is proposed: at CET SUD, at CET Grozavesti and at a location in the Pantalimon area. These locations will give reasonable transport distances for the waste as well as for the heat.

The facilities shall NOT be designed and constructed due to the heat demand but do to the waste quantities available for incineration.

Three different models for construction and operating the facilities are seen in Europe:

- The “Danish model”: A special purpose company with the municipality(s) as the owner is established. This company construct, operate and maintain the facility.
- The “French model”: The municipalities construct the plants but private operators operate and maintain the plants based on a concession agreement.
- The “British model”: The municipalities offer a concession agreement regarding incineration of waste and production of heat. A private company construct, operate and maintain the facilities.

It can be found that the “Danish model”, instead theoretically, will give the cheapest gate fees (incineration costs) and the lowest heat price, cannot be successful implemented due to current demonstrated inefficiency in Romania (see RADET example). Theoretically, the “French model” is a little

3 COMPANIILE DE PRODUCTIE

Productia de energie termica actuala centralizata si transportul pe distante lungii vor fi inlocuite cu productia localizata cat mai aproape de consumator.

Companiile de productie sunt companii private care produc energie termica pentru sistemul de transport si electricitate pentru reteaua nationala. Companiile de productie vor fi:

- 1-3 concesionari pentru facilitatile de transformare a desurilor in energie
- Unul sau mai multi concesionari pentru aprox. 40 de unitati de cogenerare descentralizate

Productia locala, energia solara si CAF-urile vor fi instalate de catre companiile de distributie si alte terte parti cu care acestea au incheiat contracte.

3.1 Facilitatile de transformare a deseurilor in energie

Se vor construi trei facilitati cu o capacitate de aprox. 35 t de deseuri pe ora. Initial, locatia propusa este la : CET Sud, CET Grozavesti si in zona Panteliomon. Aceste locatii vor asigura distante rezonabile atat pentru deseuri cat si pentru energia termica.

Facilitatile NU vor fi proiectate si construite pe baza cererii de energie electrica, ci conform cantitatilor disponibile de deseuri pentru incinerare.

In Europa exista trei modele diferite pentru construirea si exploatarea facilitatilor:

- Modelul “Danez”: O companie cu scop dedicat care este detinuta de primarie (primarii). Aceasta companie construieste si exploateaza facilitatea.
- Modelul “Francez”: municipalitatea construieste centrala, insa este exploatata de operatori privati care si intretin centralele in baza unui acord de concesiune.
- Modelul “Britanic”: municipalitatile ofera un acord de concesiune privind incinerarea deseurilor si productia de energie termica. Facilitatile sunt construite, exploatate si intretinute de companii private.

Se poate observa ca “modelul Danez”, desi teoretic ar avea cel mai ieftin pret la poarta (costuri de incinerare) si cel mai mic pret al energiei termice, nu poate fi aplicat cu succes, datorita ineficientei demonstrate a sistemelor administrative din Romania (dovada chiar RADET). Teoretic, “Modelul francez” este putin mai scump decat cel danez, in timp ce more expensive than the Danish while the British model is far the most expensive. In reality, the situation are complete different, depending on obligations enforced in front of the operators, the procedures for awarding and the organisation of the monitoring and regulation of the operation of the services. Thus, separate or together, lack or poor obligations requested in front of operators, lack of real competition on the award process and/or missing of a strong organisation for monitoring and regulation (the decision taken shall be far away from political influences) are considered the main elements which lead to the inefficiency of different models.

In the current financial situation it is difficult to recommend the Municipality of Bucharest, which model to select. The current trend is public investment. This is most clearly seen in the US where more of the large utilities have focused more on profit than public service ending in bankruptcy.

In the end, the selected model might be the one possible and this might very well be the British. We have in the following assumed private investment (private partnership) based on concessions for sale of power, heat and incinerations of waste.

Selection of the concessionaire(s) shall be based on offered gate fee (price of incineration) and heat tariff.

modelul britanic este de departe, tot teoretic, cel mai scump. In realitate situatiile sunt mult diferite, functie de obligatiile impuse operatorilor, de mecanismul de incredintare si de organizarea monitorizarii si reglementarii derularii operarii. Astfel, separat sau cumulat, insuficienta si/sau neclaritatea obligatiilor impuse operatorilor, lipsa competitiei reale la incredintare si /sau lipsa unei entitati puternice de monitorizare si reglementare, care sa ia decizii independent de deciziile politice, sunt elemente cheie care fac ca diferitele modele sa devina ineficiente.

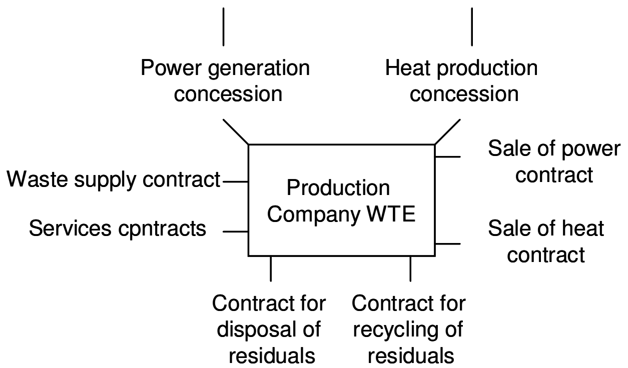
In situatia financiara actuala este dificil de recomandat Municipiului Bucuresti, ce model sa selecteze. Curentul actual se indreapta spre investitia publica. Acest curent se regaseste clar in SUA unde utilitatile mari s-au concentrat mai mult pe profit decat pe serviciul public,sfarsind prin a fi falimentare.

In concluzie, modelul selectat poate fi cel mai posibil de realizat, care poate fi foarte bine cel britanic. In continuare am estimat ca investitia va fi privata (parteneriat public privat), bazat de contracte de concesiune pentru vanzarea de energie electrica, energie termica si incinerarea deseurilor.

Selectarea concesionarilor va avea in vedere pretul la poarta oferit (pretul incinerarii) si tariful energiei termice.

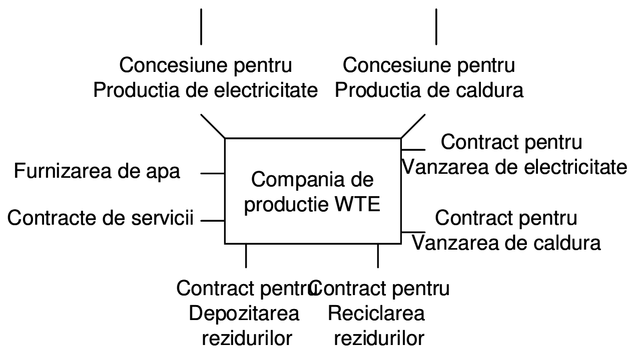
Framework

The functional framework for the waste-to-energy facility is:



Cadrul functional

Cadrul functional pentru facilitatile de transformare a deseurilor in energie este:



Obligations of the Concessionaire

The concessionaire must be requested to undertake a number of obligations:

- Construct and commissioned the facility according to the concession agreement regarding time, capacities and general technical conditions, as requested by Terms of references, the consequences of lack of commitment, period of concession (equal with

Obligatiile concesionarilor

Concesionarii vor trebui sa-si asume o serie de obligatii:

- Construirea si punerea in functiune a facilitatilor, respectand contractul de concesiune in ceea de priveste responsabilitatile asumate de atingere a capacitatilor si a indicatorilor de performanta din caietul de sarcini la anumite termene, period for recovering the investment, inside the provision of the law), basic tariff and related procedures for adjustment of it and also the procedures for maintaining the financial balance of the concession, technical general condition for the investments.

- Enter a contract with the transmission company regarding conditions for sale of heat.
- To pay an annual concession royalty to the municipality as negotiated when establishing the concession, in the condition of maintaining the affordability and universality of the services[1].
- To submit key data regarding the facilities for calculation of benchmarking values.

consecintele neindeplinirii, durata concesiunii (egala cu durata de recuperare a investitiilor, in limitele legii), tariful de baza si mecanismele de ajustare ale acestuia si de mentinere a echilibrului financiar al concesiunii, conditiile tehnice generale ale investitiilor.

- Incheierea unui contract cu compania de transport privind conditiile de vanzare a energie termice.
- Plata unei redevente anuale catre municipalitate, negociate la stabilirea contractului de concesiune, in masura in care nu afecteaza suportabilitatea si universalitatea serviciilor.[1]
- Prezentarea datelor importante privind facilitatile pentru calcularea valorile de referinte (benchmarking)

Rights of the Concessionaire

The rights of the Concessionaire(s) in front of Bucharest Municipality shall be:

- To receive the stipulated quantities of waste having properties within an also agreed range (heating content, humidity etc)
- To receive a capacity payment (fixed tariff)
- To receive payment for the heat supplied

In addition the concessionaire will receive payment for sale of power according to the concession agreement.

Drepturile concesionarilor

Drepturile concesionarilor in fata municipalitatii vor fi:

- Primirea cantitatilor de deseurilor specificate, avand proprietatile stabilite in contract (continut caloric, umiditate etc).
- Primirea unui taxe pe capacitate (tarif fix)
- Primirea platii pentru energia termica furnizata.

Suplimentar, concesionarul va primi plata pentru vanzarea energiei electrice conform contractului de concesiune.

3.2 Decentralised CHP units

About 40 CHP units with an average capacity of about 10 MJ/sec shall be constructed at strategically points in the transmission system to secure supply in the period before the waste-to-energy facilities are commissioned and when the capacity of these facilities are insufficient. The final capacity shall be determined based on the capacity of the heat exchanger station to which the CHP units are connected on the transmission side.

3.2 Unitatile de cogenerare descentralizate

Aprox. 40 de unitati de cogenerare cu o capacitate medie de aprox. 10 MJ/sec vor fi construite in punctele strategice in sistemul de transport pentru a asigura furnizarea in perioada de pana la punerea in functiune a facilitatilor de transformare a deseurilor in energie si pentru cand capacitatile acestor unitati sunt insuficiente. Capacitatea finala va fi determinata pe baza capacitatii statiilor de schimbatoare de caldura la care unitatile de cogenerare sunt conectate pe

[1]There is common thing that any royalty increase the tariff, being included in the tariff. Due to the fact that the competition on royalty will generate increased prices, against the concept of “best value for the money”, usually in the poor countries, the concession with capital contribution, the royalty could be irrelevat in order to avoid situation of breaking the concept of universality of the services/ *Este stiut ca orice redeventa incarca costurile operatorului, care si le recupereaza din tarif. Intrucat concurenta operatorilor pe redeventa ar genera preturi marite, ceea ce ar fi in contradictie cu obiectivul obtinerii celui mai bun raport calitate / pret al serviciilor, de regula la concesiunile cu aport de capital din tarile sarace redeventa este modica (simbolica), pentru a nu afecta pretul serviciilor si implicit principiul universalitatii serviciului (accesului la serviciu).*

The constructors and operators of the CHP plants are assumed being private companies obtaining concessions for heat production and power generation and contracts for fuel supply.

Initially the units are assumed operated based on natural gas but as the production will decrease as the solar heating systems and the waste-to-energy facilities are commissioned and capacity related natural gas tariffs are introduced it might be feasible to shift fuel to bio diesel or similar products. The units must be prepared for fuel shift.

partea de transport.

Presupunem ca operatorii si constructorii centralelor de cogenerare sunt companii private care au obtinut concesiunea pentru productia de energie termica si energie electrica si care au contracte pentru furnizarea de combustibil.

Initial, se presupune ca unitatile vor functiona pe baza de gaze naturale, insa intrucat productia va scade odata cu punerea in functiune a statiilor de incinerare si a sistemelor pe baza de energie solara si odata cu introducerea tarifului pentru capacitate pe baza de gaze naturale, inlocuirea gazului natural cu bio-combustibil sau alte produse similare ar fi fezabila. Unitatile trebuie pregatite pentru inlocuirea combustibilului.

Obligations of the Concessionaire

The concessionaire must be requested to undertake a number of obligations:

- Construct and commissioned the CHP units and related centralised heat storage according to the concession agreement regarding time, capacities and general technical conditions, in the condition of maintaining the financial balance. The financial resources could be own financial resources or loans.
- Enter a contract with the transmission company regarding conditions for sale of heat.
- To pay an annual concession royalty to the municipality as negotiated when establishing the concession.
- To submit key data regarding the units for calculation of benchmarking values.
- To continuously improve the technical, environmental and economic performance by improving benchmark values.

Obligatiile concesionarului

Concesionarii vor trebui sa-si asume o serie de obligatii:

- Construirea, din surse proprii sau atrase, si punerea in functiune a unitatilor de cogenerare si a acumulatoarelor de caldura centralizate aferente, respectand contractul de concesiune in ceea de priveste durata, capacitatile si conditiile tehnice generale, precum si cu mentinerea echilibrului financiar al contractului.
- Incheierea unui contract cu compania de transport privind conditiile de vanzare a energie termice.
- Plata unei redevente anuale catre municipalitate, negociate la stabilirea contractului de concesiune.
- Prezentarea datelor importante privind facilitatile pentru calcularea valorile de referinte (benchmarking)
- Imbunatatirea continua a performantei tehnice, economice si de mediu prin imbunatatirea valorilor de referinta.

Rights of the Concessionaire

The rights of the Concessionaire(s) in front of Bucharest Municipality shall be:

- To receive a capacity payment (fixed tariff)
- To receive payment for the heat supplied

In addition the concessionaire will receive payment for sale of power according to the concession agreement.

Drepturile concesionariului

Drepturile concesionarilor in fata municipalitatii vor fi:

- Primirea unui taxe pe capacitate (tarif fix)
- Primirea platii pentru energia termica furnizata.

Suplimentar, concesionarul va primi plata pentru vanzarea energiei electrice conform contractului de concesiune.

3.3 Income/expenditure structure

The principle money flow in the system is shown in chapter 2.

The concessions and contracts must allow the production companies to have an income balancing the expenditures.

3.3 Structura veniturilor/cheltuielilor

Fluxul principal de numerar in sistem este prezentat in sectiunea 2.

Concesiunile si contractele trebuie sa permita companiilor de producere sa obtina un profit acoperind cu cheltuielile.

4 TRANSMISSION COMPANY

The current transmission system (primary system) is operated in islands according to the production capacity of each plant. In spite of demonstrated huge savings by introducing pooled operation and economical load dispatch no actions are taken in this respect.

After installing control systems in all substations pooled operation could be introduced without delay. Hence, introduction of pooled operation is not a technical problem but human willingness to give-up the, in terms of human effort, convenient fixed flow concept.

Economic load dispatch has no meaning for the transmission system operator as today all heat is sold to the system at the same tariff. Huge resources are waited today and this cannot continue in the future if a competitive district heating system shall be established in Bucharest. The main problem for introducing economic load dispatch is interest of doing it and conflict of interest in respect of who has to perform the dispatch (ordering production from the different units in the system).

The current RADET organisation seems unable to understand the challenge of the future and uninterested in modernising the system. Hence, the establishment of a modern transmission system, operating and maintaining it should be given in concession to a private operator who should have an economic enticement in optimising the system and obtaining a high security of supply.

The transmission company shall be established as a non-profit, no-taxpaying company (apart from VAT and possible energy/environmental taxes). Conditions for establishment such a company and rule for how to allow a 3 or 5 year rolling budget where profit one year can be repaid to the consumers next year obtaining a zero balance over a 5 year period.

4 COMPANIA DE TRANSPORT

Sistemul actual de transport (sistem primar) este exploatat in insule in conformitate cu capacitatea fiecarei centrale. Chiar daca s-a demonstrat ca se pot obtine economii substatinale prin introducerea functionarii in inel si dispecerizarii, nu s-au luat nici un fel de masuri in acest sens.

Dupa instalarea sistemelor de automatizare in toate punctele termice functionarea in inel poate fi introdusa fara intarziere. Astfel, introducerea functionarii in inel nu este o problema tehnica ci doar o problema de vointa umana, in sensul de efort uman, de a renunta la conceptul convenabil de debit constat.

Dispecerizarea tehnica si economica nu are nici o importanta pentru operatorul sistemului de transport intrucat astazi, energia termica vanduta in sistem este la acelasi tarif. In prezent se irosesc resurse uriase si aceasta nu poate continua in viitor daca, in Bucuresti se va stabili un sistem de termoficare competitiv. Principala problema privind introducerea dispecerizarii economice este legata de conflictul de interese dintre interesul de a fi realizata efectiv si cine va face dispecerizarea (cine sa comande productia de la diferitele unitati din sistem).

Organizarea actuala a RADET pare ca nu poate sa inteleaga provocarea legata de modernizarea viitoare si este neinteresata de modernizarea sistemului. Astfel, stabilirea unui sistem de transport modern, exploatat si intretinut ar trebuie concesionata unui operator privat care ar trebuie sa aiba un scop economic privind optimizarea sistemului si realizarea furnizarii in conditii de siguranta.

Compania de transport trebuie sa fie o companie non-profit, care nu plateste taxe (cu exceptia TVA-ului si altor taxe posibile de mediu si energie). Conditiile pentru stabilirea unei astfel de companii, precum si regulile dupa care bugetul acestei companii va fi rulat pe o perioada de 3 sau 5 ani ar putea fi dupa cum urmeaza: in cazul in care dupa un an, se inregistreaza profit, acesta va fi repartizat consumatorilor, astfel incat la sfarsitul ciclului de evaluare de 5 ani, profitul sa fie zero.

4.1 Ownership

The current primary system is owned by the municipality.

The new heat transmission company in Bucharest is assumed established as a private company with the municipality as the main share holder. The private

4.1 Proprietatea

Sistemul primar existent in prezent se gaseste in proprietatea municipalitatii.

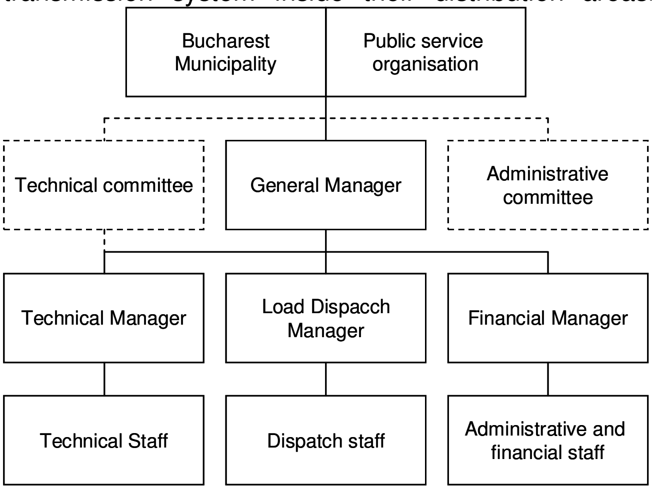
Noua companie de transport din Bucuresti se presupune ca va fi stabilita ca o companie privata a carui actionar principal va fi municipalitatea. La operator might be invited to participate in financing of the reconstructed transmission system and thus become a share holder.

finantarea reconstructiei sistemului de transport pot fi invitati si operatori privati si care vor deveni astfel actionari.

4.2 Structure of the Transmission Company

The total staff should be less than 50 headed by a general manager, a technical manager, a financial manager and a manager for load dispatch.

All services required for operation and maintenance of the transmission system is contracted from private companies. The distribution companies should be one of these contractors performing services related to the transmission system inside their distribution areas.

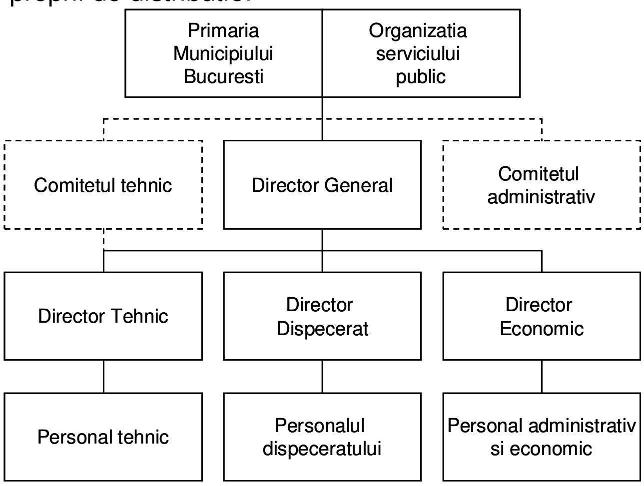


A technical committee and an administrative committee to ensure a smooth cooperation between the transmission company and the distribution companies should be established. Bucharest Municipality (The public service organisation is member of both committees).

4.2 Structura companiei de transport

Personalul companiei trebuie sa fie mai mic de 50 coordonati de un director general, un director tehnic, un director economic si un director pentru dispecerat.

Toate serviciile pentru exploatarea si intretinerea sistemului de transport sunt contractate cu terte parti private. Companiile de distributie trebuie sa asigure serviciile legate de sistemul de transport in zonele proprii de distributie.



Se va stabili un comitet tehnic si unul administrativ pentru a asigura o colaborarea stransa intre compania de transport si companiile de distributie. Municipiul Bucuresti (organizatia serviciului public) trebuie sa fie membru in ambele comitete.

4.3 Obligations of the Operator

The concession agreement between the operator and the municipality shall clearly describe the obligations of the Operator:

- To take over the operation of the current primary system.
- Maintenance, rehabilitation and modernisation/ resizing of the transmission system as to maintain the financial balance of the concession contract.
- Establish the new layout of the transmission system reusing as much as feasible of the existing primary system and considering the plans for establishment of distribution companies (heat exchanger stations) and

4.3 Obligatiile Operatorului

Contractul de concesiune intre operator si municipalitate va descrie clar obligatii operatorului:

- Preluarea functionarii sistemului primar existent.
- Investitia in intretinerea, reabilitarea si modernizarea / redimensionarea sistemului de transport cu mentinerea echilibrului financiar al contractului de concesiune a serviciului.
- Stabilirea noii scheme a sistemului de transport, refolosind pe cat fezabil sistemul primar existent si luand in considerare planurile pentru stabilirea companiilor de distributie (statiile de schimbatoare de

location/sizing of the new production facilities.

- Negotiate and enter commercial contracts with current production facilities. The PSO-organisation might be involved in these negotiations ensuring the interests of the consumers are respected.
- Establish and implement a business plan for reconstruction ensuring that new production facilities and heat exchanger stations are connected to the transmission system in time for testing prior to commissioning.
- Negotiate and enter commercial contracts with the distribution companies. An overall principle must be that all distribution companies are treated equal in terms of received heat and paid tariffs and other relevant aspects.
- Introduce pooled operation and a variable flow concept.
- Establish a load dispatch function ensuring an effective technical and economical load dispatch
- Calculate and provide values for calculation of benchmarking.
- To pay an annual concession royalty to the municipality.
- To continuously improve the technical, environmental and economic performance by improving benchmark values.

caldura) si localizarea/dimensiunea noilor facilitati de productie.

- Negocierea si incheierea de contracte comerciale cu unitatile de productie existente. Organizatia Serviciului Public se poate implica in negocierii pentru a se asigura ca interesele consumatorilor sunt respectate.
- Stabilirea si implementarea unui plan de afaceri pentru reconstruire care sa prevada conectarea noilor unitati de productie si a statiilor de schimbatoare de caldura la sistemul de transport, la timp pentru testarea inainte de punerea in functiune.
- Negocierea si incheierea contractelor comerciale cu companiile de distributie. Principiul general aplicabil este ca toate companiile de distributie sa fie tratate egal in ceea ce priveste caldura furnizata si tarifele platite si alte aspecte relevante.
- Introducerea functionarii in inel si a conceptului de debit variabil.
- Stabilirea unui dispecerat pentru a asigura dispecerizarea tehnica si economica efectiva.
- Calcularea si furnizarea valorilor pentru benchmarking.
- Plata unei redevente catre municipalitate.
- Imbunatatirea continua a performantelor tehnice, economice si de mediu prin imbunatatirea valorilor de benchmarking.

4.4 Rights of the Operator

The concession must establish the right of the Operator in terms of:

- A fixed annual administration fee
- A bonus scheme for performance better than agreed (measured by benchmarks).

4.4 Drepturile Operatorului

Concesiunea trebuie sa stabileasca drepturile operatorului privind:

- O taxa anuala de administrare
- O schema de bonificatie pentru depasirea performantelor stabile (masurate de benchmarking)

4.5 Income / expenditures structure

The principle money flow in the system is shown in sketch in chapter 3.

The concessions and contracts must allow the transmission company to have an income in balance with the expenditures.

4.5 Structura veniturilor/cheltuielilor

Fluxul principal de numerar in sistem este prezentat in in schita din sectiunea 3.

Concesiunile si contractele trebuie sa permita companiilor de productie sa obtina un profit in raport cu cheltuielile.

4.6 Experience of Load Dispatch

More or less advanced technical and economical load dispatch has been performed for decades in many

4.6 Experienta Dispeceratului

Dispecerizarea tehnica si economica, mai mult sau mai putin avansata, a fost realizata de decade pentru systems with more production units aiming to obtain the cheapest production costs. However, as the heat market become liberalised in more and more countries, and we assume also within few year in Romania, the challenge of load dispatch is increasing and more companies has already establish a Heat Load Unit within the load dispatch centre.

When the Heat Load Unit carries out load dispatch, it decides how much heat is to be generated by each production facility on a given day. The producers tender for the assignment. Subsequently, the Heat Load Unit distributes production to the different units to make it as economical as possible.

Costs include such elements as:

- Fuel prices
- Operating and maintenance costs
- Energy taxes on heat production
- CO_2 quota costs
- Income from the electricity market

We describe in the following how a Heat Load Unit and advanced load dispatch software was established at CTR, Copenhagen:

Thorough preparation

The new Heat Load Unit started up on 7 January 2008. It is staffed by four employees.

Prior to the establishment of the Heat Load Unit, a lot of fact-finding and analytical work had to be carried out to examine the situation under different framework conditions. It was important to make it clear how the companies would be able to provide reliable and environmentally benign district heating at the lowest possible cost – in the short and the long term. The project was implemented in 2005–06. Among the conclusion were the following:

- That a deregulated heating market cannot be established along the lines of the electricity market model, since there are too few producers to enable a proper, competition-based marketplace'
- That it could cost heating consumers in the metropolitan area upwards of EUR 30 million a year if the heat load dispatch is not carried out by ensuring overall optimization of electricity and heat generation.

The conclusion was that the heating companies had to ensure that the production at the plants was prioritized based on an overall optimization. The producers also saw a need for a new model, but insisted to communicate with only one organizational unit in the daily load dispatch exercise.

Against this backdrop, the producers and the heating companies concluded an agreement, which resulted in

sisteme cu mai multe unitati de productie, avand drept scop obtinerea celor mai mici costuri de productie. Totusi, pe masura ce piata energiei termice este liberalizata din ce in ce in mai multe tari, se presupune ca in scurt timp si in Romania, provocarea privind dispecerizarea creste si multe companii au stabilit deja o unitate de dispecerizare a caldurii in cadrul dispeceratului central.

Cand unitatea de dispecerizare a caldurii isi va realiza functiile, decide ce cantitate de caldura va fi produsa de fiecare sursa intr-o anumita zi. Producatorii vor fi desemnati prin licitatie publica. Astfel, unitatea de disperizare a caldurii distribuie productia la diferitele unitati intr-un mod cat se poate de economic.

Costurile includ:

- Preturi de combustibil
- Costuri de exploatare si intretinere
- Taxe pe energie privind productia de energie
- Costurile legate de emisia de CO_2
- Venituri din piata de electricitate

In cele ce urmeaza vom descrie modul in care unitatea de dispecerizare a caldurii si software-ul pentru dispecerizare avansata au fost stabilite in compania de transport CTR din Copenhaga.

Pregatirea in amanunt

Noua unitate de dispecerizare a caldurii a inceput sa functioneaza in 7 ianuarie 2008, cu patru angajati.

Inainte de infiintarea unitatii de dispecerizare a fost realizata o munca de analiza a situatiilor intampinate sub diferite conditii cadru. Era important sa se stabileasca modul in care companiile vor fi capabile sa furnizeze energie termica in conditii de siguranta si cu respectarea mediului la cel mai mic pret posibil – pe termen lung si scurt. Proiectul a fost implementat in perioada 2005 – 2006. Principalele concluzii au fost urmatoarele:

- O piata dereglementata a energiei termice nu poate fi stabilita pe modelul pietei de electricitate atata timp cat exista mult prea putini producatori care sa permita realizarea unor conditii de piata bazate pe competitie.
- Lipsa unei dispecerizarii cu optimizarea producerii de electricitate si caldura ar conduce la costuri de peste 30 de milioane EUR pe an pentru consumatorii de energie termica din zona metropolitana.

Concluzia: companiile de termoficare trebuiau sa se asigure ca productia este prioritizata pe o optimizara generala. Producatorii au realizat necesitatea introducerii unui model nou, insa au insistat ca comunice doar cu o singura unitate organizationala in the establishment of the new Heat Load Unit for the entire metropolitan area on the premises of CTR.

Heat plan for the day

The Heat Load Unit is busy from early morning. The tender round for the next day's heat purchase starts as early as 7.30 in the morning, when the department receives tender graphs from the producers. These graphs show the costs of producing electricity and heat for every hour, and on the basis of a demand forecast the Heat Load Unit decides how much heat it wants to buy from each of the producers.

The final load dispatch must be financially optimized. Heat produced from renewable sources shall have priority and the tax structure for the different fuels encourages the use of the most environmentally benign fuels by giving them priority over fossil fuels.

The heat plan must be ready by 10.30 to allow the suppliers to know how much heat they are to generate – and thus how much electricity they can offer for sale through the pool exchange.

However, forecasts are one thing – reality is another. Three times a day – at 8 a.m., 2 p.m. and 8 p.m. – the plans for the day are therefore adjusted in relation to the actual heat requirement and any unforeseen events at the plants.

Ongoing follow-up on operations

Trust is a key word for the work of the Heat Load Unit. Suppliers should trust that the heat plans are correct and will result in optimal utilization of the production facilities. Consequently, ongoing follow-up on operations is carried out as a basis for an ongoing dialogue with the producers on the actual production at the plants.

There is a new challenge in extending the daily adjustment to include any imbalances on the electricity market that make the electricity price fluctuate from one hour to the next.

The new structure has already meant that basically the heating companies now have better insight into the load dispatch. Another result is even more focus on the need for daily heating forecasts of the best possible quality for the purpose of load dispatch. It has been agreed between the parties that the Heat Load Unit will be reviewed in 2009, when it has been up and running for twelve months.

activitatea zilnica de dispecerizare.

Impotriva acestui impediment, producatorii si companiile de termoficare au incheiat un acord, care a avut drept rezultat stabilirea unei noi unitati de dispecerizare a caldurii pentru intreaga zona metropolitana la sediul CTR.

Planul de energie termica pentru o zi

Unitatea de dispecerizare a caldurii isi incepe activitatea dimineata devreme. Licitatia pentru cumpararea de energie termice necesara in urmatoarea zi incepe la 7.30 dimineata, cand unitatea primeste graficele de la producatori. Aceste grafice arata costul producerii de electricitate si caldura pe ore, si pe baza unei prognoze a cererii, unitatea de dispecerizare a caldurii decide canitatea de caldura ce trebuie cumparata de la fiecare producator.

Cantitatea finala trebuie optimizata din punct de vedere financiar. Caldura produsa din surse regenerabile va avea prioritate si structura taxelor pentru combustibil incurajeaza folosirea combustibililor cel mai putin daunatori mediului, prioritari in fata celor fosili.

Planul de energie termica trebuie sa fie gata pana la ora 10.30 pentru a face cunoscuta furnizorilor cantitatea de caldura pe care trebuie sa o produca – respectiv cantitatea de electricitate disponibila pentru vanzare pe piata de electricitate.

Totusi, prognoza este un lucru, realitatea insa alta. De trei ori pe zi la orele: 8 a.m., 2 p.m. si 8 p.m., planurile pentru acea zi sunt actualizate in corelare cu cerinta curenta de energie termica si orice eveniment neprevazut aparut la centrale.

Operatiuni ulterioare de urmarire

Incredere este cuvantul cheie pentru functionarea unitatii de dispecerizare a caldurii. Furnizorii trebuie sa aiba incredere ca planurile de energie termica sunt corecte si ca va rezulta utilizarea optima a facilitatilor de producere. In consecinta, operatiuniile ulterioare de urmarire se realizeaza pe baza de dialog continuu cu producatorii, considerand productia curenta la sursele de producere.

Apara o noua provocare in extinderea ajustarii zilnice, pentru a include orice neechilibru din piata de electricitate, care face ca pretul electricitatii sa fluctueze de la ora la ora.

Noua structura a inclus deja in esenta companiile de termoficare in sistemul dispecer. Un alt rezultat este concentrat din ce in ce mai mult pe necesitatea prognozarii cat mai exacte a necesarului zilnic de caldura pentru obtinerea unei calitati a dispecerizarii cat mai buna. Partile s-au inteles ca unitatea de dispecerizare a caldurii sa fie revizuita in 2009, dupa 12 luni de activitate,

5 DISTRIBUTION COMPANIES

About 10 new private owned distribution companies are assumed established.

The current distribution is inefficient, expensive and non-satisfactory for the consumers. The overall problem is the 4-pipe concept and centralised preparation of heating and hot tap water as this results in corrosion of the heating pipes as they are emptied for water in the off-heating season and waiting time for having hot tap water.

A modern supply concept with heat and hot tap water on demand can only be obtained by decentralised preparation of heating and hot tap water by installing heating modules at the houses/apartment blocks. This will furthermore reduce the water losses from the distribution systems as most of the current water losses are inside the buildings.

The current management of the distribution system does not understand the need of improving comfort and seems unable to manage the installed control systems as the foreseen savings and improved comfort has not been seen.

A private operator can obtain huge savings if he is motivated to do so; both from operation and from investments by changing the distribution concept to decentralised preparation of heating and hot tap water and performing a general redesign and reconstruction of the distribution system.

5 COMPANII DE DISTRIBUTIE

Se preconizeaza infiintarea a 12 noi companii de distributie private.

Activitatea de distributie curenta nu este eficienta, fiind scumpa si nesatisfacatoare pentru consumatori. Problema generala este data de: conceptul de functionare utilizand 4 tevi si de prepararea centralizata a incalzirii si a apei calde de consum, de coroziunea conductelor de incalzire in perioada de vara, ca urmare a golirii sistemului si de timpul de asteptare pentru a avea in timp apa calda la robinet.

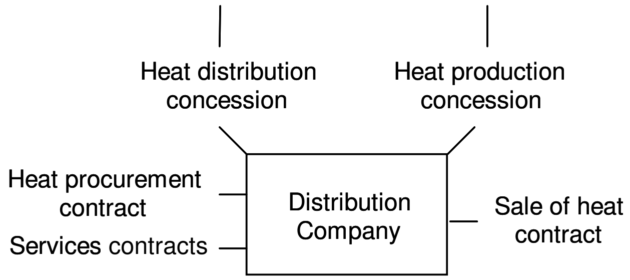
Un concept modern de furnizare cu furnizarea caldurii si a apei calde de consum la cerere nu poate fi obtinut decat printr-o preparare descentralizata a acestora, utilizand module termice la nivel de bloc/casa. Aceast lucru va conduce la reducerea pierderilor de agent termic din sistemul de distributie, in conditiile in care cele mai multe pierderi de agent termic se realizeaza in interiorul cladirilor.

Managementul actual al sistemului de distributie nu intelege necesitatea imbunatatirii confortului si pare incapabil ca gestioneze instalarea automatizarii, atata vreme cat economiile prognozate si imbunatatirea confortului nu au putut fi vazute.

Un operator privat ar putea obtine economii imense daca va fi motivat sa o faca, atat in ceea ce priveste exploatarea sistemului cat si in ceea ce priveste investitiile, prin schimbarea conceptului actual de distributie cu un concept descentralizat de preparare a caldurii si acm precum si realizarea reproiectarii generale si reconstruirea sistemului de distributie.

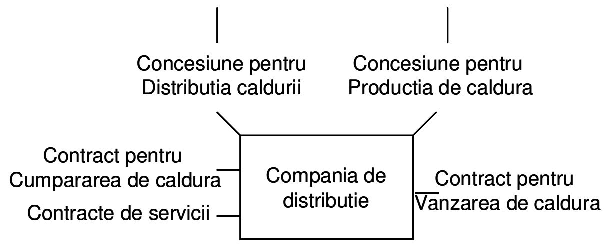
5.1 Framework for the Distributer

The overall functional framework for the distribution companies is:



5.1 Cadru general pentru Distribuitor

Cadrul general de functionare pentru companiile de distributie este urmatorul:



5.2 Obligations of the Distributer

The Distributor most undertake a number of obligations, among others:

5.2 Obligatiile Distribuitorului

Distribuitorul trebuie sa isi asume o serie de obligatii, printre care:

- Take over the current distribution systems
- Pay an annual concession royalty to the municipality negotiated during concession negotiations reflecting the value of the systems taken-over.
- Invest in redesign and reconstruction of the network and heat exchanger stations.
- Establish solar energy system (panels and storage etc) to cover at least 35% of the annual heat demand in 2020.
- Install heat-only-boilers to cover the peak load.
- Introduce a “heat on demand” supply concept meaning that heating and hot tap water is available as decide by the consumers
- To submit key value for the operation for calculation of benchmarking values.
- To continuously improve the technical, environmental and economic performance by improving benchmark values.

- Preluarea sistemului existent de distributie
- Sa plateasca o redeventa anuala municipalitatii, negociata in cursul procedurii de negociere a concesiunii, reflectand valuarea preluarii sistemului
- Sa investeasca in reproiectare si reconstruirea sistemului si statiilor de schimbatoare de caldura
- Instalarea sistemelor de panouri solare (panouri si sisteme de acumulare, etc) pentru a acoperi cel putin 35% din necesarul anual de energie termica aferent anului 2020.
- Instalarea cazanelor care sa acopere sarcina de varf.
- Introducerea conceptului de “caldura la cerere” prin care consumatorul determina necesarul de acm si incalzire.
- Sa transmita valorile cheie pentru exploatare pentru a se putea calcula valorile de benchmarking.
- Sa-si imbunatateasca continuu activitatea din punct de vedere tehnic, economic si de protectie a mediului prin imbunatatirea valorilor de benchmarking.

5.3 Rights of the Distributer

The concession must insure the right of the investor in terms of:

- To receive an annual fixed income related to the investments the concessionaire has performed.
- To receive a fixed payment for keeping the system operational
- To include costs in the tariffs enable payments to the transmission costs
- To include costs of operation and maintenance in the tariff.
- To include an administration fee in the tariff

5.3 Drepturile Distribuitorului

Concesiunea trebui sa garanteze dreptul investitorului fata de urmatoarele:

- Sa primeasca un venit anual fix corespunzator investitiilor facute de cel care a concesionat .
- Sa primeasca o plata fixa pentru a mentine sistemul operational
- Sa includa costurile in tarif, permitand efectuarea platilor pentru costurile de transport
- Sa includa costurile de exploatare si intretinere in tarif.
- Sa includa o taxa de administrare in tarif

6 PUBLIC SERVICE ORGANISATION

The Public Service Organisation (PSO) is established by the municipality to ensure that the organisational setup is functioning as indented and ensure:

- High service performance in front of the consumers
- High efficiency in energy production
- Competitive heat prices

The PSO must be independent for all producers and distributors and shall function based on his organisation description.

6.1 Set-up of the PSO

The PSO is appointed by Bucharest Municipality (CGMB). The permanent organisation should be relatively small but supplemented with specialised experts when required, for example lawyers, accountants consultants etc.

The PSO should be the organisation to oversee the restructuring of the current organisational set-up and to ensure that reconstruction of the system starts.

6.2 Obligations of the PSO

The overall obligation of the PSO is to ensure that the system actors perform theirs obligation and that the system is operated based on competitiveness aiming to obtaining the lowest possible heat tariff in Bucharest.

The PSO shall establish a procedure for verifying the annual accounting of all parties by establishment of a benchmarking system for comparison of key values.

The PSO shall monitor the fulfilling of the provision of concession contracts, applying correction (penalties) in case of not achievement of the assumed performance indicators or other contractual obligations.

The PSO shall endorse the concession contracts for future concession before submission for CGMB's approval

6 ORGANIZATIA SERVICIULUI PUBLIC

Organizatia Serviciului Public (OSP) este stabilita de catre municipalitate pentru a se asigura ca este realizat cadrul organizational de functionare intentionat, oferind urmatoarele:

- Servicii de inalta competenta in fata consumatorilor
- Eficienta ridicata in producerea de energie
- Pret competitiv pentru energia termica

OSP trebuie sa fie independent fata de toti producatorii si distribuitorii si sa functioneze independent, pe baza exclusiva a statutului sau.

6.1 Infiintarea OSP

OSP trebuie infiintat de catre Municipiul Bucuresti (CGMB). Organizatia permanenta trebuie sa fie relativ mica, suplimentata de experti specializati la cerere, de exemplu juristi, consultanti financiar contabili, etc.

OSP trebuie sa fie organizatia care supravegheaza restructurarea cadrului organizational actual si sa asigure ca procesul de restructurare va incepe.

6.2 Obligatiile OSP

Obligatiile generale ale OSP sunt de a sigura ca actorii implicati in sistem isi indeplinesc obligatiile, iar sistemul este exploatat pe baza de competitivitate, avand ca scop obtinerea celui mai scazut pret posibil pentru energia termica in Bucuresti.

OSP trebuie sa-si stabileasca o procedura de verificare a contabilitatii anuale a tuturor partilor, prin stabilirea unui sistem de benchmarking pentru compararea valorilor cheie.

OSP monitorizeaza obiectiv respectarea prevederilor contractelor de concesiune de catre operatori si aplica corectiile (penalitatile) prevazute de contracte pentru neindeplinirea indicatorilor de performanta asumati si a altor obligatii contractuale.

OSP avizeaza contractele de concesiune pentru viitoare concesiuni inaintea supunerii spre aprobare CGMB.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 9a: Production Cost Structure

Anexa 9a: Structura Costurilor de productie

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3				
2	25.09.2009	Corrections	GMCB	haa
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0	10.05.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

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Cuprins

1 INTRODUCTION

This report analyse the structure of production costs and establish the related tariff structure as known from most West European district heating systems and as it is recommended introduced in Bucharest prior to privatisation.

All prices and costs are in fixed 2007 value (not inflated). The 2007 prices are adjusted with expected increases in real prices as indicated in relation to the calculations. The main costs, which will increase faster than inflation are:

- Fuel prices
- Romanian salaries, which influence construction costs and operation and maintenance costs etc.

1 INTRODUCERE

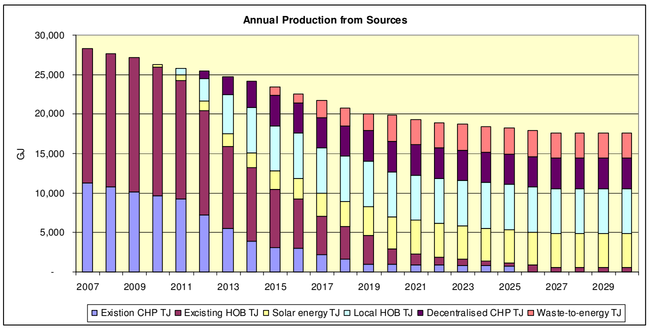
Acest raport analizeaza structura costurilor de producție şi stabileste structura tarifului aferent, asa cum este cunoscuta in majoritatea sistemelor de termoficare din Vestul Europei si cum se recomanda a fi introdusa in Bucuresti inainta de privatizare.

Toate prețurile şi costurile iau in considerare valori din anul 2007 (fara inflatie). Prețurile din 2007 sunt ajustate cu majorarile estimate ale preturilor reale, asa cum rezulta din calculele. Principalele costuri, care vor creste mai repede decat inflatia sunt:

- Pretul combustibililor
- Salariile din Romania, care influențează costurile de construcție şi costurile de exploatare si intretinere, etc

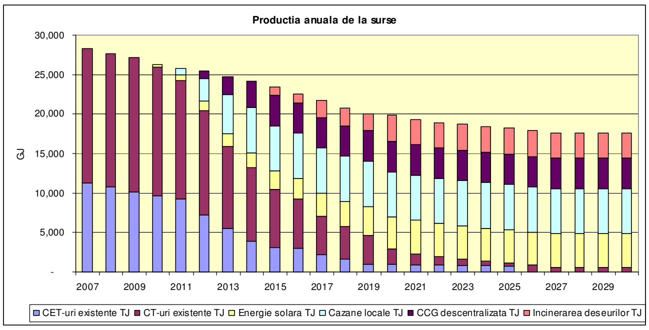
2 DISPATCH

The following production pattern will result from the technical-economical load dispatch:



2 DISPECERIZAREA

In urma dispecerizarii tehnico – economice va rezulta urmatorul model de producere:



3 STRUCTURE OF PRODUCTION COSTS

The principle used for establishment of the structure of production costs and calculation of production costs is the same private-economic principles as used by private investors.

A private investor considers the investment as a business and requests an interest according to the invested capital. It will probably not be possible to find private investment cheaper than 12 % and if the investors find risks involved the interest might be 14-16% or even higher. We have considered the investment a low-risk investment and used 12% for the calculations in this report.

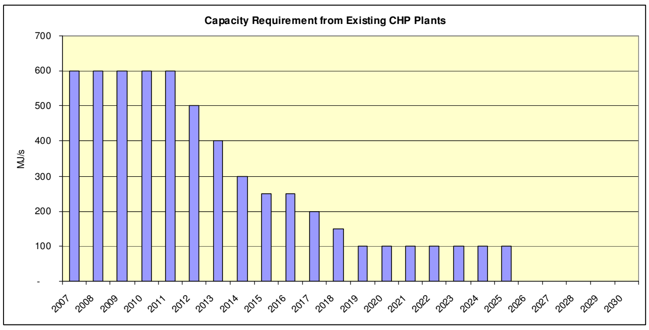
3.1 Existing CHP

Cost structure

Installed capacity

The current installed useful capacity is about 600 MJ/s and about 180 MW as CHP production. This capacity will be decommissioned as replacement capacity is commissioned.

As it will take time to construct the replacement capacity the current capacity must be maintained and rehabilitated to provide the capacity shown below:



Value of capacity

The value of the capacity is estimated to 500,000 EUR/MJ/s, about ½ value of new capacity. The price escalation is estimated 3% p.a. and the interest requested by the producer 12 % p.a.

The cost of having the necessary capacity available will develop:

3 STRUCTURA COSTURILOR DE PRODUCTIE

Principiul folosit pentru stabilirea structurii costurilor de productie şi de calcul al acestora este acelaşi principiu economic-privat folosit de catre investitorii privați.

Un investitor privat consideră investitiile ca o afacere şi solicită o dobanda în funcție de capitalul investit. Probabil va fi greu să se găsească investitori privati care solicita o dobanda mai mica de 12%, iar în cazul în care investitorii considera ca investitia implica riscuri, dobanda ar putea fi 14-16% sau chiar mai mare. In acest raport am luat in considerare o investie cu risc scazut si am folosit o dobanda de 12% pentru calcule.

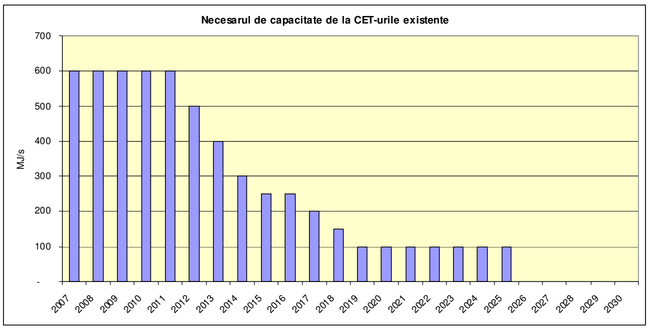
3.1 CET existent

Structura costului

Capacitatea instalata

Actuala capacitate instalată utila este de circa 600 MJ/s din care aproximtiv 180 MW fiind producere in cogenerare. Aceasta capacitate va fi scoasa din funcțiune odata cu punerea in functiune a altor capacitati noi de inlocuire.

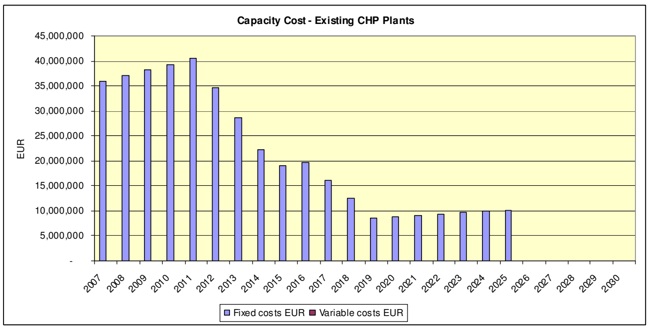
Intrucat construirea noilor capacitati va dura, capacitatile existente trebuie intretinute si reabilitate pentru a asigura necesarul de capacitate prezentat mai jos:



Valoarea capacitatii

Valoarea capacitatii este estimata la 500.000 EUR/MJ/s, aprox. ½ din valoarea noi capacitati. Se estimeaza ca preturilor vor creste cu 3% pe an iar dobanda solicitata de producator va fi de 12% p.a.

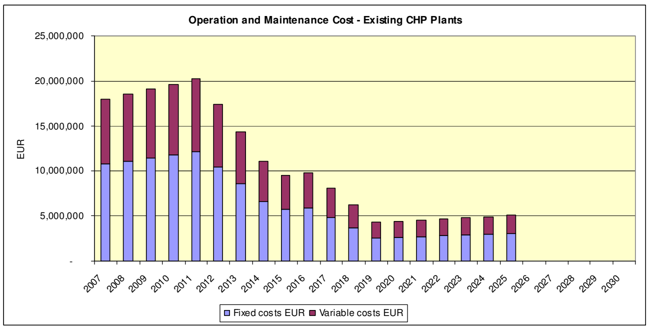
Evolutia costului pentru a avea capacitatea necesara disponibila este prezentata mai jos:



Operation and Maintenance costs

The operation and maintenance costs are calculated based on the value of the units and information about costs found in Phase I: Data Collection.

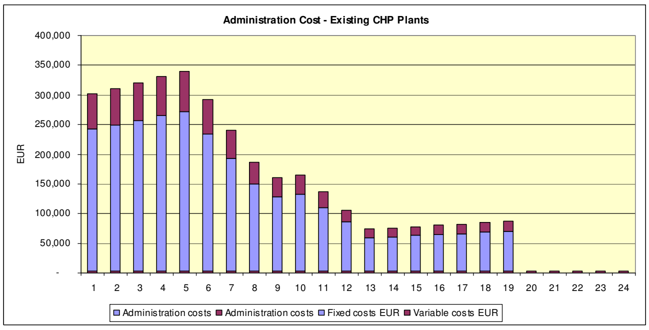
The operation and maintenance costs will develop:



Administration costs

The administration costs are calculated based on the value of the plant and information about costs found in Phase I: Data Collection

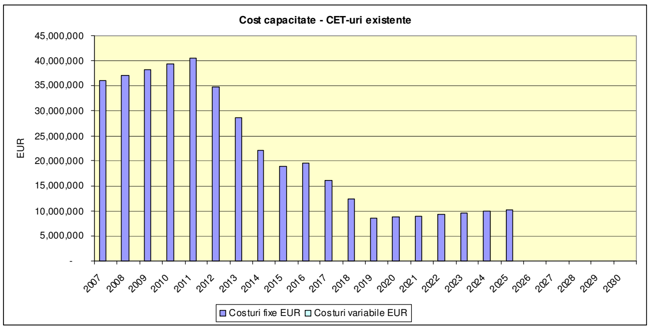
The administration costs will develop:



Sale of power

Sale of power will generate and income used to reduce the heat tariff. Sale of power is based on a tariff of 65 EUR/MWh in 2007, increasing with an escalation 3% p.a.

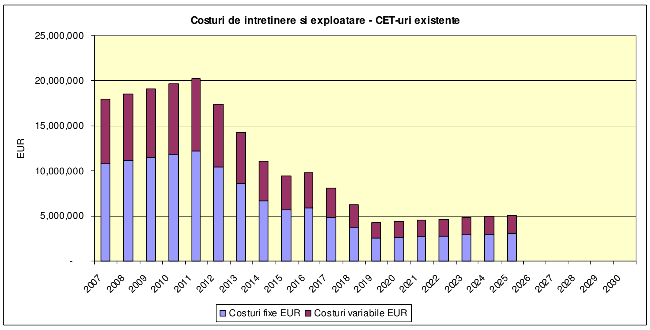
The income from sale of power will develop:



Costuri de exploatare si intretinere

Costurile de exploatare si intretinere sunt calculate pe baza valorilor unitare si a informatiilor privind costurile din Etapa I: Colectarea datelor.

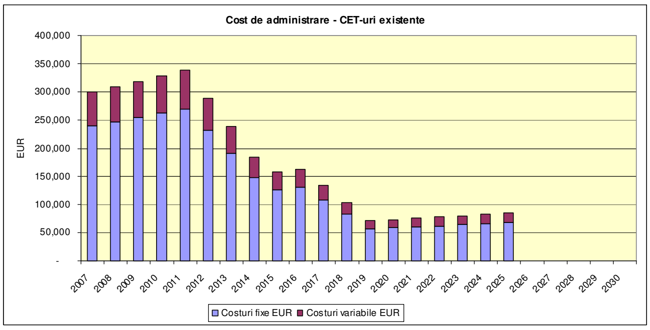
Evolutia costurilor de exploatare si intretinere va fi dupa cum urmeaza:



Costuri de administrare

Costurile de administrare sunt calculate pe baza valorii centralei si a informatiilor privind costurile incluse in Etapa I: Colectarea datelor.

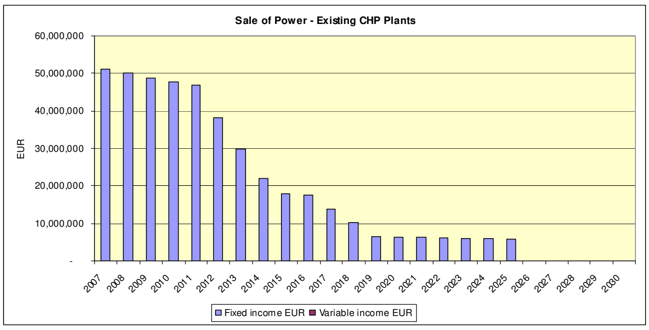
Evolutia costurilor de administrare va fi urmatoarea:



Vanzarea de energie electrica

Vanzarea de energie electrica va genera un venit care va fi folosit pentru reducerea tarifului energiei termice. Vanzarea de energie electrica are la baza un tarif de 65 EUR/MWh la nivelul anului 2007, la care se adauga o crestere de 3% p.a.

Venitul din vanzarea de energie electrice va evolua astfel:

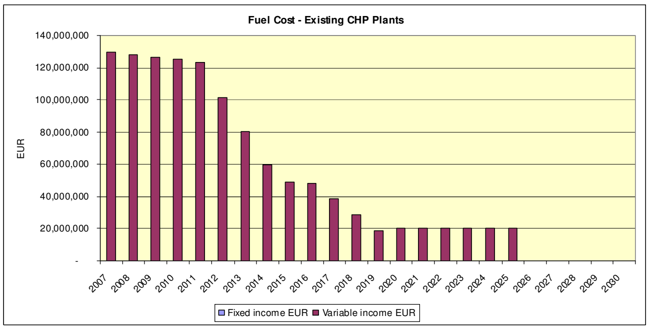


Fuel costs

The fuel cost is based on current border price Russia/Ukraine and EU of 255 EUR/1000 m^3 as is was in September 2007. This border price compares to 6.33 EUR/GJ with added transmission cost will be 7.33 EUR/GJ at plants centralised located.

A price escalation of 4% p.a. is expected.

The development in fuel costs will thus be:

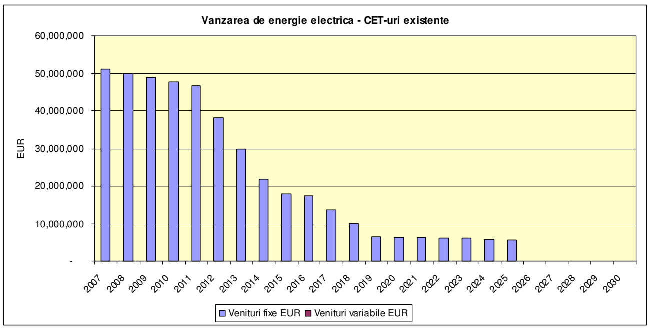


Taxes

Environmental and energy taxes are not yet introduced on fuel used for production of heat. However, we expect that Romania will have to introduce these taxes as they are seen in other EU countries. We have foreseen that the taxes will be 10% from 2011, 20% from 2015 and 30% from 2019, comparable to the level currently found in more EU countries.

With the increasing tax level the point will be reached where it will be feasible to change to bio oil but considering the decommissioning schedule for the existing CHP capacity we have not found it feasible to reconstruct the burners and establish storage facilities etc.

Payment of taxes will develop:

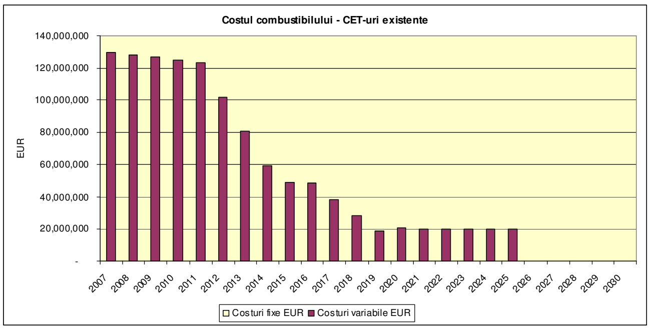


Costul combustibilului

Costul combustibilului are la baza pretul la granita dintre Rusia/Ucraina si UE de 255 EUR/1000 m^3 in septembrie 2007. Acest pret la granita in comparatie cu 6,33 EUR/GJ, la care se adauga si costul de transport acesta devine 7,33 EUR/GJ, pentru CET-urile care functioneaza centralizat .

Se preconizeaza o creste anuala de 4%.

Evolutia costurilor combustibilului va fi urmatoarea:

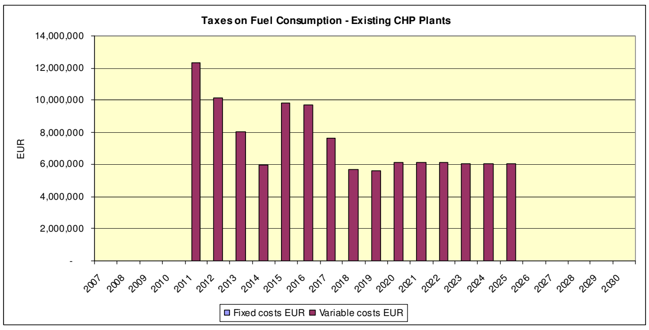


Taxele

Taxele de mediu şi de energie pentru utilizarea combustibilul la producerea de energie termica nu sunt încă introduse. Cu toate acestea, ne aşteptăm că România va trebui să introducă aceste taxe, asa cum sunt si în alte ţări ale UE. Preconizam ca taxele vor fi de 10% incepand cu anul 2011, 20% din 2015 şi 30% din 2019, comparabile cu nivelul celor intalnite în prezent în mai multe ţări ale UE.

Odata cu creşterea nivelului de taxare se va atinge un nivel la care trecerea la bio-combustibil va deveni fezabila, dar avand in vedere programul de dezafectare a capacitatilor CET-urilor existente nu consideram ca este fezabil sa se adaptateze arzatoarele si sa se construiasca facilitati de depozitare etc.

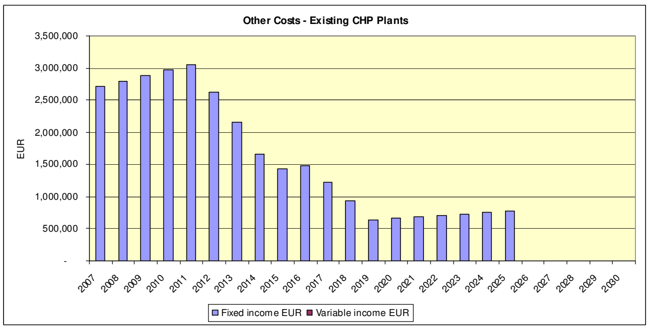
Plata taxelor va evolua astfel:



Other costs

Other costs such as royalty to the Municipality, profit to the operator and taxes/commissions (others than energy and environmental taxes) are calculated as 5% of other expenditure exclusive fuel and environmental taxes.

Other costs will develop:

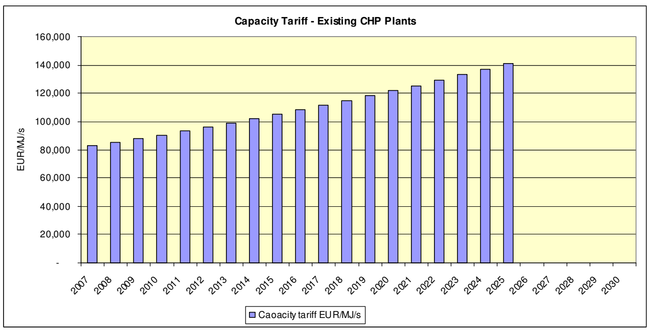


Tariff structure

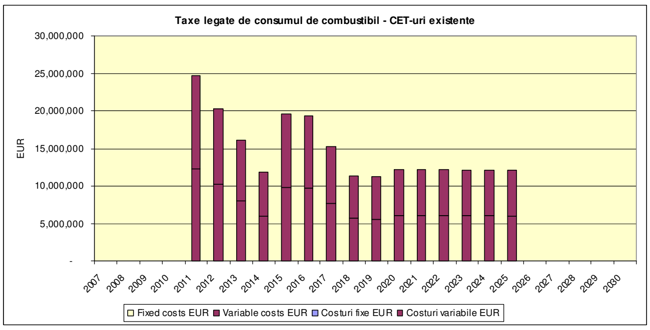
Tariffs for sale of heat

The tariffs should be a capacity tariff (fixed tariff) related to the capacity requirement (EUR/MJ/s) and an Energy tariff (variable tariff) related to the energy production (EUR/GJ).

The capacity tariff will develop:



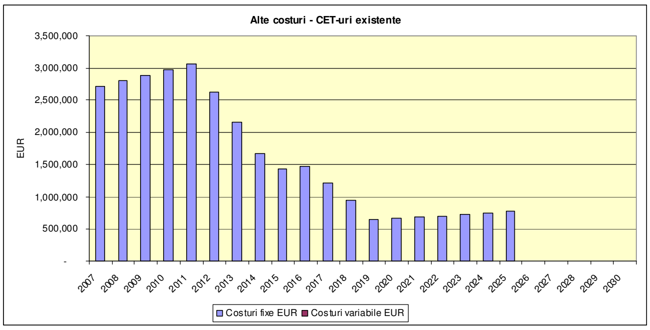
The energy tariff will develop:



Alte costuri

Costuri cum ar fi plata unei redevente catre Primarie, profitul pentru operator si alte taxe si comisioane (altele decat taxele de mediu si energie) sunt calculate a fi 5% din cheltuieli, excluzand taxele de mediu si pe combustibil.

Aceste costuri vor evolua astfel:

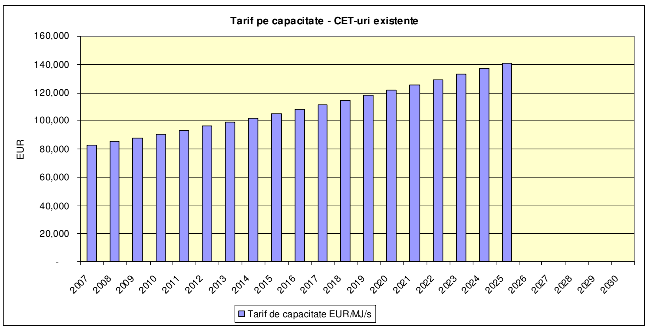


Structura tarifului

Tariful pentru vanzarea energiei termice

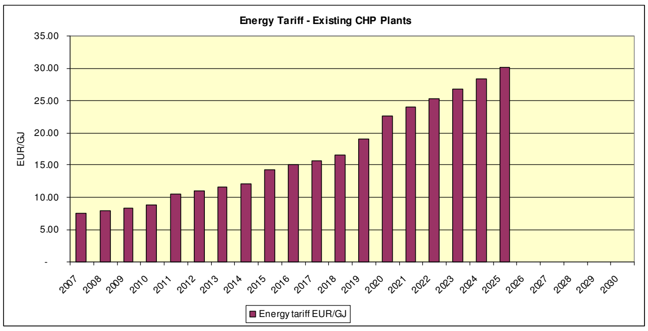
Tariful ar trebui sa fie format dintr-un tarif de capacitate (tarif fix) aferent necesarului de capacitate (EUR/MJ/s) si un tarif de energie (tarif variabil) aferent productiei de energie (EUR/GJ).

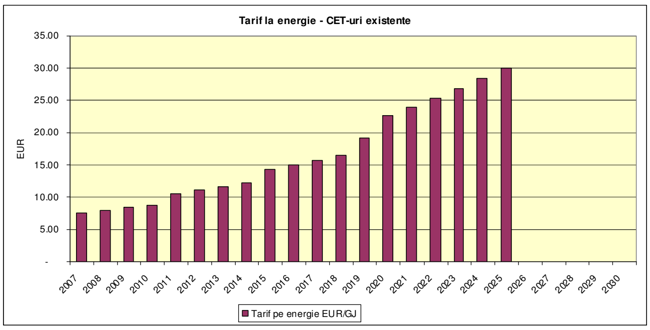
Tariful de capacitate va evolua astfel:



Tariful la energie va evolua astfel:

Grontmij | Carl Bro


Energy Tariff - Existing CHP Plants
EUR/GJ
Energy tariff EUR/GJ


Tarif la energie - CET-uri existente
EUR
Tarif pe energie EUR/GJ

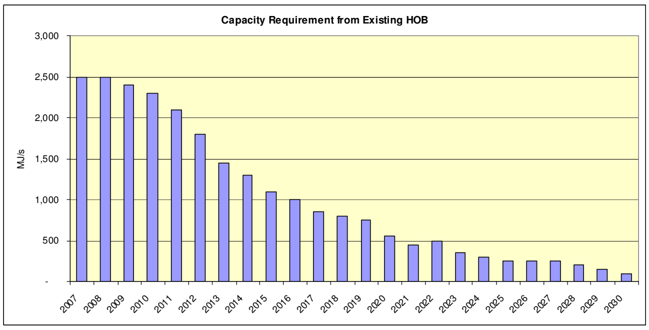
3.2 Existing HOB

Cost structure

Installed capacity

The current installed useful capacity is about 2,500 MJ/s. Most of this capacity will be decommissioned as replacement capacity is commissioned. However a part of the boilers are located close to the consumers and this capacity is expected rehabilitated/life extended to be operational after 2020.

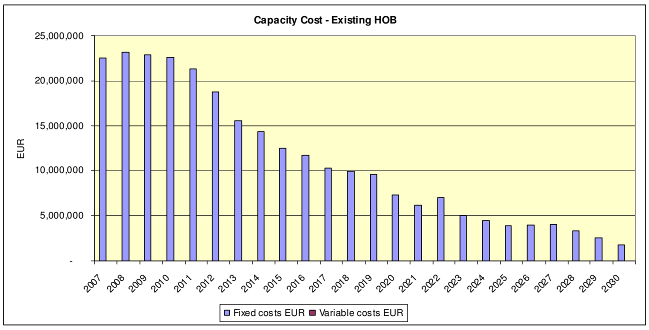
As it will take time to construct the replacement capacity the current capacity must be maintained and rehabilitated to provide the capacity shown below:



Value of capacity

The value of the capacity is estimated to 75,000 EUR/MJ/s, about ½ value of new capacity. The price escalation is estimated 3% p.a. and the interest requested by the producer 12 % p.a.

The capacity value will thus develop:



Operation and Maintenance costs

The operation and maintenance costs are calculated based on the value of the plant and information about costs found in Phase I: Data Collection.

The operation and maintenance costs will develop:

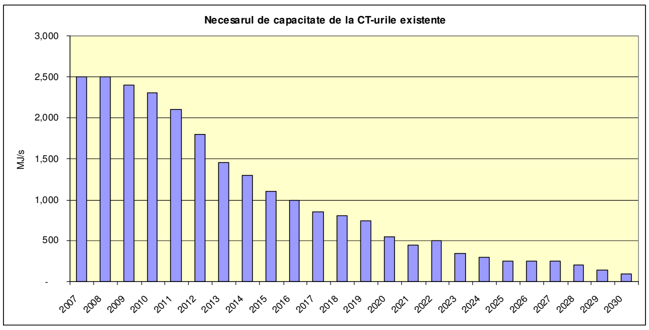
3.2 CT existent

Structura costului

Capacitatea instalata

Capacitatea utila instalata in prezent este de cca 2.500 MJ/s. O mare parte din aceasta va fi dezafectata cand capacitatile noi vor fi puse in functiune. Totusi, unele CT-uri sunt localizate aproape de consumatori si se preconizeaza ca acestea vor fi reabilitate, cu extinderea duratei de viata pentru a fi operationale dupa anul 2020.

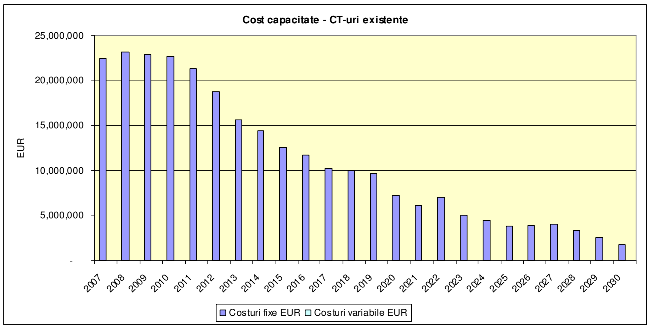
Intrucat, construirea capacitatilor de inlocuire va dura, capacitatile existente trebuie intretinute si reabilitate pentru a asigura necesarul de mai jos:



Valoarea capacitatii

Valoarea capacitatii este estimata la 75.000 EUR/MJ/S, aprox. ½ din valoarea noilor capacitatii. Se estimeaza ca pretul va creste cu 3% p.a. si dobanda solicitata de producator va fi de 12% p.a.

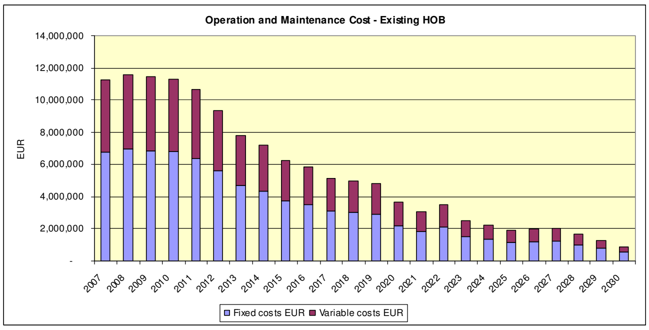
Valoarea capacitatii va evolua astfel:

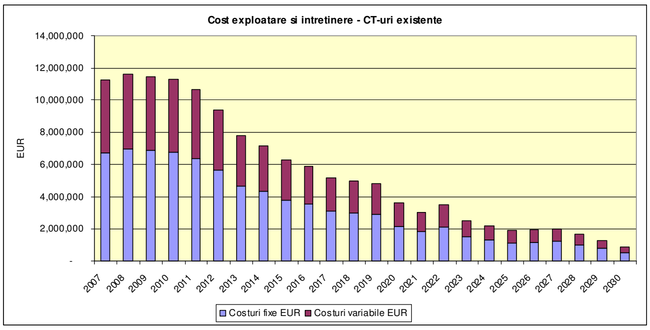


Costuri de exploatare si intretinere

Costurile de exploatare si intretinere sunt calculate pe baza valorii centralei si a informatiilor privind costurile cuprinse in Etapa I: Colectarea datelor.

Costurile de exploatare si intretinere vor evolua astfel:

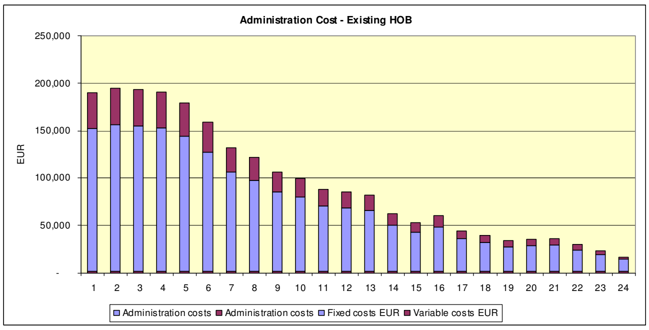




Administration costs

The administration costs are calculated based on the value of the plant and information about costs found in Phase I: Data Collection

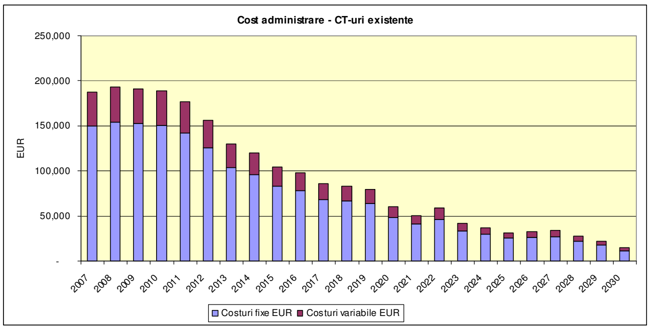
The administration costs will develop:



Costuri de administrare

Costurile de administrare sunt calculate pe baza valorii centralei si a informatiilor privind costurile cuprinse in Etapa I: Colectarea datelor.

Costurile de administrare vor evolua astfel:

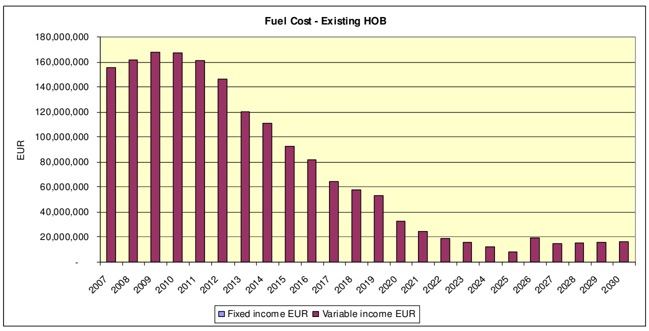


Fuel costs

The fuel cost is based on current border price Russia/Ukraine and EU of 255 EUR/1000 m^3 as is was in September 2007. This border price compares to 6.33 EUR/GJ with added transmission cost will be 7.33 EUR/GJ at plants centralised located.

A price escalation of 4% p.a. is expected.

The development in fuel costs will thus be:

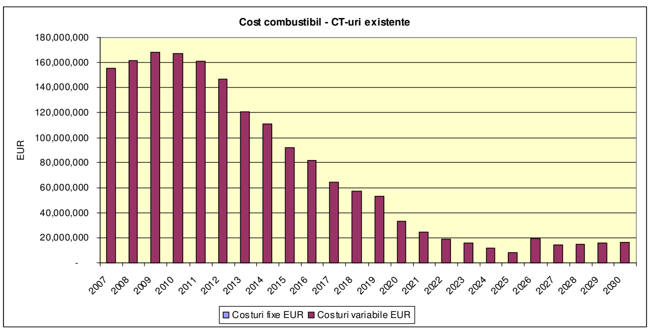


Costul combustibilului

Costul combustibilului are la baza pretul la granita dintre Rusia/Ucraina si UE de 255 EUR/1000 m^3 in septembrie 2007. Acest pret la granita in comparatie cu 6,33 EUR/GJ, la care se adauga si costul de transport acesta devine 7,33 EUR/GJ, pentru CET-urile care furnizeaza .

Se preconizeaza o creste anuala de 4%.

Evolutia costurilor combustibilului va fi urmatoarea:



Taxes

Environmental and energy taxes are not yet introduced on fuel used for production of heat. However, we expect that Romania will have to introduce these taxes as they are seen in other EU countries. We have foreseen that the taxes will be

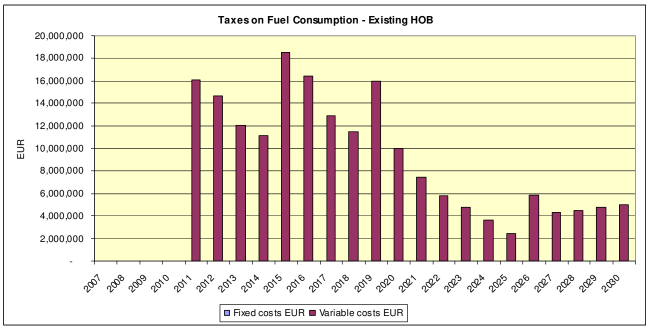
Taxe

Taxele de mediu şi de energie pentru utilizarea combustibilul la producerea de energie termica nu sunt încă introduse. Cu toate acestea, ne aşteptăm ca România va introduce aceste taxe, asa cum sunt si în alte ţări ale UE. Preconizam ca taxele vor fi de 10%

10% from 2011, 20% from 2015 and 30% from 2019, comparable to the level currently found in more EU countries.

With the increasing tax level the point will be reached where it will be feasible to change to bio oil but considering the decommissioning schedule for the existing HOB capacity we have not found it feasible to reconstruct the burners and establish storage facilities etc.

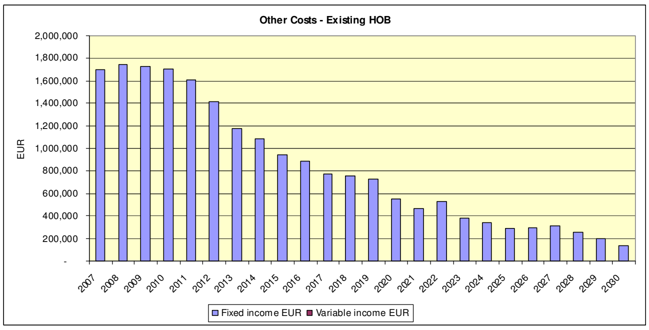
Payment of taxes will develop:



Other costs

Other costs such as royalty to the Municipality, profit to the operator and taxes/commissions (others than energy and environmental taxes) are calculated as 5% of other expenditure exclusive fuel and environmental taxes.

Other costs will develop:



Tariff structure

Tariffs for sale of heat

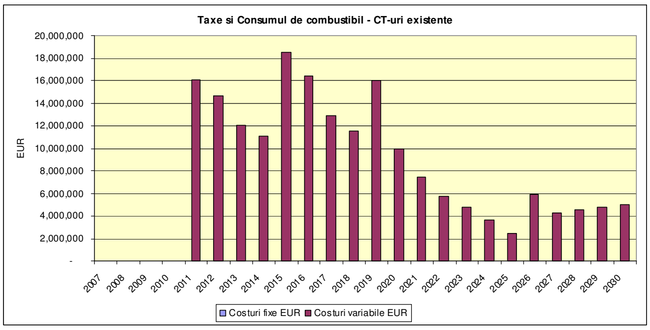
The tariffs should be a capacity tariff (fixed tariff) related to the capacity requirement (EUR/MJ/s) and a Energy tariff (variable tariff) related to the energy production (EUR/GJ).

The capacity tariff will develop:

incepand cu anul 2011, 20% din 2015 şi 30% din 2019, comparabile cu nivelul celor intalnite în prezent în mai multe ţări ale UE.

Odata cu creşterea nivelului de taxare se va atinge un nivel la care, trecerea la bio-combustibil va deveni fezabila, dar avand in vedere programul de dezafectare a capacitatilor cazanelor existente nu consideram ca este fezabil sa se adaptateze arzatoarele si sa se construiasca facilitati de depozitare etc.

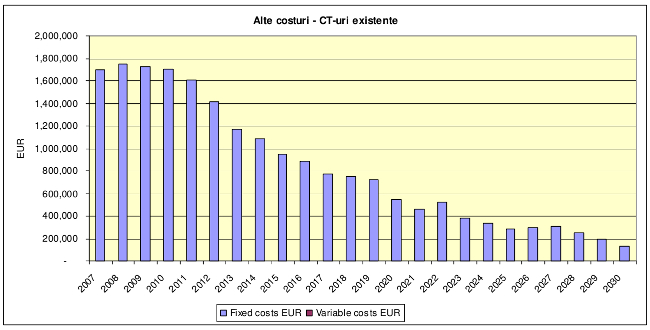
Plata taxelor va evolua astfel:



Alte costuri

Costuri cum ar fi redeventa catre Primarie, profitul pentru operator si alte taxe si comisioane (altele decat taxele de mediu si energie) sunt calculate a fi 5% din cheltuieli, excluzand taxele de mediu si pe combustibil.

Aceste costuri vor evolua astfel:

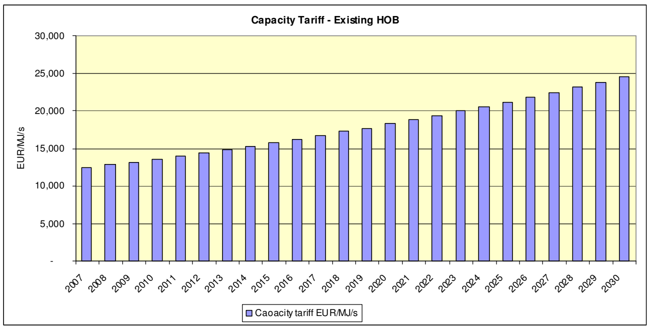


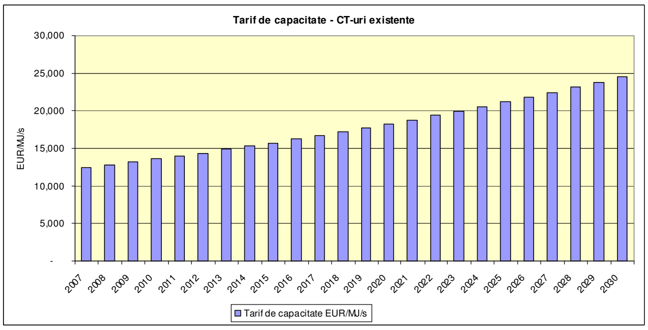
Structura tarifului

Tariful pentru vanzarea de energie termica

Tarifele ar trebui sa fie formate dintr-un tarif de capacitate (tarif fix) aferent necesarului de capacitate (EUR/MJ/s) si dintr-un tarif de energie (tarif variabil) aferent productiei de energie (EUR/GJ).

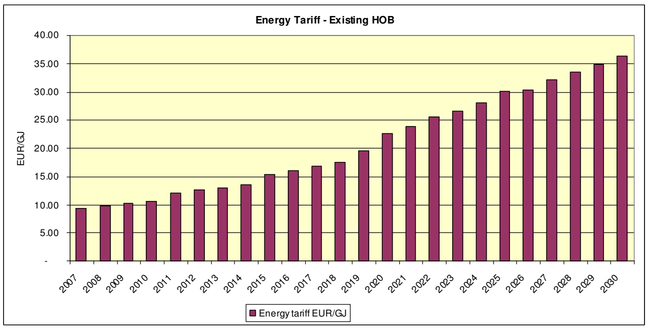
Tariful de capacitate va evolua astfel:

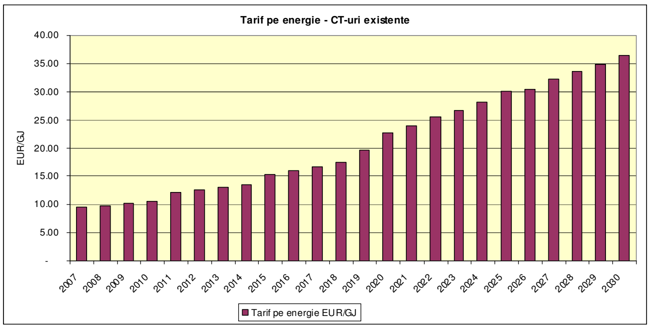




The energy tariff will develop:

Tariful pe energie se va dezvolta astfel:





3.3 Solar heating system

Cost structure

Installed capacity

There are currently no solar systems in Bucharest on buildings connected to the district heating system but many systems will be installed in the future as the support scheme currently under preparation will pass the parliament and funds will be available.

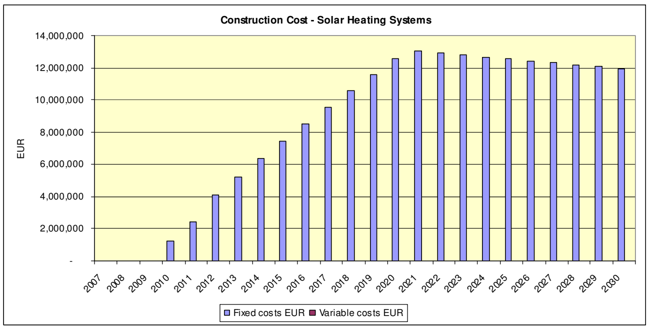
The problem with solar heating system is that they has no capacity value for the district heating system as full alternative capacity must be maintained for periods with more continues days without sunshine. However, the heat storages will have a minor capacity value on weak-to-weak basis.

Value of capacity

The installation costs are expected supported by 70% by the Government.

Solar panels are still developed giving higher output and lower construction costs. We foresee a price escalation of -1% p.a. continuing the trend seen for the last decade.

The total value of the solar systems will thus develop:



Operation and Maintenance costs

The operation and maintenance costs are calculated based on information from similar projects. The major contributor to the costs is power for circulation and annual service inspections. The cost of spare parts is insignificant.

The operation and maintenance costs will develop:

3.3 Sistemul de incalzire solara

Structura costului

Capacitatea instalata

In prezent, in municipiul Bucuresti nu exista instalate pe cladiri sisteme de incalzire solara, conectate la sistemul de termoficare insa in viitor se vor instala multe sisteme intrucat schema de sprijin actuala, in curs de pregatire, va fi aprobata de parlament si fondurile vor fi disponibile.

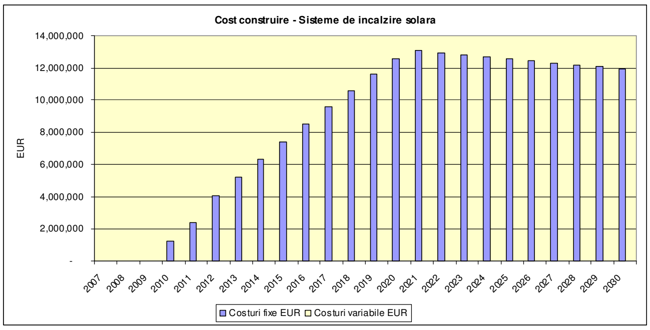
Problema legata de sistemele de incalzire solara este legata de faptul ca acestea nu au valoare de capacitate pentru sistemul de termoficare, intrucat capacitatea alternativa trebuie mentinuta pentru perioadele cu zile multe succesive fara soare. Totusi, acumulatoarele de caldura vor avea o valoare de capacitate mica luand in considerare acumularea de la o saptamana la alta.

Valoarea capacitatii

Se estimeaza ca prin schemele de finantare guvernamentale se vor suporta 70% din costurile de instalare.

Panourile solare sunt in continua dezvoltare cu performante mari si costuri de construire mici. Estimam o cresterea a preturilor de 1% p.a., continuand tendinta din ultima decada.

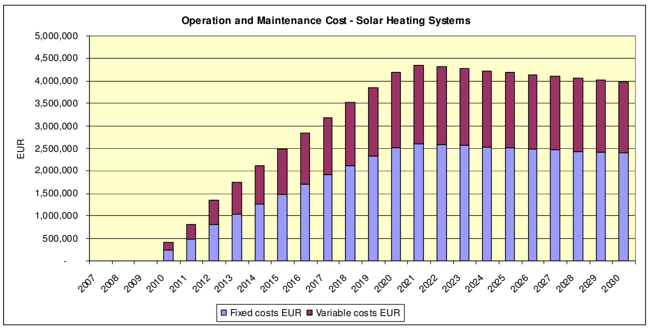
Valoarea totala a sistemului de incalzire solara va evolua astfel:

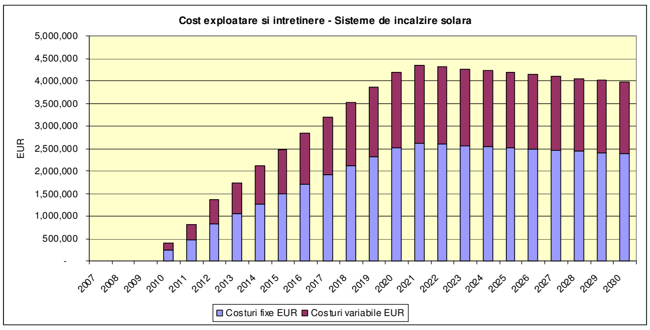


Costuri de exploatare si intretinere

Costurile de exploatare si intretinere sunt calculate in baza informatiilor de la proiecte similare. Ponderea majora in structura costurilor o are energia electrice necesara pentru circulatia apei si reviziile anuale. Costul pieselor de schimb este nesemnificativ.

Costurile de exploatare si intretinere vor fi astfel:





Administration costs

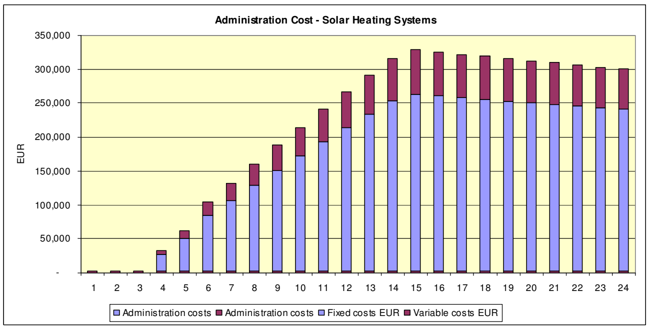
The administration costs are calculated based experience from similar project although the data available is rather inconsistent and depend very much of the size of the system. Administration costs for small and medium-size system is reported zero or very low indicating that the private owner does not consider that the time spend on administration is provided free.

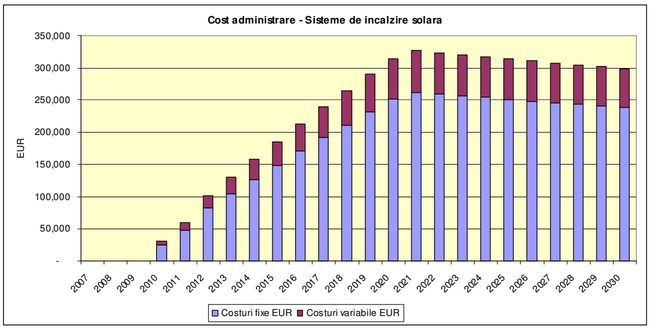
The administration costs will develop:

Costuri de administrare

Costurile de administrare sunt calculate pe baza experientei din proiecte similare cu toate ca datele disponibile sunt inconsistente si depind foarte mult de dimensiunea sistemului. Costurile de administrare pentru sisteme mici si medii raportate sunt zero sau foarte mici, indicand faptul ca proprietarii privati considera timpul alocat pentru administrare ca fiind gratuit.

Costurile de administrare vor evolua astfel:





Taxes

Production from solar heating systems is assumed attempted from energy and environmental taxes. Taxes related to the consumption of electricity are included in the maintenance costs.

Taxe

Productia de la sistemele de incalzire solara se estimeaza a fi scutita de taxe de mediu si energie. Taxele aferente consumului de energie electrica sunt incluse in costurile de intretinere.

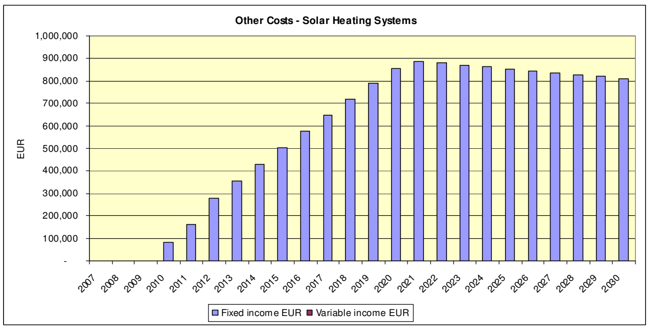
Other costs

Other costs such as royalty to the Municipality, profit to the operator and taxes/commissions (others than energy and environmental taxes) are calculated as 5% of other expenditure.

Other costs will develop:

Alte costuri

Costuri cum ar fi plata unei redevente catre Primarie, profitul pentru operator si alte taxe si comisioane (altele decat taxele de mediu si energie) sunt calculate a fi 5% din cheltuieli, excluzand taxele de mediu si pentru combustibil. Aceste costuri vor evolua
astfel:

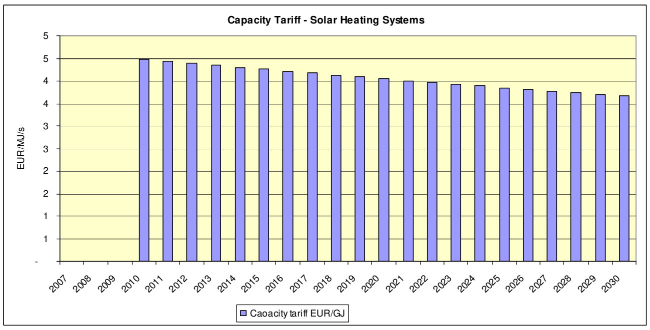


Tariff structure

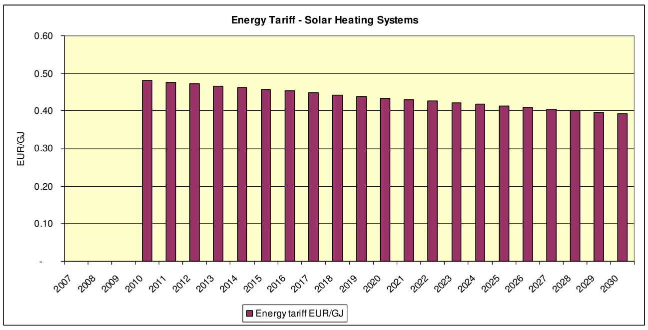
Tariffs for sale of heat

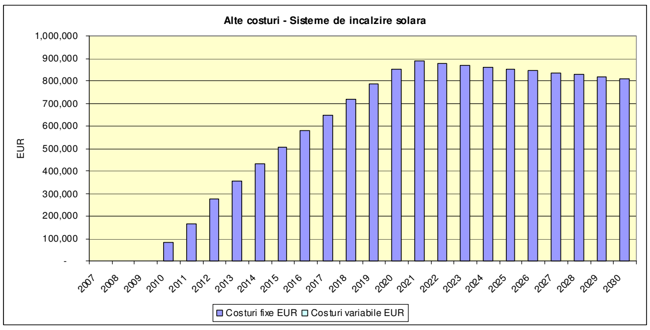
The tariffs should be a capacity tariff (fixed tariff) related to the capacity requirement (EUR/MJ/s) and a Energy tariff (variable tariff) related to the energy production (EUR/GJ).

The capacity tariff will develop:



The energy tariff will develop:



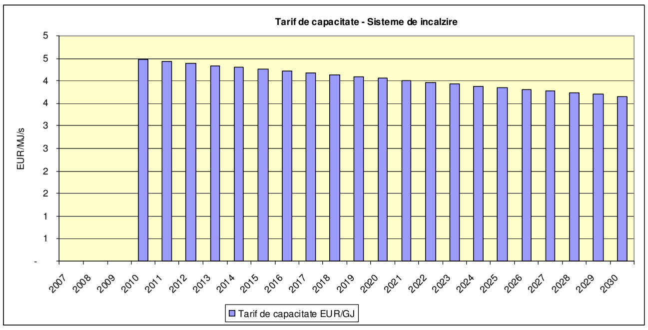


Structura tarifului

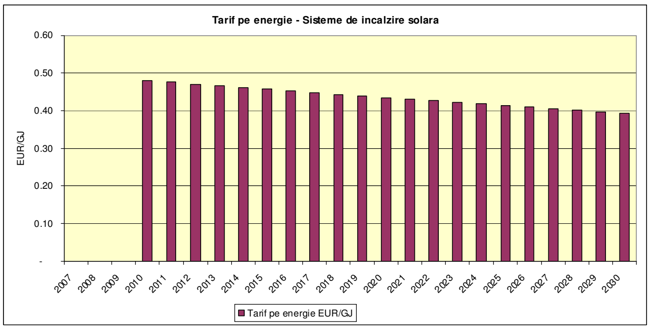
Tariful pentru vanzarea de energie termica

Tarifele ar trebui sa fie formate dintr-un tarif de capacitate (tarif fix) aferent necesarului de capacitate (EUR/MJ/s) si dintr-un tarif de energie (tarif variabil) aferent productiei de energie (EUR/GJ).

Tariful de capacitate va evolua astfel:



Tariful de energie va evolua astfel:



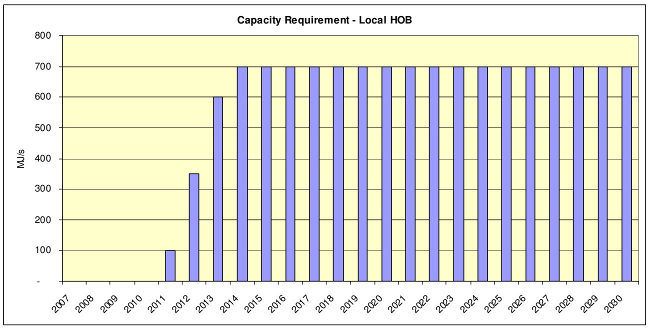
3.4 Local HOBs

Cost structure

Installed capacity

700 MJ/s will be necessary for covering the peak-load demand.

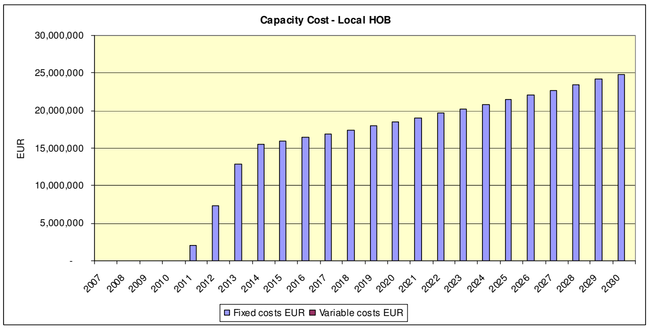
The development of local peak-load boilers is expected:



Value of capacity

The value of the capacity is estimated to 150,000 EUR/MJ/s – abour 3 times the value of the existing boiler capacity. The price escalation is estimated 3% p.a. and the interest requested by the producer 12 % p.a.

The value of capacity will thus develop:



Operation and Maintenance costs

The operation and maintenance costs are based on information from boiler suppliers and benchmarking values from Denmark.

The operation and maintenance costs will develop:

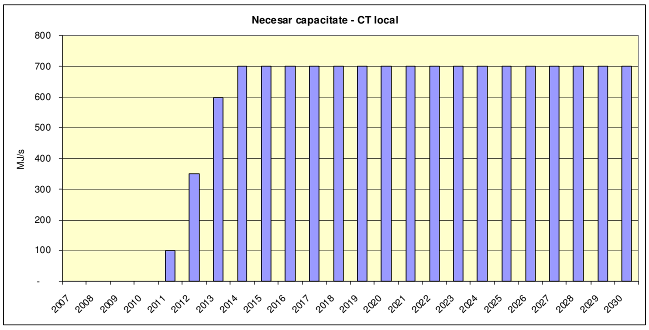
3.4 CT-uri locale

Structura costului

Capacitatea instalata

Pentru acoperirea necesarului la varf de consum va fi necesara o capacitate instalata de 700 MJ/s.

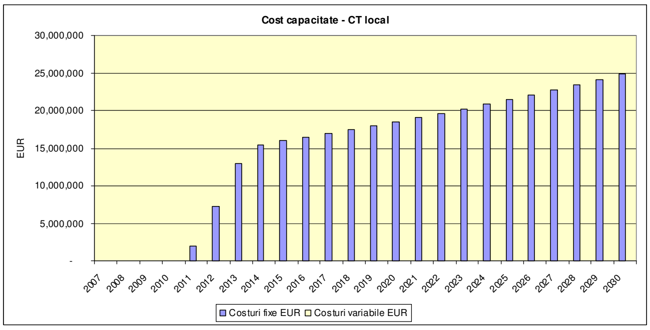
Evolutia CT-urilor locale pentru acoperirea varfului de consum se estimeaza a fi dupa cum urmeaza:



Valoarea capacitatii

Valoarea capacitatii se estimeaza a fi de 150.000 EUR/MJ/s – de aprox. 3 ori mai mare decat valoarea capacitatii existente. Se estimeaza ca pretul va creste cu 3% p.a. si dobanda ceruta de producator va fi de 12% p.a.

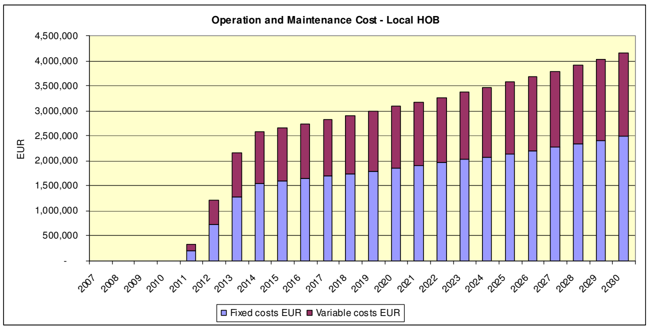
Valoarea capacitatii va fi dupa cum urmeaza:



Costuri de exploatare si intretinere

Costurile de exploatare si intretinere au la baza informatiile furnizate de producatorii de cazane si valorile de referinte (benchmarking) din Danemarca.

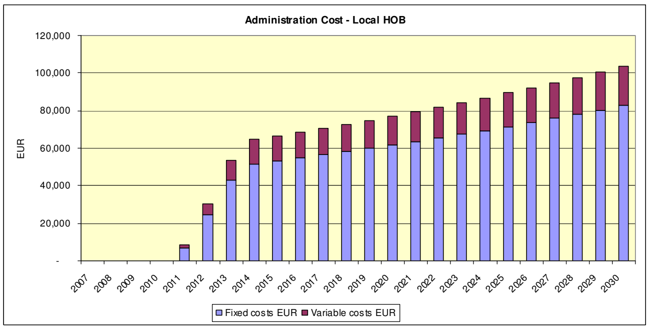
Costurile de exploatare si intretinere vor evolua astfel:



Administration costs

The administration costs are calculated based on benchmark values from Denmark.

The administration costs will develop:

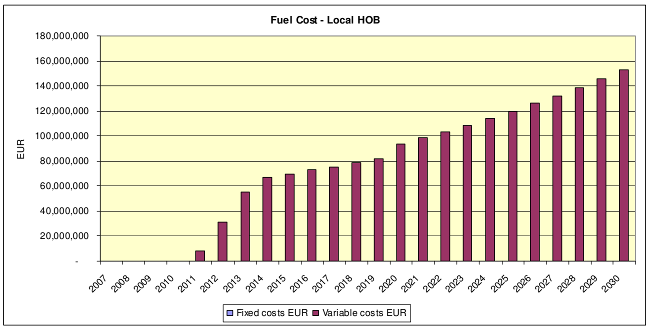


Fuel costs

The fuel cost is based on current border price Russia/Ukraine and EU of 255 EUR/1000 m^3 as is was in September 2007. This border price compares to 6.33 EUR/GJ with added transmission and distribution cost will be 8.433 EUR/GJ at plants decentralised located.

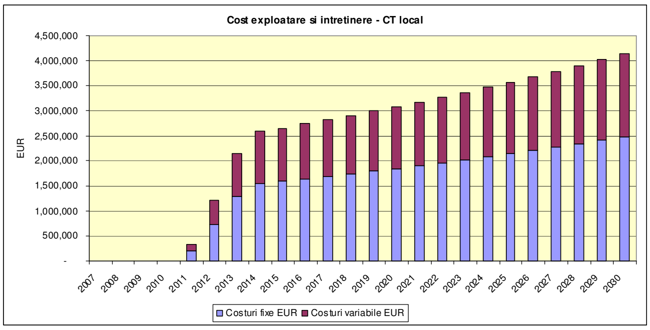
A price escalation of 4% p.a. is expected.

The development in fuel costs will thus be:



Taxes

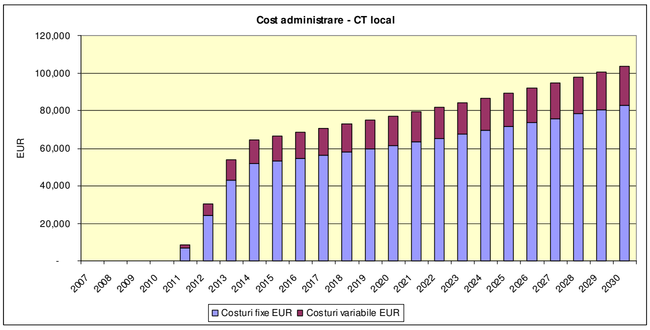
Environmental and energy taxes are not yet introduced on fuel used for production of heat. However, we expect that Romania will have to introduce these taxes as they are seen in other EU countries. We have foreseen that the taxes will be 10% from 2011, 20% from 2015 and 30% from 2019,



Costuri de administrare

Costurile de administrare sunt calculate pe baza valorilor de referinta din Danemarca.

Costurile de administrare vor evolua astfel:

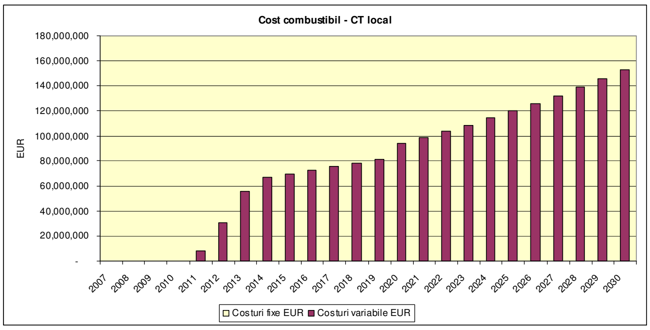


Cost combustibil

Costul combustibilului are la baza pretul la granita dintre Rusia/Ucraina si UE de 255 EUR/1000 m^3 din septembrie 2007. Acest pret la granita comparat cu 6,33 EUR/GJ, la care se adauga costurile de transport si distributie, va fi de 8,433 EUR/GJ, pentru centralele locale descentralizate.

Se preconizeaza o creste anuala de 4%.

Evolutia costurilor combustibilului va fi urmatoarea:

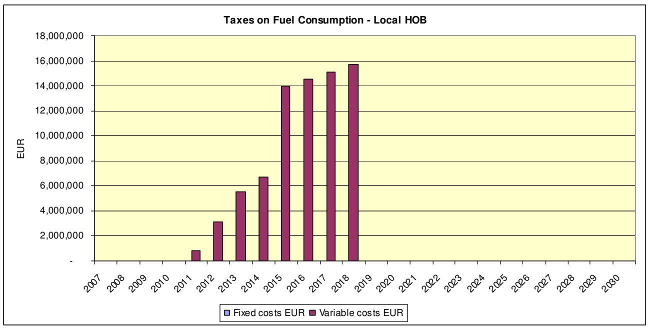


Taxe

Taxele de mediu şi de energie pentru utilizarea combustibilul la producerea de energie termica nu sunt încă introduse. Cu toate acestea, ne aşteptăm că România va introduce aceste taxe, asa cum sunt si în alte ţări ale UE. Preconizam ca taxele vor fi de 10% incepand cu anul 2011, 20% din 2015 şi 30% din comparable to the level currently found in more EU countries.

With the increasing tax level the point will be reached where it will be feasible to change to bio oil from 2019 when the tax level reaches 30%.

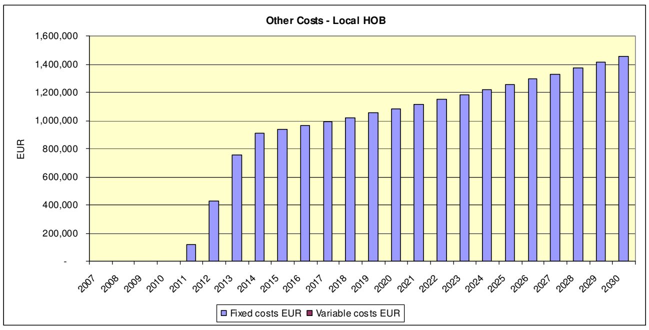
Payment of taxes will develop:



Other costs

Other costs such as royalty to the Municipality, profit to the operator and taxes/commissions (others than energy and environmental taxes) are calculated as 5% of other expenditure exclusive fuel and environmental taxes.

Other costs will develop:



Tariff structure

Tariffs for sale of heat

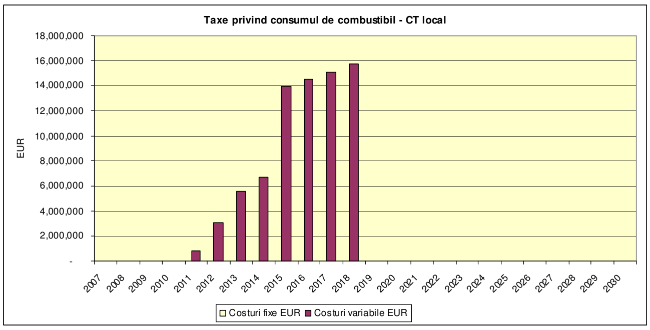
The tariffs should be a capacity tariff (fixed tariff) related to the capacity requirement (EUR/MJ/s) and a Energy tariff (variable tariff) related to the energy production (EUR/GJ).

The capacity tariff will develop:

2019, comparabile cu nivelul celor intalnite în prezent în mai multe țări ale UE.

Odata cu cresterea nivelului taxelor, se atinge un anumit nivel, astfel incat trecerea la biocombustibil va deveni fezabila din anul 2019 cand nivelul taxelor va atinge 30%.

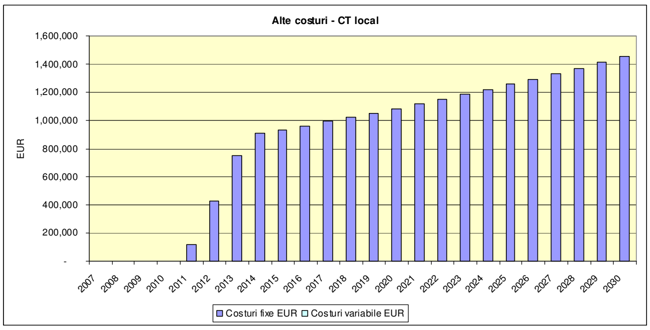
Plata taxelor va evolua astfel:



Alte costuri

Costuri cum ar fi plata unei redevente catre Primarie, profitul pentru operator si alte taxe si comisioane (altele decat taxele de mediu si energie) sunt calculate a fi 5% din cheltuieli, excluzand taxele de mediu si pe combustibil.

Aceste costuri vor evolua astfel:

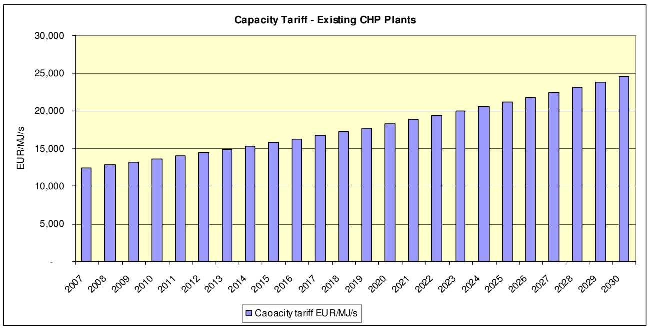


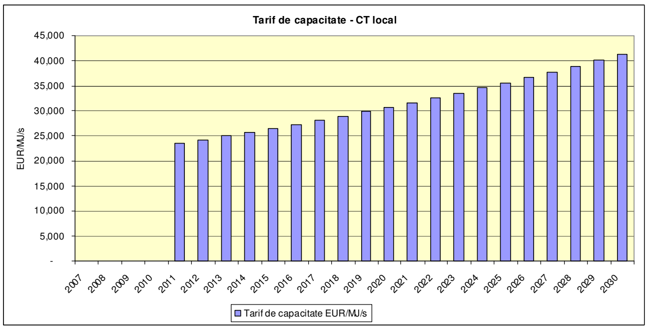
Structura tarifului

Tariful pentru vanzarea de energie termica

Tarifele ar trebui sa fie dintr-un tarif de capacitate (tarif fix) aferent necesarului de capacitate (EUR/MJ/s) si dintr-un tarif la energie (tarif variabil) aferent productiei de energie (EUR/GJ).

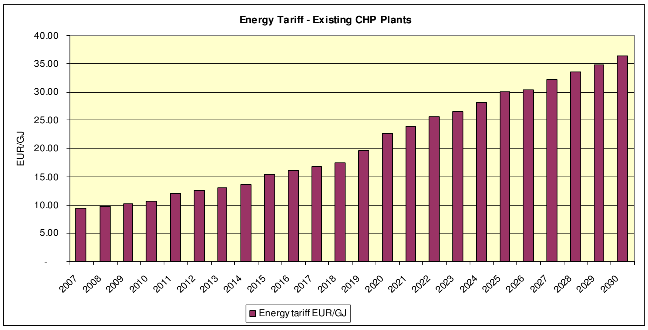
Tariful de capacitate va evolua astfel:

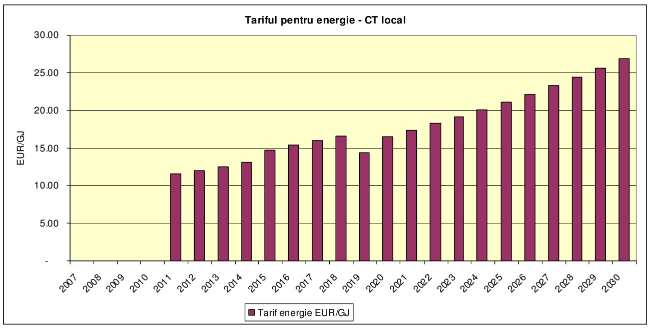




The energy tariff will develop:

Tariful pentru energie va evolua astfel:





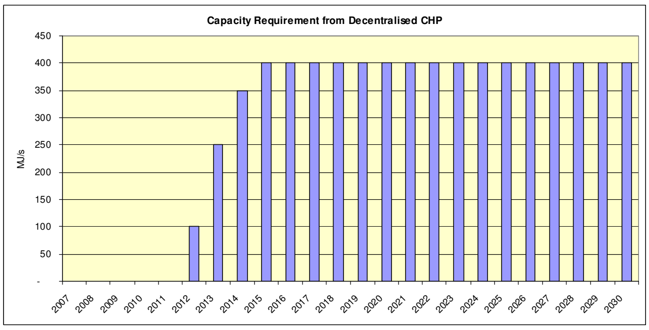
3.5 Decentralised CHP

Cost structure

Installed capacity

Considering the structure of the reconstructed system, the load duration curve and the cost of decentralised CHP we have assessed that installing about 400 MJ/s / 400 MW will be feasible.

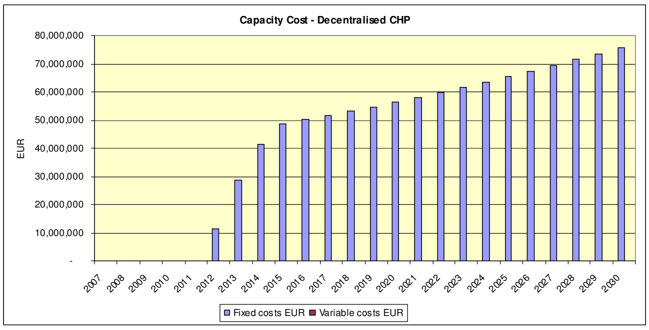
The development in installed capacity:



Value of capacity

The value of the capacity is estimated to 800,000 EUR/MJ/s, about double of the existing capacity value. The price escalation is estimated 3% p.a. and the interest requested by the producer 12 % p.a.

The capacity value will thus develop:



Operation and Maintenance costs

The O&M costs are established based on information from suppliers and benchmarking values from Denmark.

The operation and maintenance costs will develop:

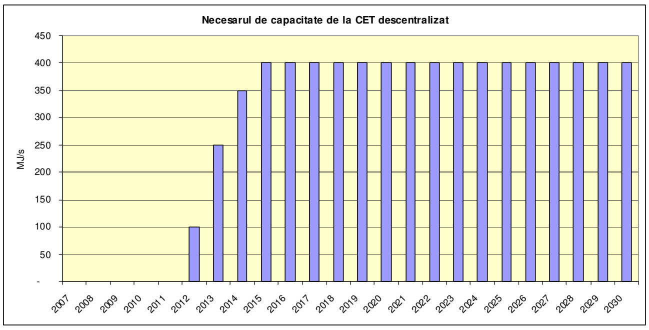
3.5 Unitate de cogenerare descentralizata

Structura costului

Capacitatea instalata

Avand in vedere structura sistemului reconstruit, curba duratei de incarcare si costul unitatii de cogenerare descentralizate, am estimat ca va fi fezabila instalarea unei capacitati de aprox. 400 MJ/s / 400 MW.

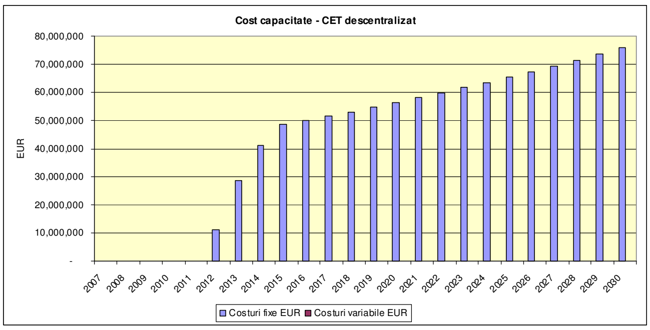
Evolutia instalarii capacitatilor va fi astfel:



Valoarea capacitatii

Valoarea capacitatii este estimata la 800.000 EUR/MJ/s, aprox. dublu fata de valoarea capacitatii existente. Se estimeaza o crestere a preturilor cu 3% p.a. si dobanda solicitata de producator va fi de 12 % p.a.

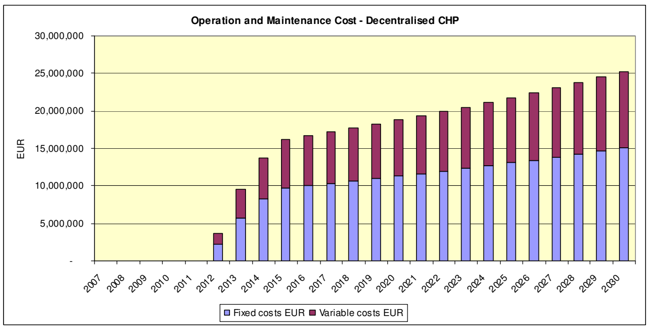
Valoarea capacitatii va evolua astfel:

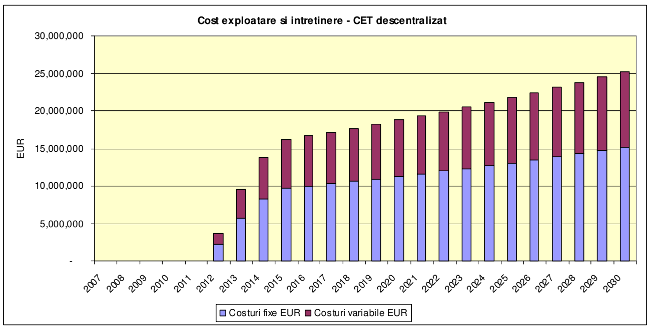


Costuri de exploatare si intretinere

Costurile de exploatare si intretinere sunt stabilite pe baza informatiilor de la furnizori si valorilor de referinta (benchmarking) din Danemarca.

Costurile de exploatare si intretinere vor evolua astfel:





Administration costs

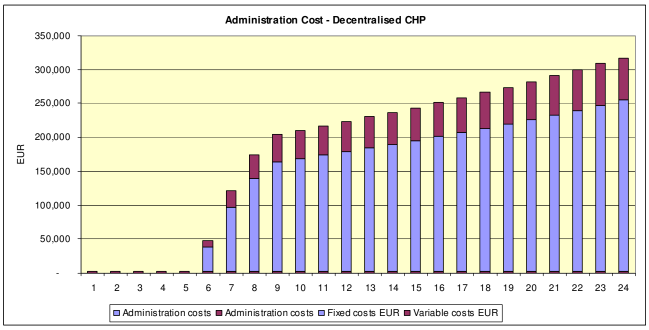
The administration costs are established based on benchmarking values from Denmark.

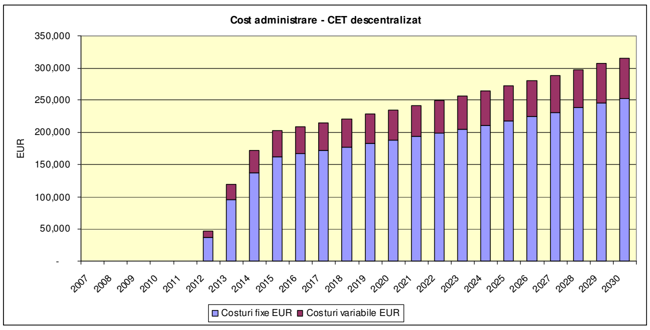
The administration costs will develop:

Costuri de administrare

Costurile de administrare sunt stabilite pe baza valorilor de referinta (benchmarking) din Danemarca.

Costurile de administrare vor evolua astfel:





Sale of power

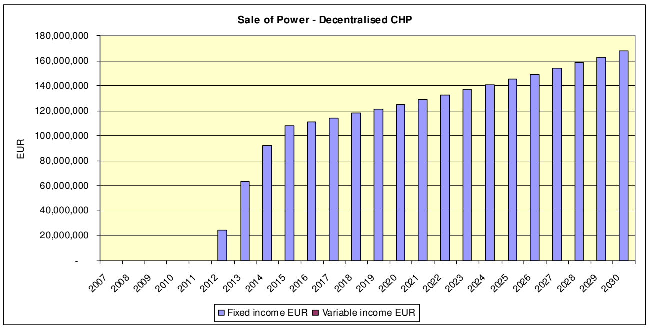
Sale of power will generate and income used to reduce the heat tariff. Sale of power is based on a tariff of 80 EUR/MWh in 2007, increasing with an escalation 3% p.a. The power tariff considers the decentralised location in terms of reduced power transmission and distribution losses.

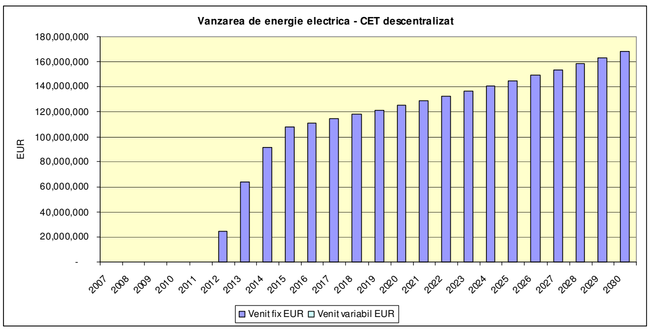
The income from sale of power will develop:

Vanzarea de energie electrica

Vanzarea de energie electrica va genera un venit care va fi folosit pentru reducerea tarifului energiei termice. Vanzarea energiei termice are la baza un tarif de 80 EUR/MWh aferent anului 2007, majorat cu 3% p.a. Tariful energiei electrice are in vedere producerea descentralizata considerand reducerea transportului de energie electrica si a pierderilor din retelele de distributie.

Venitul din vanzarea de energie electrica va evolua astfel:





Fuel costs

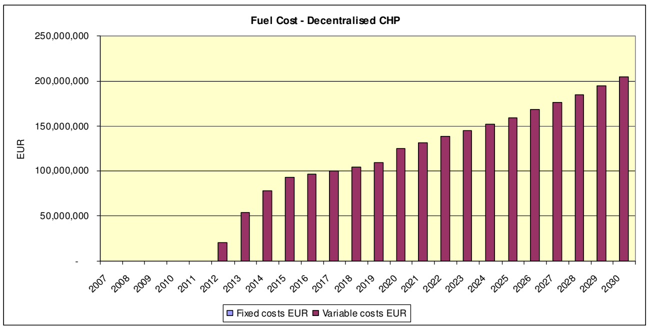
The fuel cost is based on current border price Russia/Ukraine and EU of 255 EUR/1000 m^3 as is was in September 2007. This border price compares to 6.33 EUR/GJ with added transmission and distribution

Costul combustibilului

Costul combustibilului are la baza pretul la granita dintre Rusia/Ucraina si UE de 255 EUR/1000 m^3 din septembrie 2007. Acest pret la granita comparat cu 6,33 EUR/GJ, la care se adauga costurile de transport cost will be 8.433 EUR/GJ at plants decentralised located.

A price escalation of 4% p.a. is expected.

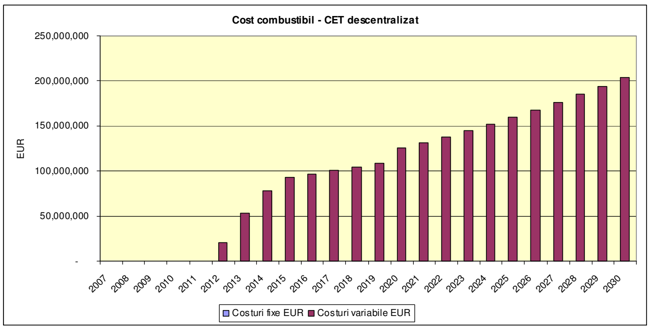
The development in fuel costs will thus be:



si distributie devine 8,433 EUR/GJ, pentru centralele locale descentralizate.

Se preconizeaza o creste anuala de 4%.

Evolutia costurilor combustibilului va fi urmatoarea:

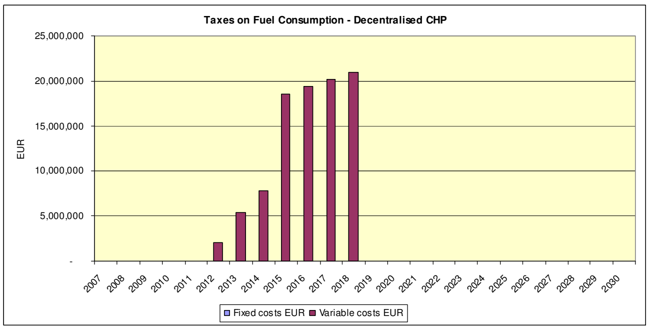


Taxes

Environmental and energy taxes are not yet introduced on fuel used for production of heat. However, we expect that Romania will have to introduce these taxes as they are seen in other EU countries. We have foreseen that the taxes will be 10% from 2011, 20% from 2015 and 30% from 2019, comparable to the level currently found in more EU countries.

With the increasing tax level the point will be reached where it will be feasible to change to bio oil from 2019 when the tax level reaches 30%.

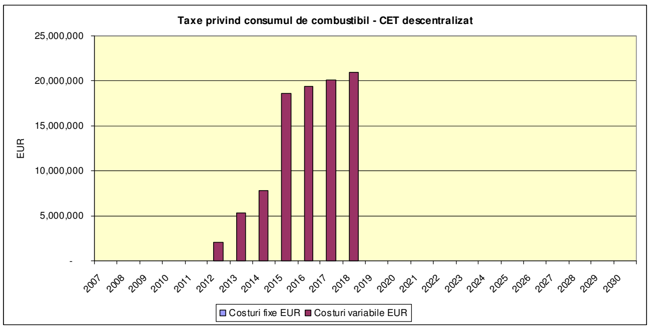
Payment of taxes will develop:



Taxe

Taxele de mediu şi de energie pentru utilizarea combustibilul la producerea de energie termica nu sunt încă introduse. Cu toate acestea, ne aşteptăm că România va introduce aceste taxe, asa cum sunt si în alte țări ale UE. Preconizam ca taxele vor fi de 10% incepand cu anul 2011, 20% din 2015 şi 30% din 2019, comparabile cu nivelul celor intalnite în prezent în mai multe țări ale UE.

Odata cu cresterea nivelului taxelor, se va atinge un anumit nivel astfel incat trecerea la biocombustibil va deveni fezabila incepand cu anul 2019 iar nivelul acestora va atinge 30%. Plata taxelor va evolua astfel:



Other costs

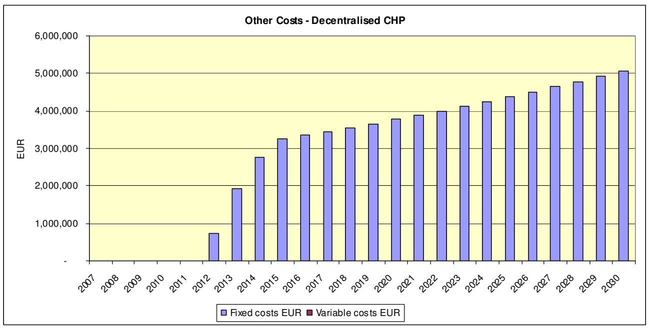
Other costs such as royalty to the Municipality, profit to the operator and taxes/commissions (others than energy and environmental taxes) are calculated as 5% of other expenditure exclusive fuel and environmental taxes.

Other costs will develop:

Alte costuri

Costuri cum ar fi plata unei redevente catre Primarie, profitul pentru operator si alte taxe si comisioane (altele decat taxele de mediu si energie) sunt calculate a fi 5% din cheltuieli, excluzand taxele de mediu si pe combustibil.

Aceste costuri vor evolua astfel:

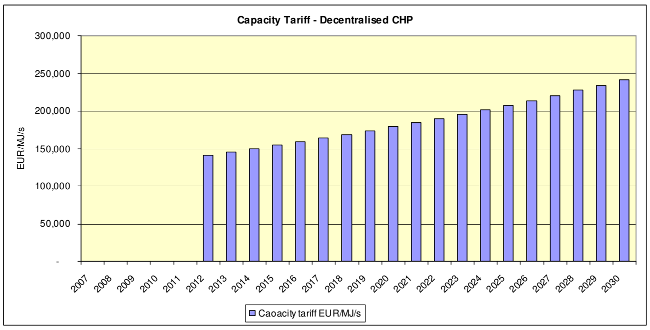


Tariff structure

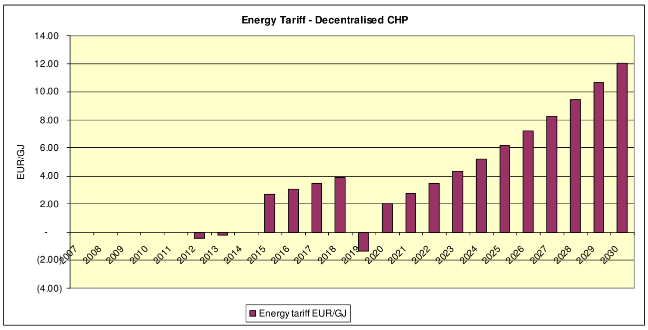
Tariffs for sale of heat

The tariffs should be a capacity tariff (fixed tariff) related to the capacity requirement (EUR/MJ/s) and a Energy tariff (variable tariff) related to the energy production (EUR/GJ).

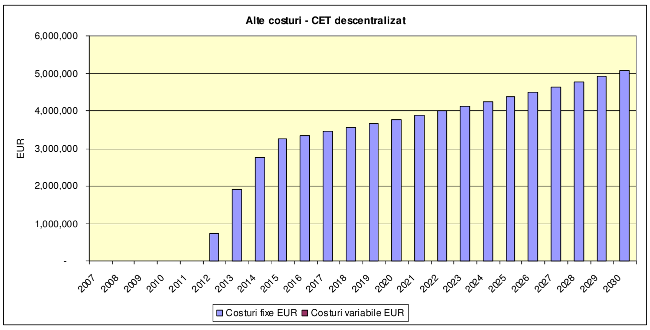
The capacity tariff will develop:



The energy tariff will develop:



The minus energy tariff indicate that the income in some years exceed other variable costs.

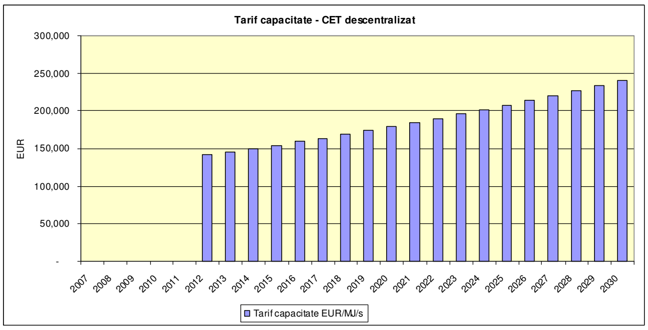


Structura tarifului

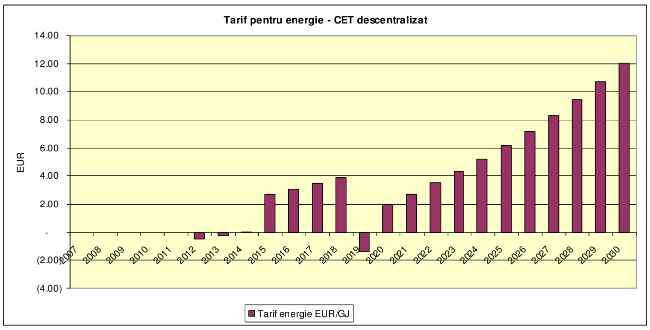
Tariful pentru vanzarea de energie termica

Tarifele ar trebui sa fie formate dintr-un tarif de capacitate (tarif fix) aferent necesarului de capacitate (EUR/MJ/s) si dintr-un tarif la energie (tarif variabil) aferent productiei de energie (EUR/GJ).

Tariful de capacitate va evolua astfel:



Tariful pentru energie va evolua astfel:



Tariful pentru energie negativ indica faptul ca venitul in anumiti ani a depasit alte costuri variabile.

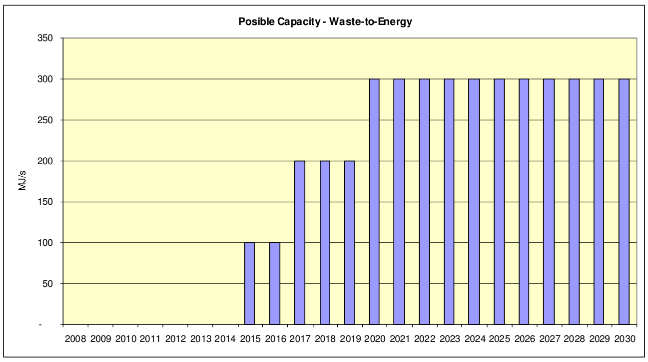
3.6 Waste-to-energy

Cost structure

Installed capacity

The installed capacity will be determined by the quantity of waste available for incineration. The waste planning for Bucharest indicates that there will be sufficient waste for construction of three waste-to-Energy facilities each with a capacity of about 36 t waste per hour ~ 100 MJ/s heat production.

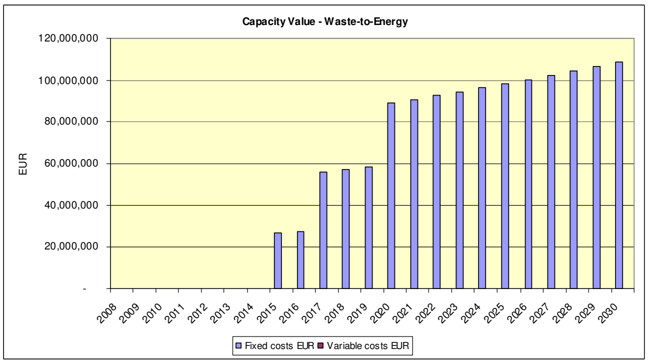
The development in installed capacity:



Value of capacity

The value of the capacity is estimated to 1,950,000 EUR/MJ/s, more then double of constructing new CHP capacity based on natural gas. The price escalation is estimated 2% p.a. and the interest requested by the producer 12 % p.a.

The capacity value will thus develop:



Operation and Maintenance costs

The O&M costs are established based on information from suppliers and benchmarking values from Denmark.

The operation and maintenance costs will develop:

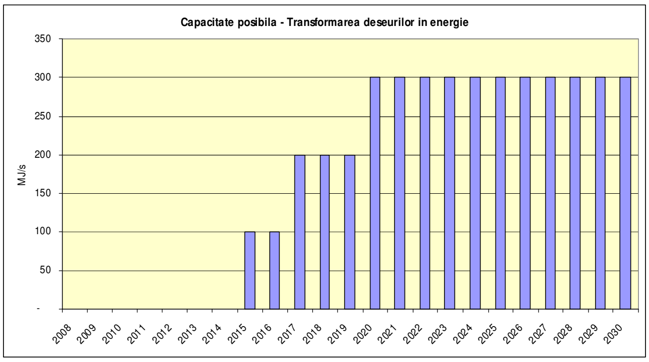
3.6 Transformarea deseurilor in energie

Structura costului

Capacitatea instalata

Capacitatea instalata va fi determinata de cantitatea de deseuri disponibile pentru incinerare. Planificarea deseurilor pentru municipiul Bucuresti indica faptul ca sunt suficiente deseuri pentru construirea a trei facilitati de transformare a deseurilor in energie fiecare cu o capacitate de aprox. 36 t de deseuri pe ora ~ 100 MJ/s producere de energie termica.

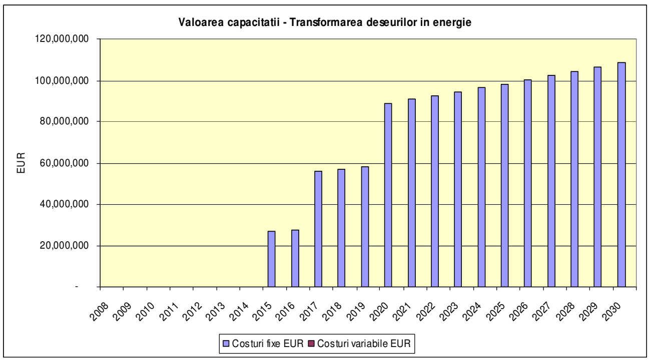
Evolutia privind capacitatea instalata:



Valoarea capacitatii

Valoarea capacitatii este estimata la 1.950.000 EUR/MJ/s, mai mult decat dublul construirii unei noi capacitati in cogeneare pe baza de gaz natural. Se estimeaza o crestere a preturilor de 2% p.a. si dobanda solicitata de producator va fi de 12 % p.a.

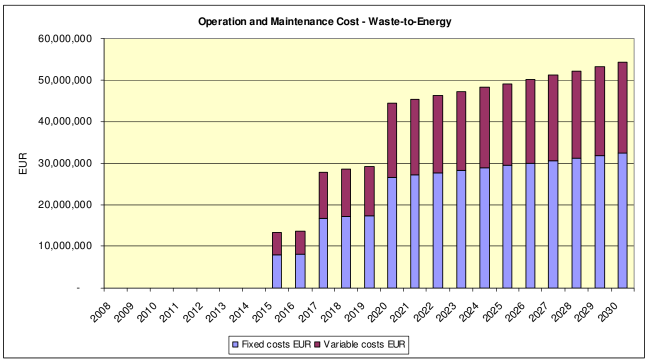
Valoarea capacitatii va evolua astfel:

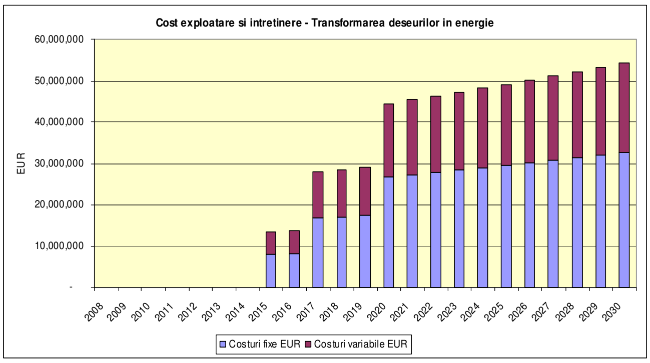


Costuri de exploatare si intretinere

Costurile de exploatare si intretinere sunt stabilite pe baza informatiile de la furnizori si valorile de referinta (benchmarking) din Danemarca.

Costurile de exploatare si intretinere vor evolua astfel:





Administration costs

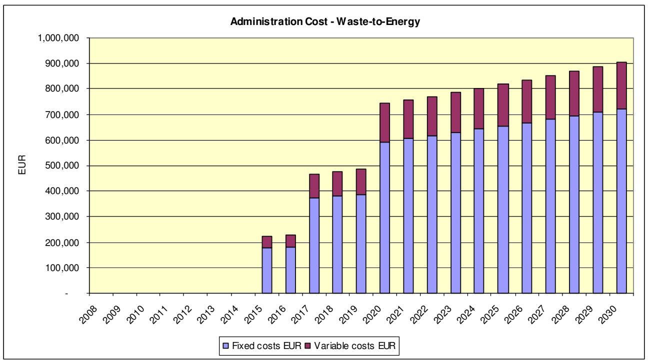
The administration costs are established based on benchmarking values from Denmark.

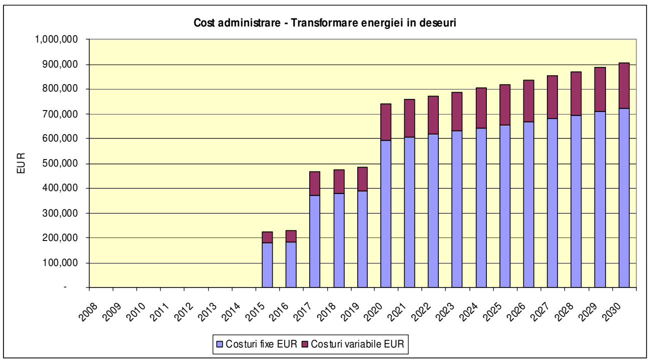
The administration costs will develop:

Costuri de administrare

Costurile de administrare sunt stabilite pe baza valorilor de referinta (benchmarking) din Danemarca.

Costurile de administrare vor evolua astfel:





Sale of power

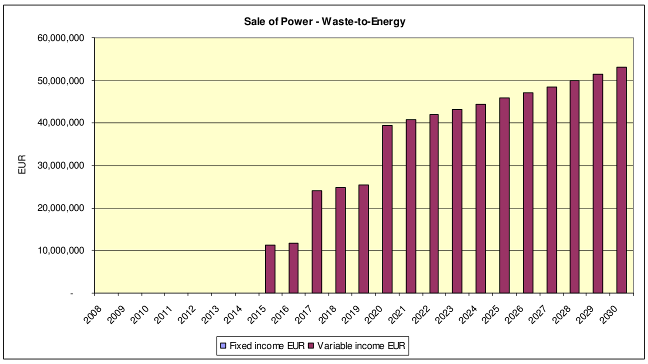
Sale of power will generate and income used to reduce the heat tariff. Sale of power is based on a tariff of 65 EUR/MWh in 2007, increasing with an escalation of 3% p.a.

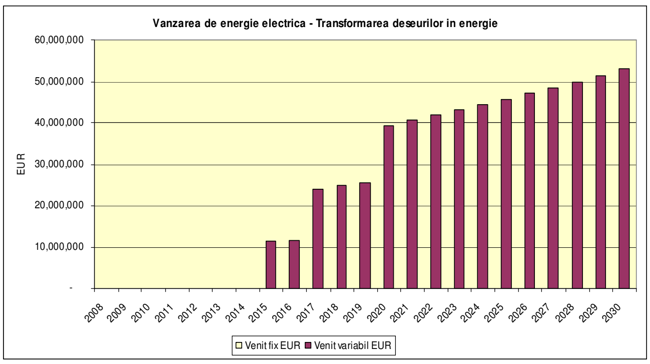
The income from sale of power will develop:

Vanzarea de energie electrica

Vanzarea energiei electrice va genera cu venit care va fi folosit la reducerea tarifului la energia termica. Vanzarea de energie electrica are la baza un tarif de 65 EUR/MWh in anul 2007 la care se adauga o crestere de 3% p.a.

Venitul din vanzarea de energie electrica va evolua astfel:





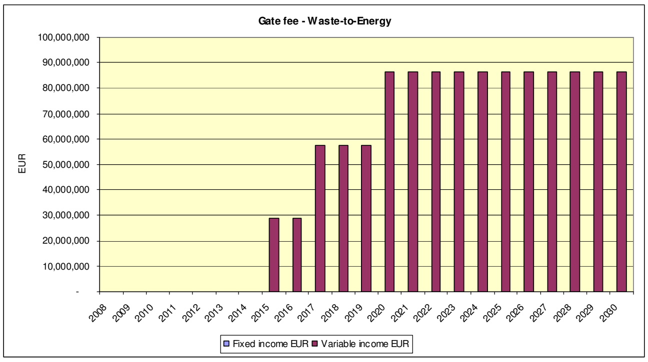
Sale of power

Gate fee for receiving waste for incineration will generate a income for the waste-to-energy facility, which will reduce the heat price.

Vanzarea de energie electrica

Taxa la poarta pentru primirea deseurilor pentru incinerare va genera incasari pentru unitatea de transformare a deseurilor in energie, care vor reduce pretul energiei termice.

The income from gate fee will develop:



Fuel costs

The waste-to-energy facilities will use no other fuel than waste.

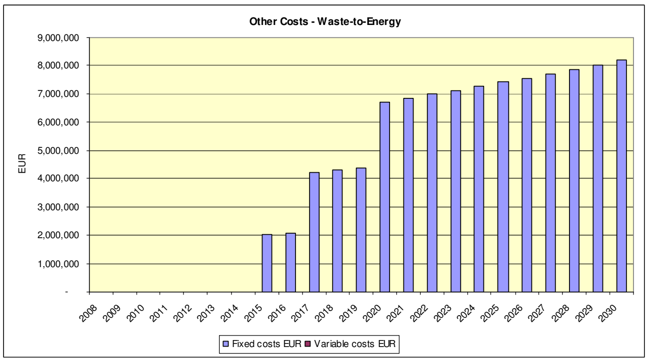
Taxes

Waste is normally considered a renewable source and is thus attempted from energy and environmental taxes.

Other costs

Other costs such as royalty to the Municipality, profit to the operator and taxes/commissions (others than energy and environmental taxes) are calculated as 5% of other expenditure exclusive fuel and environmental taxes.

Other costs will develop:



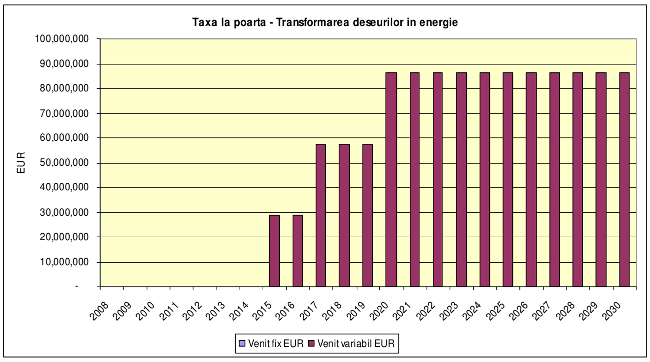
Tariff structure

Tariffs for sale of heat

The tariffs should be a capacity tariff (fixed tariff) related to the capacity requirement (EUR/MJ/s) and a Energy tariff (variable tariff) related to the energy production (EUR/GJ).

The capacity tariff will develop:

Aceste incasari vor evolua astfel:



Costul combustibilului

Facilitatile de transformare a deseurilor in energie nu vor folosi alt combustibil decat deseuri.

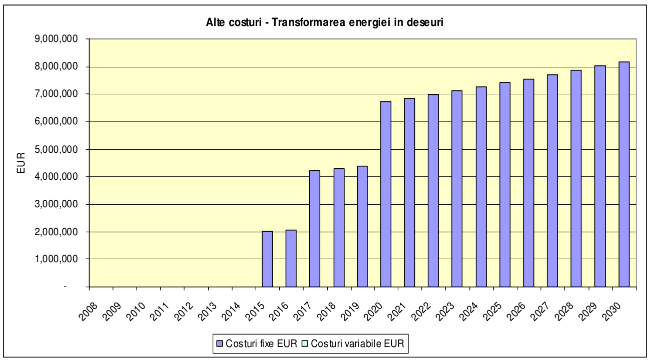
Taxele

In general deseurile sunt considerate sursa regenerabila si de aceea sunt scutite de la plata taxelor de mediu si energie.

Alte costuri

Costuri cum ar fi plata unei redevente catre Primarie, profitul pentru operator si alte taxe si comisioane (altele decat taxele de mediu si energie) sunt calculate a fi 5% din cheltuieli, excluzand taxele de mediu si pe combustibil.

Aceste costuri vor evolua dupa cum urmeaza:

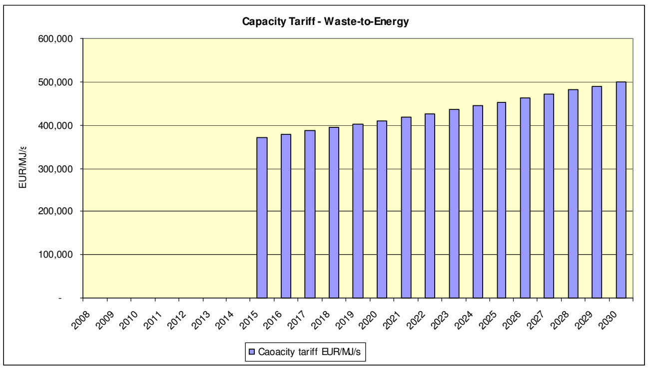


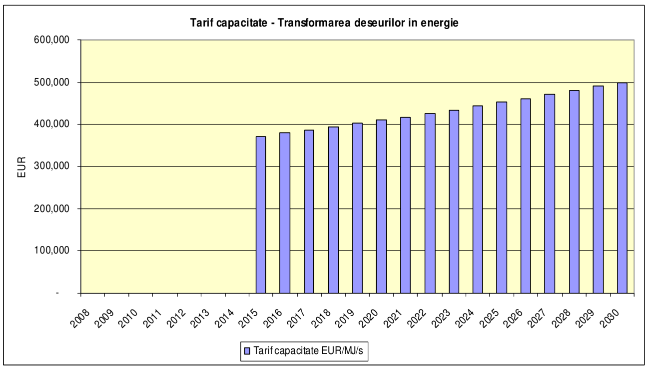
Structura tarifului

Tariful pentru vanzarea de energie termica

Tarifele ar trebui sa fie formate dintr-un tarif de capacitate (tarif fix) aferent necesarului de capacitate (EUR/MJ/s) si dintr-un tarif la energie (tarif variabil) aferent productiei de energie (EUR/GJ).

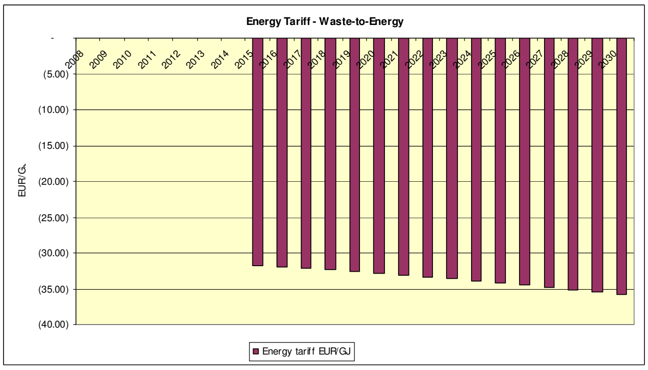
Tariful de capacitate va evolua astfel:

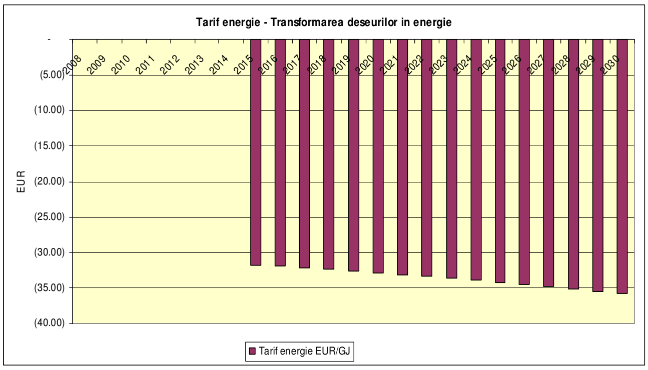




The energy tariff will develop:

Tariful pentru energie va evolua astfel:





The minus energy tariff indicate that the income from sale of power and gate fee exceed the variable expenditures.

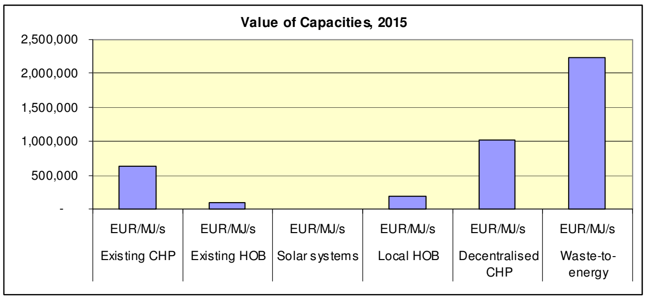
Valorile negative pentru tariful la energie indica faptul ca venitul din vanzarea de energie electrica si taxa la poarta depasesc cheltuielile variabile.

3.7 Comparison

In this section we compare the production cost structure for the different production options.

Capacity value

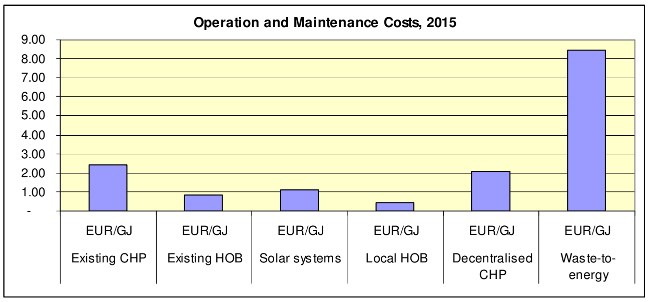
Obviously, the heat-only options have far the lowest capacity value. Solar heating has no capacity value as full capacity must be maintained on other options for periods with more continuous days with no sunshine.



Decentralised CHP has high and waste-to-energy even very high capacity values. However, as we will see in later comparisons, these two options have the capability of generation income from sale of electricity and the waste-to-energy facility also the capability of generation income from incineration of waste (gate fee).

Operation and maintenance costs

Cogeneration units have high maintenance costs and also solar systems will have relatively high operation and maintenance costs due to power consumption for circulation and maintenance of the many small systems.



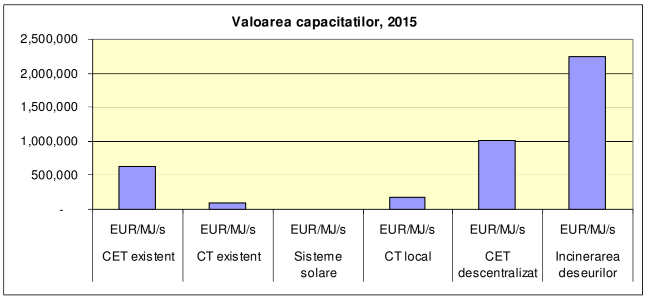
Operation and maintenance of the waste-to-energy facilities includes operation of the waste handling facilities and maintenance of the waste incineration facilities, cost which are not found for other production options.

3.7 Comparatie

In aceasta sectiune comparam structura costului de productie pentru diferitele optiuni de producere.

Valoarea capacitatii

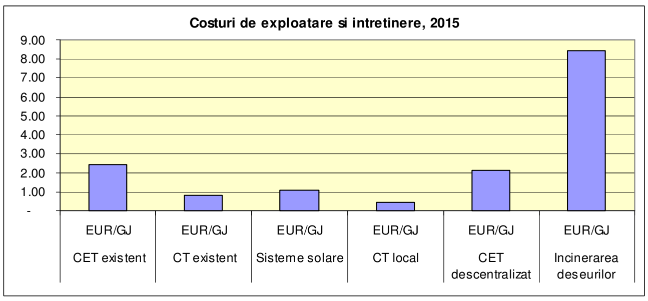
In mod evident, CT-urile au de departe valoarea capacitatii cea mai mica. Incalzirea solara nu are valoarea din punct de vedere al capacitatii intrucat intreaga capacitate trebuie mentinuta din alte surse pentru perioadele cu zile succesive fara soare.



Centralele de cogenerare centralizate au o valoare a capacitatii foarte mare, la fel si statiile de transformare a deseurilor in energie. Cu toate acestea, vom vedea din comparatiile ulterioare ca aceste doua optiuni pot genera venituri din vanzarea de energie electrica, iar facilitatile de transformare a deseurilor in energie genereaza venituri din incinerarea deseurilor (taxa la poarta).

Costurile de exploatare si intretinere

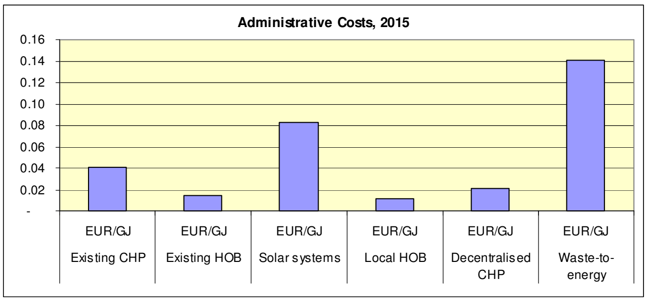
Unitatile de cogenerare au costuri mari de intretinere si de asemenea sistemele solare au costuri relativ mari de exploatare si intretinere datorita consumului de energie electrica pentru recircularea agentului termic si nevoi de intretinere a multor altor sisteme de dimensiuni mici.



Exploatarea si intretinerea facilitatilor de transformare a deseurilor in energie includ operarea facilitatilor de manevrare a deseurilor si intretinerea facilitatilor de incinerare a deseurilor, costuri care nu exista pentru alte optiuni de producere.

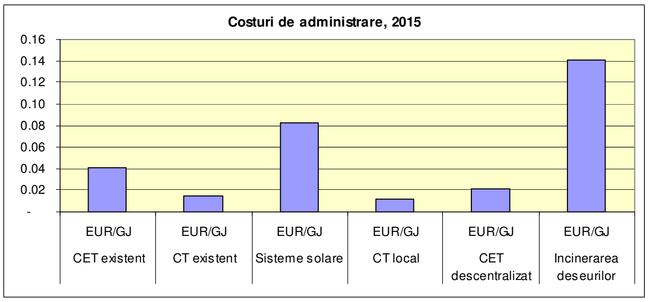
Administration costs

The administration costs are very high for waste-to-energy due to administration of the waste quantities arriving at the plant. The administration costs are also high for solar energy due to the many shall units.



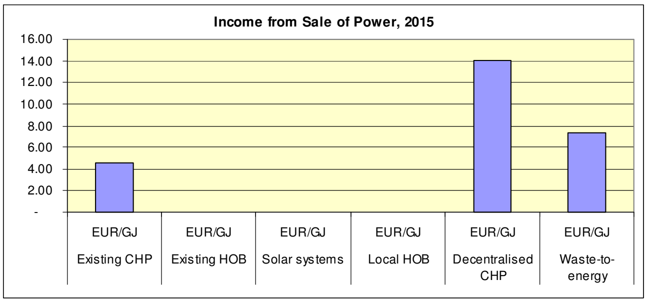
Costuri de administrare

Costurile de administrare sunt foarte mari pentru facilitatile de transformare a deseurilor in energie datorita gestionarii cantitatilor de deseuri sosite la statie. De asemenea, costurile de administrare pentru energia solara sunt mari datorita numarului mare de unitati de dimensiuni mici.



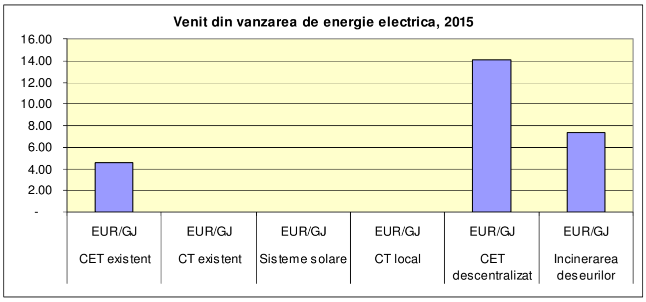
Sale of Power

Income from sale of power is significant as it reduced the heat price correspondingly.



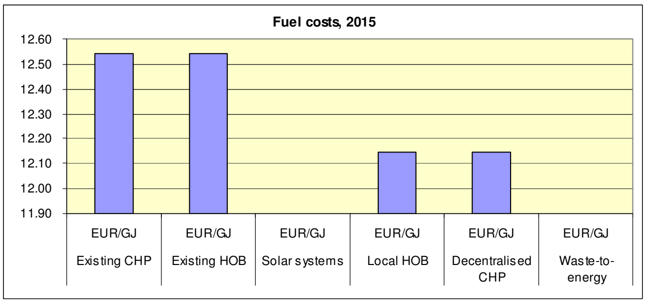
Vanzarea de energie termica

Venitul din vanzarea de energie electrica este semnificativ intrucat reduce pretul pentru energia termica.



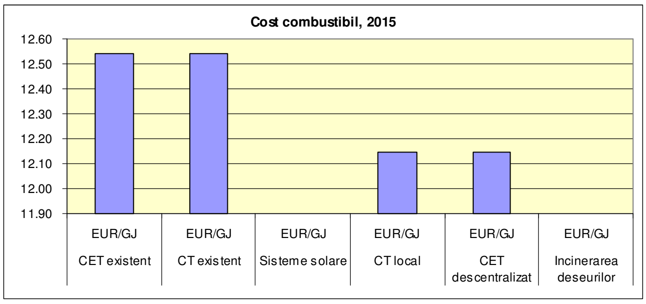
Fuel costs

The fuel costs are higher for the existing plants due to lower efficiencies.



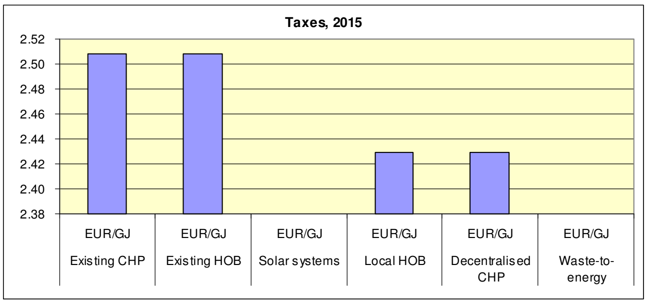
Costul combustibilului

Costul combustibilului este mare pentru centralele existente datorita eficientei scazute.



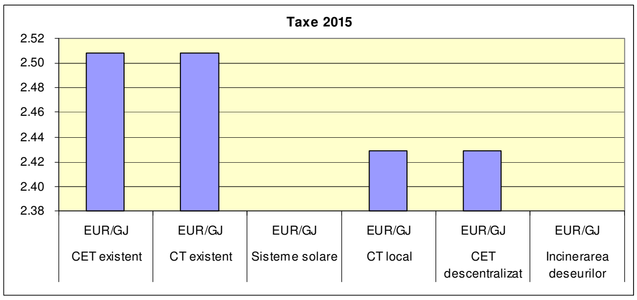
Taxes

Environmental and energy taxes are expected introduced from 2011 and reaches 20% in 2015 and 30% in 2020.



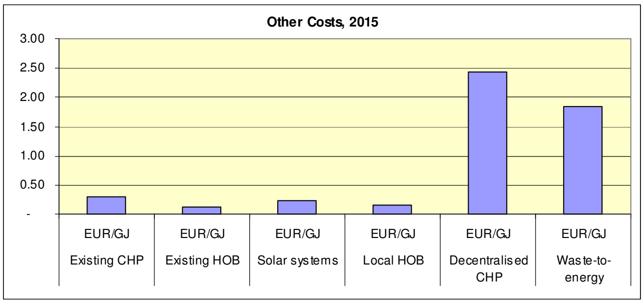
Taxele

Se estimeaza ca taxele de mediu si energie vor fi introduse din anul 2011 si vor atinge 20% in 2015 si 30% in 2020.



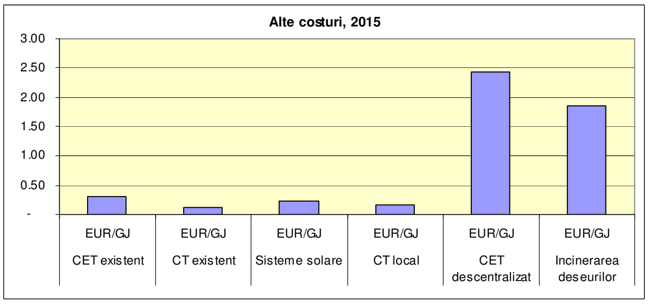
Other Costs

Other costs (approvals, services charges, royalties and profit to the investor/operator etc) are calculated as 5% of total costs exclusive fuel costs and taxes.



Alte costuri

Costurile indirecte (aprobari, servicii, redevente si profit pentru investitor/operator etc) sunt calculate ca fiind 5% din costul totala, exclusiv costul combustibilului si taxele.



Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 7e: Alternative Production Sources

Anexa 7e: Surse alternative de producere

4				
3				
2	01.09.2009	Corrections	GMCB	haa
1	09.06.2009	First edition – more sources added	GMCB	haa
0	05.04.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

ATH energ

Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

Besides the traditional production technologies described in Appendix C: Production other production technologies might be used. We have estimated that less that 5% of the district heating demand in 2020 will be covered by other sources:

- Fuel cells
- Heat pumps
- Biomass (pellets)
- Geothermal
- Others

These technologies are described in the following sections and the cost of using these technologies is estimated based on rough calculations as experience data is not always available.

1 INTRODUCERE

In afara de tehnologiile de producere traditionale descrise in Anexa C : Productia, se pot folosi si alte tehnologii. Am estimat ca mai putin de 5% din necesarul de caldura pentru anul 2020 va fi acoperit din alte surse:

- Pile de combustie
- Pompe de caldura
- Biomasa (peleti)
- Energie geotermala
- Altele

Aceste tehnologii sunt descrise in sectiunile urmatoare impreuna cu evaluare costului utilizarii acestora pe baza calculelor estimative intrucat datele din experiente anterioare nu sunt disponibile intotdeauna.

2 FUEL CELLS

2.1 Description of the technology

A fuel cell is an electrochemical conversion device. It produces electricity from fuel (on the anode side) and an oxidant (on the cathode side), which react in the presence of an electrolyte. The reactants flow into the cell, and the reaction products flow out of it, while the electrolyte remains within it. Fuel cells can operate virtually continuously as long as the necessary flows are maintained.

Several types of fuel cells are developed. Most of these are developed for hydrogen but some can also be used with natural gas.

2.2 Development of fuel cells

The technology of fuel cells is more that hundred years old but only during the last decades we have seen fuels cell systems developed.

The technology is still considered in the demonstration phase although the first cars with the technology is seen and small electrical producing units in the size up to few kW can be procured as plug-and-produce units.

Fuel cell for charging mobile phones, MP3 players etc.

Development of fuel cells has so far focussed on electricity production. No commercial units producing heat and power are developed but of course such a unit can be produced by procurement and assembling of the necessary pieces.

Projects for large plants (up to 65 MW) are in the

2 PILELE DE COMBUSTIE

2.1 Descrierea tehnologiei

O pila de combustie este un dispozitiv de conversie electrochimica. Aceasta produce energie electrica consumand combustibilul (anodul) ca urmare a prezentei unui oxidant (catodul) si a unui electrolit. Reactantii din interiorul pilei genereaza un flux de electroni care parasesc pila, in timp ce electrolitul ramane in ea. Pilele de combustie pot functiona continuu, practic, atat timp cat fluxurile necesare sunt mentinute.

Sunt dezvoltate mai multe tipuri de pile de combustie. Cele mai multe dintre acestea sunt utilizate pe baza de hidrogen, dar unele pot fi de asemenea, cu gaze naturale.

2.2 Dezvoltarea pilelor de combustie

Tehnologia pentru pilele de combustie este veche de pe o suta de ani insa doar in ultimele decenii s-au intalnit sisteme de pile de combustie.

Tehnologia este considerata a fi inca in faza experimentala, de altfel au aparut deja primele autoturisme cu aceasta tehnologie si se pot chiar achizitiona unitati electrice de producere mici, de cativa kW, ca surse de producere dotate si cu priza de conectare(“plug-and-produce”).

Surse de 50 w “plug-and-produce”

Pile de combustie pentru incarcarea telefoanelor mobile, MP3 players etc.

Dezvoltarea de pile de combustie s-a concentrat pana acum pe productia de electricitate. Nu s-au dezvoltat unitati destinate vanzarii, producatoare de energie electrica si termica, dar desigur ca o astfel de unitate poate fi produsa prin cumpararea si asamblarea pieselor necesare.

Investitiile pentru centrale mari (pana la 65 MW) se design phase. However, it has so far been impossible to find commercial investors.

The US environmental strategy pushes for a faster development of fuel cell and large public investment in the technology is announced. Thus, cars with fuel cells and electricity producing units with capacities 5-10 MW will probably be available within the next 5 years.

afla in faza de proiectare. Cu toate acestea, nu a fost pana acum imposibil sa se gaseasca investitori privati.

Strategia de mediu a SUA insista pentru o dezvoltare mai rapida a pilelor de combustie si a anuntat o mare investitie publica in tehnologie. Astfel, masinile cu pile de combustie si unitatile producatoare de energie electrica cu capacitati de 5-10 MW, probabil, vor fi disponibile in urmatorii 5 ani.

2.3 Efficiency

The theoretical obtainable efficiency is 85% but this level is far from reached in this stage of development.

The small plug-and-produce unit available on the market has efficiencies in the level of 50% producing electricity. The reason for the relatively low efficiency is the low-temperature cell types it is necessary to use (maximum 60-70 ^{0}C)

Large-scale plants with high-temperature cell types are on the drawing board. Interesting is a CHP project using the 800-1000 ^{0}C exhaust for steam production to produce heat and electricity in cogeneration. The design data is 65 MW and 25 MJ/sec at an overall efficiency of 80%.

2.3 Eficienta

Teoretic, eficienta ce poate fi obtinuta este de 85%, dar acest nivel este departe de ce cel la care s-a ajuns in acest stadiu de dezvoltare.

Sursa mica “plug-and-produce” disponibila pe piata are o eficienta de cca 50%, energie electrica. Motivul pentru aceasta eficienta este relativ scazuta tine de necesitatea utilizarii tipurilor de celule cu temperaturii joase (maximum 60-70 ^{0}C).

Centralele mari cu celule cu temperatura inalta sunt in faza de conceptie. Interesant este un proiect de centrala de cogenerare care utilizeaza abur cu 800-1000ºC din alta sursa de producere pentru a produce energie electrica si termica in cogenerare. Datele de proiectare sunt 65 MW si 25 MJ / sec la o eficienta globala de 80%.

2.4 Cost of fuel cell technology

It is difficult to find commercial prices for fuel cell systems. A plug-and-produce 25 W system is offered at a price of 2,000 EUR (80 MEUR/MW). Cost of a modern gas turbine would for comparison be below 1 MEUR/MW.

Logically the specific cost will go down when the size is increased. From literature found on the internet about the table projects ongoing all over the world we see costs in the level of 10-20 MEUR/MW, still 10-20 times the cost on conventional technologies.

2.4 Costul pilei de combustie

Este dificil sa se gaseasca preturile comerciale pentru sistemele de pile de combustie. O unitate “plug-and-produce” de 25 W este oferita la un pret de 2.000 EUR (80 milioane EUR/MW). Pentru comparatie costul unei turbine cu gaz ar fi sub 1 million EUR/MW.

Logic, costul specific va scadea proportional cu cresterea dimensiunii. Din literatura disponibila pe internet privind proiecte in curs de desfasurare in lume, vedem costuri de nivelul de a 10-20 MEUR / MW, inca de 10-20 mari mari decat costul tehnologiilor conventionale.

2.5 Environmental aspects

Fuel cell technology is praised for being almost greenhouse gas free. However, this is only true when the fuel is hydrogen in the process H_2O+energy $\Rightarrow$ H_2 + O $\Rightarrow$ H_2O-energy.

When carbon fuels, such as natural gas are used, we will still have emissions of CO_2 and CO related greenhouse gasses. The reason the fuel cell technology is still considered environmental friendly is the high efficiency obtained producing electricity.

2.5 Aspecte legate de mediu

Tehnologia pilelor de combustie este apreciata pentru ca este o tehnologie aproape neutra din punct de vedere al emisiilor de gaze cu efect de sera. Totusi, acest lucru este adevarat numai in cazul in care combustibilul este hidrogen in procesul H_2O+energie $\Rightarrow$ H_2 + O $\Rightarrow$ H_2O – energie.

Daca combustibilul este carbon, cum ar fi gazul natural, vom avea in continuare emisii de CO_2 si gazele cu efect de sera aferente, CO. Motivul pentru

However, compared to high efficient gas turbines or internal combustion engines in cogeneration they are more expensive and the emission level is about the same.

care tehnologia cu pile de combustie este considerata inca “prietenoasa naturii” este inalta eficienta obtinuta din productia de energie electrica. Cu toate acestea, in comparatie cu turbinele cu gaz cu eficienta inalta sau cu motoarele cu combustie interna in cogenerare pilele de combustie sunt mult mai scumpe, iar nivelul de emisii este acelasi.

2.6 Use of the technology in Bucharest

Use of the fuel cell technology for heat production will be pure marginal.

The fuel cell will have to compete with green house gas neutral heat production from solar panels and waste-to-energy. This is not in any way in favour of fuel cells.

2.6 Folosirea tehnologiei in Bucuresti

Utilizarea tehnologiei pe baza de pile de combustie pentru producerea de energie termica va fi pur marginala.

Pilele de combustie vor trebui sa concureze cu sursele de producere neutre din punct de vedere a emisiilor de gaze cu efect de sera si anume panourile solare si facilitatile de recuperare a energiei din deseuri. Aceste aspecte nu sunt deloc in favoarea pilelor de combustie.

3 HEAT PUMPS

3.1 Description of the technology

A heat pump is known to all as the compressor in a refrigerator or an air conditioning system. In this setup, the objective is to provide cooling inside while producing heat on the outside. If we reverse the process, producing heat inside the building and cooling outside the building we have the principle of air-to-air based systems commercial sold.

Other means than air as the secondary coolant is used:

- Soil to hot air or hot water
- Groundwater to hot air or hot water
- Surface water to hot air or hot water
- more

In large commercial or institutional buildings heat pumps can feasible be used in the ventilation system as heat recovering.

3.2 Development of heat pumps

The technology is commercial available and still developed in terms of lower cost of the heat pump units and higher efficiencies.

Heat pumps are found as small as air condition split units (air-to-air pumps) and they are installed the same way. Some of them (more expensive units) can also operate reverse producing cooling in the summer period.

Common seen systems are soil-to-water pumps. These pumps look like a washing machine and the volume is about the same. A typical pump for a 200-220 m^2 house has a heat output of about 10-15 kW and an about 250 m^2 grid of plastic pipes in the garden, excavated to a dept of about 1.2 meter.

3 POMPELE DE CALDURA

3.1 Descrierea tehnologiei

O pompa de caldura este cunoscuta tuturor ca un compresorul intr-un frigider sau ca un sistem de aer conditionat. In acest cadru, obiectivul este de a oferi racire in interior, in timp ce se produce caldura la exterior. Daca vom inversa procesul, cu productia de energie termica in interiorul cladirii si racirea in afara acesteia, avem sisteme bazate pe principiul de aer-aer disponibile in scopuri comerciale.

S-au utilizat si alte mijloacele decat aerul ca agent de racire secundar:

- sol - aer cald sau apa calda
- apele subterane - aer cald sau apa calda
- ape de suprafata - aer cald sau apa calda
- altele

In cladiri comerciale sau institutii mari pompele de caldura pot fi utilizate in mod fezabil in sistemul de ventilatie cu recuperarea caldurii.

3.2 Dezvoltarea pompelor de caldura

Din punct de vedere comercial, tehnologia este disponibila si in continua dezvoltare, cu scopul reducerii costului si cresterii eficientei pompelor de caldura.

Pompele de caldura disponibile pe piata sunt de dimensiunea unui aparat de aer conditionat (pompe aer-aer) si se instaleaza in acelasi mod. Unele dintre ele (unitati mai scumpe) pot de asemenea sa inverseze procesul de productie, producand aer rece vara.

Sistemele cele mai des intalnite sunt pompe sol-apa. Aceste pompe arata ca o masina de spalat si volumul este aproximativ la fel. Un exemplu tipic de pompa

3.3 Efficiency

The obtained efficiency depends of the temperature of the secondary media. The efficiency can be as high as 1:6 (One kWh electricity provides 6 kWh cooling) for groundwater systems or as low as 1:2 for air-to-air systems.

The most seen systems for heating and hot tap water production are soil-to-hot water systems. The system operates at efficiency between 4.5 and 2.4 KWh produced from 1 kWh of electricity. The efficiency is lowest with cold outdoor temperatures and an annual average efficiency of much more than 3-3.5 cannot be expected.

3.4 Cost of using heat pumps

Prices of heat pump systems can be found on the WEB.

We have in the following calculated the cost of heating by heat pumps.

Cost of Heat pumps:

Area	Type	Capacity	Unit price	Installation	Total
m^2		kW	EUR	EUR	EUR
100	Air-to-air	5	1,477	805	2,282
220	Soil-water	11	4,295	5,369	9,664
700	Soil-water	35	7,114	8,054	15,168
700	water-water	35	7,114	5,638	12,752

Fixed costs:

Size	kW	5	11	35	35
Investment	EUR	2,282	9,664	15,168	12,752
Interest	%	14	13	11	12
Period	years	15	20	20	20
Cost of system	EUR/y	372	1,376	1,905	1,707
Maintenance	EUR/y	19	55	76	68
Fixed costs	EUR/y	390	1,431	1,981	1,776

Variable costs:

Size	kW	5	11	35	35
Utilisation	h/y	2,000	2,000	2,000	2,000
Heat production	KWh/y	10,000	22,000	70,000	70,000
Ratio	Heat/cool	3.0	3.5	3.5	4.0
Electricity	KWh/y	3,333	6,286	20,000	17,500
Electricity price	EUR/MWh	150	150	150	150
Variable cost	EUR/y	500	943	3,000	2,625

Cost of heating:

Size	kW	5	11	35	35
Consumption	EUR/y	890	2,374	4,981	4,401
Production	GJ/y	12	23	72	63
Cost	EUR/GJ	74	105	69	70

With a price in the level of 70 EUR/GJ heat pumps cannot compete with district heating at commercial

pentru o casa de 200-220 m^2, produce aproximativ 10-15 kW energie termica si necesita o retea de conducte din plastic de aproximativ 250 m^2 in gradina, ingropate la o adancime de cca 1,2 m.

3.3 Eficienta

Eficienta obtinuta depinde de temperatura din mediul secundar. Eficienta poate fi pana la 1:6 (un kWh energie electrica asigura 6 kWh racire) pentru sistemele cu ape subterane sau la un nivel de 1:2 pentru sistemele aer-aer.

Cele mai des intalnite sisteme pentru incalzire si preparare a apei calde de consum sunt sistemele sol-apa calda. Sistemul functioneaza cu o eficienta intre 4.5 si 2.4 KWh consumand 1 kWh de energie electrica. Eficienta cea mai mica este cand temperatura exterioara este joasa si nu se estimeaza o eficienta medie anuala mai mare de 3 - 3.5.

3.4 Costul utilizarii pompelor de caldura

Preturile sistemelor de pompe de caldura pot fi gasite pe WEB.

In cele de urmeaza am calculat costul energiei termice de la pompele de caldura.

Costul pompelor de caldura:

Zona	Tip	Capacitate	Pret unitar	Instalare	Total
m^2		kW	EUR	EUR	EUR
100	Aer-aer	5	1,477	805	2,282
220	Sol-apa	11	4,295	5,369	9,664
700	Sol-apa	35	7,114	8,054	15,168
700	Apa-apa	35	7,114	5,638	12,752

Costuri fixe:

Dimensiune	kW	5	11	35	35
Investitie	EUR	2,282	9,664	15,168	12,752
Dobanda	%	14	13	11	11
Perioada	ani	15	20	20	20
Cost sistem	EUR/an	372	1,376	1,905	1,601
Intretinere	EUR/an	19	55	76	64
Costuri fixe	EUR/an	390	1,431	1,981	1,665

Costuri variabile:

Dimensiune	kW	5	11	35	35
Utilizare	h/an	2,000	2,000	2,000	2,000
Energie termica	KWh/an	10,000	22,000	70,000	70,000
Raport	Cald/rece	3.0	3.5	3.5	4.0
Electricitate	KWh/an	3,333	6,286	20,000	17,500
Pret en. Electrica	EUR/MWh	150	150	150	150
Cost variabil	EUR/an	500	943	3,000	2,625

Costul caldurii:

Dimensiune	kW	5	11	35	35
Consum	EUR/y	890	2,374	4,981	4,290
Productie	GJ/y	12	23	72	63
Cost	EUR/GJ	74	105	69	68

Cu un pret la nivelul de 70 EUR/GJ pentru energia termica produsa de pompele de caldura, acestea nu conditions.

If/when a promotion scheme is implemented the feasibility might be improved but from a socio-economic point of view individual heat pump systems should not be promoted when district heating is available, which it will be all over Bucharest when the Energy Strategy is fully implemented.

pot concura cu energia termica din sistemele de incalzire centralizata in conditii comerciale.

Daca / atunci cand se va implementa o schema de suport financiar, fezabilitatea ar putea fi imbunatatita, insa din punct de vedere socio-economic sistemele de pompe de caldura individuale nu ar trebui promovate daca sistemul de termoficare este disponibil. Acest lucru va fi posibil in tot orasul Bucuresti cand strategia va fi implementata.

3.5 Environmental aspects

The consumption is electricity, marginally generated on coal fired power plants. Thus, heat pumps will lead to a much higher emission of CO_2 gasses than the alternative district heating, which in Bucharest will be CO_2 neutral.

Areas where pipes for the heat pumps are located in the soil will have a lower agriculture value than natural soil. For areas where the heat is removed from the soil we'll see the snow stay longer, the grass grow lower and the trees grow shorter.

Pipes located in lakes or rivers will have no significant impact, assuming floating water.

3.5 Aspecte legate de mediu

Consumul este energia electrica generata marginal de centralele de producere pe baza de carbuni. Astfel, pompele de caldura vor conduce la emisii de CO_2 mai mari decat alternativa data de sistemul de termoficare, si care in Bucuresti va deveni neutru.

Zonele in care conductele pentru pompele de caldura sunt ingropate in pamant vor avea o valoare mai mica pentru agricultura decat solurile naturale. In zonele unde caldura a fost indepartata din pamant, vom vedea ca zapada sta mai mult, iarba creste mai incet si copacii nu cresc asa de inalti.

Conductele care se afla in lacuri sau rauri nu vor avea avea un impact semnificativ, presupunand ca este apa statatoare.

3.6 Use of the technology in Bucharest

Use of heat pump technology for heat production will be pure marginal.

However, heat pumps in relation to thermal energy might be a possibility in the northern location of Bucharest where some geothermal possibilities are discovered but not yet utilised commercial.

3.6 Utilizarea tehnologiei in Bucuresti

Utilizarea tehnologiei pompelor de caldura pentru producerea de energie termica va fi pur marginal. Cu toate acestea, utilizarea pompelor de caldura pentru producerea de energie termica ar fi posibila in partea de nord a municipiului Bucuresti, unde s-au descoperit ape termale, dar care nu sunt inca folosite in scopuri comerciale.

4 SMALL BIOMASS BOILERS

4.1 Description of the technology

Burning wood is the world's oldest heating technology but it has been developed constantly since the first humans "invented" the fire. The technology used today is mostly based on prepared biomass.

The picture shows a 35 KW pellet/wood chip unit with automatic stoker. The stoker requires daily filling with wood pellets and the boiler requires ash cleaning once per week.

The shown unit is suitable for a 2-3 family house.

The unit uses wood pellets or wood chips. Wood pellets are made from saw dust while wood chips are cut from wood residuals in the forest industry. Wood pellets must be considered the most comprehensive for use in a city as it is transported in tight bags and has a low humidity and ash content.

There are some practical problems related to use of biomass boilers:

- Who will fill the storage every day?
- Who will clean the boiler?
- What to do with the ash?
- The boiler must be started and stopped outside the heating season. Thus, heat storage (or hot tap water storage) is required if a reasonable comfort level shall be obtained.

4.2 Development of tehnology

The technology is considered fully developed and minor improvements are still introduced (mostly related to the boiler and combustion control).

4.3 Cost of using biomass boilers

4 CAZANE MICI PE BIOMASA

4.1 Descrierea tehnologiei

Arderea lemnului este cea mai veche tehnologie de incalzire, care s-a dezvoltat constant inca de la descoperirea focului de catre om. Tehnologia folosita astazi are la baza biomasa procesata.

In imagine este prezentat un taiator de peleti/lemn de 35 KW cu sistem automat de alimentare.

Sistemul de alimentare necesita alimenatrea zilnica cu peleti de lemn si cazanul trebuie curatat de cenusa o data pe saptamana. Unitatea prezentata este potrivita pentru 2-3 case.

Unitatea foloseste peleti si cipsuri de lemn. Peletii sunt fabricati din rumegus, in timp ce cipsurile din lemn provin din reziduri lemnoase ca urmare a procesarii industriale. Peletii de lemn sunt cei mai potriviti pentru utilizarea in oras intrucat sunt transportati in saci inchisi si au un continut de cenusa mic si umiditate scazuta.

Utilizarea cazanelor pe biomasa implica unele probleme practice:

- Cine va alimenta depozitul zilnic?
- Cine va curata cazanul?
- Ce se intampla cu cenusa?
- Cazanul trebuie pornit si oprit in regimul de vara. Astfel, este necesar un acumulator de caldura (apa calda) daca se doreste obtinerea unui confort rezonabil.

4.2 Dezvoltarea tehnologiei

Tehnologia este considerata pe deplin dezvoltata si se introduc doar imbunatatiri minore (in principal legate de controlul cazanului si combustiei).

4.3 Costul utilizarii cazanelor pe biomasa

The cost of biomass boilers can be found on the WEB.

We have calculated the costs of using biomass boilers:

Fixed costs:

Size	kWt	17	35	70	110
Investment	EUR	9,122	17,841	33,898	50,604
Interest	%	14	13	11	11
Period	years	15	20	20	20
Cost of system	EUR/y	1,485	2,540	4,257	6,355
Maintenance	EUR/y	74	102	170	254
Fixed costs	EUR/y	1,559	2,641	4,427	6,609

Variable costs:

Size	kWt	17	35	70	110
Utilisation	h/y	2,000	2,000	2,000	2,000
Heat production	GJ	94	194	389	611
Efficiency	%	85	89	91	93
Heat consump.	GJ	111	218	427	657
Heating value	GJ/t	15.0	15.0	15.0	15.0
Pellets	t	6	13	26	41
Price pellets	EUR/t	450	430	420	410
O&M	EUR/y	1,474	1,735	2,217	2,718
Variable cost	EUR/y	4,307	7,309	13,106	19,422

Cost of heating:

Size	kWt	17	35	70	110
Fixed costs	EUR/y	1,559	2,641	4,427	6,609
Variable costs	EUR/y	4,307	7,309	13,106	19,422
Costs*	EUR/GJ	62.11	51.17	45.08	42.60

* Handling costs (internal pellet transport) not included

4.4 Environmental aspects

The biomass units are not equipped with any flue gas cleaning and this is a problem if many houses within the same area use biomass. The problem is already seen today on the country side of Romania and in Austria, where the use of biomass is extensive, regulation for small one-family houses is under implementation.

The main environmental problems are related to the exhaust (dust and CO) and the ash residuals.

Environmental requirements for use of biomass within the city limit must also be introduced in Romania.

Costul cazanelor pe biomasa este disponibil pe Web.

Am calculat costurile utilizarii cazanelor pe biomasa:

Costuri fixe:

Dimensiune	kWt	17	35	70	110
Investitie	EUR	9,122	17,841	33,898	50,604
Dobanda	%	14	13	11	11
Perioada	ani	15	20	20	20
Cost sistem	EUR/an	1,485	2,540	4,257	6,355
Intretinere	EUR/an	74	102	170	254
Costuri fixe	EUR/an	1,559	2,641	4,427	6,609

Costuri variabile:

Dimensiune	kWt	17	35	70	110
Utilizare	h/y	2,000	2,000	2,000	2,000
Productie cald	GJ	94	194	389	611
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Peleti	t	6	13	26	41
Pret peleti	EUR/t	450	430	420	410
Expl & Intretinere	EUR/y	1,474	1,735	2,217	2,718
Cost variabil	EUR/y	4,307	7,309	13,106	19,422

Costul caldurii:

Dimensiune	kWt	17	35	70	110
Costuri fixe	EUR/y	1,559	2,641	4,427	6,609
Costuri variabile	EUR/y	4,307	7,309	13,106	19,422
Costuri*	EUR/GJ	62.11	51.17	45.08	42.60

* Costuri de manevrare (transport intern al peletilor) nu sutn incluse

4.4 Aspecte legate de mediu

Unitatile pe biomasa nu sunt echipate cu filtre pentru curatarea gazelor de ardere si aceasta constituie o problema daca mai multe case din aceeasi zona utilizeaza biomasa. In prezent, aceasta problema este intalnita in zona rurala a Romaniei si in Austria, unde biomasa se utilizeaza masiv. In acest sens se implementeaza reglementari privind casele pentru o familie.

Principalele probleme de mediu sunt legate de evacuare (praf si CO) si cenusa.

Cerintele de mediu privind utilizare biomasei in oras trebuie, de asemenea, introduse in Romania.

5 GEOTHERMAL ENERGY

Geothermal sources should be available in the northern part of Bucharest. These sources have previously been tried utilised but stopped due to pollution from the underground water.

Geothermal energy is utilised for district heating in Oradea and thus expertise is available in Romania.

Utilisation of geothermal energy where available must be considered very feasible as the cost of energy is 0 (zero) and the price of heating thus only related to investment, operation and maintenance.

The cost of utilising geothermal energy varies a lot from project to project. In Island we see costs of geothermal energy from plants constructed 15-20 years ago in the level of 20-25 EUR/MWh$_e$ and 5-10 EUR/MWh$_t$. In the Philippines the costs from new project is in the level of 60-90 EUR/MW$_e$ (50-75 EUR/MW$_e$ after sale of Emission Reduction Units to the World Bank carbon fund).

Compared to generation based on fossil fuels, the cost of electricity is between about 25% and 60% cheaper from geothermal sources. For heating the cost is less than 75%.

5 ENERGIA GEOTERMALA

Sursele geotermale ar trebui sa fie disponibile in partea de nord a Bucurestiului. Anterior s-a incercat utilizarea acestor surse, dar s-a stopat datorita poluarii generate de apele subterane.

Energia geotermala este utilizata pentru termoficare in Oradea si astfel, se considera ca experienta exista in Romania.

Utilizarea energiei geotermale, acolo unde este disponibila, trebuie sa fie considerata foarte fezabila, costuriile energiei fiind 0 (zero) si pretul caldurii este influentat doar de costurile de investitie, exploatare si intretinere.

Costul de utilizare a energiei geotermale variaza foarte mult de la proiect la proiect. In Islanda vom vedea costuri ale energiei geotermale de la centrale construite in urma cu 15-20 de ani la un nivel de 20-25 EUR/ MWh$_e$ si 5-10 EUR / MWh$_t$. In Filipine, costurile obtinute in urma implementarii proiectelor noi sunt la nivelul de 60-90 EUR / MW$_e$ (50-75 EUR / MW$_e$ dupa vanzarea de unitati de reducere a emisiilor la fondul de carbon al Bancii Mondiale).

In comparatie cu productia pe baza de combustibili fosili, costul energiei electrice din surse geotermale este cu aproximativ 25% si 60% mai ieftin. Costul pentru incalzire este mai mic cu 75%.

6 OTHER ALTERNATIVE SOURCES

6.1 Small-scale nuclear power

Small-scale nuclear power is mentioned as a possibility for energy supply in Bucharest.

Micro-scale nuclear power units from a size of about 150 kW are sold commercial but the safety requirements, among others the possible spread of nuclear material, is still unsolved.

The production costs are reported in the level of 5-7 US¢. This is about 3-4 times the production costs at Cernavodă Nuclear Power Plant.

Technically it will be possible to operate the nuclear units in CHP-mode but such units are not seen in operation yet.

6.2 Wind Power

Wind power for heat production is only found in some demonstration projects. Both in Spain and Denmark accumulation electrical heating from wind turbines are demonstrated feasible in competition with oil boilers on small islands.

The benefit of the accumulating heating is that the annual full load equivalent operation hours can be increased with 200-300 hours.

The Bucharest area is not a wind power zone. If wind power shall be generated for use in Bucharest it must be on hillside slopes or near the Black Sea several hundred kilometres from Bucharest. In addition, accumulated heating is expensive in establishment.

About 800-1,200 MW installed capacity for power generation is in preparation in Romania (Autumn 2008) and additional capacity is expected in the coming years. However, nobody has considered wind power for heating in district heating areas.

6 ALTE SURSE ALTERNATIVE

6.1 Unitati nucleare de mica putere

Unitatile nucleare de mica putere au fost mentionate ca si o posbilila sursa de furnizare a energiei in Municipiul Bucuresti.

Unitatile nucleare de foarta mica putere, avand o putere de 150 kW sunt disponibile pentru a fi comercializate, insa printre altele, cerintele pentru siguranta manipularii materialelor radioactive nu pot fi inca rezolvate.

Costurile de producere sunt raportate la un nivel de 5 -7 US¢. Aceast lucru reprezinta aproximativ de 3-4 ori costurile de producere inregistrate la centrala nucleara de la Cernavoda.

Din punct de vedere tehnic este posibila exploatarea unitatilor nucleare in sistem de cogenerare, dar insa in prezent, asemenea unitati nu sunt inca puse in functiune.

6.2 Energia eoliana

Energia eoliana utilizata pentru producerea energiei termice se regaseste in anumite proiecte demonstrative. Atat in Spania cat si in Danemarca, pe insule mici, acumularea incalzirii electrice provenita de la turbinele eoliene si-a demonstrat fezabilitatea in raport cu cazanele pe baza de combustibili fosili lichizi.

Beneficiul acumularii incalzirii este acela ca echivalentul incarcarii anuale in ore de exploatare poate fi crescut cu aproximativ 200-300.

Zona Municipiului Bucuresti nu este considerata o arie cu potential de energie eoliana. Producerea energiei prin captarea energiei eoliene pentru a fi utilizata in Bucuresti va fi posibila pe dealuri sau in apropierea Marii Negre, la cateva sute de Km de Bucuresti. In plus, instalarea acumularii caldurii este in general scumpa.

In Romania, se preconizeaza instalarea unei capacitati de circa 800 - 1,200 MW pentru producerea de electricitate(toamna anului 2008) si se asteapta instalarea unor capacitati suplimentare in anii care urmeza. Totusi, nimeni nu a luat in considerare energia eoliana pentru incalzire in zonele in care acest lucru se poate face prin sistemele de termoficare.

6.3 Solar Power

While solar heating is very feasible as discussed elsewhere in the Energy Strategy report the technology for generation of solar power is still not commercial and only constructed with heavy support from national governments and international environmental funds.

Solar power is considered to be commercial within the next decade but using solar power for heating purposes in district heating areas seems out of scope (why consider generating power for heating when solar heating is already feasible today?).

6.3 Energia Solara

In timp ce energia solara pentru incalzire este foarte fezabila, asa cum a fost mentionat in acest raport, tehnologia pentru producerea energiei electrice prin panouri solare nu este inca disponibila comercial, ci doar construite in conditiile in care exista scheme puternice de suport financiar oferite la nivel guvernamental sau scheme de suport financiar provenite din fondurile de mediu.

Energia solara pentru producerea electricitatii se preconizeaza ca va putea deveni comerciala in urmatoarele decade, iar utilizarea electricitatii din energia solara pentru incalzire, in zonele in care este disponibil sistemul de termoficare pare lipsita de sens (de ce trebuie utilizata electricitatea produsa din energia solara pentru incalzire, in conditiile in care energia solara pentru incalzire este fezabila astazi?).

6.4 Hydro power

Hydro power is developed in Romania and cover about 25% of the electricity generation. However, a large potential for small, mini and micro hydro power is currently not developed to full capacity.

As more than 40% of the power is generated from fossil fuel this production determines the marginal costs in the grid. Thus, electrical heating is not widely used being too expensive.

6.4 Energia hidro

Energia hidro este dezvoltata in Romania si acopera aproximativ 25% din producerea de electricitate. Totusi, exista un potential hidro imens inca neexploatat atat la scara mica (mini-hidrocentrale) cat si la scara foarte mica(micro-hidrocentrale).

Considerand faptul ca mai mult de 40% din electricitate este produsa utilizand combustibili fosili, aceasta productie determina costurile marginale in reteaua nationala. In orice caz, incalzirea pe baza de electricitate nu este utilizata la scara larga, fiind inca suficient de scumpa.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Strategy Report

Partea C: Anexe

Appendix 2a: Overall Strategies

Anexa 2a: Strategii Generale

4				
3				
2	01.09.2009	Corrections	GMCB	haa
1	30.06.2009	First edition	GMCB	haa
0	20.03.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

ATH energ

Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

This report describes the overall goals the Energy Strategy must cope with. The goals has been discussed with the Energy Committee and approved.

The energy strategy is carried by three pillars:

1. Climate
2. Sustainability
3. Quality

The pillars are founded on the Romanian legislations, the National Energy Strategy, EU-legislation and policies and international conventions.

1 INTRODUCERE

Acest raport descrie obiectivele generale ale Strategiei Energetice si modalitatea in care acestea pot fi atinse. Obiectivele au fost discutate in cadrul Comitetului Energetic Municipal si acceptate de catre acesta.

Strategia Energetica se bazeaza pe trei piloni:

1. Clima
2. Sustenabilitatea
3. Calitatea

Pilonii se bazeaza pe prevederile Legislatiei din Romania, Strategia Energetica Nationala, Legislatia Europeana si politicile si conventiile internationale.

CLIMATE

The Municipality of Bucharest recognise its responsibility in relation to reducing the global warming and include in the Energy Strategy goals for reducing greenhouse gasses.

SUSTAINABILITY

The Energy Strategy must include the overall goal of obtaining sustainability in financial, economical, organisational and institutional terms.

CLIMA

Primaria Municipiului Bucuresti isi recunoaste responsabilitatile pe care le are referitor la reducerea incalzirii globale si include printre obiectivele Strategiei Energetice reducerea emisiilor de gaze cu efect de sera.

SUSTENABILITATEA

Strategia Energetica trebuie sa cuprinda ca obiectiv general obtinerea sustenabilitatii financiare, economice si din punct de vedere organizational si institutional.

QUALITY

The Energy Strategy must include goals for improved quality of energy services and establishment of a high degree of consumer satisfaction.

CALITATE

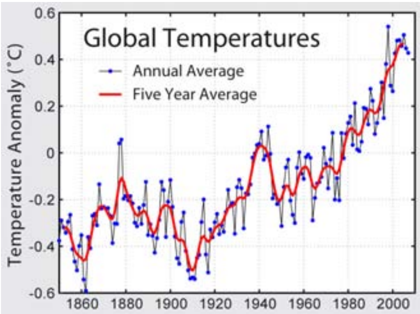
Strategia energetica trebuie sa includa obiective pentru imbunatatirea calitatii serviciilor energetice si obtinerea unui grad inalt de satisfacere a consumatorului.

2 GOALS REGARDING CLIMATE CHANGE

The goals of the Energy Strategy regarding climate are:

- CO_2 neutrality for preparation of heat and hot tap water from 2020
- CO_2 emission related to transport reduced by 50% in 2020

There are set no goals for consumption of electricity and other means of energy as these are outside the responsibility of the Municipality.



2.1 CO_2 neutral heat and hot water

The goal of CO_2 neutral energy consumption for preparation of heating and hot tap water bring the Energy Strategy of Bucharest in-line with strategies for many other district heating systems around Europe.

The Energy Strategy shall include the following measures:

- Energy conservation. A 45% reduction of current demand by 2020.
- Development of the solar energy resource. 40% of 2020 demand covered by solar panels.
- Recovering of heat from other waste incineration. 50% of 2020 demand produced from new waste-to-energy plants.
- Promotion of the other renewable sources and heat pumps. 10% of 2020 demand produced from biogas, biomass, geothermal and other renewable sources.

2 OBIECTIVE PRIVIND MODIFICARILE CLIMATICE

Obiectivele Strategiei Energetice din punct de vedere al climei sunt:

- Producerea energiei termice pentru incalzire si apa calda de consum sa devina in anul 2020 neutra din punct de vedere a emisiilor de CO_2.
- Emisiile de CO_2 din sistemul de transport sa se reduca cu 50% pana in anul 2020.

Dry soil in Romania

Nu sunt specificate obiective pentru consumul de electricitate si pentru alte forme de energie considerand ca acestea nu sunt in sfera de responsabilitate a Primariei Municipiului Bucuresti.

2.1 Incalzirea si apa calda de consum sa devina neutre d.p.d.v. al emisiilor de CO_2

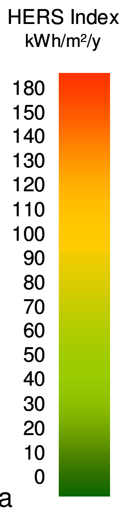
Obtinerea neutralitatii din punct de vedere al emisiilor de CO_2 pentru incalzire si apa calda de consum reprezinta un obiectiv care aduce Strategia Energetica a Municipiului Bucuresti in linie cu strategiile multor alte sisteme de termoficare din Europa.

Strategia Energetica trebuie sa includa urmatoarele masuri:

- Conservarea energiei. O reducere cu 45% a cererii curente de energie termica pana in anul 2020.
- Dezvoltarea surselor de energie solara care ar trebui sa acopere 40% din consumul aferent anului 2020.
- Recuperarea caldurii prin incinerarea altor deseuri. 50% din necesarul de caldura aferent anului 2020 se va produce in statii de incinerare a deseurilor.
- Promovarea altor surse de energie regenerabila si pompe de caldura. 10% din necesarul de caldura aferent anului 2020 se va acoperi avand ca surse biogazul, biomasa, ape geotermale si alte surse de energie regenerabila.

Energy Conservation

The proposed energy conservation is in-line with targets found in the national strategy and it will thus be possible to obtain financial support in compliance with coming national support schemes.



An energy conservation of at least 45% is necessary if buildings in Bucharest shall comply with EU-policies, international best practice and the national strategy.

The current average energy consumption is about 180 kWh/m^2/y (0.65 GJ). International best practice as adopted in EU-policies and norms in many countries is 80-100 kWh/m^2/y for existing buildings and 50 kWh/m^2/y for new buildings.

From demonstration projects in Romania and many full-scale project abroad we know that about 20% energy conservation from internal measures and about 25% energy conservation from external building measures is obtainable and feasible for existing buildings.

Internal building measures for existing buildings will include:

- Meters on each block/consumer
- Thermostatic valves on radiators and heat cost allocaters
- Repair of installation (stop water losses)
- Insulating of pipes
- Insulation of floors, roofs and basements
- Heat recovery from ventilation, where applicable

External building measures for existing buildings will include:

- Repair of concrete structures
- Repair/replacement of windows and doors
- Construction of an outside insulation envelope

Solar panel should be integreated in the insularion envelope.

Most new buildings are constructed without energy consumption in mind with limited insulation, if any, and large window areas. Bringing the energy consumption down to 50 kWh/m^2/year seen almost impossible. An energy audit scheme for building is currently under implementation in Romania. Most new buildings will obtain "red mark" from the audit meaning that these buildings will be impossible to sale and refinance at reasonable conditions.

Conservarea Energiei

Propunerea pentru masurile de conservare a energiei este in linie cu tintele stabilite prin strategia nationala si de aceea va fi posibil sa se obtina suport financiar in conformitate cu viitoarele scheme de sprijin financiar stabilite la nivel national.

Daca si in Bucuresti pentru cladiri va deveni obligatoriu sa fie conforme cu politicile UE, cele mai bune practici internationale si strategia nationala, atunci la nivelul acestora este necesar sa se obtina cel putin 45% conservarea energiei.

Necesarul mediu de caldura in prezent in Bucuresti este de aproximativ 180 kWh/m^2/an (0.65 GJ). Cele mai bune practici internationale adoptate prin politicile si normele UE situeaza consumul mediu in cele mai multe tari in intervalul 80 - 100 kWh/m^2/an pentru cladirile existente si 50 kWh/m^2/an pentru cladirile noi.

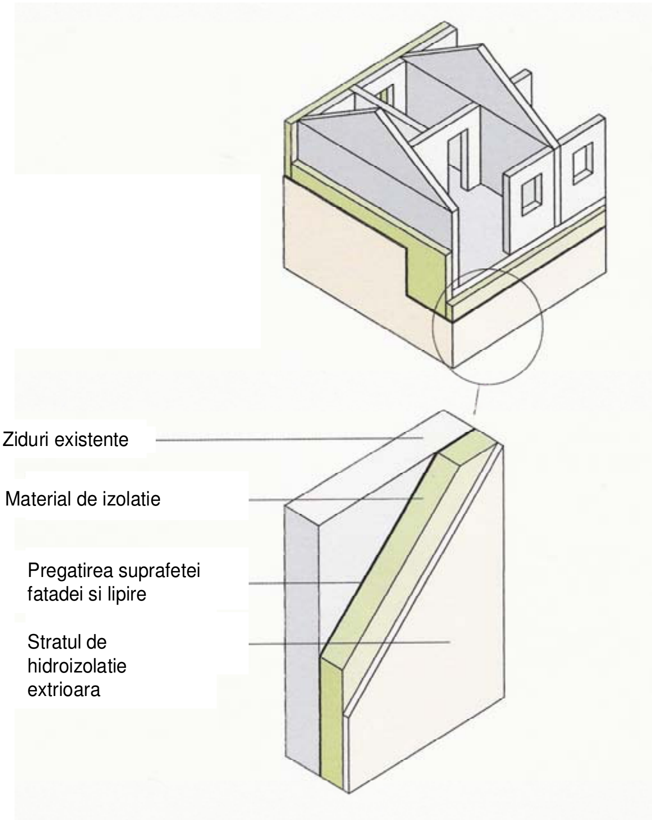
Din proiectele demonstrative din Romania si proiecte la scara larga din afara tarii, stim ca la nivelul cladirilor vechi se pot obtine si sunt fezabile aproximativ 20% conservarea energiei prin masuri in interiorul cladirilor si 25% prin masuri externe.

Masuri in interiorul cladirilor existente vor include:

- Contorizarea la nivel de scara/consumator
- Vane termostatate si repartitoare de cost montate pe radiatoare
- Repararea instalatiilor interioare (eradicare pierderilor de agent termic)
- Izolarea conductelor
- Izolarea pardoselilor, acoperisului si subsolurilor.
- Recuperarea caldurii din ventilate acolo unde este aplicabil

Masuri in exteriorul cladirilor vor include:

- Repararea structurilor din beton
- Repararea / inlocuirea tocariei: usi, ferestre
- Realizarea anvelopei exterioare a cladirilor




Solar panels integrated in new insulation envelope

Panourile solare trebuie integrate in izolatia exterioara.

Please find attached the appendix related to above mentioned technical solution, the performance and tendency in the future

Cele mai multe cladiri noi au fost construite fara a se avea in vedere consumul de energie, avand o izolatie foarte redusa si uneori si suprafete largi vitrate. Scaderea consumului de energie in aceste cladiri la nivelul de 50 kWh/m^2/an pare aproape imposibila. O schema pentru realizarea auditului energetic a cladirilor este in prezent in curs de implementare in Romania. Cele mai multe cladiri vor obtine o ”eticheta rosie” ca urmare a realizarii auditului, ceea ce inseamna ca aceste cladiri nu pot fi vandute sau refinantate/reabilitate in conditii rezonabile.

A se vedea anexa, cu astfel de solutii tehnologice utilizate in prezent, performantele acestora si tendintele de viitor.

Utilisation of solar energy resources

Solar energy is promoted in the national strategy and will thus be subject for national financial support schemes.

Utilizarea resurselor de energie solara

Energia solara este promovata prin strategia nationala si in consecinta va face subiectul unor scheme nationale de finantare.

Utilizarea energiei solare, in Romania nu este o practica obisnuita, insa va juca un rol insemnat in viitor, in modelul de furnizare a energiei termice.

Solar energy is almost not found in Romania but for sure solar energy will play an important role in the future heat supply pattern.

Solar panels integrated in new insulation envelope

In the Scandinavian countries (56^0 north) it is today evaluated feasible to install about 6 m^2 solar panels and 0.6 m^3 heat storage per apartment or house. This cover with less that 1.800 sunshine hours and a mean temperature of 8.4 ^{0}C about 20-25% of the annual energy consumption of hot tap water and space heating. Thus, Bucharest locate 45^0 north, which more that 2,500 sunshine hours and a mean temperature of 12.5 ^{0}C should easily be able to cover at least 40% with appropriately designed heat storages.

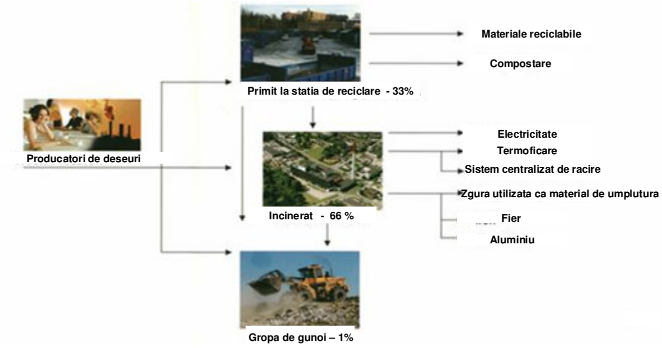
Please find attached the appendix related to above mentioned technical solution, the performance and tendency in the future

In tarile din Scandinavia(56^0 latitudine nordica) este astazi evaluat ca fiind fezabil instalarea a circa 6 m^2 de panouri solare si 0.6 m^3 acumularea caldurii pentru fircare apartament sau casa(o familie). Aceast lucru acopera circa 20-25% din consumul anual de apa calda si caldura in conditiile existente de expunere solara de 1800 de ore si 8,4 ^{0}C temperatura medie. In Bucuresti, in conditiile in care amplasarea este la 45^0 latitudine nordica, cu mai mult de 2500 de ore de insorire anual si o temperatura medie de 12,5 ^{0}C, se poate acoperi usor cel putin 40% din consumul de energie termica, luand in considerare o solutie de proiectare adecvata pentru sistemul de acumulare a caldurii.

A se vedea anexa atasata cu astfel de solutii tehnologice utilizate in prezent, performantele acestora si tendintele de viitor.

Waste-to-Energy

Construction of waste incineration plants in Romania is necessary for obtaining compliance with the EU Waste Directive. About 10 waste incineration plants are included in the national strategy.



Thus, construction of waste-to-energy facilities shall be seen as a combined solution for handling of waste and production of “cheap” district heating.

Construction of waste-to-energy facilities is a must according to the EU-directive on Waste. The directive priorities as follows:

1. Prevention. Waste shall be limited as much as practical and technical possible.
2. Recycling. When practical and technical possible waste shall be recycled.
3. Incineration with heat recovery.
4. Incineration without heat recovery.

It is necessary, taking into account all above mentioned, to make a correlation between politics and legislation regarding public services, as centralised heating, waste handling and EU Directives.

Bucharest produces today about 600,000 t/y waste and the quantity is increasing and will assumingly be in the level of 1,500,000 in 2020 (90% of the quantities seen today in France and Germany). Recycling has priority in the waste handling scheme (second to prevention) but still large quantities will be available for waste incineration.

From one tonnes of sorted waste it will be possible to recover about 2 MWh (7.2 GJ) heat and about 0.65 MWh electricity. Thus, 1.5 Mt will be able to produce about 10,800 TJ and about 975 GWh – in the Energy Strategy we have, considering recycling, assumed a heat production of 7.500 GJ in 2020 corresponding to construction of 2 – 3 waste-to-energy facilities.

Recuperarea energiei din deseuri

Construirea statiilor de incinerare in Romania este necesara pentru a se obtine conformarea cu prevederile Directivelor UE privind deseurile. In strategia nationala este inclusa construirea a circa 10 statii de incinerare.

In aceasta situatie construirea facilitatilor pentru recuperarea caldurii din deseuri trebui sa fie vazuta ca o solutie combinata pentru manipularea deseurilor si producerea energiei termice ieftine pentru sistemul de incalzire centralizata.

Construirea facilitatilor pentru recuperarea caldurii din deseuri este obligatorie in conformitate cu prevederile Directivelor Europene. Prioritatile mentionate in Directiva sunt dupa cum urmeaza:

1. Actiunile preventive. Producerea deseurilor trebuie limitata cat de mult este posibil din punct de vedere practic si tehnic.
2. Reciclarea. Cand este practic si tehnic posibil, deseurile trebuie reciclate-
3. Incinerarea cu recuperarea caldurii
4. Incinerarea fara recuperarea caldurii.

In acest sens va fi necesara o mai stransa corelare a politicilor si legislatiei serviciilor comunale de utilitate publica, cum sunt cele de incalzire centralizata si de salubritate, intre ele si cu Directivele Europene in domeniu.

Bucurestiul produce in prezent circa 600,000 t/an de deseuri, iar aceasta cantitate este in crestere si se prognozeaza ca in anul 2020(90% din cantitatea pe care o regasim astazi in Germania si Franta) sa se ajunga la aproximativ 1,500,000 t. Reciclarea are prioritate in schema de gestionare a deseurilor pe locul secund dupa prevenire. In continuare exista o mare cantitate de deseuri disponibila pentru incinerare.

Dintr-o tona de deseuri sortate este posibil sa se obtina aproximativ 2 MWh (7.2 GJ) caldura si circa 0.65 MWh electricitate. In aceste conditii, cele 1,500,000 t prognozate vor putea produce aproxinativ 10,800 TJ energie termica si circa 975 GWh (energie electrica). Din acest motiv, in Strategia Energetica, luand in considerare si reciclarea am prognozat in 2020 o productie de energie termica de 7,500 GJ, ceea ce corespunde cu construirea a 2 sau 3 facilitati

Please find attached the appendix related to above mentioned technical solution, the performance and tendency in the future

de incinerare a deseurilor.

A se vedea anexa atasata cu astfel de solutii tehnologice utilizate in prezent, performantele acestora si tendintele de viitor.

Other renewable sources

Some areas of Bucharest might be supplied by other renewable sources than solar and waste-to-energy.

Geothermal heating is limited available but might be developed.

Biomass (wood pellets or firewood) might be a fuel for some specific purposes.

Existing landfill might produce sufficient gas to establish recovering and utilisation.

It is assumed that 10% of the energy demand will be supplied by these resources of renewable energy.

Alte surse de energie regenerabila

In anumite zone din Bucuresti se poate furniza energie utilizand si alte surse de energie regenerabila, altele decat energia solara si energia produsa din incinerarea deseurilor.

Disponibilitatea pentru incalzirea utilizand apele geotermale este limitata, insa poate fi dezvoltata.

Biomasa(peleti din lemn sau lemnul de foc) poate fi considerata ca si combustibil pentru anumite scopuri specifice.

Gropile de gunoi existente ar putea produce o cantitate suficienta de gaz pentru a se instala facilitati de recuperarea si utilizare.

Se considera ca 10% din necesarul viitor de energie poate fi acoperit din aceste resurse de energie regenerabila.

2.2 50% reduction of transport emissions

Obtaining the goal of 50% reduction of CO_2 emission before 2020 will depend on:

1. An increase in efficiency of motors and battery technologies.
2. Actions taken by the municipality to reduce the private transport in Bucharest.

2.2 Reducerea cu 50% a emisiilor rezultate din transport

Atingerea acestui obiectiv si anume reducerea cu 50% a emisiilor rezultate din transport depinde de:

1. Cresterea eficientei motoarelor si tehnologiilor utilizand baterii
2. Actiuni pe care trebuie sa le ia Municipalitatea in Bucuresti pentru a reduce utilizarea transportului privat in Bucuresti.

Increased efficiency

The authorities of EU, USA and Japan jointly and individual pushes the development of more efficient engines by constantly lowering the allowed emission level for cars (EURO1 ⇒ EURO2 ⇒ EURO3 ⇒ EURO4 ⇒ EURO5 ⇒ EURO6 and so on). At the same time national governments introduce environmental taxes and similar promoting cars with low emissions. The present cars seen in Bucharest have a consumption between 20 l/100 km for the 4-wheel driven large MPW's and 8 l/100 km for the small modern family cars. This is far from the factory declarations of about 15 and 5 l/100 km and is related to the traffic situation in Bucharest.

Hybrid cars are just a little more efficient but most of the benefit of the hybrid system disappears when the car is sitting in a traffic jam only moving few meters per minute with light and air conditions or heating fans on.

Electrical driven cars are very few but as the battery technology improves and prices will drop more and more such cars must be expected in the years to come.

As long as the traffic jam situation continues the increased efficiency and development of hybrids and electrical car will only contribute limited percentages to reduction of emissions.

Cresterea eficientei

Autoritatile din UE, USA si Japonia, impreuna si individual stimuleaza dezvoltarea unor motoare mai eficiente, luand in considerare in mod constant scaderea nivelului admis de emisii pentru autoturisme.

(EURO1 ⇒ EURO2 ⇒ EURO3 ⇒ EURO4 ⇒ EURO5 ⇒ EURO6 si asa mai departe).

In acelasi timp la nivel guvernamental in fiecare tara, se introduc taxe de mediu si similar, fiind promovate autoturismele cu emisii reduse.

Autoturismele intalnite in prezent in Bucuresti se situeaza in plaja de consum de combustibil intre 20 l/100 km pentru motoare mari si dubla tractiune 4X4 pana la 8 l/100km pentru masini mici moderne de familie. Situatia reala este complet diferita de declaratiile producatorilor consumul variaza de fapt intre 15 si 5 l/100km si are stransa legatura cu situatia traficului din Bucuresti.

Autoturismele hibrid sunt cu putin mai eficiente, dar tot beneficiul sistemelor hibrid se pierde in situatia in care autoturismul este prins in trafic si se deplaseaza doar cativa metri intr-un minut, in conditiile in care sunt aprinse luminile si functioneaza si aerul conditionat/sistemul de incalzire. Autoturismele cu motoare electrice sunt foarte putine astazi, dar in conditiile in care tehnologiile pentru baterii se imbunatatesc continuu si preturile vor scadea din ce in ce mai mult se asteapta ca acest tip de autoturisme sa se inmulteasca in anii care urmeaza.

Atat timp cat situatiile cu blocaje in trafic vor continua, cresterea eficientei si dezvoltarea modelelor de autoturisme hibrid si electrice vor contribui cu un procentaj limitat la reducerea emisiilor.

Driving restrictions

It will not be a popular decision but to cope with the still increasing traffic congestion in Bucharest some form of driving restrictions for private cars and traffic control must be introduced.

Two aspect of the traffic congestion must not be neglected: Air pollutions will affect the life expectancy of the city population and with ambulance services taken more than 30 minutes in parts of the city some

Restrictii de circulatie

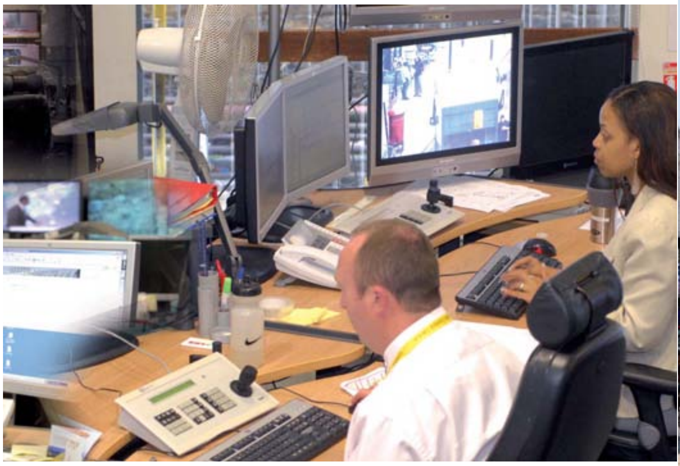
O asemenea decizie nu va putea fi populara, dar pentru a putea face ceva in sensul decongesti-onarii traficului in Bucuresti, vor trebui introduse o serie de restrictii de circulatie pentru autotu-rismele private si monitorizarea traficului.

Doua aspecte ale traficului aglomerat nu trebuie neglijate: poluarea aerului va afecta starea de sanatate a populatiei si speranta de viata si de persons will die due to lack of timely support and treatment.

Driving restrictions and traffic control can be introduced in many ways from traffic police trying their best to keep to traffic moving to advanced camera controlled systems.

The London traffic system is an example of how it is possible to establish acceptable transport in a busy, crowded city. The traffic management in London is based on three measures:

- Taxes on driving (especially for high polluting cars) and high parking fees for others than electrical and hybrid cars.



- Effectively separation of public transport and private transport resulting in faster public transport.
- Cameras on important corner/street and a centralised traffic dispatcher. When roads are blocked, the dispatcher stops the traffic and signs inform about waiting time with an encouragement to drives to stop the engines.

London experienced an emission reduction of more than 40% when the traffic management system was completed and the system is still improved and optimised obtaining even higher values.

Road Pricing and congestion charges

Road pricing (price of driving considering location, time of day and distance based on GPS) and Congestion charge (a system of surcharging users of a transport network in periods of peak demand to reduce traffic congestion) is already introduced in more European countries:

- The German scheme for truck was introduced by 2005 and the system will be further

asemenea faptul ca in anumite zone din Bucuresti serviciiile de ambulanta pierd mai mult de 30 de minute pentru a sosi la locul solicitat, astfel incat anumite persoane pot muri in lipsa unor masuri de ajutor si tratament care trebuie acordate rapid.

Restrictiile de circulatie si monitorizarea traficului pot fi introduse in moduri diferite, pornind de la eforturile la fata locului a politiei de circulatie de a fluentiza traficul cat de mult este posibil, pana la cele mai avansate sisteme de monitorizare.

Sistemul de trafic in Londra este un exemplu de cum se poate realiza un sistem de transport acceptabil, intr-un oras mare si aglomerat. Managementul

traficului, in Londra se bazeaza pe 3 masuri:

- Introducerea unor taxe ridicate pentru circulatie (in mod special pentru masinile cu grad ridicat de poluare) si taxe de parcare ridicate pentru toate autoturismele cu exceptia celor hibride si electrice.
- Separarea efectiva a transportului public de transportul privat, avand ca si consecinta cresterea rapiditatii sistemului public de transport
- Instalarea camerelor de luat vederi pe cele mai importante artere si intersectii, precum si dispecerizarea centralizata a traficului. In cazul in care arterele sunt blocate, dispeceratul opreste accesul in zona, informand prin semnalizare timpul de asteptare, cu incurajarea soferilor de a-si opri motoarele.

Experienta din Londra a condus la reducerea emisiilor cu mai mult de 40%, odata ce sistemul de management al traficului a fost complet finalizat si in prezent sistemul este imbunatatit si optimizat continuu, obtinandu-se valori de reducere a emisiilor si mai mari.

Taxele de drum si suprataxele de aglomeratie

Taxele de drum (plata pentru condus luand in developed in the coming years.

- Milan in Italy has introduced a pollution pricing on trail basic from January 2008.
- A fully automated system called a Controlled Vehicular Access (CVA) system has been launched in Malta's capital city of Valletta since May 1, 2007
- One of the earliest schemes was introduced in Bergen in Norway in 1986
- Stockholm has a congestion pricing system, Stockholm congestion tax, in use on a permanent basis since August 1, 2007
- Durham became the first city in the UK to have a permanent congestion charge in 2002. London has had a congestion charge in the central area since 2003

A similar concept should also be used in Bucharest to easy the current traffic problems.

consideratie locatia, perioada din zi si distantele masurate prin GPS) si suprataxele de aglomeratie (un sistem de suprataxare a utilizatorilor retelelor de transport in perioada de varf, conduce la reducerea aglomerarii traficului) sunt deja introduse in multe tari europene:

- Schema germana pentru camioane a fost introdusa in 2005 si sistemul este in dezvoltare pentru anii care urmeaza.
- In Milano(Italia) a fost introdus un sistem de taxare a poluarii pe baza probelor inregistrate, incepand cu ianuarie 2008.
- Un sistem complet automatizat numit CVA (controlul accesului vehiculelor) a fost introdus in capitala Maltei (Lavaletta) incepand ci 01 mai 2007.
- Una dintre cele mai vechi scheme introdusa este cea din localitatea Bergen din Norvegia si care a fost introdusa in 1986.
- Stockholm are introdus permanent un sistem de suprataxare a aglomeratiei, inca din 01 august 2007.
- Durham a devenit primul oras din Marea Britanie care are un sistem permanent de suprataxare a aglomeratiei din 2002. In Londra, acest sistem pentru zona centrala este implementat din 2003.

Un concept similar ar trebui folosit si in Bucuresti pentru a reduce din problemele curente de aglomeratie a traficului.

2.3 Goals Regarding Sustainability

The goals of the Energy Strategy regarding sustainability are:

- A sustainable, cost related heat tariffs introduced by 2010
- A sustainable subsidise scheme introduced by 2012
- A sustainable organisational and institutional set-up implemented by 2012, focusing on:
    - Reduced cost, offering an established level of quality of the public services, quantified by the performance indicators, as included in the concessions
    - Increased efficiency of the investments and for the operation of the system
    - Private investments on the market conditions, considering development of the competition and the energy market

2.3 Obiective privind sustenabilitatea

Obiectivele Strategiei Energetice privind sustenabilitatea sunt:

- Un tarif al caldurii sustenabil bazat pe costuri reale, transparente, sa fie introdus incepand cu 2010.
- O schema de subventie sustenabila sa fie introdusa incepand cu 2012
- O regandire sustenabila a sistemului organizational si institutional care sa fie implementata din 2012, prin care sa se obtina:
    - costuri minime la o calitate prestabilita a serviciilor, pe baza indicatorilor de performanta de rezultat, asumati de operatori prin contracte de delegare a gestiunii (concesiuni),
    - eficienta maxima a investitiilor si a operarii, precum si
    - aport de capital privat obtinut in conditii avantajoase, pe baza maximizarii competitiei si dezvoltarii pietelor de energie

2.4 Cost related tariff

An energy tariff is composed by a fixed component and a variable component. The fixed component is related to investment costs, administration, operation and maintenance which must be carried by the utility independent the sale of energy. The variable component is related to the energy sold (fuel, consumables and variable operation and maintenance costs). The tariff analysed in this report is based on September 2007 values.

There is pointed the current improper administrative system for the monitoring of RADET activity, generating for the Municipality main difficulties in obtaining accurate information regarding real cost incurred by RADET. The improper system is determined by RADET financial difficulties (subsidiary scheme and delays in approval of the tariff), lack of contract for the delegation of the responsibilities between Municipality and RADET describing the goals for the increasing of performance of the services, as is mentioned in study performed by FACTOR & TRAPEC, approved by the General Council of BM.

2.4 Tarif in functie de costuri

Tariful pentru energia termica este compus dintr-o componenta fixa si una variabila. Componenta fixa are la baza costurile de investitii, administrare, exploatare si intretinere, care sunt intampinate de catre operatorii de servicii independent de vanzarea de energie termica. Componenta variabila este legata de vanzarea de energie(combustibil,consumabile si costuri de exploatare si intretinere variabile). Tariful analizat in acest raport se bazeaza pe valorile din Septembrie 2007.

Trebuie remarcat totusi dificultatea ca Municipalitatii de a obtine, in sistemul actual administrativ de gestionare a operatorului RADET, informatii detaliate suficient de exacte pentru stabilirea unor costuri reale, avand in vedere disfunctionalitatile financiare (schema de subventiei, aprobarea tarifului cu intarziere) ale RADET de pana acum, lipsa orientarii catre rezultate a regiei - in lipsa unor indicatori de performanta si a unui contract de delegare a gestiunii, dupa cum arata studiul FACTOR & TRAPEC, aprobat de CGMB.

Production tariff

Tariful de producere

The tariff 8.60 EUR/GJ for procurement of heat from ELCEN is a uniform tariff fixed by the authorities. National gas is indirectly subsidised with at least 1.60 EUR/GJ as the domestic gas is sold cheaper than the border price Russia/EU of 255 EUR/10,000 m^3.

The level of financial subsidises is not established. However, if established based on the replacement costs the tariff component related to the investment in the plant should be about 8.75 EUR/GJ – about the same as the energy component.

Thus, without considering the investment in the plant the energy tariff was (EUR/GJ):

	Real	Actual
Production price	10.20	10.20
Gas subsidises		- 1.60
Production tariff	10.20	8.60

When we compare this tariff with the tariff in the CTR system (Copenhagen Region Transmission company) we find that:

	Bucharest		Copenhagen	
Source	%	€/GJ	%	€/GJ
Waste-to-energy	-		50	3.75
CHP 1			25	4.50
CHP 2	100	10.20	15	9.00
Heat only and others			10	14.50
Average tariff		10.20	100	5.80

CHP 1: Heat from power plants in operation due to power production (heat considered surplus)

CHP 2: Heat from power plants in operation due to heat production (power considered surplus)

Thus, to obtain a sustainable production tariff new cheaper production sources must be introduced in the system.

Tariful de 8,6 EUR/GJ pentru cumpararea energiei termice de la ELCEN este un tarif uniform fixat de catre autoritatile nationale. Gazul natural din productia interna este indirect subventionat cu cel putin 1,6 EUR/GJ, fiind vandut mai ieftin decat pretul gazului la granita Rusia/UE de 255 EUR/10,000 m^3.

Nivelul subventiilor financiare nu este stabilit. Totusi, in cazul in care ar fi stabilit pe baza costurilor de inlocuire, componenta tarifului referitoare la investitii in centrala ar trebui sa fie de circa 8,75 EUR/GJ – aproximativ aceeasi cu componenta de energie.

In consecinta, fara a lua in considerare investitiile din centrala, tariful energiei a fost (EUR/GJ):

	Real	Actual
Pret de productie	10.20	10.20
Subventia gazului		- 1.60
Tarif de productie	10.20	8.60

Comparand acest tarif cu tariful practicat de CTR (Compania Regionala de Transport Copenhaga) descoperim urmatoarele:

	Bucurest		Copenhaga	
Surs	%	€/G	%	€/G
Statii de	-		50	3.75
Cogenerare 1			25	4.50
Cogenerare 2	100	10.20	15	9.00
Cazane sau altele			10	14.50
Tarif		10.20	100	5.80

Cogenerare 1: Energia termica de la centrale avand prioritate energia electrica(energia termica este considerata surplus)

Cogenerare 2: Energia termica de la centrale avand prioritate energia termica(energia electrica este considerata surplus)

In concluzie, pentru a putea obtine un tarif sustenabil pentru producere este necesara introducerea unor surse care sa produca in sistem mai ieftin.

Transmission tariff

The current tariff covers only the operation costs as investment costs are subsidised by Bucharest Municipality, who subsidise directly with cash contributions to rehabilitation projects and indirectly by perform the loan services.

Calculated based on replacement cost the investment contribution amount to about 4.30 EUR/GJ.

The tariff development through the transmission system can be established as (EUR/GJ):

	Real	Actual
Procurement	10.20	8.60
Transmission tariff	7.60	7.60
Investment subsidises		- 4.30
Consumer tariff	17.80	11.90

By comparison of 2007 values for the Copenhagen system and the Bucharest system we find:

- The transmission cost in the central Copenhagen system is 3.45 EUR/GJ. The transmission cost in Bucharest is 7.60 EUR/GJ.
- The transmission factor was 79,000 GJ/km in Copenhagen while 40,500 GJ/km in Bucharest.
- The heat losses in the Copenhagen system was about 3% in Bucharest they were about 12%.

Thus, to obtain a sustainable future the transmission costs must be reduced by redesign of the transmission system in terms of pipe diameters, number of substations and pipe lengths considering that the future centralised that the future transmission need will be reduced to three waste-to-energy facilities.

Tariful de transport

Tariful curent acopera doar costurile de exploatare, in timp ce costurile de investitii sunt subventionate de catre Primaria Municipiului Bucuresti, care subventioneaza direct prin transferuri de fonduri pentru plata proiectelor de reabilitare si indirect prin plata cheltuielilor legate de imprumuturi.

Calculat pe baza costurilor de inlocuire a investitiilor, contributia este in jur de 4,3 EUR/GJ.

Dezvoltarea tarifului aferent sistemului de transport poate fi stabilit ca (EUR/GJ):

	Real	Actual
Achizitie	10.20	8.60
Tarif de transport	7.60	7.60
Subventii in investitii		- 4.30
Tariful consumatorului	17.80	11.90

Prin comparatia valorilor in Bucuresti si in Copenhaga din anul 2007 rezulta urmatoarele:

- Costul de transport a energiei termice in sistemul central din Copenhaga este de 3,45 EUR/GJ. Costul de transport in Bucuresti este de 7,6 EUR/GJ.
- Factorul de transport in Copenhaga este de 79,000 GJ/km in timp de in Bucuresti este 40,500 GJ/km
- Pierderile de caldura in sistemul din Copenhaga sunt de aproximativ 3% in timp ce in Bucuresti sunt de aproximativ 12%.

Fata de cele de mai sus, pentru a exista un viitor sustenabil al sistemului de transport al energiei termice este necesara reducerea costurilor de transport prin reproiectarea sistemului. Acest lucru inseamna micsorarea diametrelor conductelor, a numarul punctelor termice si lungimea conductelor, tinand cont ca viitorul sistem centralizat va fi redus si va avea ca surse doar doua sau trei statii de incinerare a deseurilor.

Distribution Systems

The current tariff covers only the operation costs as investment costs are subsidised by Bucharest Municipality, who subsidise directly with cash contributions to rehabilitation projects and indirectly by perform the loan services.

Calculated based on replacement cost the investment contribution amount to about 3.80 EUR/GJ.

The tariff development through the distribution system can be established as (EUR/GJ):

Sistemul de distributie

Tariful actual acopera costurile de exploatare, in timp ce costurile de investitii sunt subventionate de catre Primaria Municipiului Bucuresti, care plateste direct prin transferurile pentru investitii si indirect prin plata cheltuielilor aferente creditelor.

Calculata pe baza costurilor de inlocuire, contributia pentru investitii este aproximativ de 3,8 EUR/GJ.

Structura tarifului pentru sistemul de distributie poate fi stabilita dupa cum urmeaza:

	Real	Actual
Procurement	17.80	11.90
Distribution tariff	7.40	7.40
Investment subsidises		- 3.80
Consumer tariff, commercial	25.20	15.50
Household subsidises		- 7.10
Consumer tariff, household	25.20	8.40

The Copenhagen distribution tariffs (21 distribution companies) vary between 4.75 EUR/GJ and 5.50 EUR/GJ. The heat losses vary between 8% and 12% - In Bucharest the heat losses are in the level of 15%.

Thus, to obtain future sustainability the distribution costs and must be reduced, which can be obtained by redesign of the systems considering:

- Fewer, larger substations to limit the investment costs.
- Replacement of the current 4-pipe systems with 2-pipe systems and local heat preparation, reducing investment costs and heat losses.

Natural Gas

From a financial point of view supply of natural gas is not the responsibility of Bucharest Municipality. However, the Energy Strategy will influence the financial sustainability of natural gas supply as:

- The consumption of natural gas for preparation of space heating and hot tap water will be zero by 2020. The present natural gas consumers will be connected to the district heating system or establish individual heating based on renewable sources.
- The consumption of natural gas for cooking and industrial processes will be reduced significant. Electrical cooking will over time replace natural gas cooking, especially in new developed areas and in rehabilitated existing areas. To the extent the industries require steam or superheated hot water for their processes this shall be produced in cogeneration.

Transport

	Real	Actual
Achizitie	17.80	11.90
Tarif de distributie	7.40	7.40
Subventii pt. investitii		- 3.80
Tarif la consumator, comercial	25.20	15.50
Subventia la populatie		- 7.10
Tarif la consumator, casnici	25.20	8.40

Tarifele de distributie in Copenhaga (sunt 21 de companii de distributie) variaza intre 4,75 EUR/GJ si 5,5 EUR/GJ. Pierderile de caldura variaza intre 8% si 12%. In Bucuresti pierderile de caldura sunt in jur de 15%.

Fata de cele prezentate mai sus, pentru a exista un sistem de distributie sustenabil in viitor, costurile de distributie trebuie reduse, acest lucru putandu-se realiza prin reproiectarea inclusiv redimensionarea sistemului, luandu-se in consideratie:

- Puncte termice mai putine si cu capacitati instalate mai mari, pentru a se limita costurile de investitii
- Inlocuirea sistemului existent de 4 tevi cu un sistem cu doua tevi si prepararea locala a caldurii, reducand astfel, costurile de investitii si pierderile de caldura.

Gazul natural

Din punct de vedere financiar furnizarea gazului natural nu este responsabilitatea Primariei Municipiului Bucuresti. Totusi, Strategia Energetica va influenta sustenabilitatea financiara a furnizarii gazului natural dupa cum urmeaza:

- Consumul de gaze naturale pentru incalzirea spatiilor si prepararea apei calde de consum va fi zero in 2020. Consumatorii actuali de gaze naturale se vor conecta la sistemul de termoficare sau vor instala surse de incalzire individuale pe baza surselor regenerabile de energie.
- Consumul de gaze naturale pentru gatit si pentru procese industriale se va reduce semnificativ. Aparatele de gatit electrice vor inlocui treptat aparatele de gatit pe gaze naturale, in special in zonele noi de dezvoltare si in zonele existente reabilitate. Pentru scopuri industriale, fabricile solicita abur sau apa supraincalzita pentru procesele tehnologice,iar acestea vor fi produse in co-generare.

Transport

Road pricing and/or congestion charges might contribute a significant amount to the Municipality budget. This money, or a part of it, should be used for improvement of the public transport.

Taxa de drum si/sau suprataxele de aglomeratie ar putea contribui semnificativ la bugetul Municipalitatii. Aceste sume, sau o parte dintre ele ar putea fi utilizate pentru imbunatatirea sistemului de transport public.

2.5 Sustainable Subsidises

The main problem with the present subsidise scheme is that it subsidise everybody, rich and poor.

As demonstrated in section 2.4 subsidises amount to about 9.70 EUR/GJ for commercial consumers and to about 16.80 EUR/GJ for household consumers. Clearly, this is not sustainable and regarding subsidises to the commercial consumers it might be against the competition rules of the EU.

However, subsidises based on social criteria are known in all EU-countries, including Romania. Thus, the policy must be to remove the general subsidises and strengthen the social subsidise scheme for the disadvantaged groups in the society how really need it.

The figure below shows how a revised subsidise scheme might be constructed: While subsidises are removed from the highest income groups subsidises are increased for the most disadvantaged consumers. The dotted line shows how everybody is subsidised about 75% today.

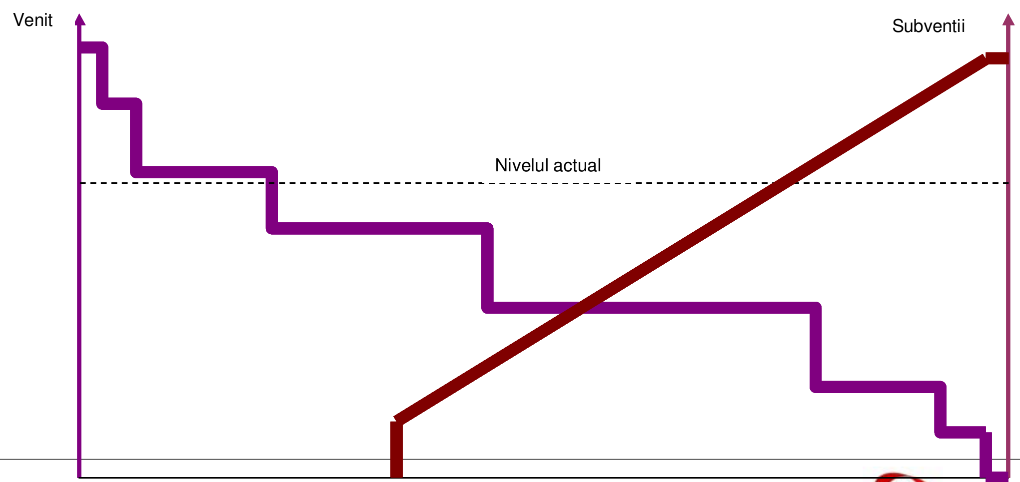
2.5 Subventii sustenabile

Marea problema legata the schema existenta de subventii este aceea ca prin aceasta schema sunt subventionati atat bogatii cat si saracii.

Asa cum am demonstrat in sectiunea 2.4, valoarea subventiilor este de 9,7 EUR/GJ pentru consumatorii comerciali si de 16,8 EUR/GJ pentru consumatorii casnici. In mod cert, aceasta schema nu este sustenabila, iar referitor la subventii acordate consumatorilor comerciali, ar putea contraveni regulilor competiei in UE.

Totusi, subventiile pe criterii solicale sunt raspundite in tarile UE, inclusiv in Romania. In acest sens, politica va trebui sa fie aceea de a elimina subventiile generale si sa sa mareasca schema de subvetii sociale acordate grupurilor dezavantajate din societate in conformitate cu necesitatile acestora.

Figura de mai jos prezinta modul in care o schema de subventii revizuita poate fi construita: Odata ce subventiile pentru grupurile de consumatori cu veniturile cele mai mari au fost eliminate, vor creste subventiile acordate consumatorilor cei mai dezavantajati. Linia punctata arata modul in care orice este subventionat astazi aproximativ ci 75% in prezent.



If the population shall accept district heating as the source of heating it must be ensured to the population that the district heating tariff is lower or at least at the same level as individual heating by natural gas. Thus. a sustainable district heating tariff cannot exceed 14.00 EUR/GJ in 2007 value.

When Romania introduces energy taxes, CO_2 taxes, SO_2 taxes and NO_x taxes etc as seen in most other EU countries the balance between natural gas and district heating based on renewables (solar and waste-to-energy etc) will be changed. The cost of natural gas will be significant higher (18-25 EUR/GJ seen in many countries) while the cost of district heating will be almost unchanged. However, still significant savings must be obtained in production, transmission and distribution as outlined in section 2.4.

Daca populatia va trebui sa accepte sistemul de termoficare ca si sursa de incalzire, in acelasi timp trebuie sa se asigure populatiei ca si tariful termoficarii este mai scazut sau cel putin la acelasi nivel cu cel al incalzirii individuale pe baza de gaze naturale. Fata de acestea, un tarif sustenabil al termoficarii nu poate sa depaseasca 14,00 EUR/GJ in preturile din anul 2007.

Cand Romania va introduce taxele de energie, taxe pentru CO_2 , taxe pentru SO_2 si pentru NO_x, etc, asa cum exista in alte tari din UE, raportul dintre gazul natural si termoficarea bazata pe surse de energie regenerabila(energie solara si incinerarea deseurilor) se va schimba. Costul gazelor naturale va vi semnificativ mai mare(18-25 EUR/GJ, cum este in multe tari), in timp ce costul termoficarii va ramane neschimbat. In acelasi timp, inca se pot obtine economii semnificative in producerea, transportul si distributia energiei termice, asa cum a fost mentionat in sectiunea 2.4.

2.6 Organisational and Institutional Matters

A modernised organisational and institutional framework to cope with the challenges of the future is needed. The national strategy realise that the public sector cannot provide the funds necessary for modernising the heating sector and thus privatisation/private participation is necessary.

For building three waste-to-energy facilities a funding of at least 600,000,000 EUR will be necessary and for reconstruction of the transmission and distribution systems we talk about the amount of 2.7 Billion EUR. It seems impossible for Bucharest Municipality to fund or guarantee funding of more than 3.3 Billion EUR over the next 12-15 years.

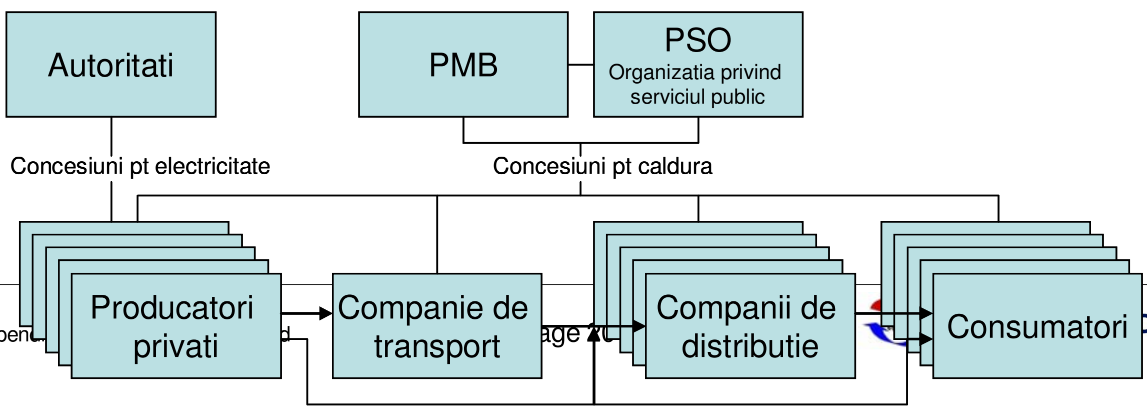
Thus, the organisational and institutional framework must be developed to cope with privatisation and/or private participation. A set-up inspired by the set-up for electricity could be a possibility:

2.6 Chestiuni organizationale si institutionale

Un cadru organizational si institutional modernizat este acela care va putea face fata provocarilor viitorului. Strategia nationala intelege ca sectorul public nu poate pune la dispozitie fondurile necesare pentru modernizarea sectorului energie termica si de aceea privatizare/participarea investitorilor privati este necesara.

Pentru a fi construite 3 facilitati de incinerare a deseurilor vor fi necesare investitii de cel putin 600,000,00 EUR, iar pentru reconstructia sistemului de transport si distributie vorbim de o suma de aproximativ 2,7 miliarde Euro. Pare apropape imposibil pentru pentru bugetul Municipalitatii sa finanteze sau sa garanteze finantari de mai mult de 3,3 miliarde Euro in urmatoriii 12-15 ani.

In acest sens, cadrul institutional si organizational trebuie sa se dezvolte astfel incat sa se poata adapta la privatizare si /sau participarea privatilor. O varianta posibila de cadrul institutional ar putea fi cel inspirat din domeniul electricitatii:



The structure is separation in production companies, transmission and distribution companies operated based on concessions issued by national authorities regarding power production to the national grid and General Council regarding heat. Between the different companies are established commercial contracts.

Bucharest Municipality

Bucharest Municipality must decide the plants and unit to be constructed and offer tenderers a concession for heat supply for a period of time at certain conditions, with prior observation of the specific obligations of the public services and also competitive and transparent access of the tenderers during payback period of the private investment, according to the European requirements and principles of good gouvernance.

Bucharest Municipality must establish a Public Service Organisation to monitor the performance of production, transmission and distribution and to take appropriate actions is not working efficient and if the supply conditions are unsatisfactory.

Heat Production

The production must be based on commercial contracts between the production companies and the transmission company (distribution companies if production if takes place at the decentralised level)

Transmission Company

The transmission company will procure the heat from the heat produces and supply the heat to substations owned by the distribution companies or industrial consumers. The procurement and sale shall be based on commercial contracts.

There should be only one transmission company responsible for technical and economical load dispatch. By keeping control of this company the Municipality of Bucharest will be able to maintain the main control of the heat supply in the city.

Distribution companies

The distribution companies will procure heat from the transmission system and decentralised or local production facilities and distribute the heat to the consumers.

To monitor the performance of the distribution companies a benchmarking should be introduced comparing the companies between each other and

Structura consta in separarea in companii de producere, transport si companii de distributie, care opereaza in baza unor concesiuni emise de catre autoritatile nationale pentru producerea electricitatii catre reteaua nationala si emise de catre CGMB pentru energia termica. Intre diferitele companii trebuie stabilite contracte comerciale.

Municipalitatea

Municipalitatea trebuie sa decida ce unitati si centrale trebuie construite si sa ofere candidatilor concesiuni pentru furnizarea caldurii pentru o perioada de timp in anumite conditii, prin care sa se asigure respectarea obligatiilor specifice serviciilor de interes general, precum si accesul transparent si concurential al ofertantilor pentru incredintarea contractelor de concesiune pe durata recuperarii investitiilor finantate de operatorii privati, in conformitate cu cerintele europene si de buna guvernare.

Municipalitatea trebuie sa infiinteze o institutie adecvata - Organizatia privind Serviciul Public (PSO), care sa monitorizeze obiectiv si transparent respectarea prevederilor concesiunilor privind productia, transportul si distributia si sa poata lua masuri corespunzatoare in conditiile lipsei de eficienta si a unor conditii de furnizare nesatisfactoare.

Producerea caldurii

Producerea trebuie sa se bazeze pe contracte comerciale intre companiile producatoare si compania de transport (companii de distributie in cazul in care producerea are loc la nivel descentralizat)

Compania de transport

Compania de transport va achizitiona energie termica de la producatori si o va furniza punctelor termice detinute de catre companiile de distributie, sau consumatori industriali. Achizitia si vanzarea trebuie sa se bazeze pe contracte comerciale.

Ar trebui sa existe numai o singura companie de transport responsabila pentru dispecerizarea din punct de vedere tehnic cat si economic. Prin mentinerea controlului asupra acestor companii Municipalitatea va fi capabila sa mentina si controlul asupra furnizarii energiei termice in oras.

Companiile de distributie

Companiile de distributie vor achizitiona energie termica de la sistemul de transport si descentralizat de la unitatile de producere locale si vor distribui consumatorilor.

Monitorizarea activitatii companiilor de distributie ar against other companies in Romania.

trebuie realizata prin introducerea benchmarking-urilor, putandu-se astfel compara intre ele aceste companii, precum si cu alte companii din Romania.

3 GOALS REGARDING QUALITY

The goals regarding quality are:

- To obtain a quality of supply in 2015 equal to the average of modern district heating systems

Obtaining this goal requires obtaining a number of sub-goals:

- To introduce a "supply on demand" concept before 2015.
- To introduce Technical Supply Conditions before 2012.
- To introduce a benchmarking system in 2009 and based on the findings, the Municipality must establish targets for future operation ensuring improvement on all heat parameters.

3.1 General

To define quality of district heating most district heating companies looks to northern Germany, Denmark, Sweden or perhaps to some of the newly rehabilitated systems in East Europe, where a very high quality of supply is obtained.

One of the main problems for most Romanian district heating systems, and specifically for the system in Bucharest, is that the scope of rehabilitation in Romanian has been to replace the components in the system, which is badly maintained, without changing the supply concept. Hence, today most consumers have a quality of supply as designed for in the 1960'ties or earlier.

In 1994-1995 when the Danish Joint-Venture performed the PHARE Programme "Study On Bucharest District Heating System" RADET demanded that any rehabilitation proposal should be based on the fixed-flow concept, a high temperature concept and centralized preparation of heating and hot tap water in large thermal substations while maintaining the sizing of the network according to Romanian Standard and Norms. At the same time the Consultant specified and implemented rehabilitation projects in the former DDR and other east-European countries all aiming to transform their systems into modern systems with low temperatures, variable flow, decentralized preparation of heating and hot tap water and a general redesign of the systems according to future requirements.

The quality of supply is closely related to the supply concept and the performance of the operation staff.

3 OBIECTIVE PRIVIND CALITATEA

Obiectivele privind calitatea sunt:

- Obtinerea in 2015 a unei calitati a furnizarii comparabila cu media din sistemele de termoficare moderne.

Pentru atingerea acestui obiectiv este necesar atingerea urmatoarellor sub-obiective:

- Introducerea pana in anul 2015 a conceptului "furnizare la cerere"
- Introducerea pana in anul 2012 a Conditiilor Tehnice de Furnizare
- Introducerea incepand cu 2009 a sistemului de "benchmarking", pe baza indicatorilor de performanta obtinuti, Municipalitatea trebuie sa stabileasca pentru viitor obiective privind exploatarea care sa asigure imbunatatirea tuturor parametrilor privind furnizarea caldurii.

3.1 Generalitati

In vederea definirii calitatii in sistemele de termoficare, multe companii de termoficare privesc catre nordul Germaniei, Danemarca, Suedia sau poate catre cateva sisteme reabilitate de curand din Europa de Est, in care se obtine o calitate ridicata a furnizarii.

Una din problemele principale pentru toate companiile de termoficare din Romania si in mod specific pentru cea din Bucuresti, este aceea ca scopul reabilitarii este acela de inlocuire a componentelor din sistem, (care se deterioreaza datorita proastei mentenante), fara a cauta sa schimbe conceptul de furnizare. Totusi astazi, marea majoritate a consumatorilor se bucura de o calitate a furnizarii asa cum a fost ea proiectata la nivelul anilor 60' sau mai devreme.

In perioada 1994-1995, cand Joint-Venture din Danemarca a intocmit "Studiul asupra sistemului de termoficare din Bucuresti, finantat din Programul PHARE, RADET a solicitat ca orice propunere de reabilitare sa fie facuta considerand conceptul de debit fix, cu temperatura ridicata si preparare centralizata a incalzirii si a apei calde de consum in puncte termice mari, mentinand de asemenea dimensiunea retelelor in conformitate cu Standardele si Normele Romanesti. In aceeasi perioada, consultantul a implementat proiecte in fosta RDG si in alte tari ale Europei de Est. In toate aceste tari s-a dorit sa transformarea sistemelor in sisteme moderne care sa utilizeze temperaturi reduse, debit variabil, During the last decade RADET has implemented two large loan packages worth more than 110 MEUR and substantial amounts received from the Municipality for other rehabilitation works. In terms of quality of supply only little is obtained – many consumers still have to wait several minutes before they receive water hot enough for bathing and often water hot enough for kitchen use is not available at all. RADET still generally overheat the apartment blocks when the outdoor temperature is above about -3 ^{0}C (which means about 90 % of the time).

Thus in spite of investing several MEUR the Bucharest district heating system is still not a modern system offering a supply quality level as known from many other rehabilitated systems and the Bucharest district heating system is still operated inefficient and with high costs.

3.2 Supply on Demand

The general principle of providing services in a consumer society is that if the consumer pays, the services shall be available.

This general principle is neglected by RADET:

- Heat should be available if the consumer opens the radiator valve. In the Bucharest district heating system heat is only available in the heating season when decided by RADET.
- Hot tab water should be available after few seconds (or at least as soon as the internal pipes in the apartment block is emptied for cold water). In reality the waiting time is much longer as the recirculation systems are closed in many systems.

For obtaining a quality level as known in modern district heating systems there is only one solution: “one more rehabilitation round”. It might seem strange to propose rehabilitated systems rehabilitated again but the true is that not only are these systems performing bad quality of supply, they are also operated at high costs and many are due for a second rehabilitation due to lack of maintenance. An example of this is that RADET now proposes replacement of the large separation valves in the primary system – these valves where installed in the second halt of the 90’ties assuming a lifetime of at least 30 years (they obtained only 10 – 13 year lifetime)

Supply on Demand requires significant changes to the current operation concept, especially the control system and the supply concept. In a modern system:

prepararea descentralizata a caldurii si a apei calde de consum, considerand in acelasi timp si o reproiectare generala a sistemului, in conformitate cu cerintele viitoare.

Calitatea furnizarii este in stransa legatura cu conceptul de furnizare si nivelul profesional al personalului din exploatare.

In ultima decada, RADET a implementat doua proiecte mari, finantate din imprumuturi externe, adunand impreuna mai mult de 110 milioane Euro, la care trebuie adaugate si alte sume substantiale primite din partea Primariei Municipiului Bucuresti pentru alte lucrari. In ceea ce priveste calitatea furnizarii, a fost obtinut foarte putin, multi consumatori, trebuie sa astepte minute bune inainte ca apa calda de consum sa ajunga la robinetele de la bai, iar adesea pentru bucatarii nu este disponibila pentru toti. RADET supraincalzeste apartamentele din blocuri cand temperatura exterioara este in jur de -3 ^{0}C (ceea ce reprezinta aproape 90% din timp).

3.2 Furnizarea la cerere

Principiul general care sta la baza furnizarii serviciilor intr-o societate de consum este acela ca: daca serviciul este platit de catre consumator, acest serviciu trebuie sa fie disponibil. Acest principiu general este nesocotit de catre RADET:

- Caldura trebuie sa fie disponibila, daca robinetul radiatorului este deschis de catre consumator. In Bucuresti, caldura in sistemul de termoficare este disponibila cand RADET decide acest aspect.
- Apa calda de consum trebuie sa fie disponibila dupa cateva secunde(sau cel putin, cel mai curand dupa ce se goleste apa racita din tevile aferente apartamentului). In realitate timpul de asteptare este mult mai lung, ca urmare a faptului ca recirculatia apei calde de consum este inchisa in multe sisteme.

Pentru obtinerea unui nivel de calitate, asa cum este cunoscut in sistemele moderne de termoficare, nu este decat o singura solutie: ”inca o runda suplimentara de reabilitare”. Poate parea ciudat sa propui reabilitarea unui sistem deja reabilitat, dar adevarul este ca nu numai aceste sisteme sunt responsabile pentru calitatea scazuta a furnizarii, ci si faptul ca sunt exploatate cu costuri ridicate, iar in multe cazuri reabilitarea este dublata datorita lipsei de mentenanta. Un exemplu pentru acest lucru este acela ca RADET propune inlocuire vanelor mari de separatie, in sistemul primar – aceste vane fiind instalate in a doua jumatate a anilor 90’, considerand ca durata lor de viata ar trebui sa cel putin 30 de ani (in RADET obtinand doar 10-13 ani durata de viata).

1. The consumers control the demand by opening or closing radiator valves and taps.
2. The change in demand is registered by the sensors at the block heating units where the pumps and control valves are programmed to maintain set-point for flows and temperatures according to specific operating conditions.
3. Changes at the block heating units are registered by the sensors in the substation where the pumps and control valves are programmed to maintain set-points for flow and temperatures at the most critical supplied block according to the specific operation condition.
4. The production plants are operated in pooled operation. Within the technical possibilities the load dispatcher calculates the most economical production scheme according to each plants efficiency curve and energy cost. The load dispatcher appoints one production units (normally the most expensive) to perform regulation of flow and temperature to satisfy the need at the most critical substation.

The conditions for implementing such a control concept is available but still not implemented 12 years after it was recommended in the PHARE Programme "Study on Bucharest District Heating System" in spite of calculated savings of about 21 MEUR/y.

Thus, introducing a higher quality performance level will not only benefit in terms of improved comfort but also influence the size of the heat bill.

Furnizare pe baza Cererii necesita modificari semnificative in conceptul actual de operare, in special sistemul de automatizare si conceptul de furnizare. Intr-un sistem modern:

1. Consumatorii controleaza cererea prin deschiderea sau inchiderea robinetilor de la radiatoare si a bateriilor pentru acc.
2. Modificarea cererii este inregistrata de catre senzorii montati in modulele termice din subsolul blocurilor, in care pompele si vanele de reglaj sunt programate sa mentina anumiti parametri (debitul si temperatura) setati in functie de conditiile specifice de operare.
3. Modificarile din modulele termice sunt inregistrate de catre senzorii din punctele termice in care pompele si vanele de reglaj sunt programate sa mentina anumiti parametri (debitul si temperatura) la cel mai dezavantajat bloc, setati in functie de conditiile specifice de operare.
4. Centralele de producere sunt operare in inel. In functie de posibilitatile tehnice, dispeceratul calculeaza cea mai economica schema de producere, in conformitate cu curba de eficienta a fiecarei centrale si cu costul energiei. Dispeceratul stabileste o unitate de producere (in mod normal cea cu pretul cel mai ridicat de producere), care sa realizeze reglarea debitului si a temperaturii pentru a satisface nevoile punctului termic cel mai dezavantajat.

Conditiile pentru implementarea unui asemenea concept de control sunt disponibile insa nu a fost implementat chiar dupa 12 ani de la data la care a fost recomandat prin "Studiul asupra sistemului de termoficare din Bucuresti, finantat din Programul PHARE, in ciuda faptului ca au fost calculate economii de aproape 21 milioane Euro/an.

In concluzie, introducerea unui nivel ridicat de performanta nu va avea ca beneficii doar imbunatatirea confortului, ci va influenta si marimea facturii de energie termica.

3.3 Technical Supply Conditions

Modern technical supply conditions should be introduced defining the responsibilities and duties of both the distribution company and the consumer.

Important for the consumers are the temperature level and the pressure drop offered by the distribution company as this define the supply quality. The quality of the services at the consumer level is described also by the other aspects, as the duration of reply on the claims, the duration of repairing of the failures or

3.3 Conditiile Tehnice de Furnizare

Conditiile tehnice moderne de furnizare trebuie introduse astfel incat sa defineasca atributiunile si responsabilitatile atat ale companiilor de distributie cat si cele ale consumatorilor.

Pentru consumatori sunt importante: nivelul de temperatura si disponibilul de presiune oferit de compania de distributie, in baza definirii calitatii furnizarii. Calitatea serviciului la nivelul consumatorului priveste insa si alte aspecte ale waiting time for telephone.

For the Municipality there is very important to be followed the quality of the services at consumers level, to obtain high efficiency indicators (heat losses and water losses in the system, electricity consumption, cost related staff, efficiency, investment efficacy, etc)

The legal EU provisions ask to be regulated the "specific obligations" (see Green Book and White Book for the public services, launched on public debate by European Commission on 2003 and 2004) for the operator of public services as: universality, continuity, quality of the service – established by competent public authority, affordability of the tariff, adaptability to the consumer's needs, equality in front of the services, safety and security of supply, democratic monitoring, transparency and responsibility – diversity in public awareness, conciliation of stakeholders.

There is necessary that the Municipality shall define, introduce and monitor those quality indicators, to be transparent and easy to monitor. We considered the conclusion formulate by the study performed by Factor-Trapec, mainly specifying that the indicators for the performance of RADET services shall be established and approved by the General Council of BM, and later on to be part in the Terms of References for the concession of the services.

Important for the distribution company is that the district heating system is separated from the heating system inside the buildings by heat exchangers and that the company have free access to meter installations and the stop-valves separation the distribution system from the internal system. The affordability of the tariff is important for the operator, in order to ensure a high level of cashing and to fulfill his obligation related to the quality of the services.

Penalties and bonuses is a part of the contractual agreements. If the district heating company cannot maintain the promised supply parameters for longer periods, alternative heating equipment must be supplied (electrical heaters or bottle-gas heaters) or the company must pay a high penalty.

If the consumer influences the performance of the distribution system for example by not repairing leakages inside the building or increase the capacity without notification a penalty can be the result.

Today most district heating companies requires a specific cooling of the district heating water. A cooling requirement of 45 ^{0}C (maximum 35 ^{0}C return temperature) is normally seen today. If the consumers cool less a percentage is added to the payment while a percentage is deducted if the consumers cool better.

relatiei cu operatorul, precum timpul de raspuns la reclamatii, timpul de remediere a avariilor sau timpul de raspuns la telefonul dat de un consumator.

Pentru Municipalitate este importanta atat respectarea calitatii serviciilor la nivelul consumatorului, cat si indicatorii de eficienta, precum nivelul pierderilor de energie in sistem, apa de adaos, consumul de energie electrica, costurile cu personalul, eficienta, eficacitatea investitiilor, etc.

Prevederile legale si europene cer sa fie reglementate "*obligatiile specifice*" (vezi Cartea verde si Cartea alba a serviciilor de interes general lansate in dezbatere de Comisia Europeana in 2003 si 2004) ale unui operator care presteaza un serviciu de interes general: *universalitatea, continuitatea, calitatea serviciului - stabilit de autoritatea publica competenta, accesibilitatea tarifara, adaptabilitatea la nevoile consumatorilor, egalitatea in fata serviciului, siguranta si securitatea aprovizionarii, controlul democratic, transparenta si responsabilitatea – pluralismul mijloacelor de comunicare in masa, concertarea factorilor implicati*

In acest context este necesar ca Municipalitatea sa defineasca, sa instituie si sa monitorizeze astfel de indicatori de calitate, transparenti si usor de cuantificat. Sunt de luat in seama si concluziile studiului Factor – Trapec cu privire la stabilirea si aprobarea de catre CGMB de indicatori de performanta cuantificabili pentru serviciile prestate de RADET, care sa devina parte a caietului de sarcini pentru operator, precum si obiectiv al contractului de delegare

Pentru compania de distributie este important: ca sistemul de termoficare sa fie separat de instalatia interioara a cladirilor, prin schimbatoare de caldura si sa aiba acces liber la instalatia contorilor si a vanelor de separatie. Pentru operator este importanta si suportabilitatea de plata a serviciului de catre utilizatori, conditie pentru un nivel ridicat de incasare a facturilor si pentru asigurarea respectarii obligatiilor asumate privind calitatea serviciului.

Penalitatile si bonusurile sunt de asemenea incluse in intelegerile contractuale. In cazul in care, compania de termoficare nu poate sa asigure furnizare pe baza parametrilor promisi pentru o perioada lunga de timp, atunci trebuie sa puna la dispozitie o varianta alternativa de incalzire (incalzire electrica sau incalzitoare pe baza de butan gaz), sau compania va trebui sa plateasca o penalitate ridicata.

In cazul in care consumatorul influenteaza performanta sistemului de distributie, de exemplu nu repara scurgerile de lichid din reteaua interioara, sau creste capacitatea fara o notificare prealabila, atunci acesta va trebui sa plateasca penalitati.

Astazi, cele mai multe companii de termoficare solicita o anumita racire pentru agentul termic. O racirea solicitata de 45 ^{0}C (temperatura de retur fiind maxim de 35 ^{0}C) este considerata ca fiind cea mai obisnuita. In conditiile in care consumatorii racesc mai putin agentul termic in instalatiile interioare, se adauga un procent la plata, in timp ce in cazul in care racirea este superioara, procentul corespunzator este scazut din factura.

3.4 Benchmarking

Benchmarking is the process of comparing the cost and quality of what one organization does against what another organization does. The result is often a business case for making changes in order to make improvements. Also referred to as "best practice benchmarking" or "process benchmarking", it is a process used in management and particularly strategic management, in which organizations evaluate various aspects of their processes in relation to best practice, usually within their own sector. This then allows organizations to develop plans on how to make improvements or adopt best practice, usually with the aim of increasing some aspect of performance. Benchmarking may be a one-off event, but is often treated as a continuous process in which organizations continually seek to challenge their practices.

A benchmarking system for district heating systems was developed in Scandinavia 10-15 years ago and is now extended to many other countries such as Germany, the Baltic Countries, Ukraine and Kaliningrad.

The benchmarking system compare both administrative and technical parameters:

Some administrative benchmarking parameters for a distribution company:

- Heat procurement tariff, fixed (€/MJ/s) and variable ($/GJ)
- Capacity tariff (€/MJ/s installed capacity)
- Operation and maintenance costs (€/GJ)
- Administration costs (€/GJ)
- Energy tariff (€/GJ)
- Number of complains (number solved, number non-solved)

Some technical benchmarking parameters:

- Obtained cooling (^{0}C)
- Make-up water (m^3/TJ and m^3/km double pipe)
- Power consumption (KWh/GJ)
- Heat losses (% of procured energy and J/km)

The management only need to compare these (and perhaps a few more) parameters from his company with same parameters from “competing” companies to see where corrective measure should be taken.

In Denmark 586 companies participate in the benchmarking. In Sweden the number is even higher. All together, in the countries mentioned above, more than 2,000 district heating companies perform benchmarking and the number is increasing every year.

National organizations (for example Danish District Heating Association) collects national data and

3.4 Benchmarking

Benchmarking-ul este procesul de comparare a costurilor si a calitatii dintre diferite organizatii cu acelasi obiect de activitate. Adesea, rezultatul reprezinta “cazuri de afaceri” care au ca o consecinta modificari pentru a se face imbunatatiri. Facandu-se referire la “benchmarking-cele mai bune practici” sau “procesul de benchmarking”, in fapt este vorba despre o procedura utilizata in management si in special in managementul strategic, prin care organizatiile evalueaza diferite aspecte ale propriilor procese considerand cele mai bune practici, in cadrul sectorului lor de activitate. Acest lucru, permite organizatiilor sa dezvolte planuri cu privire la ce ar trebui facut pentru a aduce imbunatatiri sau pentru a adopta cele mai bune practici, pornind de la dorinta de a creste performanta in anumite domenii. Benchmarking-ul poate sa sa constituie si ca un eveniment organizat cu participare larga, dar cel mai adesea este tratat ca un proces continuu, prin care organizatiile cauta in mod constant sa intre in competitie prin practicile lor.

Un sistem de benchmarking pentru sistemele de termoficare a fost dezvoltat in Scandinavia, incepand cu 10-15 ani in urma, astazi extinzandu-se si in alte tari ca: Germania, Tarile Baltice, Ucraina si Kaliningrad.

Sunt prezentati mai jos cativa parametri administrativi pentru o companie de distributie:

- Tariful fix de achizitie al energiei termice (€/MJ/s) si tariful variabil ($/GJ)
- Tariful pentru capacitatea instalata (€/MJ/s capacitate instalata)
- Costuri de exploatare si intretinere (€/GJ)
- Costuri administrative (€/GJ)
- Tariful energiei termice (€/GJ)
- Numar de reclamatii (numar rezolvat, numar nerezolvat)

Ca si parametri tehnici de benchmarking pot fi cei de mai jos:

- Racirea obtinuta (^{0}C)
- Apa de adaos (m^3/TJ si m^3/km sistem cu doua tevi)
- Consumul de electricitate (KWh/GJ)
- Pierderi de caldura (% din energia termica achizitionata si J/km)

Managementul are nevoie doar sa compare parametrii(si poate ceva mai multi) obtinuti de compania sa cu parametrii obtinuti de companii cu care se afla in competite, afland astfel unde trebuie introduse masuri corective.

exchange these with sister organizations in other countries. Many data are available on the WEB.

In Danemarca, participa in benchmarking 586 de companii. In Suedia numarul este chiar mai mare. Impreuna, in tarile mentionate mai sus, mai mult de 2,000 de companii de termoficare sunt implicare in procesul de benchmarking, iar numarul lor creste de la an la an.

Organizatiile nationale(de exemplu Asociatia de Termoficare din Danemarca) colecteaza date la nivel national si acestea sunt comparate cu cele primite din partea organizatiilor nationale similare. Multe dintre aceste informatii sunt disponibile pe internet.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144/31.12.2007

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 3a: Integrated Resource Planning

Anexa 3a: Optiuni privind Planificarea integrata a resurselor

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1 INTRODUCTION

Integrated Resource Planning (IRP) is a planning process for utilities that evaluates many different options for meeting future demands and selects the optimal mix of resources that minimises the cost of supply while at the same time meeting reliability needs and other objectives.

Different from other planning methods as for example Least Cost Planning (LCP), IRP compare all options available in the system from demand side to production and a screening then establish the ranking of the option. Options with increasing costs are then selected until a balance of demand and produced energy.

IRP options are established base on the same conditions in terms of financing and other conditions influencing the cost of the option. An option is expressed in specific cost per units (in our situation in €/GJ) for a certain quantity of energy (GJ).

The IRP consider the environmental impact as a cost. Considering the global development towards zero emission of greenhouse gasses and the many alternatives to CO_2 emitting fuels available for districts heating systems the pressure on the district heating companies to significant reduce the CO_2 emission will increase in the years to come. We have thus introduced the following environmental and energy taxes on production prices: Current 0%, short-term 10%, medium term 20% and long-term 30%.

The social aspects of the options are not considered in this report. However, other things equal, we will always select options with high social aspects in terms of job creation and saving of currency for import of fuels before selection of fuel consuming options.

1 INTRODUCERE

Planificarea integrata a resurselor (IRP) este o metoda de planificare pentru utilitati care analizeaza diferitele optiuni pentru asigurarea cererilor viitoare si selecteaza resursele optime in sensul minimizarii costului furnizarii, asigurarii necesarului si realizarii altor obiective.

Spre deosebire de alte metode de planificare, ca de exemplu, planificarea pe cel mai mic cost (LCP), IRP compara toate optiunile disponibile in sistem pornind de la consumator pana la producere si astfel, se realizeaza o ordonare a optiunilor. Optiunile cu costuri ridicate sunt alese pana cand se realizeaza un echilibru intre cererea de energie si productie.

Optiunile IRP sunt stabilite in baza acelorasi conditii privind finantarea sau alte conditiie ce influenteaza costul optiunii. O optiune este exprimata ca un cost specific per unitate (in situatia noastre in €/GJ) pentru fiecare cantitate de energie (GJ).

Planificarea integrata a resurselor considera impactul asupra mediului un cost. Considerand dezvoltarea globala catre zero emisii de gaze cu efect de sera si alternativele la combustibili disponibili pentru sistemele de termoficare care emit CO2, presiunea privind reducerea emisiilor de CO2, asupra companiilor de termoficare va creste semnificativ in anii urmatori. De aceea, am introdus urmatoarele taxe de mediu si energie la preturile de productie: Prezent 0%, pe termen scurt 10%, termen mediu 20% si termen lung 30%.

In acest raport aspectele sociale ale optiunilor nu au fost luate in considerare. In orice caz, intotdeauna selectam optiuni cu impact social mare, in sensul crearii de locuri de munca si economiei de bani pentru importul de combustibil, inainte de alegerea optiunilor consumatoare de combustibil.

2 SELECTED IRP OPTIONS

A number of options are establish and presented in an overview below. Each option is detailed described and specified in the IRP Data Sheets appendix A to this report.

2.1 Energy conservation options

Internal building energy conservation

Several measures to reduce the energy demand in existing buildings are already implemented or under implementation. Example of these are:

- Accounting of heating and hot tap water, if supplied by RADET, based on metering. Almost all building have today metering.

  Metering is not an energy conservation option but a necessity for promotion of all other options making the consumers interested in and aware of energy conservation and the possible lower energy bill.
- Mandatory installation of thermostatic valves and heat cost allocators. The installation is about 50% completed.
- Replacement of windows and doors. It will still take some years before this is completed and this option is not affordable to everyone.
- Installation of heating modules in each building for local production of heat and hot tap water. Implementation of this option has only just begun but must be extended rapidly if district heating shall be able to offer same comfort as individual natural gas heating.
- Improving the supply conditions by rehabilitation of the pipes in the basement of the apartment blocks (in relation to installation of meters). This rehabilitation is close to be completed.

The impact has so far been a 20-40% drop in heating demand and a 30-50% drop in hot tap water demand.

There is still a large energy conservation potential obtainable in existing buildings. Some of the most obviously options are:

- Repair of pipe installations inside the buildings. Most of the water losses seen in the secondary system are in fact water losses inside the buildings.

2 OPTIUNILE PIR SELECTATE

In cele ce urmeaza s-au stabilit si prezentat mai multe optiuni. Fiecare optiune este descrisa detaliat si specificata in Fisa de Date PIR prezentata in Anexa A la acest raport.

2.1 Optiunile privind conservarea de energie

Conservarea energie in interiorul cladirilor

In prezent s-au implementat deja o serie de masuri de reducerea a cererii de energie la nivelul caldirilor existente sau sunt in curs de a fi implementate, cum ar fi:

- Contabilizarea caldurii si apei calde menajere, daca sunt furnizate de RADET, pe baza contorizarii. Aproape toate cladirile sunt in prezent contorizate.

  Contorizarea nu este o masura de conservare a energiei insa este o necesitate pentru promovarea celorlalte optiuni, facandu-i pe consumatori interesati de conservarea energiei in corelare cu o posibila factura mai mica.
- Instalarea obligatorie a robinetilor termostatati si a repartitoarelor de caldura. Aceasta este in proportie de 50% finalizata.
- Inlocuirea ferestrelor si usilor. Aceasta operatiune va mai dura cativa ani, insa nu este accesibila pentru oricine.
- Montarea de module termice in fiecare cladiri pentru producerea locala a caldurii si apei calde menajere. Implementarea acestei optiuni este abia la inceput, insa trebuie extinsa repede pentru ca sistemul de termoficare sa poata oferi acelasi confort ca centralele individuale de apartament pe gaze naturale.
- Imbunatatirea conditiilor de furnizare prin reabilitarea conductelor din subsolurile blocurilor (odata cu contorizarea). Aceasta operatiune este aproape de a fi finalizata.

Pana in prezent s-a inregistrat o scadere de doar 20-40% a cererii de caldura si 30-50% a cererii de apa calda menajera.

Inca exista un potential mare de realizare a conservarii energiei in cladirile existente. Unele dintre

The water losses represent significant heat losses both directly from the pipes and from evaporation of water in wet insulation.

- Insulation of internal pipes. Most pipes are today non-insulated or the insulation is serious damaged.
- Completion of already started measures

cele mai evidente optiuni sunt:

- Repararea coloanelor de apa din interiorul cladirilor. Majoritatatea pierderilor de apa inregistrate in sistemul secundar reprezinta de fapt pierderi de apa in interiorul cladirilor.

  Pierderile de apa reprezinta pierderi de caldura semnificative direct de la conducte si prin evaporarea apei in izolatia umeda.
- Izolarea coloanelor de apa. Majoritatea conductelor, in prezent, nu sunt izolate sau izolatia este serios deteriorata.
- Finalizarea masurilor deja demarate.

Insulation of the buildings

Existing buildings has an average heating consumption of about 180 kWh/m^2/year (about 60-70 mm mineral wool equivalent insulation and 10-15% window area).

International norms for western district heating countries are in the level of 70-100 kWh/m^2/year.

To obtain corresponding values in Bucharest an after-insulation of buildings of about 150-200 mm mineral wool equivalent is necessary. However, this might not be practical possible and we have thus calculated after-insulations options for about 100 mm mineral wool equivalent this will result in an energy conservation of about 20 kWh/m^2/year (about 15%). Together with a repair of existing insulation, window joints etc about 20-25% energy conservation should be possible.

Most new buildings are constructed without energy conservation measures in mind. We find insulation of 70-100 mm mineral wool equivalent and 50-60% window areas in many new developing areas corresponding to about 200 kWh/m^2/year (about 50 kW/m^2/year higher than in existing buildings).

How the new buildings shall be after-insulated to comply with EU-directives regarding energy consumptions from buildings is an open question it will be difficult with the huge window areas seen in many new buildings.

Anveloparea cladirilor

Cladirile existente au, in medie, un consum de caldura de aprox. 180 kWh/m^2/an (cca 60-70 mm vata minerala izolatie si 10-15% zona vitrata).

In normele internationale pentru sistemele de incalzire centralizate din tarile vestice este prevazut un nivel de 70-100 kWh/m^2/an.

Pentru a obtine valori asemenatoare in Bucuresti este necesara o anvelopare a caldirilor, echivaland cu 150-200 mm vata minerala. Totusi, este posibil ca aceasta solutie sa nu poate fi realizata din punct de vedere practic. Astfel, pentru anveloparea cladirilor am calculat, ca pentru aprox. 100 mm vata minerala sau similar conservarea energie va avea o valoare de cca 20 kWh/m^2/an (cca 15%). Aceasta impreuna cu repararea izolatiei existente, a ferestrelor etc va face posibila conservarea energie in proportie de 20-25%.

Majoritatea noilor cladiri sunt construite fara a se tine cont de masurile de conservare a energiei. In multe zone noi de dezvoltare, nole constructii au izolatie in echivalentul a 70-100 mm vata minerala si 50-60% zona vitrata, reprezentand 200 kWh/m^2/an (cu cca 50 kW/m^2/an mai mare decat la caldirile existente).

Modul in care noile cladiri vor fi anvelopate in sensul respectarii directivelor UE privind consumul de energie la nivel de cladiri, ramane o dilema, insa nu va fi usor data fiind zona vitrata mare a noilor cladiri.

2.2 Local supply options

Solar energy cells

This option shall be seen together with the after-insulation option presented in section 2.1 as installation of solar panes should be integrated in the after-insulation as in the example shown below:

2.2 Optiunile privind alimentarea locala

Panouri solare

Aceasta optiune trebuie privita impreuna cu optiunea de anvelopare prezentata in sectiunea 2.1, intrucat montarea panourilor solare trebuie integrata in anvelopare asa cum se arata in modelul de mai jos:

To comply with current EU-directive on energy performance, related Directive on energy audit of buildings and a general policy of reducing import of fuels and creating energy dependency, most buildings must be after-insulated after renovation of the concrete structures.

It is conservatively estimated that about 20% of the current energy demand (30% of the 2020 demand) can be supplied from solar panels. It can be expected that almost 100% domestic hot water in the summer period can be cover by solar energy.

As it might be possible to find buildings where it will be relatively cheap to integrate solar panel we might also find building where it will be relatively expensive. The IRP-option is thus divided in 5 sub-options with increasing prices.

In vederea respectarii Directivei UE privind eficienta energetica, a directivei asupra auditul energetic al cladirilor si a politicii generale de reducere a importului de combustibil si a dependentei de energie, majoritatea cladirilor trebuie anvelopate dupa renovarea structurilor de beton.

Se estimeaza conservator ca aprox. 20% din cererea de energie actuala (30% cerere in anul 2020) poate fi asigurata de panourile solare. Se preconizeaza ca aprox. 100 % din apa calda menajera poate fi asigurata de energia solara in perioada de vara.

Integrarea panourilor solare poate fi facuta la unele cladiri cu costuri mici si la altele cu costuri relativ mari. Optiunea IRP este astfel impartita in 5 sub-optiuni cu preturi in crestere.

Heat accumulators

To obtain a high utilisation of the installed solar panel it will be necessary to install heat accumulators. Three types of heat accumulators are in mind:

- Day-to-day storage at building level
- Weak-to-weak storage at distribution level, for example at the substations.
- Long-term storage as underground storage and heat pumps to extract the heat from the storage. However, this possibility must be demonstrated feasible and is not included in

Acumulatoarele de caldura

Pentru a obtine o utilizare eficienta a panourilor solare instalate este necesar sa se monteze acumulatoare de caldura. Se iau in considerare trei tipuri de acumulatoare de caldura:

- Depozitare zilnica la nivel de cladire
- Depozitare saptamanala la nivel de distributie, de exemplu in punctele termice.
- Depozitare pe termen lung, subteran si pompe pentru extragerea caldurii din depozit. Totusi, fezabilitatea acestei posibilitati trebuie

our calculations and estimates.

Cost of construction of necessary heat storage to ensure at least 20% of the 2008 demand covered by solar cells are included in the IRP-value for solar panels.

2.3 Decentralised production obtions

The decentralised production options in mind are internal combustion engines or gas turbine units in the size of 3-7 MW installed at substation level.

Decentralised production will save transmission costs but the natural gas price is higher. Also the construction costs are higher than for centralised production.

Two IRP-options are establish: one for a first, assumingly the cheapest, phase and one for a second, assumingly more expensive, phase each producing about 1,000,000 GJ on more plants.

The decentralised CHP may be constructed in combination with heat accumulation plant and solar panels and in this way optimise the plant operation for the supply of the customers. The solar panels shall be in operation, mainly during summer time, where as the decentralised CHP are in operation during winter time.

Please find attached the appendix describing the related existing technical solution, performance and tendency in the future.

2.4 Centralised production options

Options for existing units

It will be possible to extent the lifetime of many of the current production units by extensive rehabilitation.

demonstrata si nu este inclusa in calculele si estimarile noastre.

Costul construirii acumulatoarelor de caldura necesare pentru a asigura cel putin 20% din cererea in 2008, cu panouri solare, sunt incluse in valoare IRP pentru panouri solare.

2.3 Optiunile privind productia descentralizata

Optiunile privind productia descentralizata luata in considerare, reprezinta motoare cu aredere interna sau unitati de turbine pe gaz cu capacitatii instalate de 3-7 MW la nivel de punct termic.

Descentralizarea va economisi costurile de transport insa pretul gazului natural va fi tot mai mare. De asemenea, costurile de construire sunt mai mari decat pentru productia centralizata.

S-au stabilit doua optiuni IRP: una pentru prima etapa, considerata mai ieftina, si una pentru a doua etapa, mai scumpa, fiecare producand aprox. 1.000.000 GJ in mai multe centrale.

Centralele de cogenerare descentralizate pot fi construite in combinatie cu statiile de acumulare a caldurii si panourile solare, si astfel, se va optimiza functionarea centralei privind furnizarea catre consumatori. Panourile solare vor fi in functiune, in principal vara, si iarna va fi in functiune centrala de cogenerare descentralizata.

A se vedea anexa prezentata cu astfel de solutii tehnologice utilizate in prezent, performantele acestora si tendintele de viitor.

2.4 Optiunile privind productia centralizata

Optiuni pentru unitatile existente

Prelungirea duratei de viata a multor dintre unitatile de producere actuale este posibila prin reabilitare sustinuta.

Some of these rehabilitations will be very expensive while others less expensive. However, in a short-term perspective it will be necessary to preserve most of the existing capacity, cost what it will cost, as it will take years before alternative options can be implemented with a significant capacity. Also in a medium-term perspective it will be necessary to preserve some of the existing capacity for the same reason.

In a long-term perspective the currently existing capacity will be decommissioned for technical, economical and environmental reasons. In 2020 many of the current plants, build in the period 1960'ties to 1980'ties, will have been in operation for about 50 years and has long ago passed the initial expected lifetime of about 250,000 to 300,000 hours of operation.

The selected IRP-option are related to:

- Peak load units with non or little power generation
- High-load units with some power generation
- Base-load units with power generation
- Low-load units, suitable for frequent start and stop, with some power generation

Almost none of the existing units comply with today's definition of CHP plants as the power-heat ration is far below the 1:1 (or even better) obtainable at new units.

The selected options include a limited rehabilitation of the existing plants aiming to extent the lifetime with 5 to 10 years in compliance with relevant EU-directives and national legislation.

Unele lucrari de reabilitare vor fi scumpe, in timp ce altele vor fi mai putin scumpe. Totusi, intr-un viitor apropiat este necesar sa se pastreze capacitatea existenta, indiferent de cat va costa, intrucat va dura ani inainte ca optiunile alternative sa poate fi implementate cu o capacitate semnificativa. De asemenea, intr-o perspectiva pe termen mediu unele capacitati existente trebuie pastrate, din acelasi motiv.

Intr-o perspectiva pe termen lung, capacitatea curenta existenta va fi dezafectata din motive tehnice, economice si motive legate de mediu. In anul 2020, multe dintre centralele actuale construite in anii '60 pana in anii '80, care au fost in functiune aproape 50 de ani, depasindu-si durata de viata initial prevazuta de cca 250.000 – 300.000 de ore de functionare, vor fi dezafectate.

Optiunea IRP selectata se refera la:

- Unitati pentru acoperirea consumului la varf, fara generarea de electicitate sau doar o foarte mica cantitate
- Unitati pentru asigurarea consumului mare cu generarea unei anumite cantitati de energie electrica
- Unitati pentru consumul de baza cu generarea de energie electrica
- Unitati pentru consum mic, corespunzatoare pentru situatii cu pornire si oprire frecventa, cu generarea unei anumite cantitati de energie electrica

Aproape nici una dintre unitatile existente nu respecta definitia actuala a centralelor de cogenerare intrucat raportul energie electrica-energie termica pentru unitatile noi este departe de a fi 1:1 (sau mai bine).

Optiunile selectate include o reabilitare partiala a centralelor existente, cu scopul de a extinde durata de viata cu 5 pana la 10 ani in conformitate cu directivele UE relevate si legislatia nationala.

Waste-to-energy options

Producing heat from waste is the backbone of cheap heat from district heating systems. This production is extensive explored in Northern-Europe but many incineration plants are also found in Southern-Europe.

Important for construction is that it is realised that it cost money to dispose waste at acceptable environmental condition and that saved cost of disposal is invested in the incineration plants. In relation to EU-directives and climate commitments waste incineration is considered CO_2 neutral.

Also the fact that the waste-to-energy plants can be constructed in or close to the populated area of the city and thus save transport cost should be considered in establishment of the IRP-values.

The district heating and electricity generation is closely related to quantity of waste. The current waste quantity is about 600,000 t/y and increasing. Thus, we estimate that as much as about 15,000,000 GJ/y district heating might be produced by year 2020. The IRP-values assumes construction of the units at existing power plants with connection to power grid, water supply, connection to district heating available.

We have establish 3 IRP values for waste-to-energy assuming the first plant will be constructed at the most feasible site (lowest value), the second on a less feasible site (higher value) and the second at a far less feasible site (high value).

Please find attached the appendix with the basic calculation for the estimations made and the institutional and legal measures which shall be correlated in order to be promoted waste-to-energy.

Optiunile privind transformare deseurilor in energie

Productia de agent termic din deseuri este baza pentru energie termica ieftina in sistemele de termoficare. Aceasta productie este exploatata intens in Europa de nord, insa si in Europa de Sud se gasesc multe statii de incinerare.

Important pentru constructie este sa realizam ca depozitarea deseurilor, in condiiti acceptabile pentru mediu, costa bani si costurile economisite din depozitare pot fi investite in statiile de incinerare. In ceea ce priveste directivele UE si angajamentele privind climatul, incinerarea deseurilor este considerata neutra din punct de vedere al emisiilor de CO_2.

De asemenea, faptul ca statiile de incinerare pot fi construite in, sau aproape de zonele populate ale orasului, la stabilirea valorilor IRP trebuie sa se ia in considerare si costurile de transport economisite.

Incalzirea centralizata si generarea de electricitate este in stransa legatura cu cantitatea de deseuri. Cantitatea actuala de deseuri este de aprox. 600.000 t/an, in crestere. Astfel, estimam ca pana in anul 2020 se pot produce cca 15.000.000 GJ/an energie termica. Valorile IRP iau in considerare construirea unor unitati in cadrul centralelor electrice existente, fiind disponibila racordarea la reteaua electrica, la reteaua de apa si la sistemul de termoficare.

Am stabilit trei valori IRP pentru incinerarea deseurilor, presupunand ca prima centrala va fi construita pe amplasamentul cel mai fezabil (valoare mica), cea de-a doua pe un amplasament mai putin fezabil (valoare mai mare) si ultima, pe amplasamentul cel mai putin fezabil (valoare mare).

A se vedea prezentarea din anexa atasata, care ofera detalii privind baza de calcul a estimarilor facute si masurile legislative si institutionale ce trebuie coroborate pentru promovarea solutiilor de incalzire pe baza de deseuri.

New CHP based on natural gas

The selected options are combine cycle natural units in the capacity level of 250 to 400 MW.

The IRP-values assumes the units constructed at the current power plants sizes with connection to power network, water supply and district heating system available.

Centrale de cogenerare noi pe baza de gaze naturale

Optiunile selectate sunt unitati de cogenerare in ciclu mixt cu capacitati cuprinse intre 250 si 400 MW.

Valorile IRP prevad ca noile unitati sa aiba aceleasi dimensiuni ca si centralele electrice existente, racordurile la reteaua de electricitate, la reteaua de apa si sistemul de termoficare fiind disponibile.

2.5 Transmission options

The only available transmission option is the existing primary network. The current transmission costs are high and only the operation costs are included in the current tariff. The September 2007 transmission tariff was 3.38 EUR/GJ. If also the depreciation and maintenance costs were included, which it should be in a commercial established tariff, the transmission tariff would be about 7.60 EUR/GJ.

By redesign, including resizing of the pipes, according to future requirements, reconstruction when worn-out and introduction of modern operation concepts it will be possible to reduce the transmission tariff significant over time.

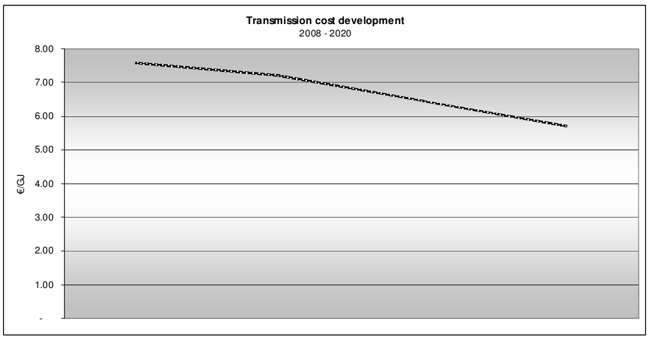
We have assumed a decreasing transmission tariff in calculation of transmission IRP-values.

2.5 Optiunile privind transportul

Singura optiune disponibila pentru transport este reteaua primara existenta. Costurile de transport actuale sunt mari iar in tariful actual sunt incluse doar costurile de exploatare. Tariful de transport in luna septembrie 2007 a fost de 3,38 EUR/GJ. Daca se includ si costurile legate de amortizare si intretinere, ceea ce ar trebuie sa se faca pentru un tarif stabilit pe baza de criterii comerciale, tariful de transport ar fi cca 7,60 EUR/GJ.

Prin reproiectare, implicit redimensionarea retelelor conform cerintelor viitoare, pe baza principiului reconstructie, cand se invecheste si prin introducerea conceptelor moderne de functionare va fi posibil ca in timp, tariful de transport sa fie redus semnificativ.

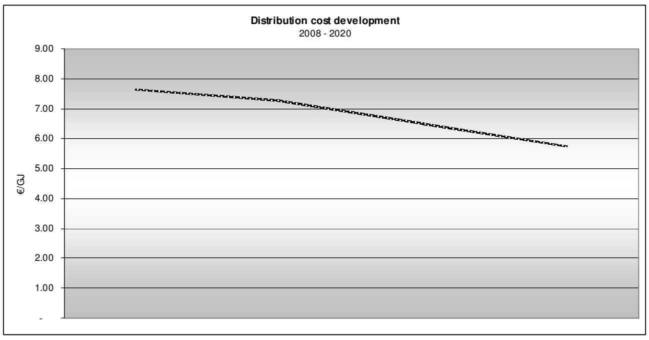
Am estimat o scaderea a tarifului de transport in calculele valorilor IRP pentru transport.

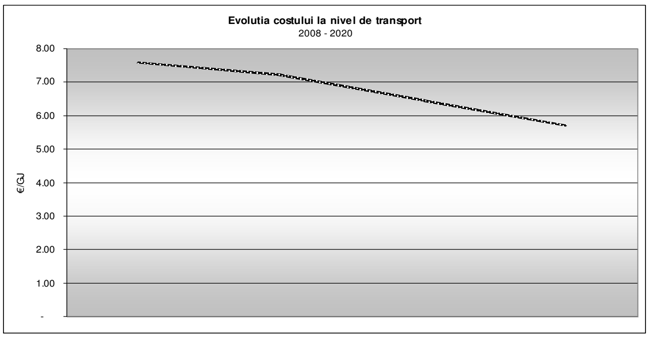


2.6 Distribution options

The only available distribution option is the existing secondary heating network. The current distributions costs are high and only the operation costs are included in the current tariff of 2.73 EUR/GJ. If also the depreciation and maintenance costs were included, the distribution tariff would be about 6.72 EUR/GJ.

It will be possible to decrease the distribution costs by redesign, including resizing and reconstruct the systems when worn-out. When redesigned it must be in accordance with the real demand and expected demand development and a supply concept with 2-pipe systems and local preparation of heat and domestic hot water. A new operation concept with variable flow and consumer controlled supply must be introduced.

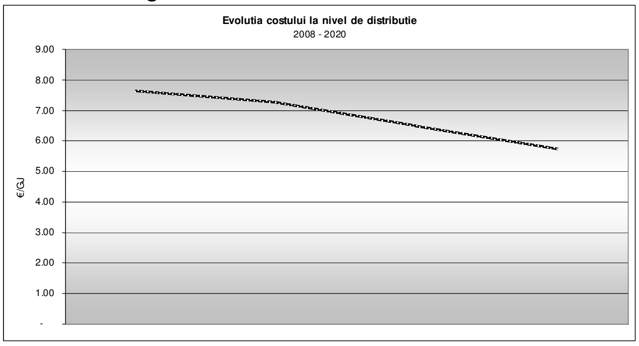




2.6 Optiunile privind distributia

Singura optiune disponibila este reteaua secundara de termoficare. Costurile actuale de distributie sunt mari si in tariful actual de 2,73 EUR/GJ, sunt incluse doar costurile de exploatare. Daca s-ar include si costurile legate de amortizare si intretinere tariful de distributie ar fi cca 6,72 EUR/GJ.

Scaderea costurilor de distributie este posibila prin reproiectarea, implicit redimensionarea si reconstruirea sistemelor cand se invechesc. Reproiectarea trebuie sa fie conform cererii reale, luand in considerare si evolutia cererii si conceptul de furnizare cu sisteme cu doua conducte si prepararea locala a caldurii si a apei calde. Trebuie sa se introduca noul concept de functionare cu debit variabil si reglarea furnizarii de catre consumator.



3 FIRST IRP SCREENING

3.1 Current available IRP-options

The only options available for 2008 are to produce at existing plants and continue demand side energy conservation.

RADET is assumed continuing modernisation of the transmission and distribution system aiming at lower heat losses, water losses, pumping costs and thus a reduction in transmission and distribution tariffs.

3.2 Short-term available IRP-options

The main source in a short-term perspective is still the existing units. However, some of this capacity will have to be decommissioned as there is no need of these with decreasing demand.

Energy conservation options are implemented with higher speed and the first new production sources are commissioned:

- Solar panels
- Decentralised CHP based on natural gas

The transmission and distribution systems are redesigned and the first reconstruction according to the new design is implemented.

RADET has continued efforts to reduce transmission and distribution costs.

The screening of short-term available options are shown below:

3 PRIMA EVALUARE PIR

3.1 Optiunile PIR actuale disponibile

Singurele optiuni disponibile pentru anul 2008 sunt productia in centralele existente si continuarea conservarii energiei la nivel de consumator.

Presupunem ca RADET va continua modernizarea sistemelor de transport si distributie cu scopul reducerii pierderilor de caldura, a pierderilor de agent termic, a costurilor de pompare si astfel reducerea tarifelor de transport si distributie.

3.2 Optiunile PIR disponibile pe termen scurt

Sursa principala in viitorul apropiat ramane cea reprezentata de unitatile existente. Totusi, unele capacitati vor trebui dezafectate, ne mai fiind necesare odata cu scaderea cererii.

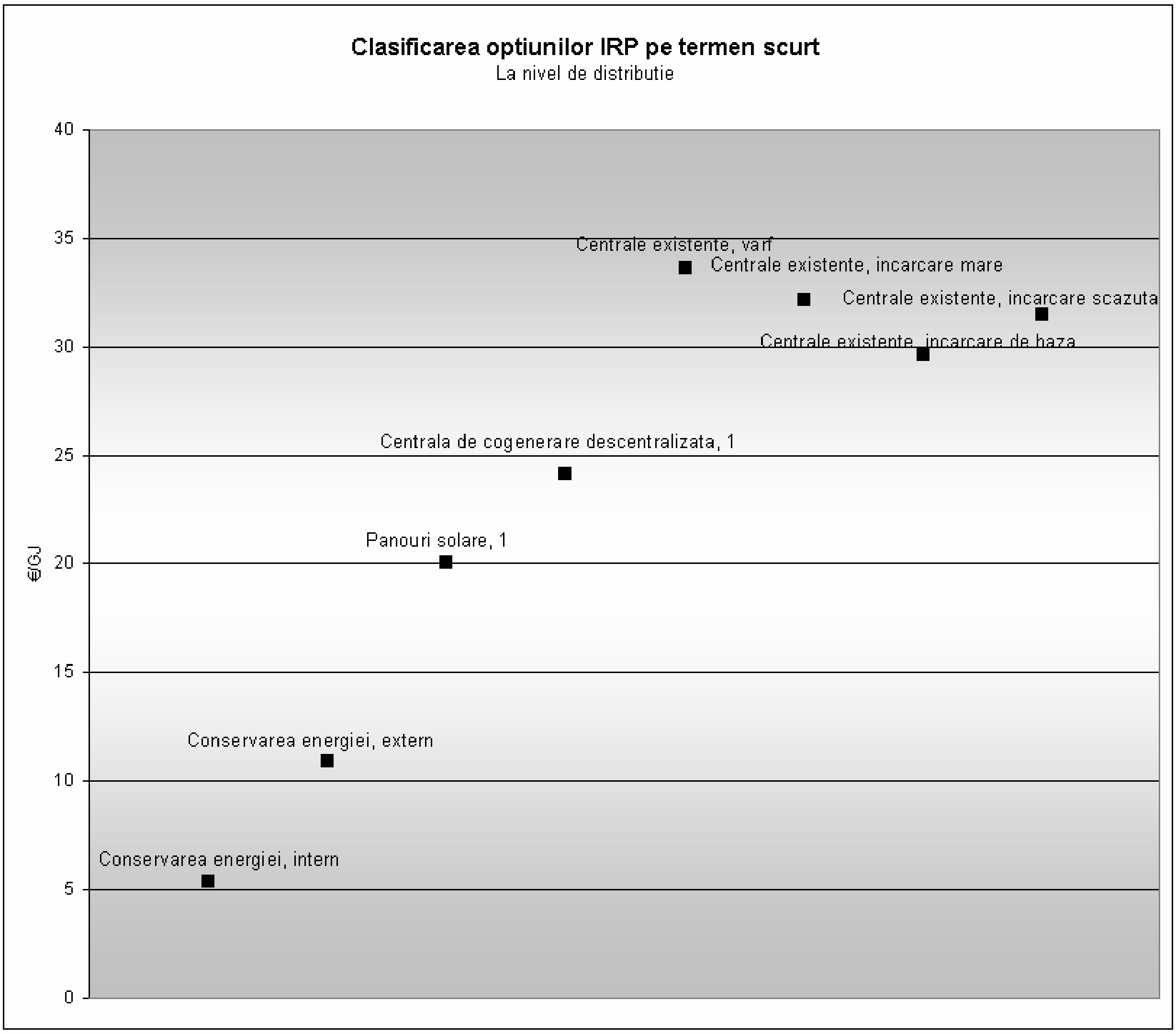
Optiunile privind conservarea energiei sunt implementare foarte repede si primele surse noi de productie sunt puse in functiune:

- Panouri solare
- Centrale de cogenerare descentralizate pe baza de gaze naturale.

Sistemele de transport si distributie sunt reproiectate si prima reconstructie conform noului proiect a fost realizata.

RADET continua eforturile de a reduce costurile de transport si distributie.

Evaluarea optiunilor disponibile pe termen scurt este prezentata mai jos:



It will be necessary to utilise all available option to cover the demand.

Este necesar sa se utilizeze toate optiunile disponibile pentru a acoperi cererea.

3.3 Medium-term available IRP-options

3.3 Optiunile PIR disponibile pe termen mediu

The demand continues to drop as implementation of energy conservation at the consumer level is speeded-up by after-insulation of the building.

More than ½ the current capacity has been decommissioned replaced mainly by renewable sources.

The capacity of the transmission and distributions has been significant reduced and the operation optimised resulting in decreased transmission and distribution tariffs.

We see energy- and/or environmental taxes introduced resulting in heavy increased cost of production on CO_2 emitting units using.

Cererea continua sa scada odata cu accelerarea implementarii masurilor de conservare a energiei la nivel de consumator prin anveloparea cladirilor.

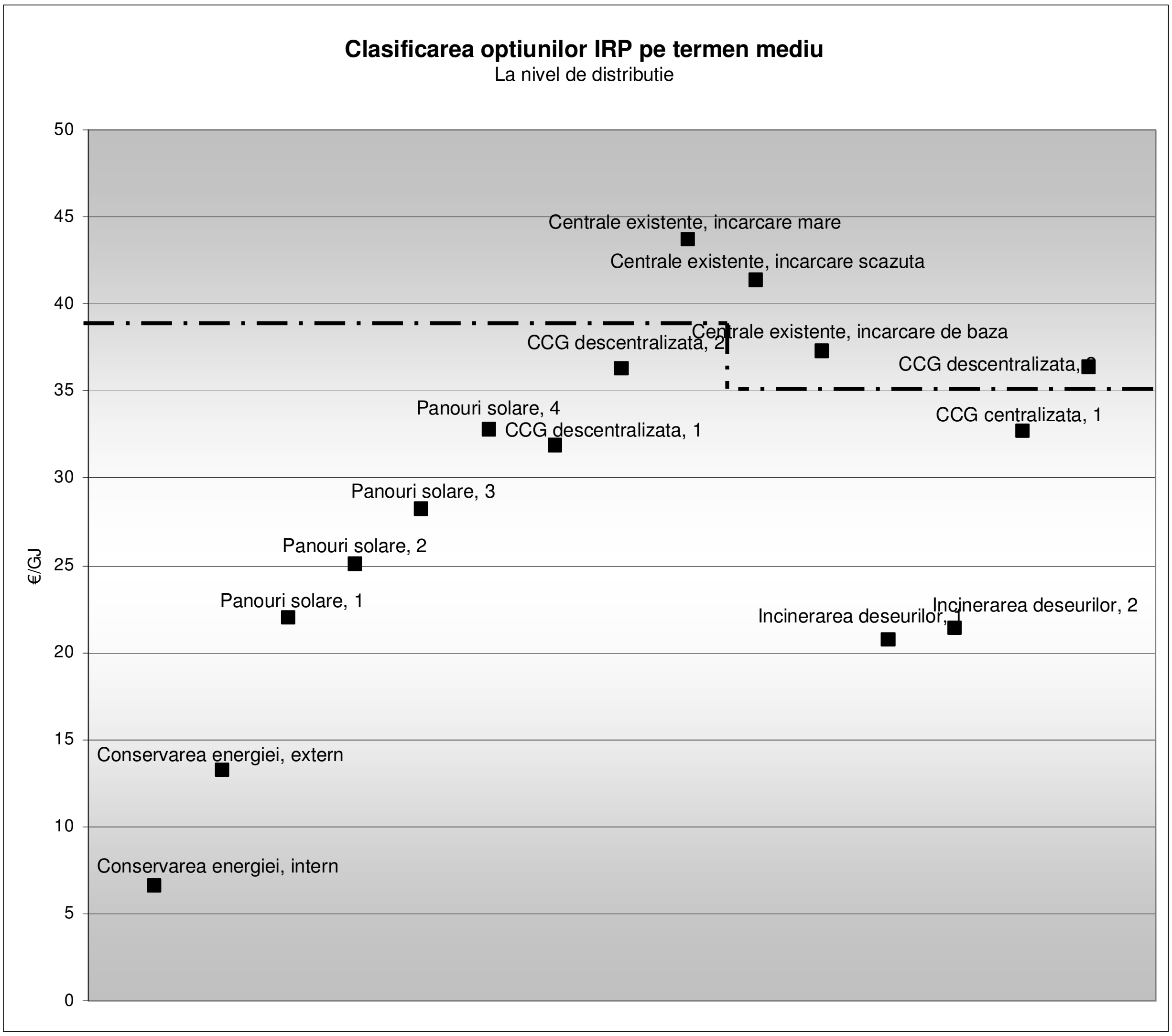
Mai mult de jumatate din capacitatea existenta a fost dezafectata, fiind inlocuita in principal cu surse regenerabile.

Capacitatea transportului si distributiei a fost redusa semnificativ si functionarea a fost optimizata avand ca rezultat scaderea tarifelor pentru transport si distributie.

Estimam ca se vor introduce taxe pe energie si/sau de mediu care vor creste mult costul de productie pentru unitatile care emit CO_2.

The screening of medium-term available is shown in the table below:

Evaluarea optiunilor disponibile pe termen mediu este prezentata mai jos:



The dash-dot line indicates the options necessary to use for covering the demand.

New production sources commissioned:

- Solar panels
- Waste-to-energy
- New centralised CHP
- Decentralised CHP

Linia punctata indica optiunile necesare a fi folosite pentru acoperirea cererii.

Noile surse de producere ce urmeaza a fi puse in functiune:

- Panouri solare
- Statii de incinerare
- Centrale de cogenerare noi centralizate
- Centrale de cogenerare descentralizate.

3.4 Long-term available IRP-options

Most energy conservation options are now implemented and the demand is stabilising at about 45% below the 2008 value.

Current production capacity is all decommissioned.

The transmission and distribution systems are now reconstructed in most parts of Bucharest and the costs are reduced.

Energy- and/or environmental taxes are again increased increasing the production costs from CO_2 emitting plants significant.

The IRP-options available in a long-term perspective are shown below:

3.4 Optiunile PIR disponibile pe termen lung

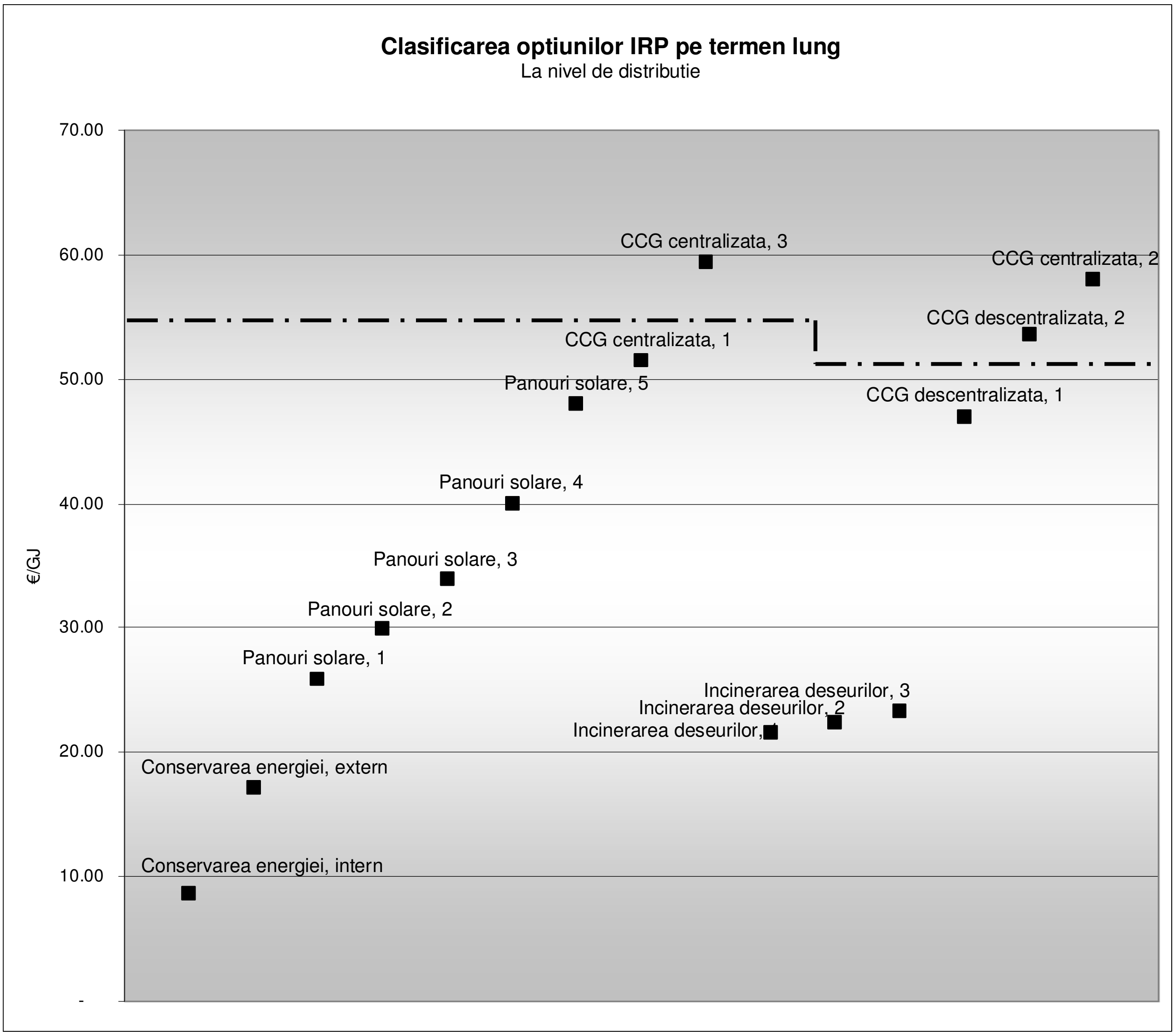
Majoritatea optiunilor de conservare a energiei a fost implementata si cererea s-a stabilizat la cca 45% mai mica decat in anul 2008.

Capacitatile de productie actuale au fost toate dezafectate.

Sistemele de transport si distributie au fost reconstruite in aproape intreg orasul si costurile au fost reduse.

Taxele pe energie si/sau mediu au fost din nou majorate, costurile de productie de la unitatile emitente de CO_2 au crescut semnificativ.

Optiunile IRP disponibile pe termen lung sunt prezentate mai jos:



3.5 Discussion of first IRP-screening

The screening demonstrate that is will be both technical and economical feasible to base the future district heating production on about 80-90% CO_2 neutral sources and energy conservation. These sources are:

- Solar energy and heat storage
- Waste-to-energy

Not surprisingly, these sources are the same as found in the most efficient district heating systems in Europe.

The screening of the medium-term available IRP-options select a new centralised CHP unit with a heat production of 5,000,000 GJ. Also the screening of long-term options selects this plant at the last. However, the full capacity will not be needed and thus, it will be more feasible to select the decentralised CHP option no 2.

3.5 Discutarea primei evaluarii PIR

Evaluarea demonstreaza ca atat din punct de vedere tehnic cat si economic este fezabil, ca viitoarea productie de energie termica sa se bazeze in proportie de 80-90% pe surse neutre din punct de vedere al CO_2 si consevarea energiei. Aceste surse sunt:

- Energia solara si acumularea energiei termice
- Facilitatile de incinerare a deseurilor

Nu este surprinzator ca aceste surse se regasesc in cele mai eficiente sisteme de termoficare din Europa.

Evaluarea optiunilor IRP disponibile pe termen mediu selecteaza o noua centrala de cogenerare centralizata cu o productie de energie termica de 5.000.000 GJ. De asemenea, evaluarea optiunilor pe termen lung selecteaza aceasta centrala in cele din urma. Totusi, intreaga capacitate nu va mai fi necesara si astfel, ar fi mai fezabil sa se aleaga optiunea a doua, adica centrala de cogenerare descentralizata.

4 SECOND IRP-SCREENING

With the centralised CHP options excluded as discussed in previous section the result of the second screening and the ranking of options will be (energy in GJ):

Option	Energy	IRP-value
Internal energy conservation	3,000,000	8.58
External energy conservation	4,500,000	17.16
Waste-to-energy, 1	5,022,000	21.50
Waste-to-energy, 2	5,022,000	22.33
Waste-to-energy, 3	5,022,000	23.30
Solar panels and heat storage, 1	1,000,000	25.86
Solar panels and heat storage, 2	1,000,000	29.89
Solar panels and heat storage, 3	1,000,000	33.92
Solar panels and heat storage, 4	1,000,000	39.97
Solar panels and heat storage, 5	1,000,000	48.03
Decentralised CHP natural gas, 1	1,015,740	51.48
Decentralised CHP natural gas, 2	1,000,350	59.40

This will result in a long-term consumer tariff in the level of 25 €/GJ in 2008 value (the current real consumer tariff was per September 2007 about 32 €/GJ).

4 A DOUA EVALUARE PIR

Odata cu excluderea centralei de cogenerare centralizata, asa cum s-a specificat in sectiunea anterioara, rezultatul celei de-a doua evaluarii si clasificarea optiunilor va fi urmatoarea (energie in GJ):

Option	Energy	IRP-value
Conservarea energiei, intern	3,000,000	8.58
Conservarea energiei, extern	4,500,000	17.16
Incinerarea deserurilor, 1	5,022,000	21.50
Incinerarea deserurilor, 2	5,022,000	22.33
Incinerarea deserurilor, 3	5,022,000	23.30
Panouri solare si acumulare caldura, 1	1,000,000	25.86
Panouri solare si acumulare caldura, 2	1,000,000	29.89
Panouri solare si acumulare caldura, 3	1,000,000	33.92
Panouri solare si acumulare caldura, 4	1,000,000	39.97
Panouri solare si acumulare caldura, 5	1,000,000	48.03
CET descentralizat pe gaz natural, 1	1,015,740	51.48
CET descentralizat pe gaz natural, 2	1,000,350	59.40

Aceasta va avea ca rezultat, pe termen lung, un tarif la consumatori de aprox. 25 €/GJ, valoare in 2008 (tariful actual la consumator a fost in septembrie 2007 de cca. 32 €/GJ).

Productie descentralizata

CET, gaz natural (faza I)
(Centrale cu capacitate de 3 - 7 MW)

Utilizare	h/an	5,500
Capacitate	MW	54
	MJ/sec	51
Productia de agent termic	GJ/an	1,015,740
Generare de electricitate	MWh/an	82,500
Costul construirii	€/MW	1,200,000
Amortizarea	€/an	7,611,384
Exploatare si Intretinere, Administrare	€/an	1,944,000
Eficienta generala	%	95
Consumul de combustibil	GJ/an	1,373,147
	€/an	10,985,179
Costurile anuale	€/an	20,540,563
Venitul din vanzarea de energie electrica	€/an	6,187,500
Valoarea IRP	€/GJ	14.13

CET, gaz natural (faza II)
(Centrale cu capacitate de 3 - 7 MW)

Utilizare	h/an	4,500
Capacitate	MW	65
	MJ/sec	62
Productia de agent termic	GJ/an	1,000,350
Generare de electricitate	MWh/an	81,250
Costul construirii	€/MW	1,200,000
Amortizarea	€/an	9,161,851
Exploatare si Intretinere, Administrare	€/an	2,340,000
Eficienta generala	%	92
Consumul de combustibil	GJ/an	1,396,440
	€/an	11,171,522
Costurile anuale	€/an	22,673,372
Venitul din vanzarea de energie electrica	€/an	6,093,750
Valoarea IRP	€/GJ	16.57

Optiuni de producere la nivel local

Panouri solare si acumulare de caldura (1)

Productie caldura	GJ/an	1,000,000
Cost constructie	€/GJ	100
Amortizare	€/an	11,745,962
Exploatare si Intretinere	€/an	3,000,000
Valoare IRP	€/GJ	12

Panouri solare si acumulare de caldura (2)

Productie caldura	GJ/an	1,000,000
Cost constructie	€/GJ	120
Amortizare	€/an	14,095,155
Exploatare si Intretinere	€/an	3,600,000
Valoare IRP	€/GJ	14

Panouri solare si acumulare de caldura (3)

Productie caldura	GJ/an	1,000,000
Cost constructie	€/GJ	140
Amortizare	€/an	16,444,347
Exploatare si Intretinere	€/an	4,200,000
Valoare IRP	€/GJ	16

Panouri solare si acumulare de caldura (4)

Productie caldura	GJ/an	1,000,000
Cost constructie	€/GJ	170
Amortizare	€/an	19,968,136
Exploatare si Intretinere	€/an	5,100,000
Valoare IRP	€/GJ	20

Panouri solare si acumulare de caldura (5)

Productie caldura	GJ/an	1,000,000
Cost constructie	€/GJ	210
Amortizare	€/an	24,666,521
Exploatare si Intretinere	€/an	6,300,000
Valoare IRP	€/GJ	25

Productie centralizata 1

CET existent (incarcare minima)

Utilizare	h/an	5,500
Capacitate	MW	200
	MJ/sec	400
Productia de agent termic	GJ/an	7,920,000
Generare de electricitate	MWh/an	305,556
Costul construirii	€/MW	1,100,000
Amortizarea	€/an	35,803,987
Exploatare si Intretinere, Administrare	€/an	6,600,000
Eficienta generala	%	80
Consumul de combustibil	GJ/an	11,236,806
	€/an	84,276,042
Costurile anuale	€/an	126,680,029
Venitul din vanzarea de energie electrica	€/an	22,916,667
Valoarea IRP	€/GJ	13.10

CET existent (incarcare de baza)

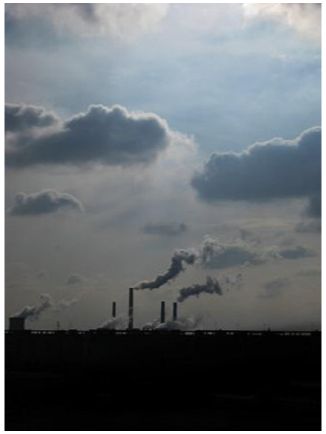
Utilizare	h/an	5,500
Capacitate	MW	550
	MJ/sec	1,210
Productia de agent termic	GJ/an	23,958,000
Generare de electricitate	MWh/an	840,278
Costul construirii	€/MW	1,000,000
Amortizarea	€/an	89,509,967
Exploatare si Intretinere, Administrare	€/an	16,500,000
Eficienta generala	%	85
Consumul de combustibil	GJ/an	31,645,850
	€/an	237,343,873
Costurile anuale	€/an	343,353,840
Venitul din vanzarea de energie electrica	€/an	63,020,833
Valoarea IRP	€/GJ	11.70

CET existent (incarcare maxima)

Utilizare	h/an	4,500
Capacitate	MW	220
	MJ/sec	506
Productia de agent termic	GJ/an	8,197,200
Generare de electricitate	MWh/an	275,000
Costul construirii	€/MW	1,100,000
Amortizarea	€/an	39,384,386
Exploatare si Intretinere, Administrare	€/an	7,260,000
Eficienta generala	%	80
Consumul de combustibil	GJ/an	11,449,625
	€/an	85,872,188
Costurile anuale	€/an	132,516,573
Venitul din vanzarea de energie electrica	€/an	20,625,000
Valoarea IRP	€/GJ	13.65

CET existent (incarcare la varf)

Utilizare	h/an	4,500
Capacitate	MW	-
	MJ/sec	130
Productia de agent termic	GJ/an	2,106,000
Generare de electricitate	MWh/an	-
Costul construirii	€/MJ/sec	400,000
Amortizarea	€/an	8,462,761
Exploatare si Intretinere, Administrare	€/an	1,560,000
Eficienta generala	%	75
Consumul de combustibil	GJ/an	2,808,000
	€/an	21,060,000
Costurile anuale	€/an	31,082,761
Venitul din vanzarea de energie electrica	€/an	-
Valoarea IRP	€/GJ	14.76



Productie centralizata 2

Incinerarea deseurilor, 1

Utilizare	h/an	7,500
Capacitate	MW	31
	MJ/sec	186
Productia de agent termic	GJ/an	5,022,000
Generare de electricitate	MWh/an	64,583
Costul construirii	€/MW	7,500,000
Amortizarea	€/an	27,309,363
Exploatare si Intretinere, Administrare	€/an	6,975,000
Eficienta generala	%	75
Consumul de combustibil	GJ/an	6,997,389
	€/an	-
Costurile anuale	€/an	34,284,363
Venitul din vanzarea de energie electrica	€/an	4,843,750
Valoarea IRP	€/GJ	5.86

Incinerarea deseurilor, 2

Utilizare	h/an	7,000
Capacitate	MW	31
	MJ/sec	186
Productia de agent termic	GJ/an	4,687,200
Generare de electricitate	MWh/an	60,278
Costul construirii	€/MW	7,500,000
Amortizarea	€/an	27,309,363
Exploatare si Intretinere, Administrare	€/an	6,975,000
Eficienta generala	%	75
Consumul de combustibil	GJ/an	6,530,896
	€/an	-
Costurile anuale	€/an	34,284,363
Venitul din vanzarea de energie electrica	€/an	4,520,833
Valoarea IRP	€/GJ	6.35

Incinerarea deseurilor, 3

Utilizare	h/an	6,500
Capacitate	MW	31
	MJ/sec	186
Productia de agent termic	GJ/an	4,352,400
Generare de electricitate	MWh/an	55,972
Costul construirii	€/MW	7,500,000
Amortizarea	€/an	27,309,363
Exploatare si Intretinere, Administrare	€/an	6,975,000
Eficienta generala	%	75
Consumul de combustibil	GJ/an	6,064,404
	€/an	-
Costurile anuale	€/an	34,284,363
Venitul din vanzarea de energie electrica	€/an	4,197,917
Valoarea IRP	€/GJ	6.91

Productie centralizata, 3

CET nou, gaz natural (prima centrala)

Utilizare	h/an	5,500
Capacitate	MW	250
	MJ/sec	250
Productia de agent termic	GJ/an	4,950,000
Generare de electricitate	MWh/an	381,944
Costul construirii	€/MW	900,000
Amortizarea	€/an	26,428,416
Exploatare si Intretinere, Administrare	€/an	6,750,000
Eficienta generala	%	95
Consumul de combustibil	GJ/an	6,617,690
	€/an	49,632,675
Costurile anuale	€/an	82,811,091
Venitul din vanzarea de energie electrica	€/an	28,645,833
Valoarea IRP	€/GJ	10.94

CET nou, gaz natural (a doua centrala)

Utilizare	h/an	4,500
Capacitate	MW	330
	MJ/sec	314
Productia de agent termic	GJ/an	5,078,700
Generare de electricitate	MWh/an	412,500
Costul construirii	€/MW	900,000
Amortizarea	€/an	34,885,509
Exploatare si Intretinere, Administrare	€/an	8,910,000
Eficienta generala	%	92
Consumul de combustibil	GJ/an	7,089,620
	€/an	53,172,147
Costurile anuale	€/an	96,967,655
Venitul din vanzarea de energie electrica	€/an	30,937,500
Valoarea IRP	€/GJ	13.00

CET nou, gaz natural (a treia centrala)

Utilizare	h/an	3,750
Capacitate	MW	400
	MJ/sec	380
Productia de agent termic	GJ/an	5,130,000
Generare de electricitate	MWh/an	416,667
Costul construirii	€/MW	850,000
Amortizarea	€/an	39,936,272
Exploatare si Intretinere, Administrare	€/an	10,200,000
Eficienta generala	%	90
Consumul de combustibil	GJ/an	7,320,370
	€/an	54,902,778
Costurile anuale	€/an	105,039,050
Venitul din vanzarea de energie electrica	€/an	31,250,000
Valoarea IRP	€/GJ	14.38

jc-solarhomes.com/solar_energy_facts.htm

1m^2 de panouri solare produce cca 1kW/h (3.6 GJ)

Costul de instalare a 20 m^2 de panouri solare in SUA, inclusiv acumulatoarele de caldura si pompa de circulare etc. este de 2,000 \$ (100 \$/m^2).

Aceste costuri sunt mici in comparatie cu costurile cunoscute in Danemarca un intalnim costuri de 100-200 €/GJ.

In continuare am preconizat ca 1 m^2 de panouri va produce 22 GJ/zi (6-7 ore de utilizare) in 200 zile, rezultand o productie de 4,400 GJ/m^2/an.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Startegy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 3b: Integrated Resource Planning – 2ed Screening

Anexa 3b: Planificarea Integrata a Resurselor a-2-a Evaluare

4				
3				
2	01.09.2009	Corrections	GMCB	haa
1	17.06.2009	First Edition	GMCB	haa
0	15.05.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

ATH energ Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

This report shall be read and understood together with the IRP report Part C Appendix 3a where the general ranking of the selected options was established:

Option	Energy	IRP-value
Internal energy conservation	3,000,000	8.58
External energy conservation	4,500,000	17.16
Waste-to-energy, 1	5,022,000	21.50
Waste-to-energy, 2	5,022,000	22.33
Waste-to-energy, 3	5,022,000	23.30
Solar panels and heat storage, 1	1,000,000	25.86
Solar panels and heat storage, 2	1,000,000	29.89
Solar panels and heat storage, 3	1,000,000	33.92
Solar panels and heat storage, 4	1,000,000	39.97
Solar panels and heat storage, 5	1,000,000	48.03
Decentralised CHP natural gas, 1	1,015,740	51.48
Decentralised CHP natural gas, 2	1,000,350	59.40

However, the energy produced exceeds the requirement and the IRP values should be recalculated.

Also some of the cost of some technologies is revised in this second screening. The cost structure of the production options is discussed in Part C Appendix 9a.

1 INTRODUCERE

Acest raport trebuie citit si inteles impreuna cu Raportul PIR – Partea C Anexa 3a, in care a fost stabilit clasamentul general al optiunilor

Option	Energy	IRP-value
Conservarea energiei, intern	3,000,000	8.58
Conservarea energiei, extern	4,500,000	17.16
Incinerarea deserurilor, 1	5,022,000	21.50
Incinerarea deserurilor, 2	5,022,000	22.33
Incinerarea deserurilor, 3	5,022,000	23.30
Panouri solare si acumulare caldura, 1	1,000,000	25.86
Panouri solare si acumulare caldura, 2	1,000,000	29.89
Panouri solare si acumulare caldura, 3	1,000,000	33.92
Panouri solare si acumulare caldura, 4	1,000,000	39.97
Panouri solare si acumulare caldura, 5	1,000,000	48.03
CET descentralizat pe gaz natural, 1	1,015,740	51.48
CET descentralizat pe gaz natural, 2	1,000,350	59.40

Totusi, energia produsa depaseste cerintele iar valorile PIR trebuie recalculate.

De asemenea, o parte din costurile anumitor tehnologii au fost revizuite cu ocazia celei de-a doua evaluari. Structura costurilor pentru optiunile privind producerea sunt detaliate in Partea C Anexa 9a.

2 IRP-VALUES

2.1 Production level

Calculation of the values is found in the table sheets at the end of this report.

The calculated IRP-values at the level of production are:

		Short term	Medium term	Long term
Existing CHP	EUR/GJ	16.84	22.58	34.22
Existing HOB	EUR/GJ	14.48	18.29	28.78
Solar heating	EUR/GJ	5.31	5.10	4.78
Local HOB	EUR/GJ	14.44	17.74	24.69
Decentralised CHP	EUR/GJ	-	24.62	29.72
Waste-to-Energy	EUR/GJ	-	1.51	1.66

2.2 Distribution level

Adding the transmission costs to the centralised production options:

		Short term	Medium term	Long term
Transmission tariff	EUR/GJ	7.60	6.50	5.00

The IRP-values at the distribution level will be:

		Short term	Medium term	Long term
Existing CHP	EUR/GJ	24.44	29.08	39.22
Existing HOB	EUR/GJ	22.08	24.79	33.78
Solar heating	EUR/GJ	5.31	5.10	4.78
Local HOB	EUR/GJ	14.44	17.74	24.69
Decentralised CHP	EUR/GJ	-	24.62	29.72
Waste-to-Energy	EUR/GJ	-	8.01	6.66

2 VALORILE PIR

2.1 La nivel de Producere

Calculele privind valorile sunt cuprinse in tabelele atasate la sfarsitul acestui raport.

Valorile PIR calculate la nivelul producerii sunt urmatoarele:

		Termen scurt	Termen mediu	Termen lung
CET existent	EUR/GJ	16.84	22.58	34.22
Cazane existente	EUR/GJ	14.48	18.29	28.78
Energie solara	EUR/GJ	5.31	5.10	4.78
Cazane locale	EUR/GJ	14.44	17.74	24.69
CET descentralizat	EUR/GJ	-	24.62	29.72
Facilitati de incinerare	EUR/GJ	-	1.51	1.66

2.2 La nivel de Distributie

Adaugand costurile de transport ale energiei termice, optiunile in conditiile producerii in sistem centralizat sunt:

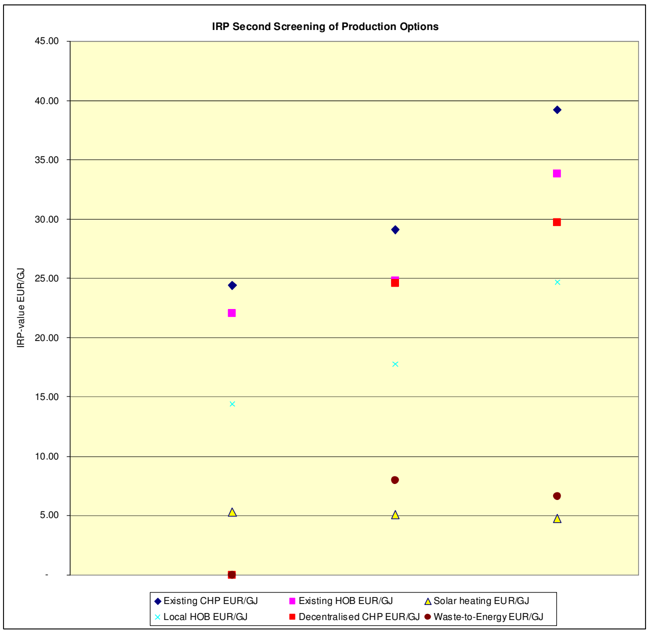
		Termen scurt	Termen mediu	Termen lung
Tarif de Transport	EUR/GJ	7.60	6.50	5.00

Valorile PIR la nivel de Distributie vor fi:

		Termen scurt	Termen mediu	Termen lung
CET existent	EUR/GJ	24.44	29.08	39.22
Cazane existente	EUR/GJ	22.08	24.79	33.78
Energie solara	EUR/GJ	5.31	5.10	4.78
Cazane locale	EUR/GJ	14.44	17.74	24.69
CET descentralizat	EUR/GJ	-	24.62	29.72
Facilitati de incinerare	EUR/GJ	-	8.01	6.66

3 RANKING OF OPTIONS

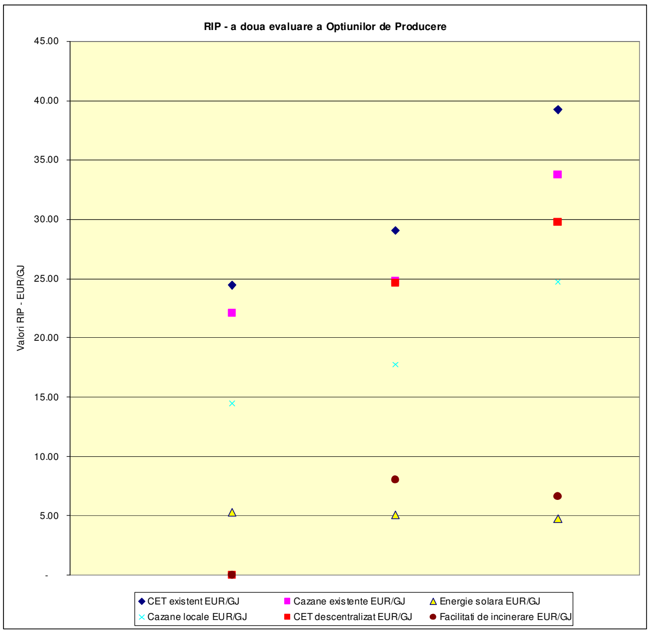
Ranking of the options according to the revised calculations demonstrate no changes in selection compared to the result of first screening. Solar heating is still the most attractive option followed by waste-to-energy.



The ranking is shown in short-term, medium-term and long-term perspectives.

3 CLASAMENTUL OPTIUNILOR

Clasamentul optiunilor in conformitate cu calculele revizuite demonstraza ca nu au aparut modificari in selectie comparativ cu rezultatele obtinute in urma primei evaluari. Caldura din energia solara ramane cea mai atractiva optiune, urmata de cea recuperata din incinerarea deseurilor.



Clasificarea este prezentata pe termen scurt, termen mediu si termen lung.

4 TABLES

4 TABELE

Existing CHP

		Short term	Medium term	Long term
Capacity available	MJ/s	600	250	100
Energy production	GJ/y	9,214,509	3,127,198	967,906
	MWh	639,896	217,167	67,216
Cost of technology	EUR/MJ/s	400,000	420,000	450,000
Investment	EUR	240,000,000	105,000,000	45,000,000
Interest	%	12	12	12
Period	years	10	10	10
Capacity cost	EUR/GJ	4.61	5.94	8.23
O&M costs	EUR/y	20,260,000	9,500,000	4,300,000
	EUR/GJ	2.20	3.04	4.44
Administration costs	EUR/y	340,000	160,000	75,000
	EUR/GJ	0.04	0.05	0.08
Fuel costs	EUR/y	123,481,990	49,025,288	20,414,059
	EUR/GJ	13.40	15.68	21.09
Environmentand energy taxes	EUR/y	12,348,199	9,805,058	6,124,218
	EUR/GJ	1.34	3.14	6.33
Sale of power	EUR/y	(46,813,593)	(17,881,504)	(6,416,057)
	EUR/GJ	(5.08)	(5.72)	(6.63)
Gate fee	EUR/y			
	EUR/GJ	-	-	-
Other costs	EUR/y	3,055,756	1,433,034	664,512
	EUR/GJ	0.33	0.46	0.69
IRP-value	EUR/GJ	16.84	22.58	34.22

CET existent

		Termen scurt	Termen mediu	Termen lung
Capacitate disponibila	MJ/s	600	250	100
Productia de nergie	GJ/y	9,214,509	3,127,198	967,906
	MWh	639,896	217,167	67,216
Costul tehnologiei	EUR/MJ/s	400,000	420,000	450,000
Investitii	EUR	240,000,000	105,000,000	45,000,000
Dobanda	%	12	12	12
Perioada	years	10	10	10
Cost de Capacitate	EUR/GJ	4.61	5.94	8.23
Costuri exploatare&intretinere	EUR/y	20,260,000	9,500,000	4,300,000
	EUR/GJ	2.20	3.04	4.44
Costuri de Administrare	EUR/y	340,000	160,000	75,000
	EUR/GJ	0.04	0.05	0.08
Costul combustibilului	EUR/y	123,481,990	49,025,288	20,414,059
	EUR/GJ	13.40	15.68	21.09
Taxe energie mediu	EUR/y	12,348,199	9,805,058	6,124,218
	EUR/GJ	1.34	3.14	6.33
Vanzare de electricitate	EUR/y	(46,813,593)	(17,881,504)	(6,416,057)
	EUR/GJ	(5.08)	(5.72)	(6.63)
Taxa la poarta	EUR/y			
	EUR/GJ	-	-	-
Alte costuri	EUR/y	3,055,756	1,433,034	664,512
	EUR/GJ	0.33	0.46	0.69
Valoare PIR	EUR/GJ	16.84	22.58	34.22

Existing HOB

		Short term	Medium term	Long term
Capacity available	MJ/s	2,100	1,100	550
Energy production	GJ/y	15,001,766	7,374,502	1,970,644
	MWh			
Cost of technology	EUR/MJ/s	75,000	85,000	95,000
Investment	EUR	157,500,000	93,500,000	52,250,000
Interest	%	12	12	12
Period	years	10	10	10
Capacity cost	EUR/GJ	1.86	2.24	4.69
O&M costs	EUR/y	10,636,058	6,270,512	3,634,621
	EUR/GJ	0.71	0.85	1.84
Administration costs	EUR/y	177,268	104,509	60,577
	EUR/GJ	0.01	0.01	0.03
Fuel costs	EUR/y	160,828,785	92,488,439	33,250,181
	EUR/GJ	10.72	12.54	16.87
Environmentand energy taxes	EUR/y	16,082,878	18,497,688	9,975,054
	EUR/GJ	1.07	2.51	5.06
Sale of power	EUR/y			
	EUR/GJ			
Gate fee	EUR/y			
	EUR/GJ			
Other costs	EUR/y	1,604,272	945,802	548,222
	EUR/GJ	0.11	0.13	0.28
IRP-value	EUR/GJ	14.48	18.29	28.78

Centrale existente

		Termen scurt	Termen mediu	Termen lung
Capacitate disponibila	MJ/s	2,100	1,100	550
Productia de energie	GJ/y	15,001,766	7,374,502	1,970,644
	MWh			
Costul tehnologiei	EUR/MJ/s	75,000	85,000	95,000
Investitii	EUR	157,500,000	93,500,000	52,250,000
Dobanda	%	12	12	12
Perioada	years	10	10	10
Cost de Capacitate	EUR/GJ	1.86	2.24	4.69
Costuri exploatare&intretinere	EUR/y	10,636,058	6,270,512	3,634,621
	EUR/GJ	0.71	0.85	1.84
Costuri de Administrare	EUR/y	177,268	104,509	60,577
	EUR/GJ	0.01	0.01	0.03
Costul combustibilului	EUR/y	160,828,785	92,488,439	33,250,181
	EUR/GJ	10.72	12.54	16.87
Taxe energie mediu	EUR/y	16,082,878	18,497,688	9,975,054
	EUR/GJ	1.07	2.51	5.06
Vanzare de electricitate	EUR/y			
	EUR/GJ			
Taxa la poarta	EUR/y			
	EUR/GJ			
Alte costuri	EUR/y	1,604,272	945,802	548,222
	EUR/GJ	0.11	0.13	0.28
Valoare PIR	EUR/GJ	14.48	18.29	28.78

SOLAR HEATING

		Short term	Medium term	Long term
Energy production	GJ/y	700,000	2,250,000	4,200,000
Cost of technology	EUR/GJ	28.67	27.54	26.19
Investment	EUR	20,069,000	61,965,000	109,998,000
Interest	%	12	12	12
Period	years	20	20	20
Capacity cost	EUR/GJ	3.84	3.69	3.51
O&M costs	EUR/y	802,000	2,479,000	4,191,000
	EUR/GJ	1.15	1.10	1.00
Administration costs	EUR/y	61,000	186,000	315,000
	EUR/GJ	0.09	0.08	0.08
Other costs	EUR/y	165,000	510,000	860,000
	EUR/GJ	0.24	0.23	0.20
IRP-value	EUR/GJ	5.31	5.10	4.78

Energie solara

		Termen scurt	Termen mediu	Termen lung
Productia de energie	GJ/y	700,000	2,250,000	4,200,000
Costul tehnologiei	EUR/GJ	28.67	27.54	26.19
Investitii	EUR	20,069,000	61,965,000	109,998,000
Dobanda	%	12	12	12
Perioada	years	20	20	20
Cost de Capacitate	EUR/GJ	3.84	3.69	3.51
Costuri exploatare&intretinere	EUR/y	802,000	2,479,000	4,191,000
	EUR/GJ	1.15	1.10	1.00
Costuri de Administrare	EUR/y	61,000	186,000	315,000
	EUR/GJ	0.09	0.08	0.08
Alte costuri	EUR/y	165,000	510,000	860,000
	EUR/GJ	0.24	0.23	0.20
Valori PIR	EUR/GJ	5.31	5.10	4.78

Local HOB

		Short term	Medium term	Long term
Capacity available	MJ/s	100	700	700
Energy production	GJ/y	820,800	5,745,600	5,745,600
	MWh			
Cost of technology	EUR/MJ/s	150,000	155,000	160,000
Investment	EUR	15,000,000	108,500,000	112,000,000
Interest	%	12	12	12
Period	years	20	20	20
Capacity cost	EUR/GJ	2.45	2.53	2.61
O&M costs	EUR/y	340,000	2,660,000	3,634,621
	EUR/GJ	0.41	0.46	0.63
Administration costs	EUR/y	8,500	67,000	77,000
	EUR/GJ	0.01	0.01	0.01
Fuel costs	EUR/y	8,521,636	69,783,760	93,882,699
	EUR/GJ	10.38	12.15	16.34
Environmentand energy taxes	EUR/y	852,164	13,956,752	28,164,810
	EUR/GJ	1.04	2.43	4.90
Sale of power	EUR/y			
	EUR/GJ			
Gate fee	EUR/y			
	EUR/GJ			
Other costs	EUR/y	120,000	935,000	1,100,000
	EUR/GJ	0.15	0.16	0.19
IRP-value	EUR/GJ	14.44	17.74	24.69

Cazane locale

		Termen scurt	Termen mediu	Termen lung
Capacitate disponibila	MJ/s	100	700	700
Productia de energie	GJ/y	820,800	5,745,600	5,745,600
	MWh			
Costul tehnologiei	EUR/MJ/s	150,000	155,000	160,000
Investitii	EUR	15,000,000	108,500,000	112,000,000
Dobanda	%	12	12	12
Perioada	years	20	20	20
Cost de Capacitate	EUR/GJ	2.45	2.53	2.61
Costuri exploatare&intretinere	EUR/y	340,000	2,660,000	3,634,621
	EUR/GJ	0.41	0.46	0.63
Costuri de Administrare	EUR/y	8,500	67,000	77,000
	EUR/GJ	0.01	0.01	0.01
Costul combustibilului	EUR/y	8,521,636	69,783,760	93,882,699
	EUR/GJ	10.38	12.15	16.34
Taxe energie mediu	EUR/y	852,164	13,956,752	28,164,810
	EUR/GJ	1.04	2.43	4.90
Vanzare de electricitate	EUR/y			
	EUR/GJ			
Taxa la poarta	EUR/y			
	EUR/GJ			
Alte costuri	EUR/y	120,000	935,000	1,100,000
	EUR/GJ	0.15	0.16	0.19
Valoare PIR	EUR/GJ	14.44	17.74	24.69

Decentralised CHP

		Short term	Medium term	Long term
Capacity available	MJ/s	-	400	400
Energy production	GJ/y	-	3,830,400	3,830,400
	MWh	-	1,064,000	1,064,000
Cost of technology	EUR/MJ/s		1,000,000	1,000,000
Investment	EUR		400,000,000	400,000,000
Interest	%		12	12
Period	years		20	20
Capacity cost	EUR/GJ		13.98	13.98
O&M costs	EUR/y		16,214,657	18,787,232
	EUR/GJ		4.23	4.90
Administration costs	EUR/y		202,683	234,965
	EUR/GJ		0.05	0.06
Fuel costs	EUR/y		107,827,469	125,001,590
	EUR/GJ		28.15	32.63
Environmentand energy taxes	EUR/y		21,565,494	37,500,477
	EUR/GJ		5.63	9.79
Sale of power	EUR/y		(107,827,469)	(125,001,590)
	EUR/GJ		(28.15)	(32.63)
Gate fee	EUR/y			
	EUR/GJ		-	-
Other costs	EUR/y		2,763,527	3,771,195
	EUR/GJ		0.72	0.98
IRP-value	EUR/GJ	-	24.62	29.72

CET descentralizat

		Termen scurt	Termen mediu	Termen lung
Capacitate disponibila	MJ/s	-	400	400
Productia de energie	GJ/y	-	3,830,400	3,830,400
	MWh	-	1,064,000	1,064,000
Costul tehnologiei	EUR/MJ/s		1,000,000	1,000,000
Investitii	EUR		400,000,000	400,000,000
Dobanda	%		12	12
Perioada	years		20	20
Cost de Capacitate	EUR/GJ		13.98	13.98
Costuri exploatare&intretinere	EUR/y		16,214,657	18,787,232
	EUR/GJ		4.23	4.90
Costuri de Administrare	EUR/y		202,683	234,965
	EUR/GJ		0.05	0.06
Costul combustibilului	EUR/y		107,827,469	125,001,590
	EUR/GJ		28.15	32.63
Taxe energie mediu	EUR/y		21,565,494	37,500,477
	EUR/GJ		5.63	9.79
Vanzare de electricitate	EUR/y		(107,827,469)	(125,001,590)
	EUR/GJ		(28.15)	(32.63)
Taxa la poarta	EUR/y			
	EUR/GJ		-	-
Alte costuri	EUR/y		2,763,527	3,771,195
	EUR/GJ		0.72	0.98
Valoare PIR	EUR/GJ	-	24.62	29.72

Waste-to-Energy

		Short term	Medium term	Long term
Capacity available	MJ/s	-	100	300
Energy production	GJ/y	-	1,094,400	3,283,200
	MWh	-	137,750	413,250
Cost of technology	EUR/MJ/s		1,950,000	1,975,000
Investment	EUR		195,000,000	592,500,000
Interest	%		12	12
Period	years		20	20
Capacity cost	EUR/GJ		23.85	24.16
O&M costs	EUR/y		13,439,622	44,515,287
	EUR/GJ		12.28	13.56
Administration costs	EUR/y		223,994	741,921
	EUR/GJ		0.20	0.23
Fuel costs	EUR/y			
	EUR/GJ		-	-
Environmentand energy taxes	EUR/y		-	-
	EUR/GJ		-	-
Sale of power	EUR/y		(11,342,343)	(39,446,651)
	EUR/GJ		(10.36)	(12.01)
Gate fee	EUR/y		(28,800,000.00)	(86,400,000.00)
	EUR/GJ		(26.32)	(26.32)
Other costs	EUR/y		2,027,143	6,714,389
	EUR/GJ		1.85	2.05
IRP-value	EUR/GJ	-	1.51	1.66

Waste-to-Energy

		Short term	Medium term	Long term
Capacity available	MJ/s	-	100	300
Energy production	GJ/y	-	1,094,400	3,283,200
	MWh	-	137,750	413,250
Cost of technology	EUR/MJ/s		1,950,000	1,975,000
Investment	EUR		195,000,000	592,500,000
Interest	%		12	12
Period	years		20	20
Capacity cost	EUR/GJ		23.85	24.16
O&M costs	EUR/y		13,439,622	44,515,287
	EUR/GJ		12.28	13.56
Administration costs	EUR/y		223,994	741,921
	EUR/GJ		0.20	0.23
Fuel costs	EUR/y			
	EUR/GJ		-	-
Environmentand energy taxes	EUR/y		-	-
	EUR/GJ		-	-
Sale of power	EUR/y		(11,342,343)	(39,446,651)
	EUR/GJ		(10.36)	(12.01)
Gate fee	EUR/y		(28,800,000.00)	(86,400,000.00)
	EUR/GJ		(26.32)	(26.32)
Other costs	EUR/y		2,027,143	6,714,389
	EUR/GJ		1.85	2.05
IRP-value	EUR/GJ	-	1.51	1.66

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 4a: Reconstruction of the district heating networks

Anexa 4a: Reconstructia retelelor de termoficare

4				
3				
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Cuprins

1 INTRODUCTION

The current transmission system is designed for transmission of about 10,000,000 Gcal/y ~ 42,000,000 GJ/h. When the production system is renewed in 2020 the centralised production will be limited to the about 2,000,000 GJ/h supplied by the waste-to-energy facilities. Obviously this call for redesign and reconstruction of the transmission system.

The current distribution system is based on an outdated direct supply concept with centralised preparation of heating and hot tap water unable to supply at a condition the consumers must expect living in this century (Heating and hot tap water on demand must be the future concept). To obtain the comfort at affordable prices a modern district heating system can provide the distribution systems must be designed and reconstructed for 2-pipe supply and local preparation of heating and hot tap water.

The distribution systems are today supplied from the transmission system via thermal substations. The future concept will be a combination of supply from centralised production (40-50%), from decentralised CHP units (10-20%) and from local solar heating systems (30-40%). The installation of decentralised CHP and solar panels will make construction of heat storages necessary.

The inefficiency of the Bucharest district heating system can be seen by comparison:

	Bucharest	***Copenhagen***
Heat sale	21,000,000 GJ	19,000,000 GJ
Transmission pipes	510 km	57 Km
Distribution companies	1	5
Thermal substations	682	0
Heat exchanger stations	0	26
Centralised plants	9	3
Decentralised units	0	12
Buster pumping stations	0	3
Transmission cost (€/GJ)	7.60	2.60

The Copenhagen transmission system is considered one of the most efficient in the world with heat losses below 2% and energy for pumping below 3 kWh/GJ. The real losses in the Bucharest system have never been measured but estimated being between 12-18%. The electricity consumption for pumping in the primary system in Bucharest is not measured and accounted.

1 INTRODUCERE

Sistemul de transport existent este proiectat pentru transportul a cca 10.000.000 Gcal/an ~ 42.000.000 GJ/h. Cand sistemul de producere va fi reinoit in anul 2020, productia centralizata va fi limitata la aprox. 2.000.000 GJ/h, care va fi asigurata din functionarea facilitatilor de recuperare a energiei din deseuri. In mod evident, aceasta situatie necesita reproiectarea si reconstructia sistemului de transport.

Sistemul de distributie existent are la baza un concept de furnizare cu conectare directa depasit, cu prepararea centralizata a apei calde si incalzirii si care nu poate indeplini cerintele pe care consumatorii le asteapta in secolul acesta (Conceptul viitor trebuie sa fie incalzire si apa calda de consum la cerere). Pentru a avea confort la preturi accesibile, asigurat de un sistem de termoficare modern, sistemele de distributie trebuie proiectate si reconstruite pentru furnizarea energiei termice prin 2 conducte iar prepararea apei calde de consum si a incalzirii sa aiba loc la nivel local.

In prezent, sistemele de distributie sunt alimentate din sistemul de transport prin punctele termice. Conceptul viitor va fi o combinatie intre furnizarea de la producerea centralizata (40-50%), de la unitatile de cogenerare descentralizate (10-20%) si de la sistemele de incalzire pe baza de energie solara (30-40%). Instalarea centralelor descentralizate de cogenerare si a panourilor solare necesita construirea acumulatoarelor de caldura.

Ineficienta sistemului de termoficare din Bucuresti poate fi vazuta prin comparatie:

	Bucuresti	***Copenhaga***
Vanzare en. termica	21.000.000 GJ	19.000.000 GJ
Retele de transport	510 km	57 Km
Companii de distributie	1	5
Puncte termice	682	0
Statii de schimbatoare de caldura	0	26
Centrale centralizate	9	3
Unitati descentralizate	0	12
Statii de pompare de reactivare	0	3
Cost transport (€/GJ)	7,60	2,60

Sistemul de transport din Copenhaga este considerat unul dintre cele mai eficiente din lume, cu pierderi de caldura mai mici de 2% si energia pentru pompare mai mica de 3 kWh/GJ. Pierderile reale in sistemul din Bucuresti nu au fost niciodata masurate, insa au fost estimate a fi intre 12-18%. Consumul de electricitate pentru pompare in sistemul primar din Bucuresti nu este contorizat.

We can thus conclude that both the transmission system and the distribution systems in Bucharest need redesign and reconstruction.

In concluzie, putem spune ca ambele sisteme, de transport si de distributie, din Bucuresti necesita reproiectare si reconstruire.

2 CONSUMER INSTALLATIONS

The consumer shall in the future own all installations inside the building after the meter and stop valves installed by the distribution company.

The private ownership includes the heating module and hot tap water storage. However, as not all consumers are expected to be able to finance installation of this a rental scheme should be setup.

2 INSTALATIILE CONSUMATORULUI

In viitor, consumatorul va fi proprietarul instalatiilor din interiorul cladirilor, dupa instalarea contoarelor si vanelor de sectionare de catre compania de distributie.

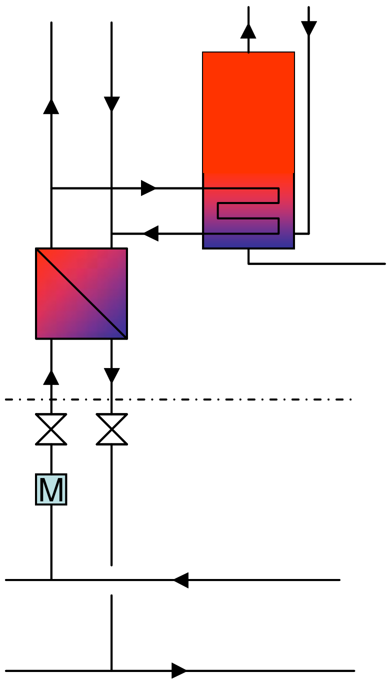
Proprietatea privata include modulele termice si acumulatoarele de apa calda de consum. Totusi, intrucat nu se aseteapta ca toti consumatorii sa poata finanta instalarea acestora, ar trebuie sa se stabileasca o schema de inchiriere(custodie).

2.1 Interface between consumer and utility

The district heating company establish supply in terms of two stop-valves and a meter. The stop valves, building side, is the interface. The interface is shown with dotted line of the sketch below:

2.1 Interfata intre consumatori si utilitati

Compania de termoficare furnizeaza doua vane de oprire si un contor. Vanele de oprire, din interiorul cladirii, reprezinta interfata. Interfata este prezentata in schita de mai jos, cu linie punctata:



2.2 Heating units and heat storage

As the heating unit, the storage for hot tap water and other internal installation are the ownership of the building owner the design is also the responsibility of the building owner. However, the installation must be in accordance with the requirements of the district heating company (Technical connection conditions)

2.2 Modulele termice si acumularea caldurii

Intrucat modulul termic, acumulatorul pentru acc si alte instalatii interioare sunt detinute de proprietarul cladirii, proiectarea este de asemenea responsabilitatea acestuia. Totusi, instalarea trebuie sa respecte cerintele companiei de termoficare (conditiile tehnice privind bransarea).

As the owner in the future will have not only to pay for consumed energy but also for installed capacity it will be the interest of the owner to avoid over-sizing. Thus, the installed capacities will be far less than today.

The district heating company must inform maximum and minimum pressures at the point in the network where the consumer is connected. Also the intended temperature concept must be informed for the purpose of design.

2.3 Branches

Branches shall be paid by the consumers according to the length and required diameter (capacity requirement). The district heating company should be allowed to charge a connection fee.

The connection fee could be separated in:

1. A fixed price including up to 10 meter branch with DN 28 mm.
2. An additional payment for additional diameter
3. An additional payment for length above 10 m

Although the branch is paid by the consumer the ownership belongs to the district heating system because the branch is on the supply side of the meter/stop-valves.

2.4 Existing consumers

It cannot be seen as fair to let existing consumers pay all costs as described in previous section.

A solution could be that the district heating company include reconstruction of the branch, when needed, in the reconstruction costs of the distribution system while the consumers include installation of the heating unit, heat storage and rehabilitation of internal piping etc in the thermal rehabilitation costs for which the consumer can obtain 80% subsidises according to the currently proposed subsidise scheme.

Deoarece in viitor proprietarul trebuie sa plateasca atat pentru energia consumata cat si pentru capacitatea instalata va fi in interesul lui sa evite supradimensionarea. Asadar, capacitatile instalate vor fi mult mai mici decat cele existente.

Compania de termoficare trebuie sa comunice valorile pentru presiunile maxima si minima la punctul unde consumatorul este conectat la retea. De asemenea, se va comunica si conceptul legat de temperatura de furnizare pentru a fi luate in considerare pentru proiectare.

2.3 Racordurile

Racordurile vor fi platite de consumatori in conformitate cu lungimea si diametrele necesare (cerinta de capacitate). Compania de termoficare trebuie sa aiba permisiunea de a cere o taxa de conectare.

Taxa de conectare ar putea fi separata in:

1. Un pret fix pentru un racord de 10 m, sau mai mica, cu DN 28 mm
2. Plata suplimentara pentru diametru mai mare
3. Plata suplimentara pentru o lungime mai mare de 10 m

Chiar daca racordul este platit de consumator, acesta apartine sistemului de termoficare, fiind localizat pe partea de furnizare a contorului/vanelor de separare.

2.4 Consumatorii existenti

Nu ar putea fi corect sa lasam consumatorii existenti sa suporte toate costurile descrise in sectiunile anterioare.

Solutia ar fi ca reconstructia racordului, cand este cazul, sa fie inclusa de catre compania de termoficare in costul reconstructiei sistemului de distributie, iar consumatorii sa includa costurile instalarii modulelor termice, a acumulatorului de caldura si reabilitarii instalatiilor interioare etc., in costurile pentru reabilitarea termica din care 80% poate fi subventionat conform schemei de subventionare propusa in prezent.

3 DISTRIBUTION SYSTEMS

There are today more than 1,000 thermal substation supplied from the transmission system. These substations supplies 834 km secondary heating pipes and about the same km hot tap water pipes.

With an annual sale of about 21,000,000 GJ (about 5,000,000 Gcal) and an utilisation of 2,000 h/y the substation capacity should be about 3,000 MJ/sec. In reality the installed capacity is more than twice this value.

The distribution pipes, even the newly rehabilitated system, are designed according to a demand calculated based on STAS norms in spite of the fact that the measured demand is only about 50% of the STAS norms values (and the demand has now been measured for 6-8 years).

It should be obviously clear for everybody with just a minimum knowledge of district heating systems that a distribution system with double capacity and with substation in an average size of 3 MJ/s cannot be feasible. Thus, redesign and reconstruction of the district heating distribution concept is needed.

3.1 Sizing of distribution systems

The current average length of the distribution systems is less than two km with an average capacity of about 3 MJ/s of the 682 thermal substations.

Obviously, the number of substations should be reduced to feasible sizes. If we should go as far as in Copenhagen and design substations in sizes of 40-50 MJ/s is probably not the most feasible solutions. The feasible sizes in Bucharest will depend of heat density and practical possibilities.

When a thermal substation is reconstructed to become a heat exchanger station all equipment related to hot tap water preparation will be decommissioned and the number of heat exchangers for heating reduced to 2 (from up to six today). Thus, inside an existing thermal substation it will probably be possible to install a heat exchanger station with a capacity of 20-25 MJ/s. The energy to be transmitted will be about 300 MJ/s (the rest is produced local or decentralised). Transmitting 300 MJ/s to heat exchanger stations with a size of 20 MJ/s will require only 15 heat exchanger stations but for practical and physical reason the number will most certainly be height – about 50.

About 580 substations can be decommissioned and

3 SISTEMELE DE DISTRIBUTIE

In prezent sunt peste 1.000 de puncte termice alimentate de la sistemul de transport. Aceste puncte termice alimenteaza 834 km de retele secundare de incalzire si aproximativ aceeasi lungime pentru retelele secundare de apa calda de consum.

Cu o vanzare anuala de aprox. 21.000.000 GJ (aprox. 5.000.000 Gcal) si o utilizare de 2.000 h/an, capacitatea punctului termic ar trebui sa fie de cca 3.000 MJ/sec. In realitate capacitatea instalata este de doua ori mai mare.

Retelele de distributie, chiar si cele recent reabilitate, sunt proiectate conform unei cereri calculate pe baza standardelor romanesti inca in vigoare, in pofida faptului ca cererea masurata este doar cca 50% din valorile prevazute in STAS-uri si normative (si cererea a fost masurata in ultimii 6-8 ani).

Ar trebui sa fie clar pentru toata lumea cu minime cunostiinte despre sistemele de termoficare, ca un sistem de distributie cu o capacitate dubla si cu puncte termice, in medie de 3 MJ/s nu poate fi fezabil. Asadar, reproiectarea si reconstructia conceptului de distributie a energiei termice sunt necesare.

3.1 Dimensionarea sistemelor de distributie

Lungimea medie a sistemelor de distributie existente este mai mica de doi km, iar punctele termice au o capacitate medie de cca 3 MJ/s.

Evident, numarul de puncte termice ar trebui redus si stabilite dimensiunile fezabila. S-ar putea urma exemplul din Copenhaga, proiectand punctele termice cu o capacitate proiectata de 40-50 MJ/s, ar putea deveni cea mai fezabila solutie. Capacitatile fezabile in Bucuresti vor depinde de densitatea cererii de caldura si de posibilitatile practice.

Cand punctul termic este reconstruit pentru a deveni o statie de schimbatoare de caldura, toate echipamentele pentru prepararea apei calde de consum vor fi dezafectate si numarul schimbatoarelor de caldura pentru incalzire va fi redus la 2 (de la maxim 6 cat sunt in prezent). Asadar, este posibil ca intr-un punct termic sa se instaleze o statie de schimbatoare de caldura cu o capacitate de 20-25 MJ/s. Energia ce urmeaza a fi transportata va fi de aprox. 300 MJ/s (restul fiind produsa local sau descentralizat). Transportul a 300 MJ/s de la statia de schimbatoare de caldura cu o capacitate de 20 MJ/s necesita doar 15 statii de schimbatoare de caldura, the building/area released for other purposes as for example heat storages, installation of decentralised production, parking area or green area/playing grounds.

The new heat exchangers stations shall be sized according to the measured heat demand (not the hot tap water demand as this is supplied from hot water storages). Coming demand side measures shall be considered and a reasonable simultaneous factor should be applied.

insa din motive practice si fizice numarul va fi cu siguranta mai mare – aprox. 50.

Aprox. 580 de puncte termice pot fi dezafectate si cladirea/zona poate fi eliberata pentru alte scopuri, cum ar fi: acumulatoare de caldura, instalatii pentru productie descentralizata, parcare sau spatiu verde/loc de joaca.

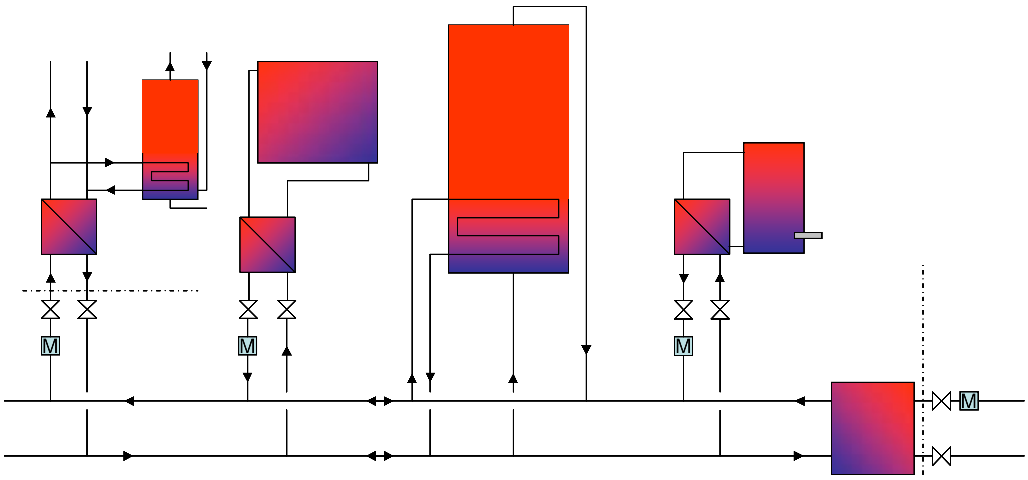
Noile statii de schimbatoare de caldura vor fi dimensionate in conformitate cu necesarul de caldura masurat (nu necesarul de apa calda de consum intrucat acesta este acoperit din acumulatoarele de apa). Se vor lua in considerare viitoarele masuratori ale cererii si se va aplica un factor de simultaneitate rezonabil.

3.2 System layout

The principle layout of the distribution systems is shown in the sketch below:

3.2 Schema sistemului

Schema de principiu a sistemului este distributie este prezentata mai jos:



The interfaces between consumer installation, transmission system and the distribution system are indicated with dotted lines.

The main components shown on the sketch are:

- The consumer installations

  Details about the consumer installations are found in section 2.
- Solar heating installations

  Details about solar system are found in Appendix A. The optimal sizing of solar panels will be about 6 m^2 / (100 to 150) m^2 heated area.
- Heat storage

  Details about heat storages in relation to solar panels are found in Appendix A. The optimal sizing of heat storages is about 50 l storage per m^2 solar panel.
- Peak load boiler

  Peak load boilers operated on biofuels (pellets or liquid) will be installed as reserve and for covering the extreme peaks (the 50 h/y peak). An alternative to installing peak load boilers is to subscribe for a higher capacity from the transmission system but, considering the few hours necessary, this will probably not be feasible.
- Heat exchanger station

  The heat exchanger station will supply heat from decentralised and centralised production facilities when required.

Interfetele dintre instalatia consumatorului, sistemul de transport si sistemul de distributie sunt indicate cu linie punctata.

Componentele principale sunt:

- Instalatiile consumatorului

  Detaliile privind instalatiile consumatorului sunt prezentate in sectiunea 2.
- Instalatii de incalzire pe baza de energie solara

  Detaliile privind sistemul pe baza de energie solara sunt prezentate in Anexa A. Dimensiunea optima a panourilor solare va fi de aprox. 6 m^2 / (100÷150) m^2 zona incalzita.
- Acumulator de incalzire

  Detaliile privind acumulatoarele de caldura aferente panourilor solare se gasesc in Anexa A. Capacitatea optima a acestora este de cca 50 l acumulare pe m^2 de panou solar.
- Cazan pentru orele de varf

  Cazanele pentru consumul la varf pe baza de biocombustibil (peleti sau lichid) vor fi instalate ca rezerva si vor acoperi consumul de varf (50 h/an). O alternativa la instalarea cazanelor pentru orele de varf este solicitarea unui debit mai mare de la sistemul de transport, insa considerand numarul mic de ore cand acest lucru este necesar, nu ar fi fezabil.
- Statie de schimbatoare de caldura

  Statia de schimbatoare de caldura va furniza caldura de la facilitatile de producere descentralizate si centralizate, cand este necesar.

3.3 Control system

An important component not shown on the sketch in section 3.2 is the control system (load dispatch system).

Overall control principles:

- The consumer controls the consumption by opening or closing the thermostatic valves on the radiators and the hot water taps.
- The pumps (at the heat storages or at the heat exchanger station) automatically adjust the speed to maintain the set-point value for pressure drop at the most critical consumer. The load dispatcher determines (programmes the system) to provide heat from the heat storages or from the heat exchanger station.

Technical and economical load dispatch.

3.3 Sistemul de automatizare

O componenta importanta care nu a fost inclusa in schita de mai sus, sectiunea 3.2 este sistemul de automatizare (sistemul de dispecerizare).

Principiile generale de control sunt:

- Consumatorul controleaza consumul prin deschidere si inchiderea vanelor termostatate instalate pe radiatoare si a robinetelor de apa calda.
- Pompele (din acumulatoarele de caldura sau statia de schimbatoare de caldura) vor ajusta automat viteza pentru a mentine valoare presetata pentru asigurarea caderii de presiune necesare la cel mai defavorizat consumator. Dispecerul comanda (programeaza sistemul) furnizarea de la

According to the marginal costs[1] of heat in the system the load dispatcher optimises and decides within the technical limits of the distribution system:

- When to charge the local storages for hot tap water.
- When to charge or discharge the system heat storages.

3.4 Heat storages

The heat storages are limited to week-to-week storage.

In the summer period the typical function of the storages will be storage from sunny days to rainy days.

In the winter period the heat storages will be used as peak load production lowering the capacity requirement of the distribution system. Thus, the storages are typically charged when the marginal cost is low and discharged when the marginal cost is high. In this respect it is important to understand that also the distribution company must pay capacity fee to the transmission company as the consumers pay capacity fee to the distribution company.

3.5 Cost of heat distribution

Distributed energy

The distributed energy will drop as demand side measures are implemented. The distributed energy is forecasted as:

		Baseline	Short term	Medium term	Long term
Energy distributed	GJ/y	22,000,000	18,550,000	15,100,000	14,000,000

Investment

The necessary investment in the distribution system is calculated based on replacement costs – the value a private investor should invest in terms of taking over

acumulatoarele de caldura sau de la statia de schimbatoare de caldura.

Dispecer considerand aspectele tehnice si economice.

In conformitate cu costurile marginale[1] ale energiei termice in sistem, dispecerul optimizeaza si decide, in limita posibilitatilor tehnice ale sistemului de distributie:

- Cand se incarca acumulatoarele locale pentru apa calda de consum
- Cand se incarca sau sa elibereze acumulatoarele pentru incalzire.

3.4 Acumulatoarele de caldura

Acumulatoarele de caldura sunt limitate la acumularea saptamanala.

In perioada de vara functia tipica a acumulatoarelor va fi acumularea in zilele insorite pentru zilele ploioase.

In perioada de iarna acumulatoarele de caldura vor fi folosite pentru productia de varf scazand cerinta de capacitate a sistemului de distributie. Astfel, acumulatoarele sunt in mod normal incarcate cand costul marginal este mic si descarate cand acesta este mare. In acest sens, este important sa intelegem ca si compania de distributie trebuie sa plateasca o taxa pe capacitate catre compania de transport, la fel cum consumatorii platesc taxa de capacitate companiei de distributie.

3.5 Costul distributiei energiei termice

Energia distribuita

Energia distribuita va scade in momentul introducerii masuratorilor privind cererea. Prognoza privind energia distribuita este dupa cum urmeaza:

		Baza	Termen scurt	Termen mediu	Termen lung
Energia distribuita	GJ/y	22,000,000	18,550,000	15,100,000	14,000,000

Investitia

Investitia necesara in sistemul de distributie este calculata pe baza costurilor de inlocuire – valoarea pe care un investitor privat trebuie sa o investeasca in

[1] The marginal costs are in principle different from hour to hour. The marginal cost can be close to zero in situations where the solar panels produces more heat than consumed and the heat storages are fully loaded. On the other hand, the marginal costs can be infinitively high in situation where there is a lack of production capacity./*Costurile marginale sunt in principiu diferite de la ora la ora. Costul marginal poate fi aproape de zero cand productia provine de la panourile solare si este mai mare decat energia consumata, iar in acest caz acumulatoarele sunt pline. Pe de alta parte, costurile marginale pot fi infinit mai mari in situatia in care nu exista capacitate de productie necesara.*

functional parts of the network and replacing others:

		Baseline	Short term	Medium term	Long term
Network	km	834		1,200	
Replacement cost	EUR/km	1,800,000		800,000	
	EUR	1,501,200,000	-	960,000,000	-
Substations	no	682		50	
Replacement costs	EUR/no	2,500,000		3,000,000	
	EUR	1,705,000,000	-	150,000,000	
Meter installations	no	8,658		8,658	
	EUR/no	1,500		1,000	
	EUR	12,987,000	-	8,658,000	
Total investment	EUR	3,219,187,000	-	1,118,658,000	

The calculated investment does not include any installations inside the buildings apart from the meter installation as internal building installations are assumed private investment in the future (as installing a natural gas boiler today).

Financing

A private investor will request at least 12% interest on his investment based on a financial lifetime of 20 years or less:

		Baseline	Short term	Medium term	Long term
Requirements	EUR	3,219,187,000		1,118,658,000	
Interest	%	10		10	
Period	y	20		20	
Annual cost	EUR	378,124,497		131,397,149	

sensul preluarii partilor functionale ale retelei si inlocuirii celor nefunctionale:

		Baza	Termen scurt	Termen mediu	Termen lung
Retea	km	834		1,200	
Cost de inlocuire	EUR/km	1,800,000		800,000	
	EUR	1,501,200,000	-	960,000,000	-
Puncte termice	nr.	682		50	
Cost de inlocuire	EUR/nr.	2,500,000		3,000,000	
	EUR	1,705,000,000	-	150,000,000	
Instalarea contoarelor	nr.	8,658		8,658	
	EUR/nr.	1,500		1,000	
	EUR	12,987,000	-	8,658,000	
Total investitie	EUR	3,219,187,000	-	1,118,658,000	

Investitia calculata nu include nici o instalatie din interiorul cladirii cu exceptia instalarii contoarelor, investitia viitoare in instalatiile interioare fiind considerata privata (cum ar fi in prezent instalarea unui cazan pe gaze naturale).

Finantarea

Un investitor privat va solicita cel putin 12% dobanda pentru investitia sa avand la baza o durata de viata de viata financiara de 20 de ani sau mai mica:

		Baza	Termen scurt	Termen mediu	Termen lung
Cerinte	EUR	3,219,187,000		1,118,658,000	
Dobanda	%	10		10	
Perioada	an	20		20	
Cost annual	EUR	378,124,497		131,397,149	

Operation and Maintenance

The costs are mainly related to pumping costs and meter maintenance. The steel pipe system can be considered maintenance free apart from moving the ball valves twice per year.

		Baseline	Short term	Medium term	Long term
Operation and maintenance	EUR	64,383,740	43,378,450	22,373,160	22,500,000
	EUR/GJ	2.93	2.34	1.48	1.61

Exploatare si intretinere

Costurile reprezinta in principal costuri de pompare si de intretinere ale contoarelor. Pentru sistemele de conducte se poate considera ca nu au nevoie de intretinere, exceptand actionarea vanelor sferice de doua ori pe an.

		Baza	Termen scurt	Termen mediu	Termen lung
Exploatare si intretinere	EUR	64,383,740	43,378,450	22,373,160	22,500,000
	EUR/GJ	2.93	2.34	1.48	1.61

Tariff structure

The tariff structure is separated in a capacity (fixed) tariff and an energy (variable tariff):

		Baseline	Short term	Medium term	Long term
Capacity tariff	EUR	378,124,497	254,760,823	131,397,149	131,397,149
	EUR/GJ	17.19	12.94	8.70	9.39
Variable tariff	EUR	64,383,740	43,378,450	22,373,160	22,500,000
	EUR/GJ	2.93	2.34	1.48	1.61

The fixed tariff is far the biggest as the cost of operations an existing distribution system is relatively small.

Structura tarifului

Structura tarifului este formata intr-un tarif de capacitate (fix) si un tarif de consum de energie (variabil):

		Baza	Termen scurt	Termen mediu	Termen lung
Tarif de capacitate	EUR	378,124,497	254,760,823	131,397,149	131,397,149
	EUR/GJ	17.19	12.94	8.70	9.39
Tarif variabil	EUR	64,383,740	43,378,450	22,373,160	22,500,000
	EUR/GJ	2.93	2.34	1.48	1.61

Tariful fix este cel mai mare intrucat costul de exploatare a unui sistem de distributie existent este relativ mic.

Tariff development

The current high distribution costs are related to the over-sizing and expensive costs of constructing the 4-pipe systems.

As the systems are reconstructed according to future demand while using standard system layouts and components the distribution tariff will decrease to about 50% of current level.

Dezvoltarea tarifului

Costurile existente mari in sistemul de distributie sunt legate de supradimensionare si de costurile ridicate pentru construirea unui sistem cu 4 conducte.

Intrucat sistemele vor fi reconstruite pe baza necesarului viitor si folosind solutii, sisteme si componente standard, tariful de distributie va putea scadea la aprox. 50% fata de nivelul actual.

4 TRANSMISSION SYSTEM

The current transmission system is about 510 km double pipe. The main influence on a redesigned transmission system will be that the capacity will be reduced to about 300 MJ/s (100 MJ/s from each of the three waste-to-energy facilities) Thus, both the length and the diameters of the transmission system will be significantly reduced.

4.1 Redesign of the system

The purpose of redesign and reconstruction is to establish a modern transmission system in-line with the requirements of the future in terms of production pattern and heat demand.

A redesigned transmission system should consist of one ring with branches to the populated areas of Bucharest and for connection of the three waste-to-energy.

A ring following and using as much as possible of the existing inner ring following Stefan cel Mare, Mihai Bravu, Calea Vacaresti, Sos Oltenitei, Soseaua Vilor, Progresului, B-dul Iuliu Manio, Sos Virtulii, Calea crancasi, Calea Grivitei, Sos Nokolae Titulescu and B-dul Iancu De Hyúredoara will be about 25 km lang.

Branches from the main ring to the West, North-West, North, North-East, East, South-East and South will in average be about 10 km long – about 70 km.

Hence with smaller branches to the about 50 substations the total length of the transmission system should be less than 150 km.

This system will:

- Require much less investment than rehabilitation of the existing primary system.
- Use much less electricity for pumping
- Have much lower heat losses

The distribution companies might establish internal connection between two or more companies. However, this will be for own commercial and/or technical reasons.

The layout of the reconstructed transmission system is outlined with green on the map below:

4 SISTEMUL DE TRANSPORT

Sistemul de transport existent are aprox. 510 km conducte duble. Cea mai mare influenta asupra reproiectarii sistemului de transport o va avea reducerea capacitatii la cca 300 MJ/s (100 MJ/s pentru fiecare dintre cele facilitati de recuperare a energie din deseuri). Astfel, atat lungimea cat si diametrele sistemului de transport vor fi reduse semnificativ.

4.1 Reproiectarea sistemului

Scopul reproiectarii si reconstructiei este de a stabili un sistem de transport modern in conformitate cu cerintele viitoare privind producerea si necesarul de caldura.

Un sistem de transport reproiectat ar trebui sa includa un inel cu racorduri pentru zonele populate ale orasului Bucuresti si pentru conectarea celor trei facilitati de recuperare a energie din deseuri.

Un inel care va folosi pe cat posibil inelul existent si va urma traseul acestuia Stefan cel Mare, Mihai Bravu, Calea Vacaresti, Sos Oltenitei, Soseaua Viilor, Progresului, B-dul Iuliu Maniu, Sos Virtutii, Calea Crangasi, Calea Grivitei, Sos Nicolae Titulescu and B-dul Iancu De Hunedoara va avea o lungime de cca. 25 km.

Ramurile de la inelul principal catre vest, Nord-Vest, Nord, Nord-Est, Est, Sud-Est si Sud vor avea in medie o lungime cuprinsa intre 10 km – 70 km.

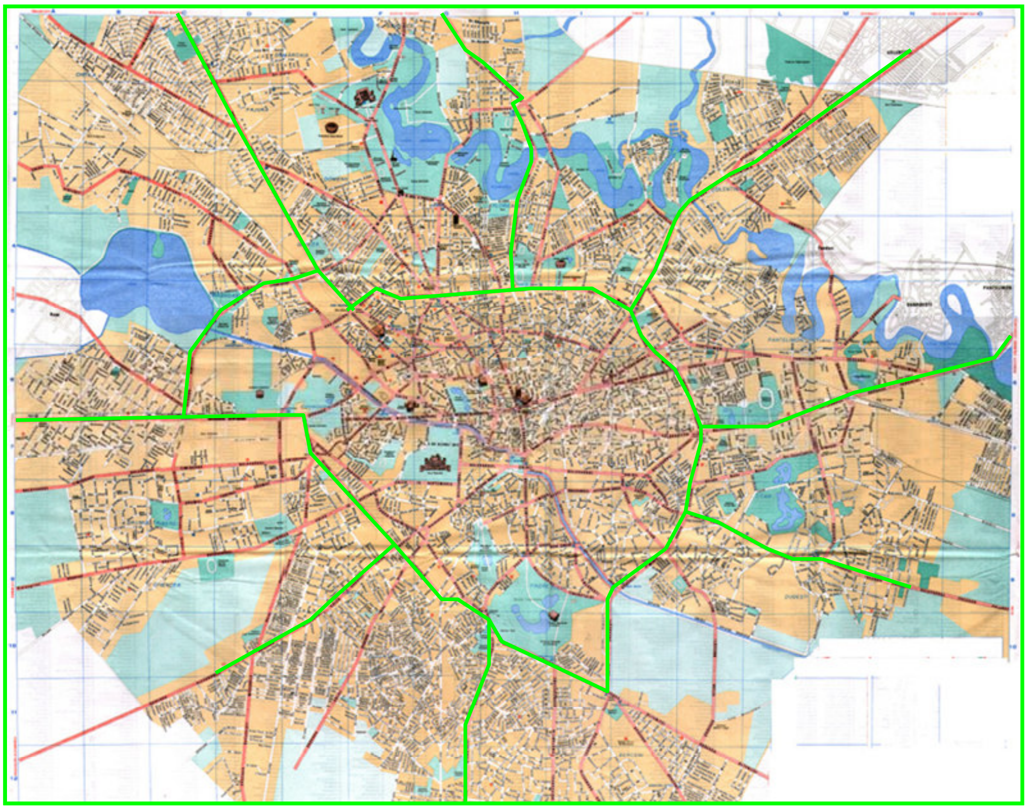
Astfel, considerand racorduri mai mici spre cele aprox. 50 de puncte termice, lungimea totala a sistemului de transport ar trebuie sa fie mai mica de 150 km.

Acest sistemul va:

- Necesita o investitie mai mica decat reabilitarea sistemului primar existent.
- Folosi mult mai putina energie electrica pentru pompare.
- Avea pierderi de caldura mult mai mici.

Companiile de distributie ar putea stabili conectari interne intre doua sau mai multe companii. Totusi, aceasta se va realiza din motive comerciale si/sau tehnice.

Schema sistemului de transport reconstruit este marcat cu verde pe harta de mai jos:



The current transmission system has pipes with diameter of 1,200 mm on main pipes at the largest power plants. The average diameter is about 600 mm.

The new waste to energy should each be connected to the transmission system at least at two points. The largest diameter in the reconstructed system will be DN 600 mm.

Sistemul de transport existent are conducte cu diametru de 1.200 mm, magistrale conectate la cele mai mari CET-uri. Diametrul mediu este de aprox. 600 mm.

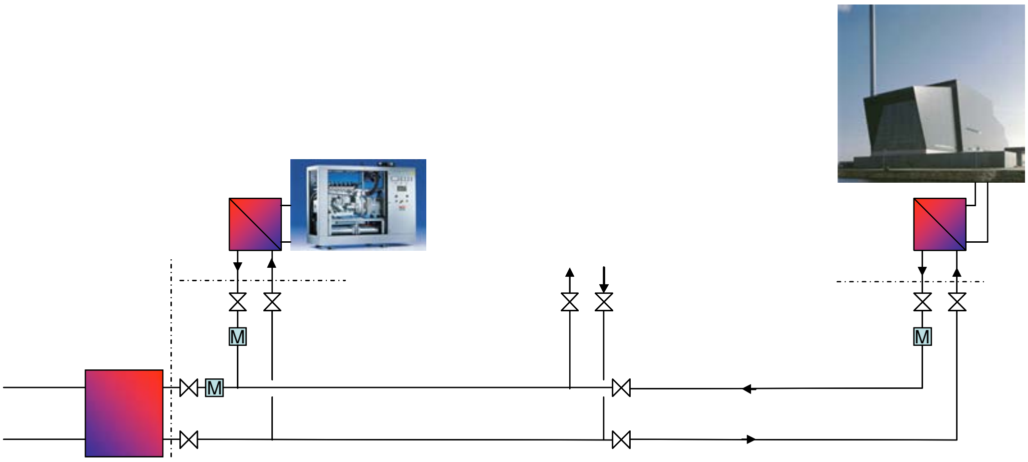
Fiecare dintre facilitati de recuperare a energie din deseuri noi trebuie conectate la sistemul de transport in cel putin doua puncte. Diametrul cel mai mare in sistemul reconstruit va fi DN 600 mm.

4.2 System layout

The principle layout of the transmission system is outlined the sketch below:

4.2 Schema sistemului

Schema de principiu a sistemului de transport este marcata prezentata in schita de mai jos.



The transmission system connects the three waste-to-energy facilities to the about 50 heat exchanger stations. Decentralised CHP units shall be installed at strategically selected heat exchanger stations ensuring satisfactory supply of all substations.

Sistemul de transport conecteaza cele trei facilitati de recuperare a energie din deseuri la aprox. 50 de statii de schimbatoare de caldura. Unitatile de cogenerare descentralizate vor fi instalate in statiile de schimbatoare de caldura strategic selectate pentru a asigura o furnizare satisfacatoare pentru toate punctele termice.

4.3 Technical and economical load dispatch

4.3 Dispecerizarea tehnica si economica

An organisation for performing technical and economical load dispatch must be established. This organisation does not necessary be the owner of the transmission system but an operator of the system based on a concession.

Trebuie sa se stabileasca o organizatie pentru dispercerizarea economica si tehnica. Aceasta organizatie nu trebuie sa fie proprietarul sistemului de transport, poate fi un operator al sistemului stabilit in baza unei concesiuni.

Definition

Technical and economical load dispatch means that the demand of the distribution companies shall be fulfilled cheapest possible within the technical limitations of the system and in accordance with safety instructions.

Definitie

Dispecer tehnic si economic inseamna ca, cererea companiilor de distributie va fi indeplinita la un cost cat mai mic posibil in limitele tehnice ale sistemului cu respectarea normelor de siguranta.

Governing principle

The governing principle is that all distribution companies shall receive heat from the transmission system at the same price. Heat from the transmission system is heat produced by the waste-to-energy facilities and the decentralised CHP units.

Principiul de baza

Principiul de baza consta in faptul ca toate companiile de distributie vor primi energie termica de la sistemul de transport la acelasi pret. Energia termica de la sistemul de transport este energia produsa de facilitati de recuperare a energie din deseuri si unitatile de cogenerare descentralizate.

Principles for load dispatch

Principiile pentru dispecer

The load dispatcher calculate each weak the heat demand for each heat exchanger stations and decides the optimal production pattern on hourly basic. If there is foreseen any limitations in supply to any of the heat exchanger stations this is informed to the distribution company enable them to prepare for production from heat only boilers.

The load dispatcher must respect the following general

Dispecerul calculeaza in fiecare saptamana necesarul de caldura pentru fiecare statie de schimbatoare de caldura si decide modul de producere optim pe baze orare. Daca apare o problema in alimentarea oricarei statii de schimbatoare de caldura, aceasta este comunicata companiei de distributie permitandu-I sa se pregateasca pentru producerea energiei termice de la cazanele pentru acoperirea varfului de consum.

Dispecerul trebuie sa respecte urmatoarea ordine a priority:

1. Solar energy
2. Waste-to-energy
3. Decentralised CHP
4. Heat only boilers

After performing the load dispatch the load dispatcher calculate what the electrify production will be and inform this to the power system dispatcher.

4.4 Cost of heat transmission

Transmitted energy

The transmission need of the future is related to only the waste-to-energy facilities as all other production will be decentralised or local:

		Baseline	Short term	Medium term	Long term
Energy transmitted	GJ/y	22,000,000	20,000,000	4,064,000	4,064,000

Investment

The necessary investment in the transmission system is calculated based on replacement costs – the value a private investor should invest in terms of taking over functional parts of the network and replacing others:

		Baseline	Short term	Medium term	Long term
Network	km	520	500	150	150
Replacement costs	EUR/km	2,000,000	2,000,000	800,000	800,000
	EUR	1,040,000,000	1,000,000,000	120,000,000	120,000,000
Meter installations	no	682	700	150	150
	EUR/no	6,000	6,000	16,000	15,000
	EUR	4,092,000	4,200,000	2,400,000	2,250,000
Total investment	EUR	1,044,092,000	1,004,200,000	122,400,000	122,250,000

Financing

A private investor will request at least 12% interest on his investment based on a financial lifetime of 20 years or less:

		Baseline	Short term	Medium term	Long term
Requirements	EUR	1,044,092,000	1,004,200,000	122,400,000	122,250,000
Interest	%	12	12	12	12
Period	y	20	20	20	20
Annual cost	EUR	139,781,763	134,441,071	16,386,763	16,366,681

Operation and Maintenance

The costs are mainly related to pumping costs and meter maintenance. The steel pipe system can be considered maintenance free apart from moving the ball valves twice per year.

		Baseline	Short term	Medium term	Long term
Operation and maintenance	EUR	20,881,840	20,084,000	2,448,000	2,445,000
	EUR/GJ	0.95	1.00	0.60	0.60

prioritatilor:

1. Energie solara
2. Recuperarea energie din deseuri
3. Centrala de cogenerare descentralizata
4. CAF

Dupa efectuarea incarcarii sistemului, dispecerul calculeaza energia electrica produsa si va comunica valoarea dispecerului pentru sistemului de energie electrica.

4.4 Costul transportului caldurii

Energia transportata

Transportul necesar pentru viitor este legat doar de facilitatile de recuperare a energiei din deseuri, toate celelalte unitati de producere fiind descentralizate sau locale:

		Baza	Termen scurt	Termen mediu	Termen lung
Energia transportata	GJ/an	22,000,000	20,000,000	4,064,000	4,064,000

Investitia

Investitia necesara in sistemul de transport este calculata pe baza costurilor de inlocuire – valoarea pe care un investitor privat trebuie sa o investeasca in sensul preluarii partilor functionale ale retelei si inlocuirii celor nefunctionale:

		Baza	Termen scurt	Termen mediu	Termen lung
Retea	km	520	500	150	150
Costuri de inlocuire	EUR/km	2,000,000	2,000,000	800,000	800,000
	EUR	1,040,000,000	1,000,000,000	120,000,000	120,000,000
Instalarea contoarelor	nr.	682	700	150	150
	EUR/nr.	6,000	6,000	16,000	15,000
	EUR	4,092,000	4,200,000	2,400,000	2,250,000
Total investitie	EUR	1,044,092,000	1,004,200,000	122,400,000	122,250,000

Finantarea

Un investitor privat va solicita cel putin 12% dobanda pentru investitia sa avand la baza o durata de viata financiara de 20 de ani sau mai mica:

		Baza	Termen scurt	Termen mediu	Termen lung
Cerinte	EUR	1,044,092,000	1,004,200,000	122,400,000	122,250,000
Dobanda	%	12	12	12	12
Perioada	an	20	20	20	20
Cost anual	EUR	139,781,763	134,441,071	16,386,763	16,366,681

Exploatare si intretinere

Costurile reprezinta in principal costuri de pompare si de intretinere ale contoarelor. Pentru sistemele de conducte se poate considera ca nu au nevoie de intretinere, exceptand actionarea vanelor sferice de doua ori pe an.

		Baza	Termen scurt	Termen mediu	Termen lung
Exploatare si intretinere	EUR	20,881,840	20,084,000	2,448,000	2,445,000
	EUR/GJ	0.95	1.00	0.60	0.60

Tariff structure

The tariff structure is separated in a capacity (fixed) tariff and an energy (variable tariff):

		Baseline	Short term	Medium term	Long term
Capacity tariff	EUR	139,781,763	134,441,071	16,386,763	16,366,681
	EUR/GJ	6.35	6.72	4.03	4.03
Variable tariff	EUR	20,881,840	20,084,000	2,448,000	2,445,000
	EUR/GJ	0.95	1.00	0.60	0.60

The fixed tariff is far the biggest as the cost of operations an existing transmission system is relatively small.

Tariff development

The current high transmission costs are related to the over-sizing and fixed flow operation concept.

As the systems are reconstructed according to future production from the waste-to-energy facilities while using standard system layouts and components the transmission tariff will decrease to about 75% of current level.

Structura tarifului

Structura tarifului este formata dintr-un tarif de capacitate (fix) si un tarif de energie (variabil):

		Baza	Termen scurt	Termen mediu	Termen lung
Tarif de capacitate	EUR	139,781,763	134,441,071	16,386,763	16,366,681
	EUR/GJ	6.35	6.72	4.03	4.03
Tarif variabil	EUR	20,881,840	20,084,000	2,448,000	2,445,000
	EUR/GJ	0.95	1.00	0.60	0.60

Tariful fix este cel mai mare intrucat costul de exploatare a unui sistem de transport existent este relativ mic.

Dezvoltarea tarifului

Costurile mari de transport actuale se datoreaza supradimensionarii si conceptului de functionare cu debit constant.

Intrucat sistemele sunt reconstruite in functie de productia viitoare de la facilitatile de recuperare a energiei din deseuri, folosind sisteme si componente standard, tariful de distributie va scadea cu aprox. 75% fata de nivelul actual.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.2007

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Part C: Appendixes

Appendix 4b: Demand forecast

Contract 4144/31.12.2007

Strategia Energetica a Municipiului Bucuresti

Etapa a III a: Strategia

Partea C: Anexe

Anexa 4b: Prognoza cererii

4				
3				
2	15.09.2006	Utility electricity consumptions included	GMCB	haa
1	22.06.2006	First edition	GMCB	haa
0	04.04.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

ATH energ Grontmij | Carl Bro

Table of content

INTRODUCTION

This report was submitted as Part 1 in the Recommendation Report, which shall conclude Phase II of the Project. The report establish the demand for:

- Heating (space heating and domestic hot water), regarding:
  - District Heating
  - Natural gas for individual heating
  - Other means of heating
- Electricity
- Transport
- Other energy consumptions

The starting point for forecasting is data for current demand provided to the Consultant and included in Part I: Estimation Report.

The forecasting is prepared in three scenarios:

Scenario 1: Slow implementation of the strategies.

Scenario 2: Implementation of strategies as recommended and approved. Baseline Scenario.

Scenario 3: Accelerated implementation of the strategies

The often heard hypothesis that the development in demand is related to development in standard of living and increased economical activities in the society is not accepted by the Consultant. The development in demand can be strongly influenced by the governments and authorities by implementing appropriate policies. If the hypothesis was true the energy consumption in the North-European counties would have been 3 to 4 three times higher than it is today.

Thus, once the strategy is discussed, analysed and approved it is the obligation of the authorities to implements measures ensuring that the targets set-out in the strategies are reached.

The national strategy includes a number of high efficient measures to reduce demands. These measures are considered implemented as intended.

The national strategy also includes a number of measures to reduce the environmental impact of energy use. These measures are also considered implemented as indented.

Romania is far behind West-European and especially North-European countries in energy efficiencies, utilisation of renewable resources and energy conservation. The Consultant has assumed that the difference will be narrowed significant, if not eliminated, over the 20-year period we estimate the demand development in this report. How it has been

INTRODUCERE

Acest raport a fost inaintat in Partea I a solutiilor strategice recomandate, care va incheia Etapa a II a a proiectului. Raportul stabileste cererea pentru:

- Caldura (incalzirea spatiilor si apa calda de consum), din punct de vedere al:
  - Sistemul centralizat de incalzire
  - Gaze naturale pentru incalzire individuala
  - Alte solutii de incalzire
- Electricitate
- Transport
- Alte tipuri de energie consumata

Punctul de plecare pentru stabilirea prognozei il reprezinta datele obtinute pentru necesarul actual puse la dispozitia consultantului si care au fost incluse in Partea I: Raportul de evaluare.

Stabilirea prognozei este realizata in trei scenarii:

Scenariu 1: Implementarea lenta a strategiilor.

Scenariul 2: Implementarea strategiilor recomandate si aprobate. Scenariu de baza.

Scenariul 3: Implementarea accelerata a strategiilor.

Ipoteza cel mai adesea auzita, potrivit careia evolutia cererii este strans legata de dezvoltarea standardului de viata si de cresterea activitatilor economice ale societatii, nu este acceptata de Consultant. Dezvoltarea cererii poate fi puternic influentata de guverne si autoritati prin implementarea unor politici corespunzatoare. Daca aceasta ipoteza ar fi fost adevarata, in tarile din nordul Europei consumul de energiei ar fi trebuit sa fie de 3 – 4 ori mai mare decat este in prezent.

Asadar, odata ce strategia este discutata, analizata si aprobata, este obligatia autoritatilor sa implementeze masurile necesare pentru atingerea tintelor stabilite prin strategii.

Strategia nationala include un numar de masuri de inalta eficienta pentru reducerea necesarului de energie. Aceste masuri se considerea ca se vor implementa, asa cum au fost ele formulate.

De asemenea, strategia nationala include un numar de masuri pentru reducerea impactului asupra mediului generat de consumul de energie. Aceste masuri se considerea ca se vor implementa, asa cum au fost ele formulate.

Romania este mult in urma tarilor vestice si in special a celor nordice in ceea ce priveste eficienta energetica, utilizarea resurselor regenerabile si conservarea energiei. Consultantul estimeaza ca diferenta va fi redusa semnificativ, sau chiar va fi possible to bring the former East-Germany almost in-line with the former West-Germany is used as inspiration for the forecasting found in this report.

eliminata, in urmatorii 20 de ani, incepand cu data la care se realizeaza aceasta estimare, in ceea ce priveste evolutia cererii. Modul in care a fost posibila alinierea Germaniei de Est la conditiile din fosta Germanie de Vest este folosit ca inspiratie pentru realizarea prognozei in acest raport.

POSSIBILITIES OF INFLUENCING THE DEMAND

The possibility of the municipality of influencing the demand of energy consumption in Bucharest is very different from source to source

Heating

Being responsible for the heat supply and owner of the district heating network the municipality will have a high potential of influencing the sources of energy used for space heating and preparation of domestic hot water.

The municipality has the authority to establish a heat supply plan determine the means of heat supply in the city.

The municipality has the political possibility of influencing the national energy strategy regarding energy conservation and ensure a fairly share of the national funds available will be allocated to buildings in Bucharest.

Thus, the municipality can decisive influence the heat tariff by implementing the “right” strategy.

Electricity

The municipality is not responsible for electricity supply and has no influence on electricity tariffs.

The municipality might decide to be electricity produced on equal terms as for private producers.

Transport

Transport is today the number one polluter and reason for bad air quality in Bucharest. Being responsible for the environment and the air quality the municipality has the power to restrict transport (use of private cars) in the city and thus indirectly influence the energy consumption for transport.

Other means of energy

Other means of energy demand in Bucharest is insignificant compared to the above mentioned energies and thus also insignificant in relation of elaboration of an Energy Strategy.

POSIBILITATI DE INFLUENTARE A CERERII

Posibilitatea municipalitatii de influentare a cererii de energie in Bucuresti este foarte diferita de la sursa la sursa.

Energia termica

Fiind responsabila pentru furnizarea de energie termica si proprietar al retelelor de termoficare, municipalitatea va avea un potential mare de a influenta sursele de energie folosite pentru incalzire si prepararea apei calde de consum.

Municipalitatea are autoritatea de a stabili un plan de furnizare a energiei termice in oras prin care sa se poata impune modalitatile de furnizare.

Municipalitatea are, din punct de vedere politic, posibilitatea de a influenta strategia energetica nationala in ceea ce priveste conservarea energiei si de a asigura o impartire corecta a fondurilor nationale disponibile cere vor fi alocate cladirilor din Bucuresti.

Asadar, municipalitatea poate influenta decisiv tariful energiei termice prin implementarea unei strategii “corecte”.

Energia electrica

Municipalitatea nu este responsabila pentru furnizarea energiei electrica si nu are nici o influenta asupra tarifului energiei electrice.

Municipalitatea ar putea decide ca energia electrica sa fie produsa in conditii similare cu cele pentru producatorii privati.

Transport

In prezent transportul este poluatorul numarul unu si responsabilul pentru calitatea proasta a aerului in Bucuresti. Municipalitatea, raspunzatoare de calitatea aerului si mediu are puterea de a restrictiona transportul (folosirea autoturismelor private) in oras si astfel, indirect poate influenta consumul de energie pentru transport.

Alte solutiile energetice

Cererea legata de alte solutii energetice in Bucuresti este nesemnificativ comparata cu energiile mentionate mai sus si de asemenea nesemnificativa in ceea ce priveste elaborarea unei strategii energetice.

A. DEMAND FORECAST FOR HEATING

The heat demand for space heating and domestic hot water is currently covered by:

A.1. District Heating: 70%

A.2. Natural gas, individual boilers: 25%

A.3. Other forms of energy: 5%

DISTRICT HEATING

Two main parameters influence the district heating demand:

- Energy conservation
- New connections/reconnection

A.1 Energy conservation

Existing buildings

The current heat demand is about 150 kW/m^2/year in existing buildings. This consumption corresponds to about 70-90 mm mineral wool equivalent insulation and about 20% window area.

The EU-target is 80 to 100 kW/m^2/year for apartment blocks supplied by district heating. This level is implemented in national norms in many district heating countries.

To bring Romania buildings in-line with the EU-target an about 45% reduction in the demand is needed. This energy conservation is possible by internal building measures:

- Repair and modernisation of installation reducing water losses, heat losses and improving the comfort.
- Complete installation of thermostatic valves and heat cost allocates
- Continue replacement of windows and doors.

And by external building measures:

- Concrete rehabilitation and after insulation of the building envelope. Installation of solar panels should be integrated in the new building envelope

A. PROGNOZAREA CERERII PENTRU ENERGIA TERMICA

Cererea de energie termica pentru incalzire si apa calda de consum este in prezent acoperita de

A.1. Sistem centralizat de incalzire: 70%

A.2. Gaz natural, centrale individuale: 25%

A.3. Alte forme de energie: 5%

SISTEMUL CENTRALIZAT DE INCALZIRE

Necesarul de caldura este influentat de doi parametrii importanti:

- Conservarea energiei
- Conectari la sistem/reconectari

A.1 Conservarea energiei

Cladirile existente

Cererea actuala de caldura este de cca 150 kW/m^2/an pentru cladirile existente. Acest consum corespunde unui echivalent de izolatie termica din vata minerala cu o grosime de aprox. 70-90 mm si cu suprafata vitrata de aprox. 20%.

Obiectivul UE este de a obtine o cerere de caldura cuprinsa intre 80 - 100 kW/m^2/an pentru apartamentele din blocurile de conectate la sistemul de termoficare. Aceasta cerinta este implementata in normele nationale din multe tari, in care exista incalzire centralizata.

Pentru ca blocuri din Romania sa poata corespunde obiectivului UE este necesara obtinerea unei reduceri a cererii de energie utila cu aprox. 45%. Acest lucru este posibil prin masuri de conservare a energiei in interiorul cladirilor:

- Repararea si modernizarea instalatii, reducand pierderile de apa, de caldura si imbunatatirea confortului.
- Finalizarea instalarii robinetilor termostatati si a repartitoarelor de costuri
- Continuarea inlocuirii ferestrelor si usilor.

Si in exteriorul cladirilor:

- Reabilitarea fatadei si anveloparea cladirilor. Instalarea panourilor solare trebuie integrata

Example of after-insulation of buildings from the 1930'ties with heating panels integrated.

in anvelopa cladirilor.

Exemplu de postizolatie a cladirilor construite in 1930, la care integrarea panourilor solare a fost facuta odata cu anveloparea.

New buildings

The heat demand in new buildings is higher than in existing buildings due to lack of insulation and large window areas. We estimate the consumption in many new buildings as high as 200 kW/m^2/year.

The EU-target for new buildings in district heating systems is 50 kW/m^2/year.

While the energy performance of new buildings in Romania is out-of-line with international best practice many cities has developed new city area based on a CO_2 neutral concept. High insulation standard (200-300 mm mineral wool equivalent), solar heat and electrical panels integrated in the building structure are the main measures to obtain CO_2 neutrality.

"Ecostaden" in Malmö, Sweden. The new developed harbour area is 100% CO_2 neutral.

Cladirile noi

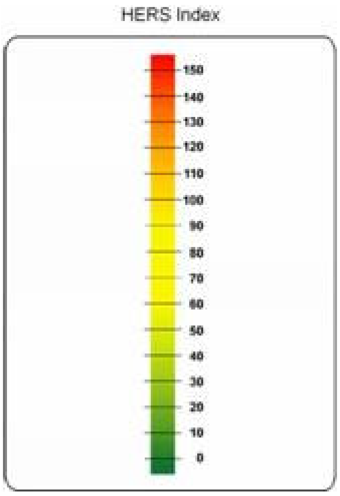
Cererea de caldura in noile cladiri este mai mare decat cea pentru cladirile existente datorita lipsei de izolatie si unei zone vitrate mari. In multe dintre cladirile noi estimam un consum de cca 200 kW/m^2/an.

Obiectivul UE pentru cladiri noi racordate la sisteme de incalzire centralizata este de 50 kW/m^2/an.

In timp ce randamentul energetic al noilor cladiri din Romania nu respecta cele mai bune practici internationale, multe orase au dezvoltat noi zone rezidentiale care au la baza conceptul neutralitatii din punct de vedere al emisiilor de CO_2. Standarde ridicate pentru izolatie (echivalent cu o grosime de 200-300 mm de vata minerala), panouri solare pentru energie termica si electrica integrata in structura cladirii sunt principalele masuri pentru a obtine neutralitatea dpdv al emisiilor de CO_2.

Ecostaden” in Malmö, Suedia. Noua zona oraseneasca din port este 100% neutra dpdv al emisiilor de CO2.

How to bring the new buildings in line with the EU-target and international best practice seems impossible without changing the basic construction, which will be extremely expensive.



The HERS (Home Energy Rating System) index or similar indexes are used by energy auditors to verify the energy consumption standard of buildings. We see that almost all buildings in Bucharest (new and old) will be declared “Red” when the EU-directive on energy audit on buildings is implemented.

Pentru a se putea respecta obiectivul UE precum si a celor mai bune practici internationale, la realizarea noilor cladiri pare imposibila fara modificarea constructiei de baza, ceea ce va fi extrem de scump.

Indexul HERS sau alte indexuri similare sunt folosite de catre auditorii energetici pentru a verifica consumul de energie al cladirii. Astfel, observam ca majoritatea cladirilor din Bucuresti (vechi sau noi) vor fi declarate “Rosu” cand directiva UE privind auditul energetic asupra cladirilor se va implementa.

Case fara emisii de CO_2

Impact on district heating demand

Baseline Scenario

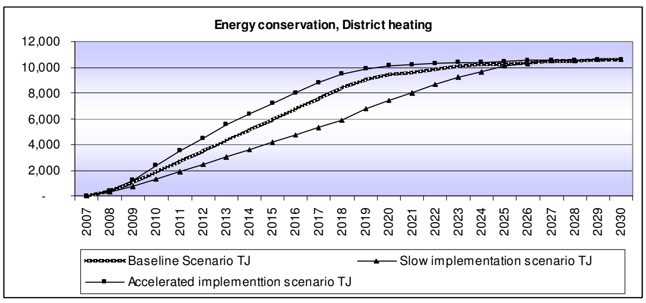
The baseline strategy shall be to obtain an energy conservation of 45% of the 2007 demand, about 9.500 TJ in 2020.

Slow implementation scenario

In the slow implementation scenario the strategy target of 45% energy conservation will be reached in 2023.

Accelerated implementation scenario

45% energy conservation is reached in 2018.



Impactul asupra cererii de caldura

Scenariu de baza

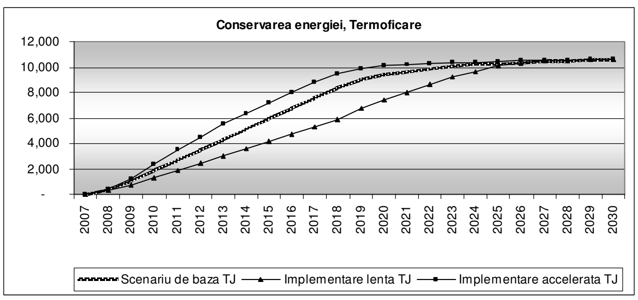
Strategia de baza este de a obtine o conservare a energiei de 45% din cererea aferenta anului 2007, ceea ce inseamna aprox. 9.500 TJ in 2020.

Scenariu privind implementarea lenta

In acest scenariu tinta strategiei de conservare a energie in proportie de 45% va fi atinsa in anul 2023.

Scenariul privind implementare accelerata

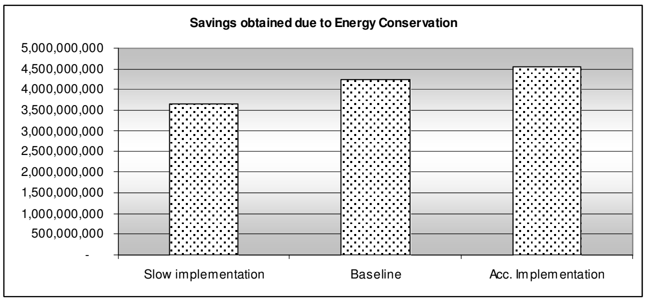
Conservarea energiei in proportie de 45% va fi atinsa in anul 2018.



Savings obtained due to energy conservation

The total obtained savings for the consumers (and lost income for the district heating system) in the period 2007 – 2030 are in 2007 value (25 EUR/GJ):

Slow implementation	3,600,000,000 EUR
Baseline Scenario	4,200,000,000 EUR
Accelerated implementation	4,550,000,000 EUR



A.2 New connections / reconnection

More consumers in district heating areas have disconnected from the district heating system and are now heated by natural gas (individual boilers).

When decided that the future means of heating in Bucharest shall be district heating it must be enforced that current consumers heated by natural gas connect to the district heating system or establish supply from renewable sources. The connection must be promoted by keeping the district heating prices at current level (if possible even reduce the tariff) while natural gas increase prices according to market conditions, expected 5-7% p.a.

The possible quantity of new connection/reconnection is about 7,300 TJ in 2007, which correspond to about 4,000 TJ in 2020 in the baseline scenario after energy conservation options are implemented as described in previous section.

Impact on District Heating Demand

Baseline Scenario

The target of connecting 4,000 TJ will be reached in 2020.

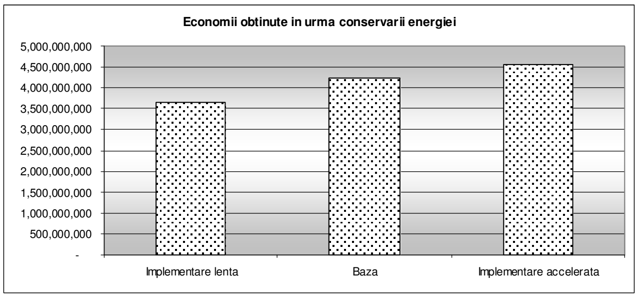
Slow implementation scenario

The target will be reached in 2025

Economii obtinute in urma conservarii de energie

Economiile totale obtinute pentru consumatori (si pierderi de venituri pentru sistemul de termoficare) in perioada 2007-2030 sunt la valoare din anul 2007 (25 EUR/GJ):

Implementare lenta	3.600.000.000 EUR
Scenariu de baza	4.200.000.000 EUR
Implementare accelerata	4.550.000.000 EUR



A.2 Noi conectari/reconectari

Multi consumatori din zonele cu incalzire centralizata s-au debransat de la sistemul de termoficare si sunt in prezent incalzite pe baza de gaz natural (centrale individuale).

Cand se va hotari ca solutia viitoare de incalzire in Bucuresti va fi incalzirea centralizata trebuie sa se impuna consumatorilor actuali cu incalzire individuala pe baza de gaz natural sa se conecteze la sistemul de termoficare sau sursa lor de caldura sa provina din surse regenerabile. Conectarea trebuie promovata prin mentinerea preturilor energiei termice la nivelul actual (daca este posibil chiar sa se reduca tariful) in timp ce pretul gazului natural va creste in conditiile pietei, cu aprox. 5-7% pe an.

Numarul posibil al noilor conectari/reconectari este de aprox. 7.300 TJ in 2007, care corespunde cu aprox. 4.000 TJ in 2020 in scenariul de baza dupa implementarea optiunilor de conservare a energiei conform descrierii de mai sus.

Impactul asupra cererii de caldura

Scenariul de baza

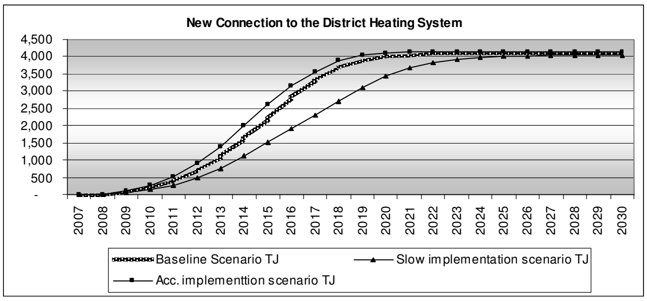
Tinta privind conectarea de 4.000 TJ si care va fi atinsa in anul 2020.

Scenariul privind implementarea lenta

Tinta va fi atinsa in 2025.

Accelerated implementation scenario

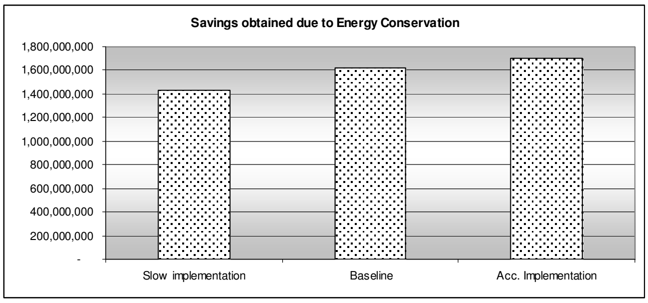
The target will be reached in 2018



Additional Income for the District Heating System

The total additional income for the district heating system in the period 2007 – 2030 are in 2007 value (25 EUR/GJ):

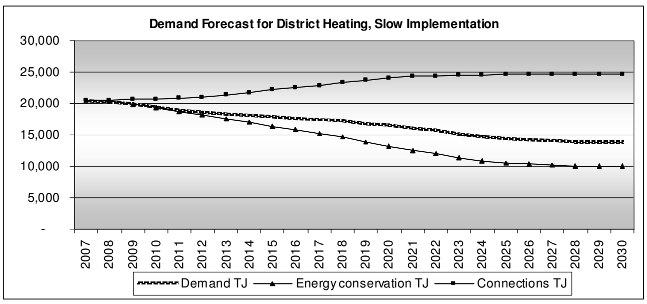
Slow implementation	1,435,000,000 EUR
Baseline Scenario	1.625,000,000 EUR
Accelerated implementation	1,698,000,000 EUR



A.3 Energy Demand Forecast

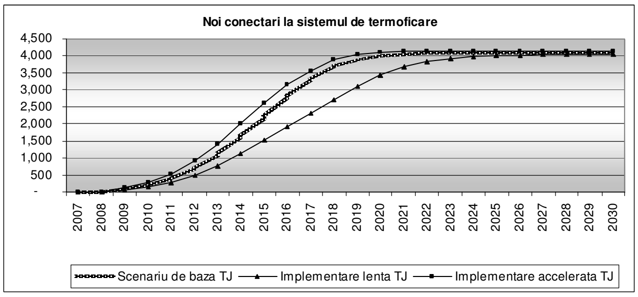
The demand forecast established based on the impact of energy conservation and connection of new consumers is:

Slow implementation scenario



Scenariul privind implementarea accelerata

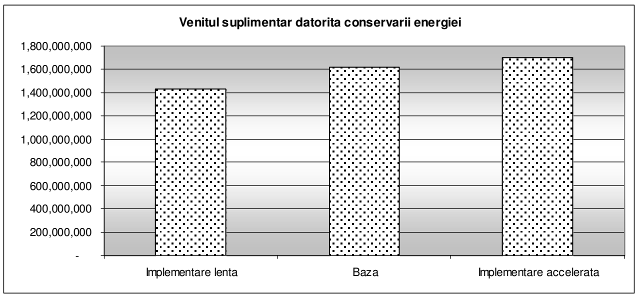
Tinta va fi atinsa in anul 2018.



Venit suplimentar pentru sistemul de termoficare

Venitul total suplimentar pentru sistemul de termoficare in perioada 2007-2030 este la valoare din anul 2007 (25 EUR/GJ):

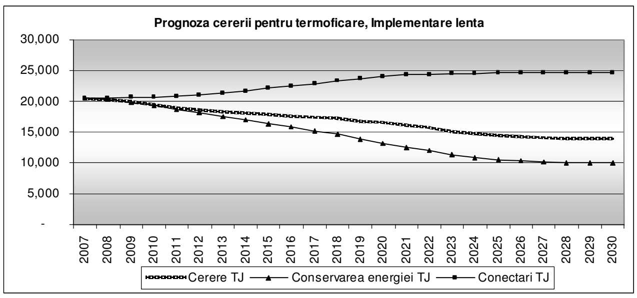
Implementare lenta	1.435.000.000 EUR
Scenariu de baza	1.625.000.000 EUR
Implementare accelerata	1.698.000.000 EUR



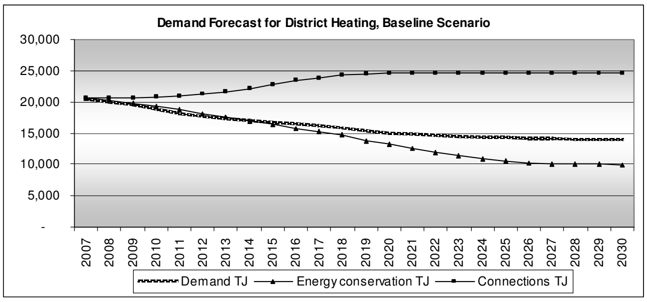
A.3 Prognoza cererii de energie

Prognoza cererii stabilita pe baza impactului generat de implementarea masurilor de conservare a energiei si conectarii unor noi consumatori este:

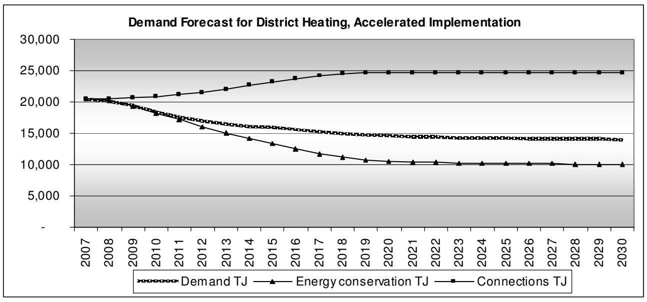
Scenariul privind implementarea lenta



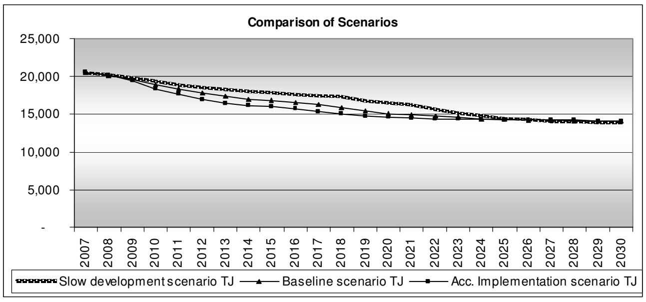
Baseline scenario



Accelerated Implementation Scenario



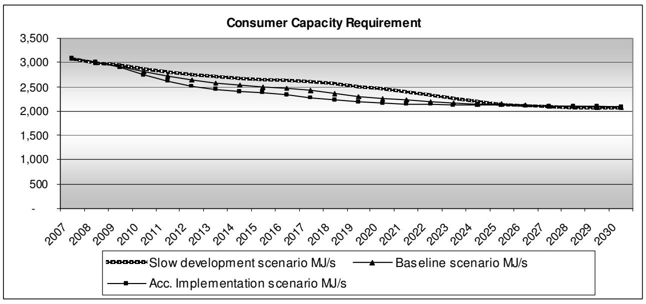
Comparison of scenarios



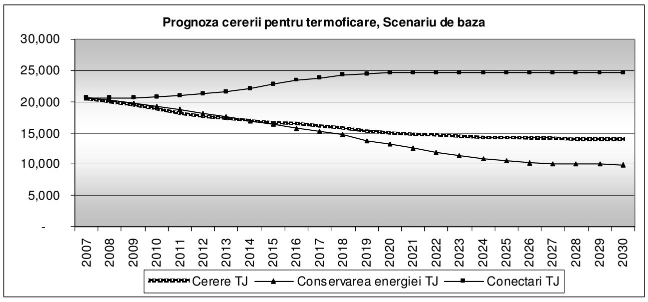
The demand will decrease from 20.580 TJ in 2007 to 14,040 TJ in 2030 in all scenarios.

A.4 Capacity demand forecast

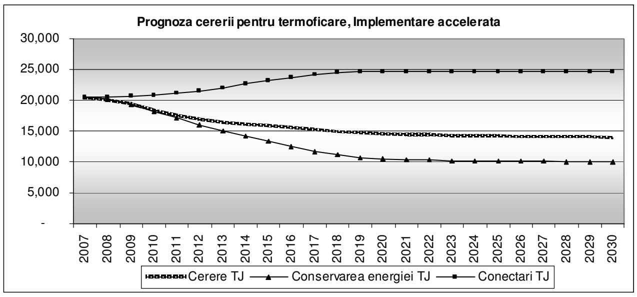
The capacity demand is established based on 1,850 h equivalent full load. Over time the utilisation hours will increase as heat storage and local production are installed.



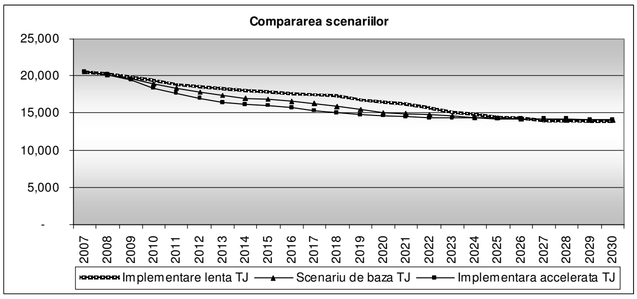
Scenariul de baza



Scenariul privind implementarea accelerata



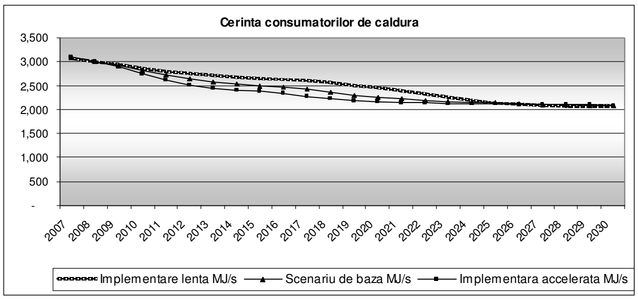
Compararea scenariilor



Cererea va scadea de la 20.580 TJ in 2007 pana la 14.040 TJ in 2030 in toate scenariilor.

A.4 Prognoza capacitatii cererii

Capacitatea cererii este stabilita pe baza a 1.850 de ore de incarcare maxima. In timp, orele de functionare vor creste ca urmare a instalarii sistemelor de acumulare a caldurii si obtinerii caldurii din surse locale.

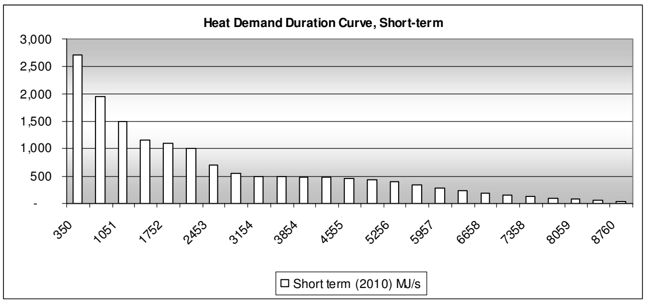


A.5 Demand duration

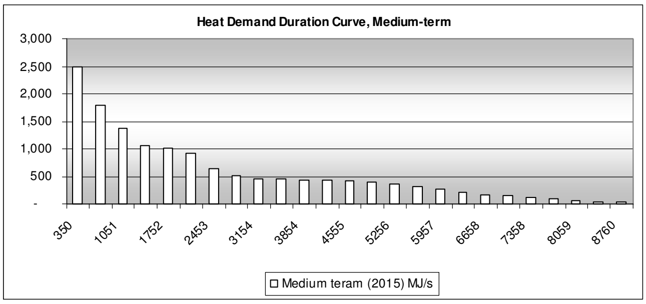
The peak load at -18 ^{0}C is today about 3,600 MJ/sec at the consumer level. However, this demand is only seen about 6 x 1 hour per year in clear weather early and it is not necessary to supply this demand as the natural heat accumulation of the buildings prevent the indoor temperature to drop significant below 21 ^{0}C.

Common used design criteria are the average demand for the top 350 hours. This criterion should ensure an indoor temperature not below 18 ^{0}C and will reduce the design value from 3,600 MJ/sec to about 2,700 MJ/sec, leading to significant reduced investments.

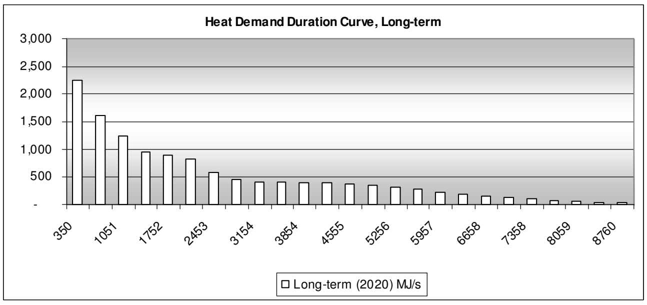
Short-term demand duration curve



Medium-term demand duration curve



Long-term demand duration curve

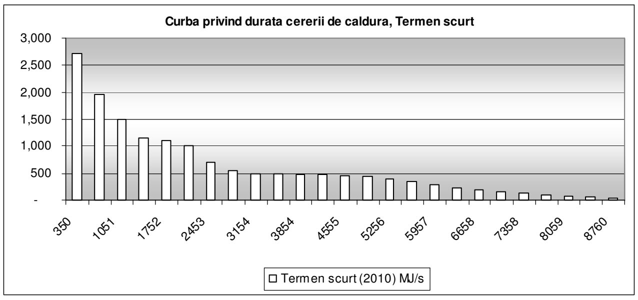


A.5 Durata cererii

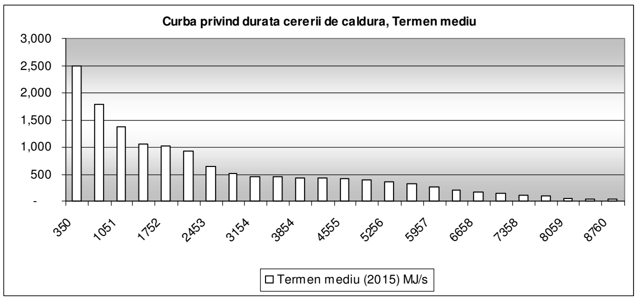
In prezent, incarcarea maxima, pentru -18 ^{0}C, la nivelul consumatoilor este de cca 3.600 MJ/sec. Totusi, aceasta situatie se poate intalni doar 6 x 1 ore pe an in conditii meteorologice bune si nu este necesar sa se asigure aceasta cerere intrucat acumularea naturala de caldura din cladiri previne scaderea semnificativa a temperaturii interioare sub 21 ^{0}C.

Criteriile uzuale de proiectare folosite iau in considerare o medie de 350 de ore aferente incarcarii maxime. Acest criteriu trebuie sa asigure o temperatura interioara de cel putin 18 ^{0}C si va reduce valoarea de proiectare de la 3.600 MJ/sec la cca 2.700 MJ/sec, conducand astfel la o reducere reducand semnificativa a investitiilor.

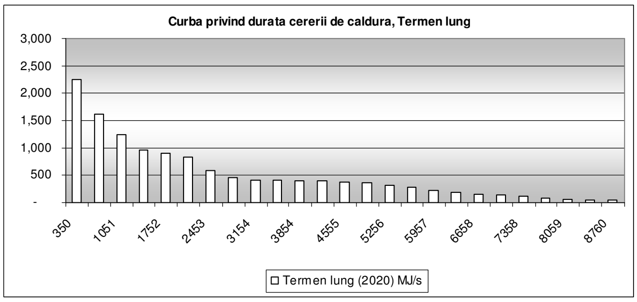
Curba privind durata cererii pe termen scurt



Curba privind durata cererii pe termen mediu



Curba privind durata cererii pe termen lung



NATURAL GAS

The same two main parameters to influence the demand for natural gas for space heating and domestic hot water are:

B.1 Energy conservation

B.2 Disconnection / Connection

A.6 Energy Conservation

The potential of energy conservation is the same in district heating supplied buildings as in natural gas supplied buildings. Thus the same assumption of 45% energy conservation by 2020 is used for the forecasting.

Impact on natural gas demand

Baseline Scenario

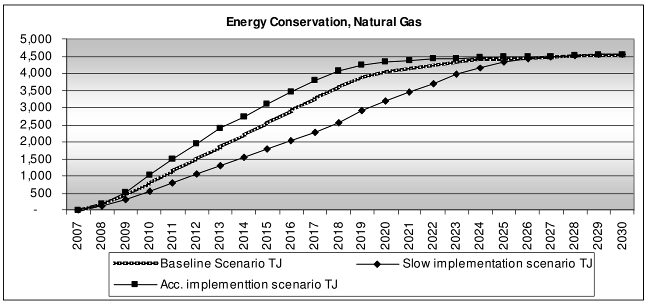
The baseline strategy shall be to obtain an energy conservation of 45% of the 2007 demand, about 4,050 TJ in 2020.

Slow implementation scenario

In the slow implementation scenario the strategy target of 45% energy conservation will be reached in 2023.

Accelerated implementation scenario

45% energy conservation is reached in 2018.



Savings obtained due to energy conservation

The total obtained savings for the consumers (and lost income for the natural gas system) in the period 2007 – 2030 are in 2007 value (14 EUR/GJ):

Slow implementation 875,350,000 EUR

GAZUL NATURAL

Cei doi parametrii principali care influenteaza cererea de gaz natural pentru incalzire si apa calda de consum sunt:

B.1 Conservarea energiei

B.2 Debransarea/ Conectarea

A.6 Conservarea energiei

Potentialul privind conservarea energiei este acelasi atat pentru cladirile conectate la sistemul de termoficare cat si pentru cele cu incalzire pe gaz natural. Asadar, pentru prognozare de va folosi aceeasi estimare si anume aceea de a se obtine 45% conservarea energiei pana in 2020.

Impactul asupra cererii de gaz natural

Scenariul de baza

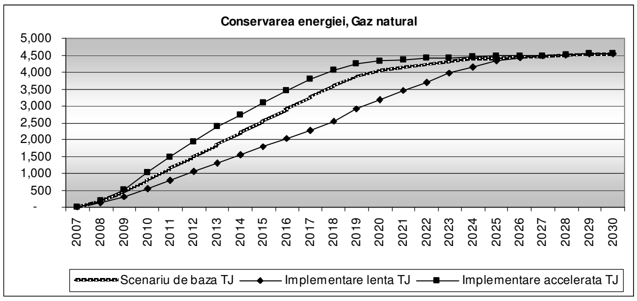
Strategia de baza este de a obtine o conservare a energiei de 45% din cererea aferenta anului 2007, aprox. 4.050 TJ in 2020.

Scenariul privind implementarea lenta

In scenariul cu o implementare lenta, tinta strategiei privind 45% conservarea energiei va fi atinsa in 2023.

Scenariul privind implementarea accelerata

45% conservarea energiei va fi atinsa in 2018.

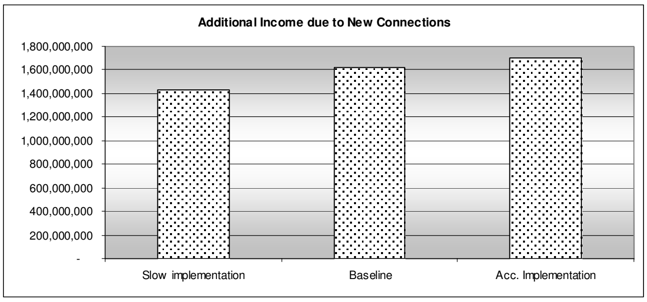


Economii obtinute datorita conservarii de energie

Economiile totale obtinute pentru consumatori (si venit pierdut pentru sistemul de gaz natural) in perioada 2007 – 2030 sunt, la valoarea din 2007 (14 EUR/GJ):

Implementare lenta 875.350.000 EUR

Baseline Scenario	1.015,000,000 EUR
Accelerated implementation	1,092,000,000 EUR



A.7 Disconnection/Connection

Obtaining the strategically goal of CO_2 neutrality in 2020 means that all current natural gas supplied buildings must the connected to the district heating system or change the supply to other means of renewable energy.

Impact on natural gas demand

Baseline Scenario

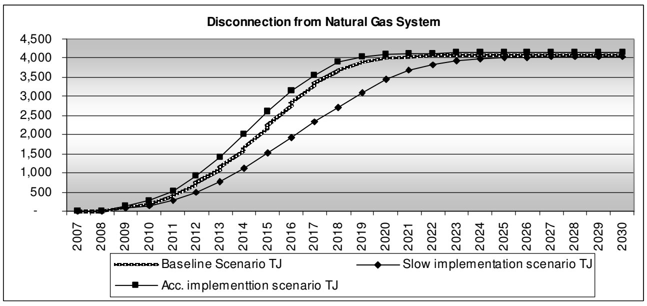
The target of connecting natural gas consumers to the district heating system will be reached in 2020.

Slow implementation scenario

The target will be reached in 2025

Accelerated implementation scenario

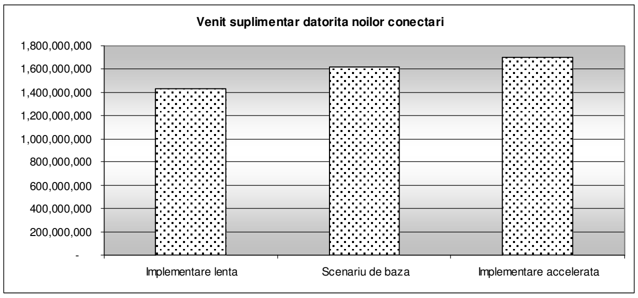
The target will be reached in 2018



A.8 Energy Demand Forecast

The demand forecast is established based on current demand and expected development regarding energy conservation and disconnection from the natural gas system.

Scenariu de baza	1.015.000.000 EUR
Implementare accelerata	1.092.000.000 EUR



A.7 Debransarea/Conectarea

Obtinerea scopului strategic privind neutralitatea dpdv al emisiilor de CO_2 in anul 2020, inseamna ca toate cladirile alimentate cu gaz natural trebuie sa se conecteze la sistemul de termoficare sau sa inlocuiasca gazul natural cu alte surse de energie regenerabile.

Impactul asupra cererii de gaz natural

Scenariul de baza

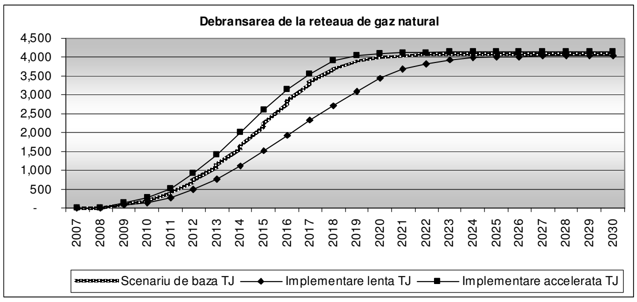
Tinta privind conectarea consumatorilor de gaz natural la sistemul de termoficare va fi atinsa in 2020.

Implementarea lenta

Tinta va fi atinsa in 2025.

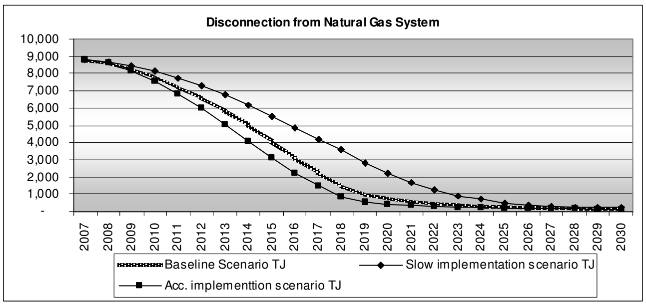
Implementarea accelerata

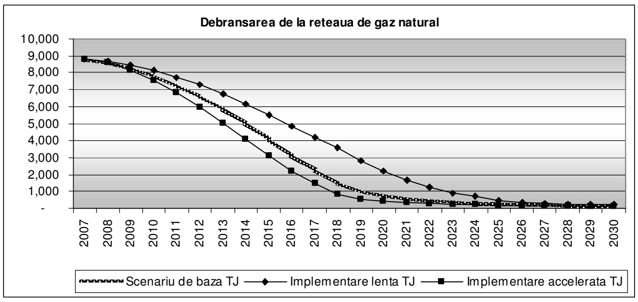
Tinta va fi atinsa in 2018.



A.8 Prognoza cererii de energie

Prognoza cererii este stabilita pe baza cererii actuale si evolutiei asteptate privind conservarea energiei si debransarea de la reteaua de gaz natural.


Disconnection from Natural Gas System
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Baseline Scenario TJ
Slow implementation scenario TJ
Acc. implementtion scenario TJ


Debransarea de la reteaua de gaz natural
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Scenariu de baza TJ
Implementare lenta TJ
Implementare accelerata TJ

OTHER MEANS OF HEATING

Other means of energy for space heating and preparation of domestic hot water is assumed staying at an insignificant level. Current means in mind are mainly electrical, liquid gas, geothermal and renewable energy, not connected to the collective district heating or natural gas systems.

CO2 emitting means must be changed to CO2 neutral means such as biomass, heat pumps, solar panels and similar.

ALTE MIJLOACE DE INCALZIRE

Celelalte solutii de incalzire a spatiilor si de preparare a apei calde de consum se considera a fi la un nivel nesemnificativ. Solutiile actuale luate in considerare sunt in principal electricitatea, gazul lichefiat si energia regenerabila, neconectate la sistemele centralizate de incalzire sau la reteaua de gaz natural.

Solutiile de producere a energiei care emit CO_2 trebuie inlocuite cu altele neutre din punct de vedere al emisiilor de CO_2, cum ar fi biomasa, pompele de caldura, panourile solare si altele similare.

B. ELECTRICITY

The Municipality has only limited influence on the electricity demand in Bucharest. Thus, the Consultant has not analysed and prepared any recommendation in this respect. Thus, the data in this section are the data obtained during data collection.

B.1 Current Energy Demand

The energy demand was in 2007 4,427 GWh, distributed as follows:

Consumatorii casnici	29.4 %
Industrie	23.9 %
Transport, depozitare si comunicatii	10.2 %
Comert	7.2 %
Iluminat	1.1 %
Alte consumatori	28.2 %

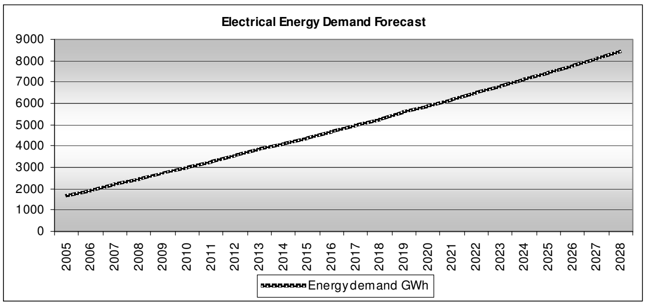
B.2 Current Capacity Demand

The peak demand was in 2007 1.449 MW, distributed as follows:

Consumatorii casnici	28.7 %
Industrie	23.8 %
Transport, depozitare si comunicatii	10.5 %
Comert	7.2 %
Iluminat	0.9 %
Alte consumatori	28.9 %

B.3 Energy Demand Forecast

The energy demand is expected to increase to 8,489 GWh by 2028.



B. ENERGIA ELECTRICA

Municipalitatea are o influenta limitata asupra cererii de energie electrica in Bucuresti. Asadar, Consultantul nu a analizat si nu a facut nici o recomandare in acest sens. Datele din aceasta sectiune sunt obtinute in urma colectarii de date.

B.1 Cererea de energie actuala

Cererea de energie in 2007 a fost de 4.427 GWh, distribuita dupa cum urmeaza:

Consumatorii casnici	29,4 %
Industrie	23,9 %
Transport, depozitare si comunicatii	10,2 %
Comert	7,2 %
Iluminat	1,1 %
Alte consumatori	28,2 %

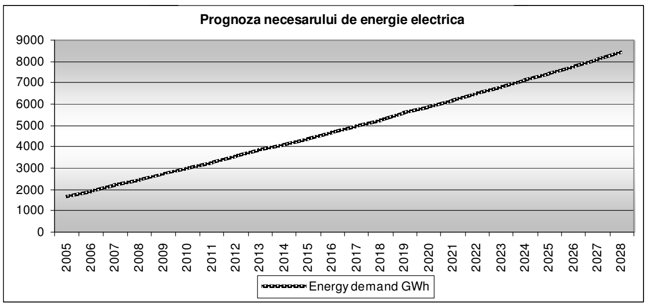
B.2 Cererea de capacitate actuala

Cererea la varf in 2007 a fost de 1.449 MW, distribuita dupa cum urmeaza:

Consumatorii casnici	28,7 %
Industrie	23,8 %
Transport, depozitare si comunicatii	10,5 %
Comert	7,2 %
Iluminat	0,9 %
Alte consumatori	28,9 %

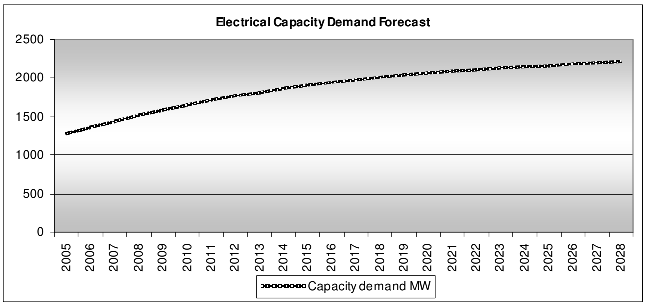
B.3 Prognoza cererii de energie

Se estimeaza ca pana in anul 2028 cererea de energie va creste la 8.489 GWh.



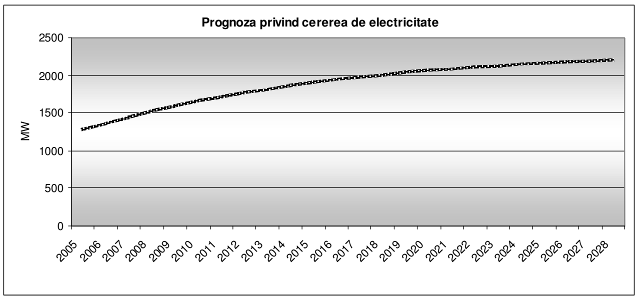
B.4 Capacity Demand Forecast

The capacity demand is expected to increase from currently 1,449 MW to 2,216 MW in 2028.



B.4 Prognoza cererii de capacitate

Se estimeaza ca pana in anul 2028 cererea de electricitate va creste de la 1.449 MW la 2.216 MW.

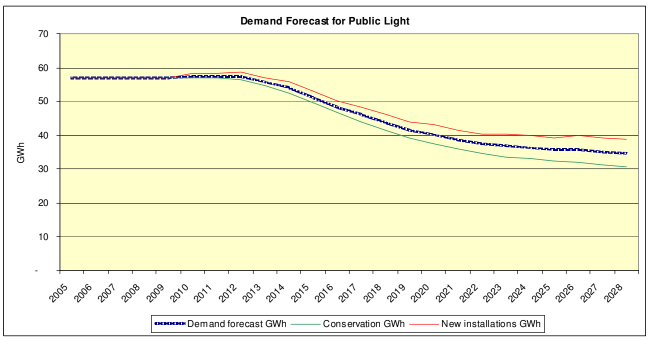


B.5 Electricity for public light

The forecast obtained from the operator of the public light system estimate an unchanged consumption at 57 GWh/year for the future.

The Consultant has established a demand forecast based on implementation of the EU directive regarding use of energy conservation bulbs with efficiency above 60% and abandon of the traditional bulbs with efficiency in the level of 5%.

The forecast is prepared in respect of the fact that a number of bulbs in Bucharest are already low energy bulbs and additional public light established in the future.

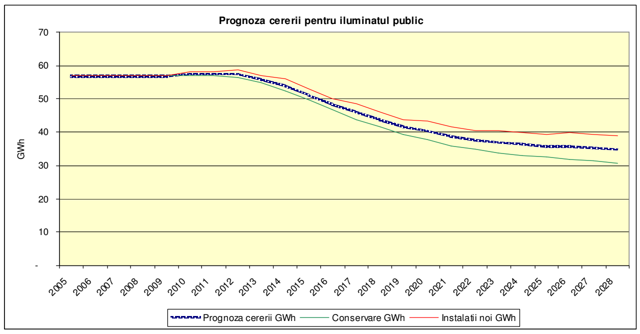


B.5 Electricitate pentru iluminat public

Prognoza pe care am obtinut-o din partea operatorului pentru sistemul de iluminat public estimeaza ca in viitor consumul va ramane nemodificat si anume 57 GWh/an.

Consultantul a stabilit o prognoza a consumului pe baza implementarii directivelor UE referitor la utilizarea surselor de iluminat cu eficienta ridicata de aproximativ 60% si renumtarea la sursele cu incandescenta a caror eficienta este la un nivel de 5%.

Prognoza este intocmita tinand cont de faptul ca in Bucuresti inca exista un anumit numar de surse clasice cu incandescenta si ca iluminatul public trebuie extins in viitor.



B.6 Electricity for trams

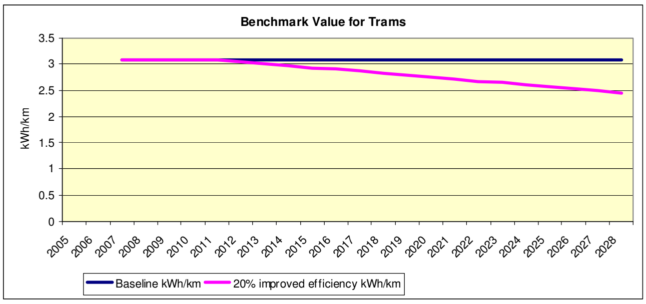
The operator of the tram system has submitted a forecast of unchanged benchmark value of 3.08 kWh/km for the future.

The Consultant has established a demand forecast based on the assumption that modern technology with at least 20% lower energy consumption will be introduced. The benchmark will thus develop:

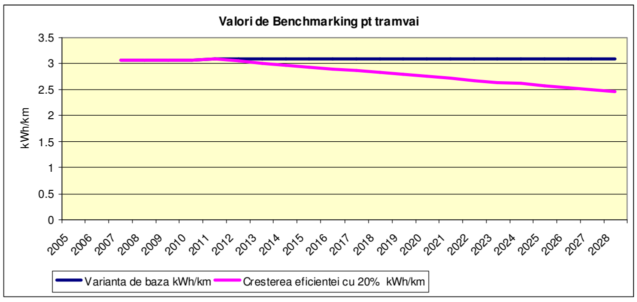
B.6 Electricitate pentru tramvaie

Operatorul de servicii pentru sistemul de transport public cu tramvaie a transmis o prognoza pentru o valoare de benchmarking pe care o considera ca nu de va modifica in viitor si anume va fi de 3.08 kWh/km.

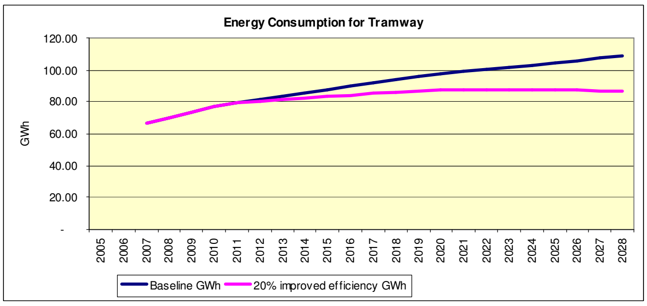
Consultantul a stabilit o prognoza a cererii pe baza supozitiei ca tehnologia moderna va putea introduce o scadere a consumului de energie cu cel putin 20% .



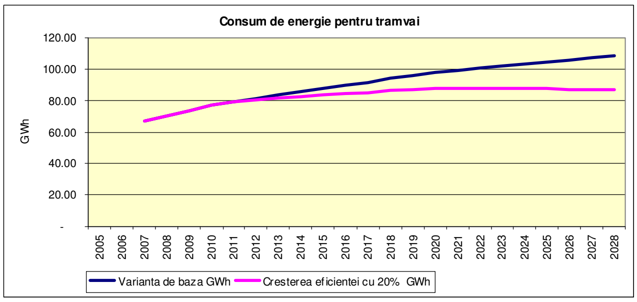
Valoarea de benchmarking va deveni astfel:



In energy consumption will be correspondingly lower. However, increased tram operation (more driving) will result in an increased consumption:



In ceea ce priveste consumul de energie se va resimti proportional aceeasi reducere. Totusi, cresterea traficului pentru tramvaie va conduce la cresterea consumului:



B.7 Electricity for trolley busses

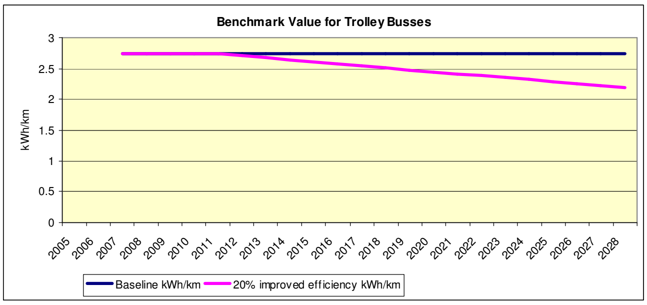
The operator of the trolley busses has submitted data based on which an unchanged benchmark value of 2.74 kWh/km for the future can be calculated.

The Consultant has established a demand forecast based on the assumption that modern technology with at least 20% lower energy consumption will be introduced. The benchmark will thus develop:

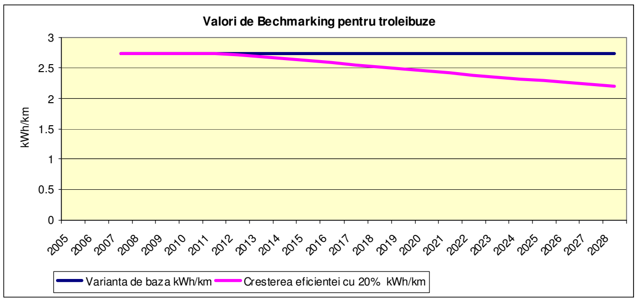
B.7 Electricitate pentru troleibuze

Operatorul de servicii pentru sistemul de transport public cu troleibuze a transmis informatii pe baza carora s-a calculat valoarea de benchmarking de 2.74 kWh/km si care in viitor se considera ca va ramane neschimbata.

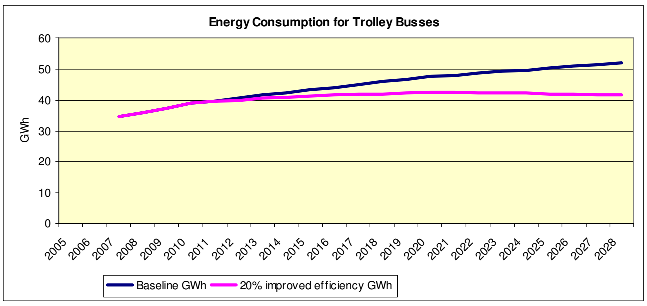
Consultantul a stabilit o prognoza a cererii pe baza supozitiei ca tehnologia moderna va putea introduce o scadere a consumului de energie cu cel putin 20%. Valoarea de benchmarking va deveni astfel:

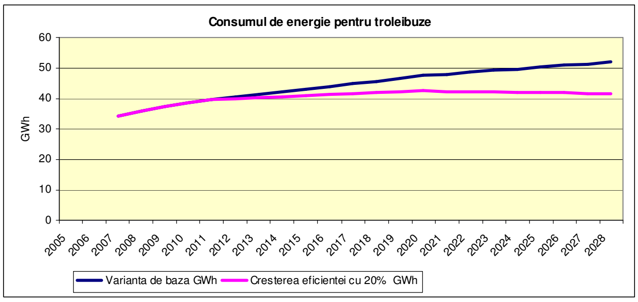


The energy consumption will develop correspondingly but due to increased operation of trolley busses the consumption will still increase:



In ceea ce priveste consumul de energie se va resimti proportional aceeasi reducere, dar cresterea traficului pentru troleibuze va conduce la cresterea consumului:


Energy Consumption for Trolley Busses
GWh
60
50
40
30
20
10
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Baseline GWh
20% improved efficiency GWh


Consumul de energie pentru troleibuze
GWh
60
50
40
30
20
10
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Varianta de baza GWh
Cresterea eficientei cu 20% GWh

C. TRANSPORT

The energy used for transport is today mainly electricity gasoline, diesel and liquid gas.

The following main parameters will influence the energy consumption for transport:

- Number of cars
- Improved efficiency of cars and optimising the traffic control
- Transport restrictions limiting the car driving in Bucharest for certain polluting types of cars.

C.1 Number of Cars and Consumption

The maximum number of cars in Bucharest is passed long ago and it is today impossible to find parking for all cars. The number of car in Bucharest is about 1,200,000.

We estimate that each car drive 3,000 km/y in the city with a consumption of 12 l/100 km. The annual consumption of fuel is thus 432,000,000 l/y ~ 17.200 TJ

C.2 Improved Efficiency

The technologies for car engines is constantly improving and many cars has today a standard consumption better than 5 l/100 km. However, without improving the traffic control and reducing the car density in Bucharest the actual consumption will be far above the standard value.

A solution for increasing the efficiency is to use hybrid cars and electrical cars. This will increase the efficiency from today's about 20% of above 80% and at the same time significantly improve the air quality in Bucharest. If we assume that 50% of the cars allowed to drive in Bucharest will be electrical or hybrids in 2020 the energy consumption will be reduced from today's about 17,200 TJ to about 10,800 TJ.

C.3 Driving restrictions

Sooner or later there will be political will to solve the traffic problems in Bucharest. If the problem is not solved by the local authorities it will be solved by national authorities as future air quality requirements will be enforces.

C. TRANSPORT

In prezent energia folosita pentru transport este in principal energie electrica, benzina, motorina si GPL.

Consumul de energie pentru transport va fi influentat de urmatorii parametrii:

- Numarul de autoturisme
- Imbunatatirea eficientei autoturismelor si optimizarea controlului traficului
- Restrictii de transport care sa limiteze folosirea anumitor tipuri de autoturisme poluante in Bucuresti

C.1 Numarul autoturismelor si consumul

Numarul maxim de autoturisme in Bucuresti a fost depasit de mult si in prezent este imposibil sa gasesti un loc de parcare. Numarul masinilor din Bucuresti este de cca 1.200.000.

Estimam ca fiecare masina parcurge 3.000 km/an in oras cu un consum de 12 l/100 km. consumul annual de combustibil este de 432.000.000 l/an ~ 17.200 TJ.

C.2 Imbunatatirea eficientei

Tehnologiile pentru motoare se imbunatatesc constant si multe masini au un consum standard mai bun de 5 l/100 km. Totusi, fara imbunatatirea controlului traficului si reducerea densitatii masinilor in Bucuresti, consumul actual va fi mult mai mare decat valoarea standard.

O solutie pentru cresterea eficientei este folosirea masinilor hibrid sau a celor electrice. Aceasta va creste eficienta de la cca 20%, cat este in prezent, la peste 80% si in acelasi timp va imbunatati semnificativ calitatea aerului in Bucuresti. Daca presupunem ca 50% din masinile care pot circula in Bucuresti, vor fi electrice sau hibrid, in 2020 consumul de energie va fi redus de la 17.200 TJ, in prezent la cca 10.800 TJ.

C.3 Restrictii de circulatie

Mai devreme sau mai tarziu rezolvarea problemei traficului in Bucuresti va deveni o problema politica. Daca problema nu este rezolvata de autoritatile locale, va fi rezolvata de autoritatile nationale in momentul impunerii cerintelor privind calitatea

We see different driving restrictions in cities around the works: close of city centres for private cars, cars only allowed each second day, high parking fees or city tax according to weight or pollution.

Such measures can limit the driving with up to 30%.

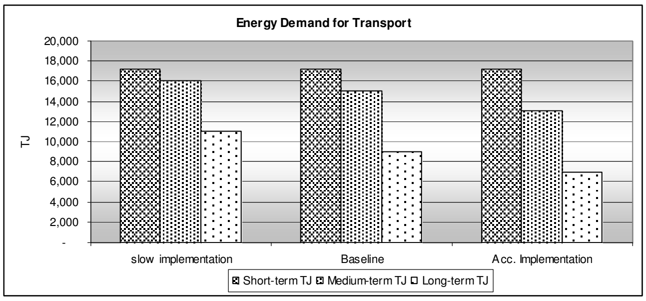
aerului.

In diferite orase din lume intalnim diferite restrictii de circulatie: inchiderea centrului orasului pentru masinile private, permiterea circulatiei masinilor la fiecare doua zile, taxe de parcare foarte mari sau taxe de oras conform greutatii sau gradului de poluare.

Astfel de masuri pot limita circulatia pana la 30%.

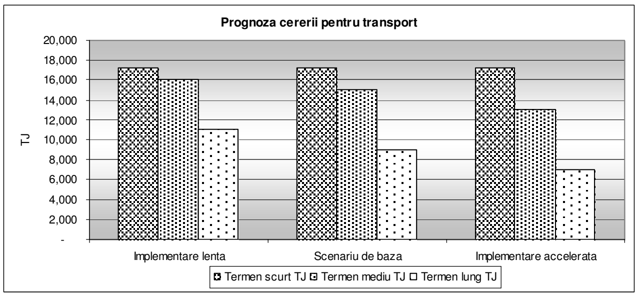
C.4 Demand forecast

The demand forecast for transportation is:



C.4 Prognoza cererii

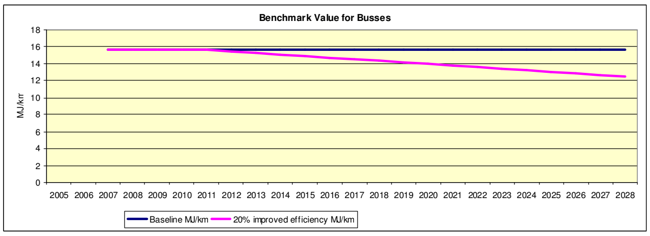
Prognoza cererii pentru transport este:



C.5 Public Busses

The operator has submitted data from which we can calculate a benchmark value of 15.68 MJ/km and the operator forecast the same value for the coming years.

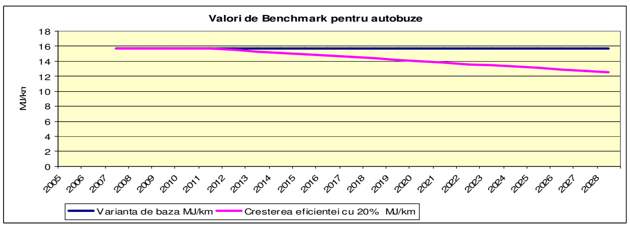
The consumption has been established based on a forecast which will improve with 20% efficiency by introduction of modern low-energy busses (as the newest busses seen in Bucharest), hybrid busses capable of charging batteries when breaking. The benchmark value will thus develop:



C.5 Transport in comun cu autobuze

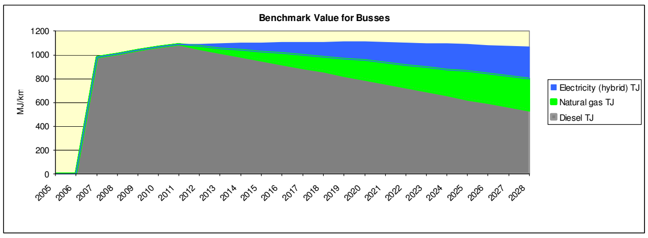
Operatorul de servicii pentru sistemul de transport in comun a transmis date pe baza carora s-a calculat valoarea de benchmarking de 15.68 MJ/km, operatorul prognozand aceeasi valoare pentru perioada care urmeaza.

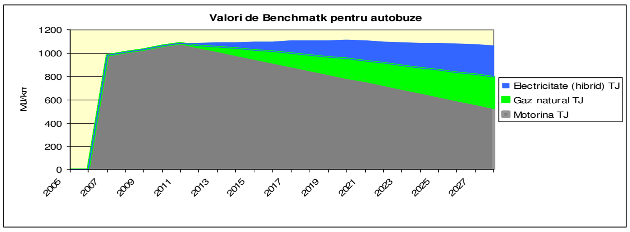
Consumul a fost stabilit pe baza unei prognoze potrivit careia va creste eficienta cu 20% ca urmare a introducerii unor autobuze moderne cu consum redus de energie (cum sunt noile autobuze introduse in Bucuresti), autobuze hibrid ale caror baterii pot fi incarcate pe perioada noptii cand nu opereaza. Valoare de benchmarking va evolua dupa cum urmeaza:



In addition new technologies as the hybrid technology mentioned above with changing of batteries in the night time and thus operate partly as electrical busses and busses running on gas (natural gas and or liquid gas) as it are seen in many cities all over the world. The development in energy consumption, which include additional bus driving, is forecasted as:

Suplimentar, noua tehnologie, ca de exemplu tehnologia « hibrid » mai sus mentionata, cu incarcarea bateriilor in perioada noptii, iar ulterior functionand partial ca autobuze electrice si autobuze functionand cu gaz(gaz natural sau GPL) sunt intalnite in multe orase din intraga lume. Evolutia in consumul de energie, care ia in considerare faptul ca traficul cu autobuzele va creste este prognozat a arata dupa cum urmeaza:


Benchmark Value for Busses
MJ/km
Electricity (hybrid) TJ
Natural gas TJ
Diesel TJ


Valori de Benchmatk pentru autobuze
MJ/km
Electricitate (hibrid) TJ
Gaz natural TJ
Motorina TJ

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 5b: Distribution Network Losses

Anexa 5b: Pierderile de pe reteaua de distributie

4				
3				
2	01.09.2009	Corrections	GMCB	haa
1	08.06.2009	First edition – editorial changes only	GMCB	haa
0	13.05.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

Table of content

Cuprins

1 INTRODUCTION

The heat losses has never been calculated or measured with high accuracy but values in the level from 15% to 35% are found in different reports.

However, experience from rehabilitation of the distribution networks in 24 substations in Programme START demonstrated reductions in heat losses from about 35% to about 20% for rehabilitated areas.

A huge part of the heat losses are related to water losses inside the buildings – this is a consequence of the direct supply concept where bad maintained internal piping require RADET to supply the make-up water. Prior to rehabilitation it was estimated that the water losses could be reduced with 94% but surprisingly it was realised that only about 20% reduction was obtained as the internal piping in the buildings were not rehabilitated.

Based on experience from Programme START we have estimated the heat losses in three situations:

1. The current distribution network. Flow and return heating pipes and flow and recirculation hot tap water pipes.
2. Reconstructed networks. Flow and return heating pipes with DN according to the real demand.
3. Reconstructed extended networks. New consumers connected to the district heating system.

1 INTRODUCERE

Pierderile de caldura nu a fost niciodata calculate sau masurate cu exactitate iar in diferinte rapoarte se gasesc valori cuprinse intre 15% si 35%.

Cu toate acestea, experienta din reabilitarea retelelor de distributie, in 24 de puncte termica prin Programul START, a demonstrat o reducere a pierderilor de caldura de la aproximativ 35% la aproximativ 20% pentru zonele reabilitate.

O cantitate relevanta a pierderilor de caldura sunt legate de pierderile de agent termic in interiorul cladirilor - aceasta fiind o consecinta a conceptului de furnizare directa. Coloanele interne sunt prost intretinute si in acest fel, RADET trebuie sa furnizeze apa de adaos. Inainte de reabilitare s-a estimat ca pierderile de apa pot fi reduse cu 94%, dar surprinzator s-a realizat ca reducerea a fost de doar aproximativ 20%, coloanele interne nefiind reabilitate.

In baza experientei din cadrul Programului START am estimat pierderile de caldura in trei situatii:

1. Retea de distributie existenta. Conductele de incalzire tur si retur si conductele de apa calda de consum tur si recirculare.
2. Retele reconstruite. Conducte de incalzire tur si retur cu DN in functie de cerere reala.
3. Retele reconstruite extinse. Consumatori noi conectati la sistemul de termoficare.

2 HEAT LOSSES

2 PIERDERILE DE CALDURA

2.1 Existing 4-pipe system

2.1 Sistemul existent cu 4 conducte

The heat losses from the current heating networks and the hot tap water networks are calculated as:

Pierderile de caldura pe retelele de incalzire si apa calda de consum existente sunt calculate astfel:

	Lenght Lungime	Losses Pierderi		Soil T T sol	Pipe T T retea	dT dT	Operation Functionare	Losses Pierderi
	km	w/m/^{0}C	GJ/km/^{0}C	^{0}C	^{0}C	^{0}C	h/y	GJ/y
Heating flow Incalzire,tur	834	2.30	0.00828	10	65	55	3,000	1,139,411
Heating return Incalzire, retur	834	2.30	0.00828	10	55	45	3,000	932,245
HTW flow ACC, tur	834	1.50	0.00540	10	60	50	8,760	1,972,577
HTW Recirc. ACC, recirculatie	834	1.00	0.00360	10	40	30	8,760	789,031
Total								4,833,264

2.2 Reconstructed 2-pipe system

2.2 Sistem reconstruit cu 2 conducte

The heat losses from the redesigned and reconstructed heating networks, which also in the new concept supply heat for preparation of hot tap water, are calculated as:

Pierderile de caldura pe retelele de incalzire reproiectate si reconstruite, care in noul concept asigura si energia termica pentru prepararea apei calde de consum sunt calculate mai jos:

	Lenght Lungime	Losses Pierderi		Soil T T sol	Pipe T T retea	dT dT	Operation Functionare	Losses Pierderi
	km	w/m/^{0}C	GJ/km/^{0}C	^{0}C	^{0}C	^{0}C	h/y	GJ/y
Heating flow Incalzire, tur	834	0.90	0.00324	10	80	70	8,760	1,656,965
Heating return Incalzire, retur	834	0.90	0.00324	10	45	35	8,760	828,482
Total								2,485,447

2.3 Reconstructed Extented Networks

2.3 Retele reconstruite extinse

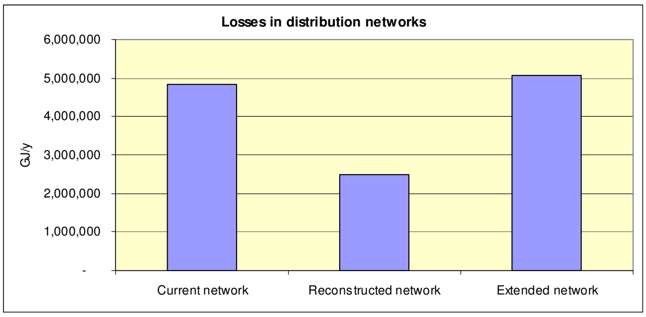
When mandatory connection to the district heating network is introduced in new areas, the distribution network must be extended to about the double length of today’s:

In conditiile in care conectarea la sistemul de termoficare va deveni obligatorie in anumite zone, aceasta decizie este legata de extinderea retelei de distributie ajungand sa aiba in final lungimi de doua ori mai mari decat in prezent.

	Lenght Lungime	Losses Pierderi		Soil T T sol	Pipe T T retea	dT dT	Operation Functionare	Losses Pierderi
	km	w/m/^{0}C	GJ/km/^{0}C	^{0}C	^{0}C	^{0}C	h/y	GJ/y
Heating flow Incalzire, tur	1,700	0.90	0.00324	10	80	70	8,760	3,377,506
Heating return Incalzire, retur	1,700	0.90	0.00324	10	45	35	8,760	1,688,753
Total								5,066,258

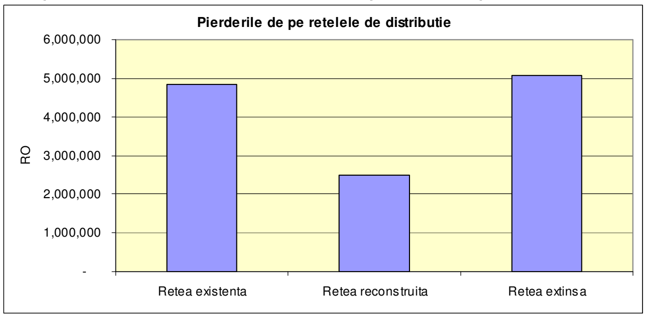
2.4 Reduction in heat losses

For supply of today's consumers the heat losses can be reduced with about 50%. However, to supply all heating consumers in Bucharest the distribution system must be extended to about the double length of today. Thus, the future heat losses will be about 5,000,000 GJ/y or about the same as today.



2.4 Reducerea pierderilor de caldura

In vederea asigurarii energiei termice pentru consumatorii de astazi, pierderile pot fi reduse cu aproximativ 50%. Totusi, pentru a asigura energia termica pentru toti consumatorii din Bucuresti lungimea sistemului de distributie trebuie aproape dublata fata de cea existenta in prezent. Astfel, pierderile de caldura viitoare vor fi de aproximativ 5.000.000 GJ / an sau aproximativ la aceleasi valori ale pierderilor de caldura intampinate in prezent.



3 ENVIRONMENTAL IMPACT

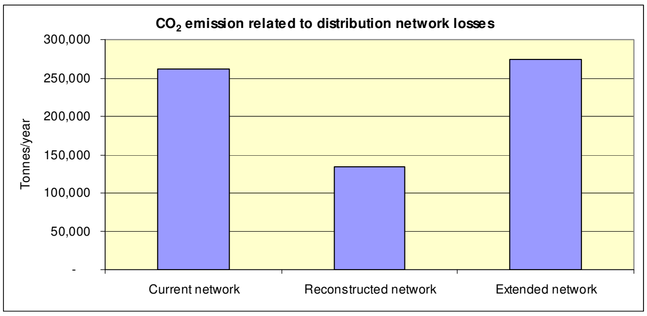
The environmental impact of reconstructing the distribution system is significant. The CO_2 emissions related to heat losses in the distribution systems will be:

3 IMPACTUL ASUPRA MEDIULUI

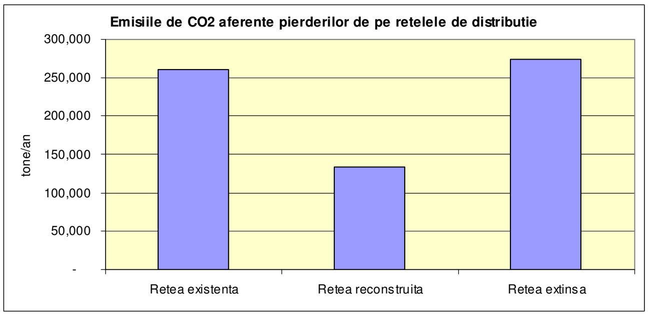
Impactul asupra mediului in urma reconstruirii sistemului de distributie este semnificativ. Emisiile de CO_2 corespunzatoare pierderilor de caldura in sistemul de distributie vor fi:

	Losses Pierderi	CO_2	
	GJ/y	t/TJ	t/y
Current network Retea existenta	4,833,264	54	260,996
Reconstructed network Retea reconstruita	2,485,447	54	134,214
Extended network Retea extinsa	5,066,258	54	273,578

About 125,000 t of CO_2 can be saved annually in supply of the current consumers. However, when the networks are extended the double length of today's to supply all heating consumers the CO_2 emission will be in the same level as today.



Aproximativ 125.000 t de CO_2 pot fi economisite anual din alimentarea consumatorilor existenti. Totusi, in conditiile in care retelele vor fi extinse, devenind de doua ori mai mari decat in prezent, furnizarea energiei termice tuturor consumatorilor, nivelul emisiilor de CO_2 va ramane acelasi.



Bucharest Municipality

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Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

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Part C: Appendixes

Partea C: Anexe

Appendix 6a: Transmission Network Losses

Anexa 6a: Pierderile de pe retelele de transport

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2	01.09.2009	Corrections	GMCB	haa
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Cuprins

1 INTRODUCTION

The heat losses has never been calculated or measured with high accuracy and values in the level from 10% to 25% are found in different reports.

However, experience from rehabilitation of 2 segments of the transmission system in Programme START demonstrated reductions in heat losses in the level of 20% based on measured temperature drop in the segments before and after rehabilitation.

Based on expires from Programme START and technical data for modern pre-insulated pipes we have estimated the heat losses in two situations:

- The current 510 km transmission network designed for a capacity of about 5,000 MJ/sec.
- A reconstructed 100 km transmission network design for a capacity of 400 MJ/sec.

1 INTRODUCERE

Pierderile de caldura nu au fost niciodata calculate sau masurate cu exactitate iar in diferite rapoarte se gasesc valori cuprinse intre 10% si 25%.

Totusi, experienta din reabilitarea a doua tronsoane de retea primara in cadrul Programului START a demonstrat o reducere a pierderilor de caldura de aproximativ 20% bazata pe masurarea caderii de temperatura in tronsoane, inainte si dupa reabilitare.

In baza experientei castigate prin Programul START si a datelor tehnice pentru conductele preizolate moderne am estimat pierderile de caldura in doua situatii:

- 510 km de retele de transport existente proiectate pentru o capacitate de approx. 5.000 MJ/sec.
- 100 km de retea de transport reconstruita pentru o capacitate de 400 MJ/sec.

2 HEAT LOSSES

2 PIERDERILE DE CALDURA

2.1 Existing network

The heat losses from the current transmission networks is calculated as:

2.1 Reteaua existenta

Pierderile de caldura pe retelele de transport existente sunt calculate astfel:

	Lenght Lungime	Losses Pierderi		Soil T T sol	Pipe T T retea	dT dT	Operation Functionare	Losses Pierderi
	km	w/m/^{0}C	GJ/km/^{0}C	^{0}C	^{0}C	^{0}C	h/y	GJ/y
Heating flow Incalzire, Tur	510	2.10	0.00756	10	95	85	8,760	2,870,880
Heating return Incalzire, Retur	510	2.10	0.00756	10	60	50	8,760	1,688,753
Total								4,559,633

2.2 Reconstructed network

The heat losses from the redesigned and reconstructed transmission networks is calculated as:

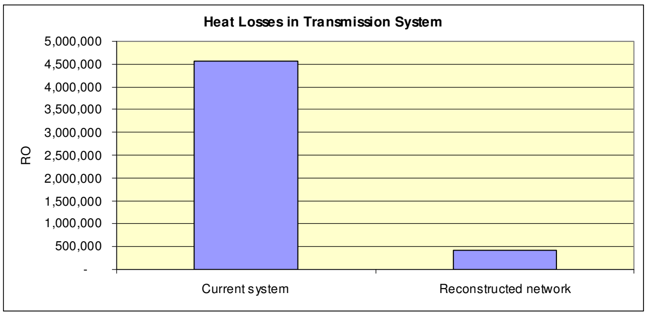
2.2 Retea reconstruita

Pierderile de caldura pe retelele de transport reproiectate si reconstruite sunt calculate mai jos:

	Lenght Lungime	Losses Pierderi		Soil T T sol	Pipe T T retea	dT dT	Operation Functionare	Losses Pierderi
	km	w/m/^{0}C	GJ/km/^{0}C	^{0}C	^{0}C	^{0}C	h/y	GJ/y
Heating flow Incalzire, Tur	100	1.00	0.00360	10	100	90	8,760	283,824
Heating return Incalzire, Retur	100	1.00	0.00360	10	50	40	8,760	126,144
Total								409,968

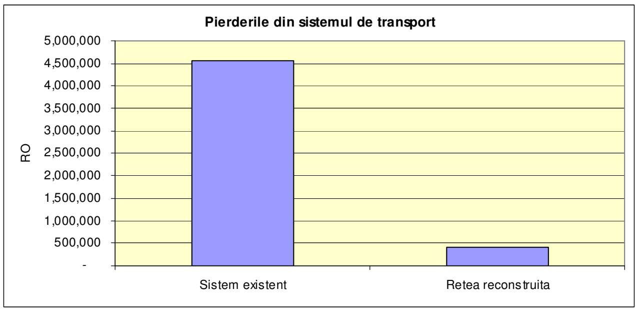
2.3 Reduction in heat losses

Not surprisingly we see a huge drop (almost 90%) in heat losses when the reconstructed system become in operation:



2.3 Reducerea pierderilor de caldura

In mod nesurprinzator vedem o scadere imensa a pierderilor de caldura (cca 90%) la darea in exploatare a sistemului reconstruit:



3 ENVIRONMENTAL IMPACT

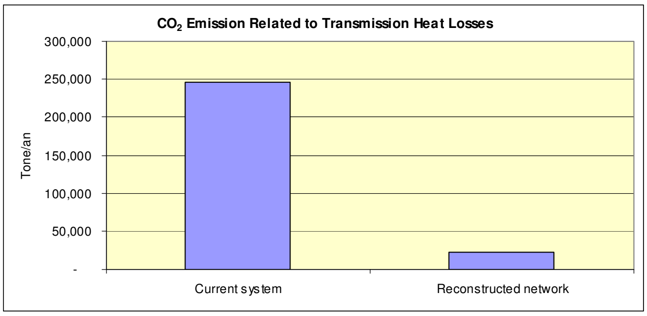
The environmental impact of reconstructing the transmission system is significant:

3 IMPACTUL ASUPRA MEDIULUI

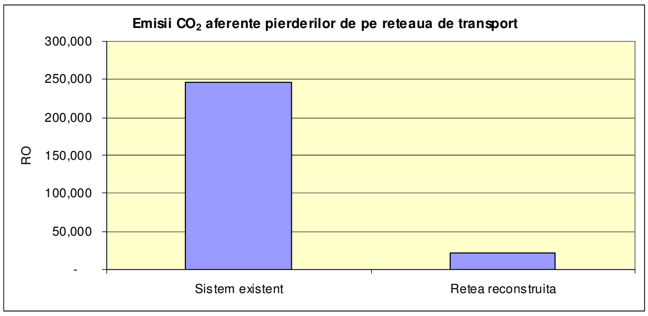
Impactul asupra mediului in urma reconstruirii sistemului de transport este semnificativ:

	Losses Pierderii	CO_2	
	GJ/y	t/TJ	t/an
Current network Retea existenta	4,559,633	54	246,220
Reconstructed network Retea reconstruita	409,968	54	22,138

About 220,000 t of CO_2 can be saved annually.



Se pot economisi cca 220.000 t anual.



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Appendix 7a: Integreation of Solar Heating in the District Heating System

Anexa 7a: Integrarea panourilor solare in sistemul de termoficare

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2	01.09.2009	Corrections	GMCB	haa
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ATH energ

Grontmij | Carl Bro

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Cuprins

1 INTRODUCTION

According to the National Energy Strategy solar heating shall supply about 30% of the national consumption of heating and hot tap water (especially hot tap water). There is no reason to believe that the percentage should be less in Bucharest, on the contrary, with high heat density, it will be far more feasible to install solar panels in Bucharest than on the country side.

Installing solar heating panels and heat storages is not without problems; both technical and economical.

Politically decisions must be taken: Shall solar panels be individual installations then benefit only the population living on the “south side”? Or shall it be collective system benefiting everybody?

A subsidise scheme for solar energy is under preparation by the Romanian Government. If this scheme will be like schemes known from other EU-countries we must expect fast installation of solar panels.

This report analyse the problems and proposes comprehensive solutions regarding installation of solar energy systems in Bucharest.

1 INTRODUCERE

In conformitate cu prevederile Strategiei Energetice Nationale, la nivel national, energia solara ar trebui sa acopere aproximativ 30% din consumul de caldura si apa calda de consum (in mod special apa calda de consum). Nu exista nici un motiv pentru care procentul mentionat ar trebui sa fie mai mic in Bucuresti, din contra, in conditiile unei densitati ridicate a necesarului de caldura, va fi de departe mult mai fezabil sa se instaleze panouri solare in Bucuresti decat in alte zone din tara.

Instalarea panourilor solare pentru incalzire, impreuna cu acumulatoare de caldura nu sunt chiar lipsite de probleme, atat din punct de vedere tehnic cat si economic.

Ar trebui luate o serie de decizii politice, cum ar fi: Panourile solare ar trebui sa fie instalate individual, astfel incat sa beneficieze doar populatia cu apartamente cu expunere catre sud? Sau ar trebui sa fie un sistem centralizat din care sa beneficieze toata populatia?

In prezent, Guvernul Romaniei, pregateste o schema de subventie pentru energia solara. In conditiile in care aceasta schema va fi in final ca si celelalte cunoscute din alte tari ale Uniunii Europene, acest lucru va genera o instalare rapida a panourilor solare.

Prezentul raport analizeaza problemele si propune solutii comprehensive privind instalarea sistemelor de panouri solare in Bucuresti.

2 FEASIBILITY OF SOLAR ENERGY

To assess the feasibility of introducing solar energy in district heated areas we have established 4 calculations, representing the buildings in Bucharest:

1. One-family houses
2. Large houses
3. Small apartment blocks
4. Large apartment blocks

2.1 Heat demand

We assume the buildings thermal rehabilitated bringing the heat demand down from 180 kWh/m^2/year or even higher to between 30 and 90 kWh/m^2/year and calculated the energy demand for space heating and preparation of hot tap water as:

Demand		One-family house	Large house	Small apartment block	Large apartment block
Energy demand					
Heated area	m2	150	500	2,000	6,000
Consumption	kWh/m2/y	130	120	100	90
	kWh/y	19,500	60,000	200,000	540,000
	GJ/y	70	216	720	1,944
Capacity demand					
Utilisation (full load equiv.)	h/y	1,200	1,200	1,200	1,200
Simultaniously factor		1.00	0.95	0.85	0.70
Capacity	kW	16	48	142	315

2.2 Solar system layout

The design norm in Denmark is a production of 400 kWh/m^2/y (Between 300 and 550). If we adjust the conditions to Bucharest in terms of more solar hours/year (about 2,200 in DK and about 2,500 in RO) and the sun-angel (55^0 for DK and 45^0 for RO) we can expect a production in Bucharest in an average level of 550 kWh/m^2/year.

For one-family houses and large houses we can select standard solar heating systems from a supplier found on the WEB[1]. Such systems come with all necessary parts for installation and installation guide can be found on the supplier's home pages. Many suppliers offer installation, too.

For apartment blocks it is not possible to procure

2 FEZABILITATEA ENERGIEI SOLARE

Pentru a se evalua fezabilitatea introducerii energiei solare, in zonele in care furnizarea energiei termice se face in sistem centralizat, s-au stabilit 4 tipuri de calcule, reprezentand cladirile din Bucuresti:

1. Case pentru o familie
2. Case mari
3. Apartamente in blocuri mici
4. Apartamente in blocuri mari

2.1 Necesarul de caldura

A fost luat in considerare faptul ca reabilitarea termica va reduce necesarul de caldura de la 180 kWh/m^2/an (sau chiar mai mult) la 30-90 kWh/m^2/an iar necesarul de energie termica pentru incalzire si prepararea apei calde de consum va fi dupa cum urmeaza:

Necesar		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Necesar de energie					
suprafata incalzita	m2	150	500	2,000	6,000
consum	kWh/m2/an	130	120	100	90
	kWh/an	19,500	60,000	200,000	540,000
	GJ/an	70	216	720	1,944
Capacitate instalata necesara					
Utilizare (echiv. sarcina max.)	h/an	1,200	1,200	1,200	1,200
Factor de simultaneitate		1.00	0.95	0.85	0.70
Capacitate	kW	16	48	142	315

2.2 Amplasarea sistemelor solare

Normele de proiectare din Danemarca prevad producerea a 400 kWh/m^2/an (intre 300 si 550) din panouri solare. Daca acestea se ajusteaza la conditiile din Bucuresti, cu mai multe ore de insorire pe an (circa 2,200 in Danemarca si aproape 2500 in Romania) precum si unghiul de orientare solara fiind 55^0 pentru Danemarca respectiv 45^0 pentru Romania, in Bucuresti productia de energie termica ar putea ajunge in medie la 550 kWh/m^2/an.

Atat pentru o casa de familie cat si pentru casele mari pot fi utilizate sisteme de incalzire solara standard furnizate de diversi producatori, care sunt disponibili pe WEB[1]. Aceste sisteme sunt livrate cu toate piesele componente necesare, inclusiv ghid de instalare, disponibil pe pagina de WEB a furnizorului. Multi furnizori ofera chiar servicii de instalare.

[1] Example: http://www.varmtvandfrasolen.dk/produkter/produkter.htm

standard systems as the system must be designed for each block. Installing the solar panels together with insulation of the walls of the buildings (establish integrated solutions) might reduce the costs calculated below:

Solar System		One-family house	Large house	Small apartment block	Large apartment block
Selected system and solar production					
Solar panels	m2	6	30	120	360
	kWh/m2/y	550	525	500	500
	kWh/y	3,300	15,750	60,000	180,000
	GJ/y	12	57	216	648
Heat storage	l	300	1,500	6,000	18,000
Cost of solar panels					
Equipment	EUR	4,308	18,116	57,972	139,132
Installation	%	40	40	40	40
	EUR	1,723	7,246	23,189	55,653
Total cost	EUR	6,031	25,363	81,161	194,785
Operation and maintenance	%	1.5	1.5	1.4	1.3
	EUR	90	380	1,136	2,532

The indicated operation and maintenance costs are mainly related to internal circulation of the water (pumping costs).

2.3 District heating System

The district heating system comprises a connection (branch) to the main distribution system (25m) and installation and connection of a heating unit with a capacity of 100% capacity as the solar heating system will not contribute to the capacity need after continues days without sunshine and simultaneous low outdoor temperatures.

District Heating		One-family house	Large house	Small apartment block	Large apartment block
Branch					
Equipment (25 m)	EUR	3,750	4,000	4,375	5,000
Installation	%	30	30	30	30
	EUR	1,125	1,200	1,313	1,500
Cost of branch	EUR	4,875	5,200	5,688	6,500
Heating unit		-	-	-	-
Equipment	EUR/kW	200	170	150	140
	EUR	3,250	8,075	21,250	44,100
Installation	%	60	60	60	60
	EUR	1,950	4,845	12,750	26,460
Cost of heating unit	EUR	5,200	12,920	34,000	70,560
Cast of district heating	EUR	10,075	18,120	39,688	77,060
Operation and maintenance	%	0.5	0.5	0.4	0.3
	EUR	50	91	159	231

The indicated operation and maintenance costs are mainly related to internal circulation of the water (pumping costs)

Currently, there is no connection fee for being connected to the district heating system and RADET is investing in and owning the heating modules. This is not a sustainable solution. Connection of a consumer shall not be paid by the other district heating consumers or the tax payers.

Pentru apartamentele de bloc nu este posibila achizitionarea unor sisteme standard, deoarece sistemul trebuie proiectat pentru fiecare bloc. Instalarea panourilor solare in acelasi timp cu reabilitarea termica a peretilor blocurilor (utilizand o solutie integrata) ar putea conduce la reducerea costurilor calculate mai jos:

Sistem solar		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Sisteme selectate si producerea de energie solara					
Panouri solare	m2	6	30	120	360
	kWh/m2/an	550	525	500	500
	kWh/an	3,300	15,750	60,000	180,000
	GJ/an	12	57	216	648
Acumularea caldurii	l	300	1,500	6,000	18,000
costul panourilor solare					
Echipamente	EUR	4,308	18,116	57,972	139,132
Instalare	%	40	40	40	40
	EUR	1,723	7,246	23,189	55,653
Cost total	EUR	6,031	25,363	81,161	194,785
Exploatare si intretinere	%	1.5	1.5	1.4	1.3
	EUR	90	380	1,136	2,532

Costurile indicate pentru exploatare si intretinere sunt in principal costuri legate de circulatia interna a agentului termic (costuri de pompare).

2.3 Sistemul de termoficare

Conectarea la sistemul de termoficare implica un racord la reteaua principala de distributie cu o lungime de 25m si instalarea si conectarea unui modul termic cu o capacitate de 100% din necesar, considerand faptul ca energia solara nu va putea contribui cu sarcina termica necesara in conditiile unor zile consecutive neinsorite si simultan cu temperaturi exterioare scazute.

Termoficare		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Racord					
Echipament (25 m)	EUR	3,750	4,000	4,375	5,000
Instalare	%	30	30	30	30
	EUR	1,125	1,200	1,313	1,500
Costul racordului	EUR	4,875	5,200	5,688	6,500
Modul termic					
Echipament	EUR/kW	200	170	150	140
	EUR	3,250	8,075	21,250	44,100
Instalare	%	60	60	60	60
	EUR	1,950	4,845	12,750	26,460
Costul modulului termic	EUR	5,200	12,920	34,000	70,560
Costul termoficarii	EUR	10,075	18,120	39,688	77,060
Exploatare si intretinere	%	0.5	0.5	0.4	0.3
	EUR	50	91	159	231

Costurile indicate pentru exploatare si intretinere sunt in principal costuri pentru circulatia interna a agentului termic(costuri de pompare).

Pana in prezent, nu exista taxa de conectare la sistemul de termoficare, iar RADET a investit in modulele termice, devenind proprietatea sa. Aceasta nu este o solutie viabila. Conectarea unui consumator la sistemul de termoficare nu trebuie platita de catre un alt consumator deja conectat, sau de platitorii de taxe.

2.4 Energy Balance

The solar system layout will give the following energy balance for supply of heating and hot tap water to the buildings:

Energy balance		One-family house	Large house	Small apartment block	Large apartment block
Solar system production	kWh/y	3,300	15,750	60,000	180,000
	GJ/y	12	57	216	648
Total demand	KWh/y	19,500	60,000	200,000	540,000
	GJ/y	70	216	720	1,944
District heating supply	KWh/y	16,200	44,250	140,000	360,000
	GJ/y	58	159	504	1,296

The problem for the district heating operator is that he must provide 100% capacity while his sale is reduced by 20-35%. This call for introduction of a capacity tariff.

2.4 Balanta energetica

Amplasarea sistemelor solare conduce la urmatoarea balanta energetica privind furnizarea energiei termice pentru incalzire si apa calda de consum in cladiri:

Energy balance		One-family house	Large house	Small apartment block	Large apartment block
Solar system production	kWh/y	3,300	15,750	60,000	180,000
	GJ/y	12	57	216	648
Total demand	KWh/y	19,500	60,000	200,000	540,000
	GJ/y	70	216	720	1,944
District heating supply	KWh/y	16,200	44,250	140,000	360,000
	GJ/y	58	159	504	1,296

Problema care apare pentru operatorul sistemului de termoficare este aceea ca trebuie sa asigure furnizarea 100% a capacitatii instalate, in timp ce vanzarea se reduce cu 20-35%. Aceasta situatie necesita introducerea unui tarif privind capacitatea.

2.5 Investment

Assuming 2/3 of the cost of the solar system refunded as currently proposed for promotion of solar energy, but also assuming that the buildings owner(s) in the future must carry the real cost of establishing district heating supply, the investment will be as calculated below:

Investment		One-family house	Large house	Small apartment block	Large apartment block
Solar system					
Total investment	EUR	6,031	25,363	81,161	194,785
Subsidises	%	67	67	67	67
	EUR	4,021	16,908	54,107	129,857
Owners investment	EUR	2,010	8,454	27,054	64,928
District heating system					
Connection to network	EUR	4,875	5,200	5,688	6,500
Heating unit	EUR	5,200	12,920	34,000	70,560
Owners investment	EUR	10,075	18,120	39,688	77,060
Total owner investment	EUR	12,085	26,574	66,741	141,988

2.5 Investitia

Considerand faptul ca 2/3 din costul instalarii sistemului solar de producere va fi rambursat, in contextul promovarii energiei solare, dar de asemenea considerand faptul ca proprietarii cladirilor vor trebui in viitor sa suporte costurile reale pentru furnizarea energiei termice din sistemul de termoficare, investitia va fi asa cum este calculata mai jos:

Investitia		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Sistem solar					
Total investitie	EUR	6,031	25,363	81,161	194,785
Subventie	%	67	67	67	67
	EUR	4,021	16,908	54,107	129,857
Investitia proprietarului	EUR	2,010	8,454	27,054	64,928
Sistemul de termoficare					
Conectarea la retea	EUR	4,875	5,200	5,688	6,500
Modul termic	EUR	5,200	12,920	34,000	70,560
Investitia proprietarului	EUR	10,075	18,120	39,688	77,060
Total investitie a proprietarului	EUR	12,085	26,574	66,741	141,988

2.6 Financing

Assuming the owner investment financed by bank loan the annual loan service will be:

Financing		One-family house	Large house	Small apartment block	Large apartment block
Solar system					
Bank loan	EUR	2,010	8,454	27,054	64,928
Period	y	15	15	15	15
Interest	%	10.0	10.0	9.7	9.5
Loan service, Solar	EUR/y	264	1,112	3,496	8,294
District heating					
Bank loan	EUR	10,075	18,120	39,688	77,060
Period	y	15	15	15	15
Interest	%	10.0	10.0	9.7	9.5
Loan service, DH	EUR/y	1,325	2,382	5,129	9,844
Total loan service	EUR/y	1,589	3,494	8,625	18,138

The possibility of obtaining cheaper financing than what the Romanian banks normally offer, which is

2.6 Finantarea

Considerand ca investitiile proprietarilor vor fi finantate prin credit bancar, costurile anuale privind creditul vor fi dupa cum urmeaza:

Finantarea		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Sistem solar					
Credit bancar	EUR	2,010	8,454	27,054	64,928
Perioada	an	15	15	15	15
Dobanda	%	10	10	10	10
Costuri credit, Solar	EUR/an	264	1,112	3,496	8,294
Termoficare					
Credit bancar	EUR	10,075	18,120	39,688	77,060
Perioada	an	15	15	15	15
Dobanda	%	10.0	10.0	9.7	9.5
Costuri credit, Termoficare	EUR/an	1,325	2,382	5,129	9,844
Costuri totale credit	EUR/an	1,589	3,494	8,625	18,138

Trebuie investigata posibilitatea obtinerii unei finantari mai ieftine, decat pot oferi in mod normal bancile din *considerable above the EU-market interest for similar loans, should be investigated.*

2.7 Cost of Heating

District heating is currently heavily subsidised bringing the tariff down form about 30 EUR/GJ to 8.60 EUR/GJ.

We can thus make two calculation to establish if solar heating is feasible when installed together with district heating:

- Scenario A: Solar heating and non-subsidised district heating (subsidises due to social needs not considered)
- Scenario B: Solar heating and district heating with current general subsidises.

Scenario A

In this scenario we assume general subsidises to district heating removed and replaced with direct subsidises according to social needs.

New solar and new/rehabilitated district heating installation

A new installation with combined solar and district heating without general subsidises will cost:

Cost of Heating - Scenario A New installations		One-family house	Large house	Small apartment block	Large apartment block
Cost of solar panels					
Loan service	EUR/y	264	1,112	3,496	8,294
Oparation and maintenance	EUR/y	90	380	1,136	2,532
Total, solar system	EUR/y	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Cost of district heating					
Loan service	EUR/y	1,325	2,382	5,129	9,844
Oparation and maintenance	EUR/y	50	91	159	231
District heating tariff	EUR/GJ	30	30	30	30
	GJ/y	58	159	504	1,296
District heating procurement	EUR/y	1,750	4,779	15,120	38,880
Total, DH	EUR/y	3,125	7,252	20,408	48,955
	EUR/GJ	54	46	40	38
Cost of heating	EUR/y	3,479	8,744	25,040	59,782
	EUR/GJ	50	40	35	31

In the situation where all heating installations must be established from new or rehabilitated, solar energy is very feasible for all sizes of buildings.

Romania, care au dobanzi considerabil peste nivelul dobanzilor practicate in UE pentru credite similare.

2.7 Costul energiei termice

In prezent sistemul de termoficare este puternic subventionat, reducand tariful de la aproximativ 30 Euro/GJ la 8,60 Euro/GJ.

Putem deci face doua calcule diferite pentru a verifica daca energia solara este fezabila, atunci cand este instalata impreuna cu termoficarea:

- Scenariul A: Energia solara si sistem de termoficare fara subventii (subventiile pe criterii sociale nu au fost luate in considerare)
- Scenariul B: Energia solara si termoficarea incluzand subventiile generale existente in prezent.

Scenariul A

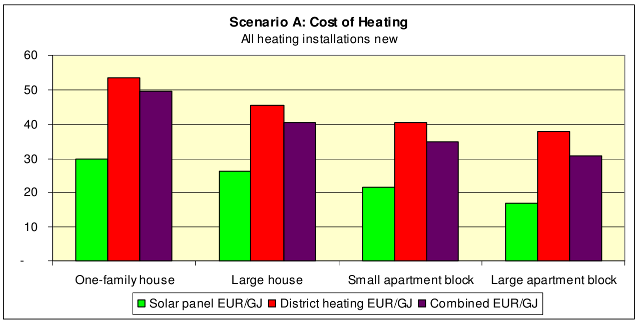
In cadrul acestui scenariu consideram ca subventiile generale din sistemul de termoficare au fost eliminate si au fost inlocuite cu subventii acordate pe criterii sociale.

Instalatii solare noi si instalatii de termoficare noi/reabilitate

Instalatiile noi, obtinute prin combinarea energiei solare cu termoficare fara subventii generale vor costa:

Costul En. termice - Scenariul A Instalatii noi		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Costul Panourilor solare					
Costuri credit	EUR/an	264	1,112	3,496	8,294
Exploatare si intretinere	EUR/an	90	380	1,136	2,532
Total, sistem solar	EUR/an	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Costul termoficarii					
Costuri credit	EUR/an	1,325	2,382	5,129	9,844
Exploatare si intretinere	EUR/an	50	91	159	231
Total, sistem de termoficare	EUR/GJ	30	30	30	30
	GJ/an	58	159	504	1,296
Achizitie termoficare	EUR/an	1,750	4,779	15,120	38,880
Total, termoficare	EUR/an	3,125	7,252	20,408	48,955
	EUR/GJ	54	46	40	38
Costul energiei termice	EUR/an	3,479	8,744	25,040	59,782
	EUR/GJ	50	40	35	31

In situatia in care toate instalatiile de incalzire trebuie regandite pornind de la sisteme de producere a energiei solare noi sau reabilitate, atunci energia solara va fi foarte fezabila pentru toate dimensiunile de cladiri.

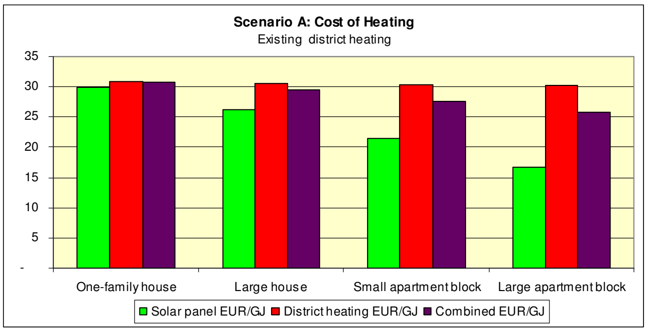


New solar and existing rehabilitated district heating installation

Installation of solar heating in buildings already connected to the district heating system and with rehabilitated installations will cost:

Cost of Heating - Scenario A Existing district heating		One-family house	Large house	Small apartment block	Large apartment block
Cost of solar panels					
Loan service	EUR/y	264	1,112	3,496	8,294
Oparation and maintenance	EUR/y	90	380	1,136	2,532
Total, solar system	EUR/y	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Cost of district heating					
Loan service	EUR/y	-	-	-	-
Oparation and maintenance	EUR/y	50	91	159	231
District heating tariff	EUR/GJ	30	30	30	30
	GJ/y	58	159	504	1,296
District heating procurement	EUR/y	1,750	4,779	15,120	38,880
Total, DH	EUR/y	1,800	4,870	15,279	39,111
	EUR/GJ	31	31	30	30
Cost of heating	EUR/y	2,155	6,362	19,911	49,938
	EUR/GJ	31	29	28	26

If the buildings already are connected to the district heating and the internal heating installation are rehabilitated it will still be feasible to install solar panels, but only marginal for houses.

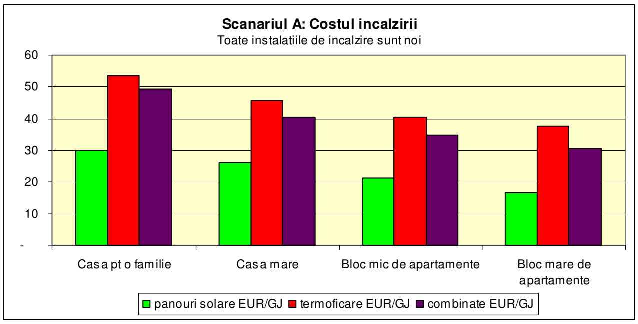


Scenario B

In this scenario we assume general subsidises to district heating maintained as it is known today.

New solar and new/rehabilitated district heating installation

Heating and hot tap water from a new installation with combined solar and district heating with general subsidises to the district heating will cost:

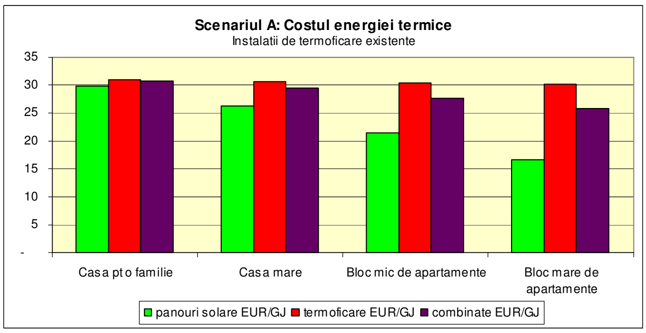


Instalatii solare noi si instalatii de termoficare existente reabilitate

Instalarea sistemelor solare de incalzire in cladiri deja conectate la termoficare si cu instalatiile reabilitate vor costa:

Costul en.termice - Scenariul A Termoficare existenta		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Costul Panourilor solare					
Costuri credit	EUR/an	264	1,112	3,496	8,294
Exploatare si intretinere	EUR/an	90	380	1,136	2,532
Total, sistem solar	EUR/an	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Costul termoficarii					
Costuri credit	EUR/an	-	-	-	-
Exploatare si intretinere	EUR/an	50	91	159	231
Tarif termoficare	EUR/GJ	30	30	30	30
	GJ/an	58	159	504	1,296
Achizitii termoficare	EUR/an	1,750	4,779	15,120	38,880
Total, termoficare	EUR/an	1,800	4,870	15,279	39,111
	EUR/GJ	31	31	30	30
Costul energiei termice	EUR/an	2,155	6,362	19,911	49,938
	EUR/GJ	31	29	28	26

In cazul in care, cladirile sunt deja conectate la termoficare si instalatiile interioare sunt reabilitate, este fezabil sa se instaleze panouri solare, pentru case pentru o familie insa, numai marginal.



Scenariul B

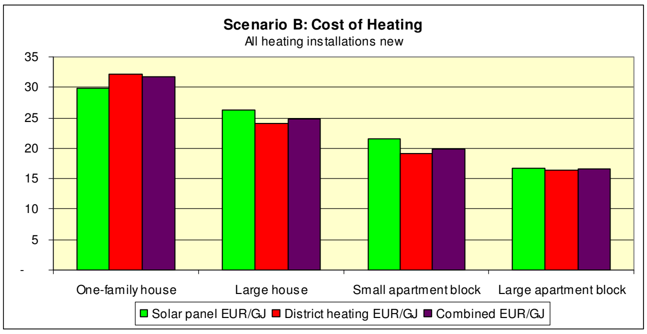
In cadrul acestui scenariu, se considera ca subventiile generale pentru sistemul de termoficare sunt mentinute, asa cum sunt cunoscute astazi.

Instalatii solare noi si instalatii de termoficare noi/reabilitate

Incalzirea si apa calda de consum, furnizate de instalatii combinate de panouri solare si termoficare, cu subventiile generale incluse, vor costa dupa cum urmeaza:

Cost of Heating - Scenario B New installations		One-family house	Large house	Small apartment block	Large apartment block
Cost of solar panels					
Loan service	EUR/y	264	1,112	3,496	8,294
Oparation and maintenance	EUR/y	90	380	1,136	2,532
Total, solar system	EUR/y	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Cost of district heating					
Loan service	EUR/y	1,325	2,382	5,129	9,844
Oparation and maintenance	EUR/y	50	91	159	231
District heating tariff	EUR/GJ	8.60	8.60	8.60	8.60
	GJ/y	58	159	504	1,296
District heating procurement	EUR/y	502	1,370	4,334	11,146
Total, DH	EUR/y	1,877	3,843	9,622	21,221
	EUR/GJ	32	24	19	16
Cost of heating	EUR/y	2,231	5,335	14,254	32,047
	EUR/GJ	32	25	20	16

If the district heating tariff is subsidised as today there will be no short-term benefit of installing solar systems:



New solar system and existing, rehabilitated district heating system

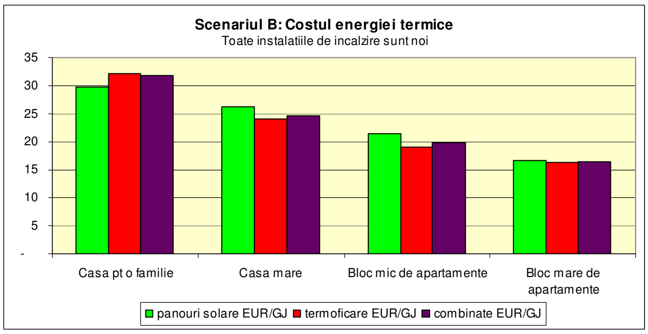
The cost of heating installing a solar system in a building where there already is a modern district heating installation will cost:

Cost of Heating - Scenario B Existing district heating		One-family house	Large house	Small apartment block	Large apartment block
Cost of solar panels					
Loan service	EUR/y	264	1,112	3,496	8,294
Oparation and maintenance	EUR/y	90	380	1,136	2,532
Total, solar system	EUR/y	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Cost of district heating					
Loan service	EUR/y	-	-	-	-
Oparation and maintenance	EUR/y	50	91	159	231
District heating tariff	EUR/GJ	8.60	8.60	8.60	8.60
	GJ/y	58	159	504	1,296
District heating procurement	EUR/y	502	1,370	4,334	11,146
Total, DH	EUR/y	552	1,461	4,493	11,377
	EUR/GJ	9	9	9	9
Cost of heating	EUR/y	907	2,953	9,126	22,203
	EUR/GJ	13	14	13	11

If the heating is subsidised as today it will be more expensive to heat the house after installing the solar panels:

Costul en.termice - Scenariul B Instalatii noi		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Costul Panourilor solare					
Costuri credit	EUR/an	264	1,112	3,496	8,294
Exploatare si intretinere	EUR/an	90	380	1,136	2,532
Total, sistem solar	EUR/an	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Costul termoficarii					
Costuri credit	EUR/an	1,325	2,382	5,129	9,844
Exploatare si intretinere	EUR/an	50	91	159	231
Tarif termoficare	EUR/GJ	8.60	8.60	8.60	8.60
	GJ/an	58	159	504	1,296
Achizitii termoficare	EUR/an	502	1,370	4,334	11,146
Total, termoficare	EUR/an	1,877	3,843	9,622	21,221
	EUR/GJ	32	24	19	16
Costul energiei termice	EUR/an	2,231	5,335	14,254	32,047
	EUR/GJ	32	25	20	16

Daca tariful pentru energia termica este subventionat asa cum este astazi, atunci pe termen scurt nu va fi nici un beneficiu din instalarea sistemelor de panouri solare:

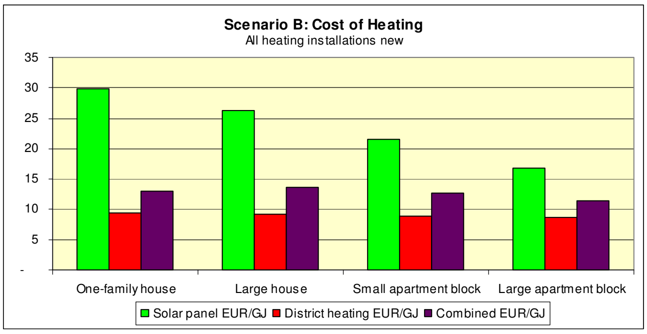


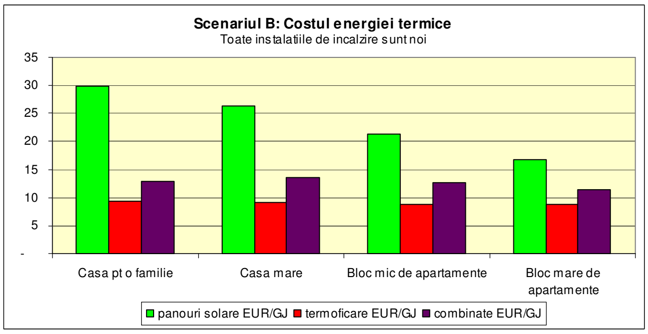
Sisteme solare noi si sistem de termoficare existent reabilitat

Costul energiei termice ca urmare a instalarii unui sistem cu panouri solare intr-o cladire, in care deja exista un sistem de termoficare reabilitat va costa:

Costul en.termice - Scenariul B Termoficare existenta		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Costul Panourilor solare					
Costuri credit	EUR/an	264	1,112	3,496	8,294
Exploatare si intretinere	EUR/an	90	380	1,136	2,532
Total, sistem solar	EUR/an	355	1,492	4,632	10,826
	EUR/GJ	30	26	21	17
Costul termoficarii					
Costuri credit	EUR/an	-	-	-	-
Exploatare si intretinere	EUR/an	50	91	159	231
Tarif termoficare	EUR/GJ	8.60	8.60	8.60	8.60
	GJ/an	58	159	504	1,296
Achizitii termoficare	EUR/an	502	1,370	4,334	11,146
Total, termoficare	EUR/an	552	1,461	4,493	11,377
	EUR/GJ	9	9	9	9
Costul energiei termice	EUR/an	907	2,953	9,126	22,203
	EUR/GJ	13	14	13	11

Daca energia termica este subventionata ca si astazi, incalzirea cladirilor va fi si mai scumpa dupa instalarea panourilor solare:





The general subsidises must be removed if solar energy shall be feasible for the consumers.

Subventiile generale trebuie eliminate, daca se doreste ca energia solara sa fie fezabila pentru consumatori.

3 TARIFF STRUCTURE

When solar energy is introduced in buildings connected to the district heating system the heat distributor will soon realise that if he maintain the current tariff structure he will be bankrupt.

The reason for bankruptcy is that the distributor must maintain 100% capacity in the distribution system and contract 100% capacity with the transmission company, too, while he will see his income decrease with 35% or even more as the solar production increases.

Currently the only tariff paid by the consumers is the energy tariff of 8.60 EUR/GJ. The subsidises are in the level of 22 EUR/GJ.

Introduction of a capacity tariff

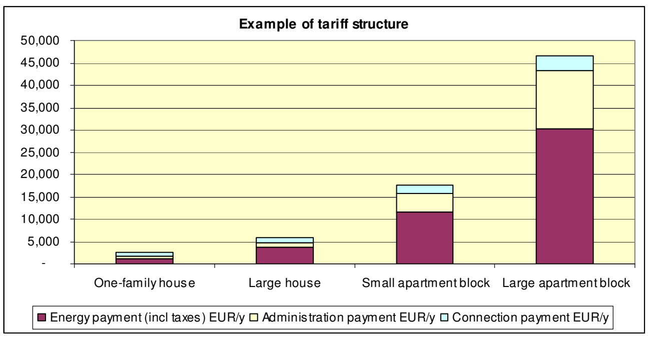
The only way to solve the problem is to separate the current tariff in an energy part and a capacity part and charge the costs of connection to the district heating system.

An example of such a system is shown below:

Example of tariff system Vestforsyningen DK		One-family house	Large house	Small apartment block	Large apartment block
Summary					
Energy payment (incl taxes)	EUR/y	1,190	3,607	11,541	30,296
Administration payment	EUR/y	323	1,075	4,301	12,904
Connection payment	EUR/y	1,013	1,147	1,720	3,249
Total	EUR/y	2,526	5,829	17,563	46,449
	EUR/GJ	43	32	30	31

The example is selected as Vestforsyningen represents an average in the Danish Benchmarking.

We see that the energy payment (incl taxes) represents less that 50% for houses while about 75% for large apartment blocks.



A tariff structure along the same line must be introduced in Bucharest to cover all cost of district

3 STRUCTURA TARIFULUI

Odata cu introducerea energiei solare in cladirile conectate la sistemul de termoficare, distribuitorul de energie termica va realiza foarte curand ca mentinerea structurii curente a tarifului va conduce la faliment.

Cauza principala a falimentului este aceea ca distribuitorul trebuie sa asigure 100% capacitatea in sistemul de distributie si de asemenea prin contract cu compania de transport trebuie sa mentina tot capacitatea 100%, in timp ce incasarile sale vor scadea cu 35% sau mai mult ca urmare a cresterii productiei din energia solara.

In prezent, singurul tarif platit de consumator este de 8,60 Euro/GJ. Tariful include subventii la un nivel de 22 Euro/GJ.

Introducerea tarifului pe capacitate

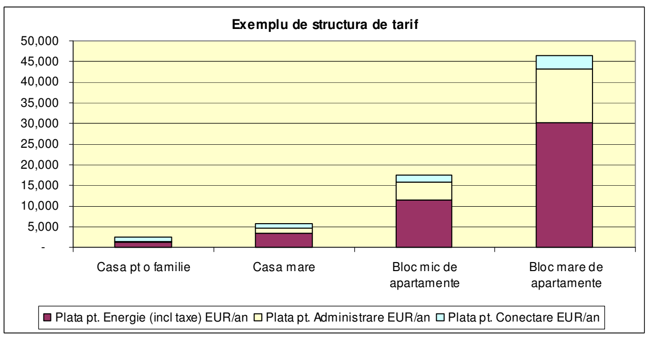
Singurele modalitati de a rezolva acesta problema sunt: separea tarifului curent intr-o componenta de energie si o componenta de capacitate, precum si introducerea unei taxe de conectare la sistemul de termoficare.

Un exemplu al unui asemenea sistem este prezentat mai jos:

Examplu pt sistem de tarif la Vestforsyningen DK		Casa pt o familie	Casa mare	Bloc mic de apartamente	Bloc mare de apartamente
Sumar					
Plata pt. Energie (incl taxe)	EUR/an	1,190	3,607	11,541	30,296
Plata pt. Administrare	EUR/an	323	1,075	4,301	12,904
Plata pt. Conectare	EUR/an	1,013	1,147	1,720	3,249
Total	EUR/an	2,526	5,829	17,563	46,449
	EUR/GJ	43	32	30	31

Exemplul selectat se datoreaz faptului ca Vestforsyningen este o companie de distributie considerata medie in Sistemul de Benchmarking din Danemarca.

Se poate observa ca plata pentru energie (inclusiv taxele) reprezinta mai putin de 50% in cazul caselor, in timp ce pentru apartamente de bloc reprezinta 75%.



O asemenea structura de tarif ar trebui introdusa si in Bucuresti pentru a putea acoperi toate costurile heating supply.

pentru furnizarea energiei termice in sistem centralizat.

4 SUBSIDISES

Current subsidises must be removed if solar energy shall be feasible for the consumers.

We have elsewhere in our report recommended removal of the general subsidises and introduction of a subsidise scheme based on social criteria.

4 SUBVENTII

Subventiile existente trebuie eliminate, daca se doreste ca energia solara sa fie fezabila pentru consumatori.

De asemenea, in celelate rapoarte am recomandat eliminarea subventiilor generale si introducerea unei scheme de subventii bazate pe criterii sociale.

5 SOLAR ENERGY FOR EVERYBODY

We have estimated that only about 50% of the buildings in Bucharest can install solar systems as described in the report. This means that about 50% of the population will see a reduced heat bill after installation of solar energy while the other 50% will not benefit.

To offer the benefit of solar heating to everybody a collective approach is needed. This means that solar energy should be seen as a production to the distribution and being distributed to all consumers by the distribution system.

If the distribution companies install solar panes where feasible the production obtained could be higher than what's shown in the calculations in this reports as these system are optimised for the building not for the district heating system. Also some public area could contribute to the solar energy production.

If political decided that solar energy shall be for everybody at least two conditions must be established:

- Private building owners must as a condition for being connected to the district heating system accept that solar panels might be installed on the building.
- The distribution companies must in their concessions undertake to produce a minimum percentage (for example 35%) of the distributed energy as solar energy.

5 ENERGIA SOLARA PENTRU FIECARE

Noi estimam ca in numai 50% din cladirile din Bucuresti pot fi instalate sisteme de panouri solare, asa cum este descris in raport. Aceasta inseamna ca 50% din populatie va putea beneficia de reducerea facturii de energie termica dupa instalarea acestor sisteme de panouri solare, in timp ce restul de 50% nu va putea beneficia.

Pentru ca toti sa poata beneficia de incalzirea din energia solara, este necesar sa existe o abordare colectiva. Aceasta inseamna, ca energia solara trebuie vazuta ca o sursa de producere pentru distributie, care ar trebui sa fie distribuita tuturor consumatorilor prin sistemul de distributie.

Daca vor fi instalate panouri solare de catre companiile de distributie, acolo unde producerea este fezabila, productia obtinuta ar putea fi mai mare decat este prezentat, in calculele din acest raport. In situatia in care sistemele sunt optimizate pentru cladiri si nu pentru termoficare si anumite zone publice ar putea de asemenea sa contribuie la producerea de energie solara.

In conditiile in care va exista dorinta politica pentru ca energia solara sa fie pentru fiecare, cel putin doua conditii trebuie indeplinite:

- In cazul cladirilor detinute de proprietari privati, ar trebui introdus ca o conditie de conectare la sistemul de termoficare, acceptarea montarii de panouri solare pe aceste cladiri .
- In concesiunile pentru companiile de distributie trebuie specificat un procent minim (de exemplu 35%) din energia distribuita, sa fie distribuita ca energie solara.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Startegy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 7b: Peak-load boiler production

Anexa 7b: Productia in cazanele pentru varf

4				
3				
2	23.09.2009	Corrections	GMCB	haa
1	20.05.2009	First edition – editorial changes	GMCB	haa
0	12.04.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

Table of content

Cuprins

1 INTRODUCTION

This report established if the future peak-load production should be based on centralised production as today or if the production shall be moved to strategically locations in the distribution networks.

Three scenarios are analysed:

1. Rehabilitation and life extension for 15 years of existing boilers
2. Construction of new centralised boilers
3. Construction of new local boilers

1 INTRODUCERE

Acest raport stabileste daca productia pentru varf trebuie sa fie bazata pe productie centralizata, asa cum este in prezent sau va fi mutata in locatii strategice in retelele de distributie.

Se analizeaza trei scenarii:

1. Reabilitarea si extinderea duratei de viata cu 15 ani a cazanelor existente
2. Construirea de cazane noi centralizate
3. Construirea de cazane noi la nivel local

2 NEED OF PEAK-LOAD BOILERS

2.1 Capacity requirement

The capacity needed on peak-load boilers in 2020 is about 700 MJ/s if centralised located and about 600 MJ/s if local located.

2.2 Energy production

The production on peak-load boilers will in 2020 be about 1,700,000 GJ if centralised located and about 1,500,000 GJ if located local.

2 NECESITATEA EXISTENTEI CAZANELOR PENTRU VARF

2.1 Necesarul de capacitate

Capacitatea necesara pentru cazane de varf in anul 2020 este de aprox. 700 MJ/s daca sunt centralizate si aprox. 600 MJ/s daca sunt amplasate la nivel local.

2.2 Productia de energie

Productia din cazane pentru varf va fi in anul 2020 de aprox. 1.700.000 GJ data este centralizata si de aprox. 1.500.000 GJ daca este amplasata la nivel local.

3 COST OF NATURAL GAS

In September 2007 the border price to the EU for natural gas from Russia was 255 EUR/1000 m^3 or 6.38 EUR/GJ. This price was at a reference price of crude oil of 90 EUR/barrel.

Tariff structure was:

Border price	6.38 EUR/GJ
Transmission costs	0.96 EUR/GJ
Tariff for centralised boilers	7.33 EUR/GJ
Distribution costs	1.10 EUR/GJ
Tariff for local boilers	8.43 EUR/GJ

3 COSTUL GAZULUI NATURAL

In septembrie 2007 pretul la frontiera cu UE pentru gazul natural din Rusia era de 255 EUR/1000 m^3 sau 6,38 EUR/GJ. Acest pret a fost la un pret de referinta al titeiului de 90 EUR/baril.

Structura tarifului a fost:

Pret la frontiere	6,38 EUR/GJ
Costuri de transport	0,96 EUR/GJ
Tarif pentru cazane centralizate	7,33 EUR/GJ
Costuri de distributie	1,10 EUR/GJ
Tarif pentru cazane locale	8,43 EUR/GJ

4 FINANCIAL COSTS

The financial requirements and production costs are calculated as:

Existing boilers

Rehabilitation costs	100,000 EUR/MJ/s
Rehabilitated capacity	700 MJ/s
Rehabilitation costs	70,000,000 EUR
Depreciation[1]	8,684,122 EUR/y
	4.96 EUR/GJ

New centralised boilers

Rehabilitation costs	120,000 EUR/MJ/s
Rehabilitated capacity	700 MJ/s
Rehabilitation costs	84,000,000 EUR
Depreciation[2]	9,202,904 EUR/y
	5.26 EUR/GJ

New local boilers

Rehabilitation costs	150,000 EUR/MJ/s
Rehabilitated capacity	595 MJ/s
Rehabilitation costs	89,250,000 EUR
Depreciation[2]	9,777,023 EUR/y
	6.57 EUR/GJ

4 COSTURI FINANCIARE

Cerintele financiare si costuri de productie sunt calculate in cele de urmeaza:

Cazane existente

Costuri de reabilitare	100.000 EUR/MJ/s
Capacitate reabilitata	700 MJ/s
Costuri de reabilitare	70.000.000 EUR
Amortizare[1]	8.684.122 EUR/y
	4,96 EUR/GJ

Cazane noi centralizate

Costuri de reabilitare	120.000 EUR/MJ/s
Capacitate reabilitata	700 MJ/s
Costuri de reabilitare	84.000.000 EUR
Amoritizare[2]	9.202.904 EUR/y
	5,26 EUR/GJ

Cazane noi locale

Costuri de reabilitare	150.000 EUR/MJ/s
Capacitate reabilitata	595 MJ/s
Costuri de reabilitare	89.250.000 EUR
Amoritizare [2]	9.777.023 EUR/y
	6,57 EUR/GJ

[1] Period 15 years, 9% interest/ Perioada 15 ani, dobanda 9%
[2] Period 20 years, 9% interest/ Perioada 20 ani, dobanda 9%

5 O&M COSTS

The operation and maintenance costs are calculated as:

Existing boilers

O&M Costs	868,412 EUR/y
	0.50 EUR/GJ

New centralised boilers

O&M Costs	368,076 EUR/y
	0.21 EUR/GJ

New local boilers

O&M Costs	391,081 EUR/y
	0.26 EUR/GJ

5 COSTURI DE EXPLOATARE SI INTRETINERE

Costurile de exploatare si intretinere sunt calculate dupa cum urmeaza:

Cazane existente

Costuri de exploatare si intretinere	868.412 EUR/y
	0,50 EUR/GJ

Cazane noi centralizate

Costuri de exploatare si intretinere	368.076 EUR/y
	0,21 EUR/GJ

Cazane noi locale

Costuri de exploatare si intretinere	391.081 EUR/y
	0,26 EUR/GJ

6 FUEL COSTS

The fuel costs are calculated as:

Existing boilers	
Natural gas tariff	7.33 EUR/GJ
Efficiency	85 %
Fuel cost	8.63 EUR/GJ
New centralised boilers	
Natural gas tariff	7.33 EUR/GJ
Efficiency	95 %
Fuel cost	7.72 EUR/GJ
New local boilers	
Natural gas tariff	8.43 EUR/GJ
Efficiency	93 %
Fuel cost	9.07 EUR/GJ

6 COSTURILE COMBUSTIBILULUI

Costurile pentru combustibil sunt calculate astfel:

Cazane existente	
Tarifului gazului natural	7,33 EUR/GJ
Eficienta	85 %
Costul combustibilului	8,63 EUR/GJ
Cazane noi centralizate	
Tarifului gazului natural	7,33 EUR/GJ
Eficienta	95 %
Costul combustibilului	7,72 EUR/GJ
Cazane noi locale	
Tarifului gazului natural	8,43 EUR/GJ
Eficienta	93 %
Costul combustibilului	9,07 EUR/GJ

7 PRODUCTION COSTS

The production costs are calculated to:

Existing boilers	
Capital costs	4.86 EUR/GJ
O&M costs	0.50 EUR/GJ
Fuel cost	8.63 EUR/GJ
Production costs	14.09 EUR/GJ
New centralised boilers	
Capital costs	5.26 EUR/GJ
O&M costs	0.21 EUR/GJ
Fuel cost	7.72 EUR/GJ
Production costs	13.19 EUR/GJ
New local boilers	
Capital costs	6.57 EUR/GJ
O&M costs	0.26 EUR/GJ
Fuel cost	9.07 EUR/GJ
Production costs	15.90 EUR/GJ

The production costs at the distribution level are calculated as:

Existing boilers	
Production costs	14.09 EUR/GJ
Transmission costs	7.60 EUR/GJ
Production costs, distribution level	21.69 EUR/GJ
New centralised boilers	
Production costs	13.19 EUR/GJ
Transmission costs	7.60 EUR/GJ
Production costs, distribution level	21.79 EUR/GJ
New local boilers	
Production costs	15.90 EUR/GJ
Transmission costs	0 EUR/GJ
Production costs, distribution level	15.90 EUR/GJ

7 COSTURILE DE PRODUCTIE

Costurile de productie sunt calculate mai jos:

Cazane existente	
Costuri de capital	4,86 EUR/GJ
Costuri de exploatare si intretinere	0,50 EUR/GJ
Costul combustibilului	8,63 EUR/GJ
Costurile de productie	14,09 EUR/GJ
Cazane noi centralizate	
Costuri de capital	5,26 EUR/GJ
Costuri de exploatare si intretinere	0,21 EUR/GJ
Costul combustibilului	7,72 EUR/GJ
Costurile de productie	13,19 EUR/GJ
Cazane noi locale	
Costuri de capital	6,57 EUR/GJ
Costuri de exploatare si intretinere	0,26 EUR/GJ
Costul combustibilului	9,07 EUR/GJ
Costurile de productie	15,90 EUR/GJ

Costurile de productie la nivel de distributie sunt calculate mai jos:

Cazane existente	
Costurile de productie	14,09 EUR/GJ
Costuri de transport	7,60 EUR/GJ
Costuri productie, nivel distributie	21,69 EUR/GJ
Cazane noi centralizate	
Costurile de productie	13,19 EUR/GJ
Costuri de transport	7,60 EUR/GJ
Costuri productie, nivel distributie	21,79 EUR/GJ
Cazane noi locale	
Costurile de productie	15,90 EUR/GJ
Costuri de transport	0 EUR/GJ
Costuri productie, nivel distributie	15,90 EUR/GJ

8 CONCLUSION

Moving the peak-load production to the local level will save about 5 EUR/GJ or about 20%.

The annual saving will be about 14 MEUR

The benefit can be even higher as the transmission system can be reduced in terms of pipe diameters resulting in reduced heat losses.

8 CONCLUZIE

Mutarea productie pentru varf la nivel local va crea o economie de aprox. 5 EUR/GJ sau aprox. 20%.

Economia anuala va fi de aprox. 14 milioane EUR.

Beneficiul poate fi chiar mai mare, daca sistemul de transport poate fi redus in sensul micsorarii diametrului conductelor, cu consecinte directe asupra reducerii pierderilor de caldura.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 7c: Reconstruction of the production system

Anexa 7c: Reconstructia sistemului de producere

4				
3				
2	01.09.2009	Corrections	GMCB	haa
1	03.06.2009	First edition – layout corrections	GMCB	haa
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ATH energ

Grontmij | Carl Bro

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Cuprins

1 INTRODUCTION

Having concluded that the current centralised and old heat and power production system has no place in a future production system where the goals will be low affordable heat prices, CO_2 neutral production and high security of supply a new production system must be designed.

The ranking of the different production options is presented in the Phase 2 Part 3 report: IRP Options. The options to be implemented are:

- Energy conservation
- Solar energy
- Waste-to-energy
- Decentralised CHP

In addition local productions options in terms of heat pumps, geothermal etc and heat-only-boilers is assumed installed.

Redesign of the production system is also prescribed in the National Energy Strategy where the focus for future heat production is solar energy, renewable and waste-to-energy and for electricity cogeneration, nuclear, coal and hydro.

Redesign and reconstruction of primary heat system, from now on called the transmission system, must go hand-in-hand with the redesign and reconstruction of the production system. The future production will be very different: the only centralised production will be waste-to-energy, unless ELCEN or other will construct power plant(s) and sell surplus heat at a price of less than 50% of the current price (about 4 EUR/GJ or less). The remaining production will be decentralised CHP and local solar energy and peak-load-boilers.

The results calculated in this report are based on weekly production and might not fully correspond with results calculated in other parts or appendixes based on monthly values.

1 INTRODUCERE

Considerand ca, este acceptat faptul ca sistemele existente vechi de producere centralizata a energiei termice si energiei electrice nu isi regasesc locul intr-un sistem de producere ale carui tinte sunt: preturile accesibile, productia neutra din punct de vedere al emisiilor de CO_2 si siguranta mare a furnizarii, in consecinta trebuie proiectat un nou sistem de producere.

Clasificarea diferitelor optiuni de productie este prezentata in Etapa II – Raportul 3: Optiunile PIR. Optiunile ce urmeaza a fi implementate sunt:

- Conservarea energiei
- Energia solara
- Recuperarea energiei din deseuri
- Unitati de cogenerare descentralizate

Suplimentar, optiuni privind producerea locala inseamna: pompe de caldura, apa geotermala, etc in conditiile in care cazanele de apa fierbinte sunt instalate.

Reproiectarea sistemului de producere este de asemenea prevazuta si in Strategia Energetica Nationala in care se pune accent pe productia de energie termica viitoare bazata pe energia solara, alte forme de energie regenerabile si recuperarea energiei din deseuri, in timp ce pentru electricitate se pune accent pe cogenerare, energia nucleara, carbune si energia hidro.

Reproiectarea si reconstruirea sistemului de termoficare primar, mai departe denumit sistemul de transport, trebuie realizata odata cu reproiectarea si reconstructia sistemului de producere. Producerea viitoare va fi foarte diferita: singura producere centralizata va fi din facilitati de incinerare a deseurilor, numai daca ELCEN sau alt producator va construi centrale de producere a energiei electrice si va vinde surplusul de energie termica la un pret mai mic cu 50% fata de pretul actual (aprox. 4 EUR/GJ sau chiar mai putin). Restul producerii va fi de la centrale de cogenerare descentralizate, energie solara si cazane pentru acoperirea varfului de consum.

Rezultatele calculate in acest raport au la baza productia saptamanala si este posibil sa nu corespunda cu alte rezultate calculate in alte rapoarte sau anexe care au luat in considerare valori lunare.

2 HEAT DEMAND FORECAST

The heat demand forecast is established in the previous submitted report: Phase 2 Part 1 Demand Forecast.

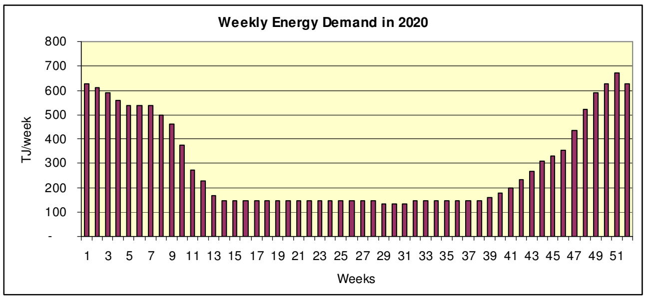
The demand was in 2007 20,580 TJ. In spite of new connections the demand will drop to about 15,100 TJ in 2020 due to energy conservation.

The capacity requirement at -18 ^{0}C outdoor temperature was in 2007 3,100 MJ/s expected to drop to about 2,250 MJ/s. However, the peak load of 3,100 MJ/sec was never reached.

The -18 ^{0}C peak load will only be seen for an hour or two early in the morning. Hence, it will not be a reasonable approach to design for this value. A reasonable design criteria is to design for an outdoor temperature of -12 ^{0}C and accepting the indoor temperature might drop to 18 ^{0}C for shorter periods. Using this design criterion the maximum peak load to design for will be about 1,600 MJ/s in 2020.

2.1 Energy demand

The weekly energy demand for 2020 is estimated as:



The maximum weekly energy demand is estimated to be just below 700 TJ.

2.2 Capacity demand

The weekly capacity demand for 2020 is estimated as:

2 PROGNOZA NECESARULUI DE CALDURA

Prognoza necesarului de caldura este stabilita in rapoartele prezentate anterior: Etapa 2 – Raportul 1 Prognoza Cererii.

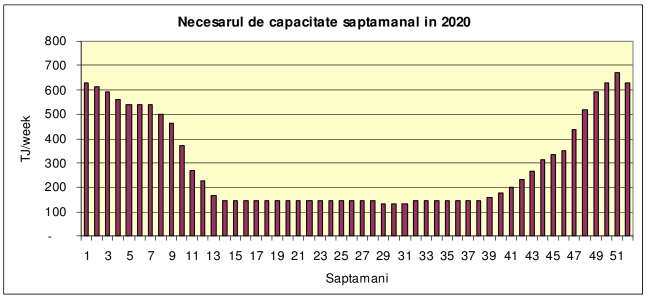
In anul 2007, necesarul a fost de 20.580 TJ. In pofida noilor bransari necesarul va scadea la aprox. 15.100 TJ in 2020, datorita implementarii masurilor de conservare a energiei.

Cerinta de capacitate la o temperatura exterioara de -18 ^{0}C in 2007 a fost 3.100 MJ/s si se estimeaza ca va scadea la aprox. 2.250 MJ/s, cu toate acestea, varful de 3.100 MJ/s nu a fost niciodata atins.

Temperatura de -18 ^{0}C poate fi intalnita doar pentru o ora sau doua dimineata devreme. Prin urmare, nu este o abordare corecta proiectarea pe baza acestei valori. Un criteriu rezonabil de proiectare este o temperatura exterioara de -12 ^{0}C si trebuie sa acceptam ca temperatura interioara poate scadea la 18 ^{0}C pentru perioade scurte. Folosind acest criteriu incarcarea maxima la varf pentru proiectarea sistemului va fi de cca 1.600 MJ/s in anul 2020.

2.1 Necesarul de energie

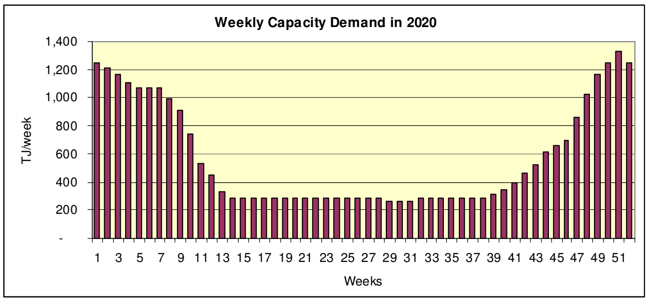
Necesarul saptamanal de energie pentru anul 2020 este estimat dupa cum urmeaza:

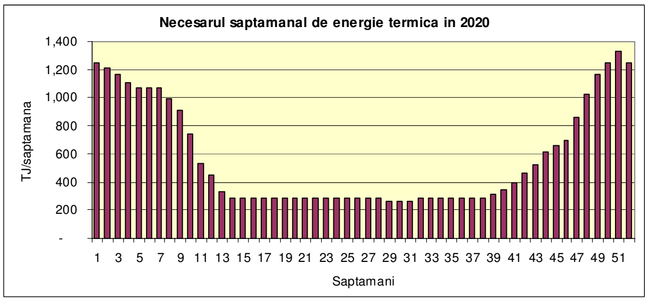


Necesarul saptamanal de energie este estimat a fi mai mic de 700 TJ.

2.2 Necesarul de capacitate

Necesarul saptamanal de capacitate pentru anul 2020 este estimat dupa cum urmeaza:


Weekly Capacity Demand in 2020
TJ/week
Weeks


Necesarul saptamanal de energie termica in 2020
TJ/saptamana
Saptamani

3 DESIGN OF PRODUCTION SYSTEM

Design of the production system is based on the energy demand (about 15,100 TJ) and the capacity demand (about 1,500 MJ/s) forecasted for 2020.

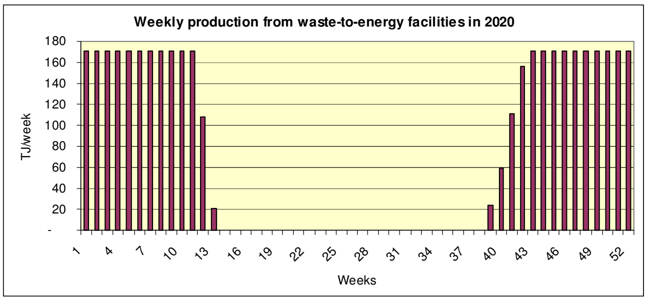
Outline of the 2020 production system:

	TJ/y	MJ/s
Centralised production	4,350	300
Decentralised production	4,150	400
Solar energy	4,900	0
Heat storages	0	50
Heat-only-boilers	1,750	700
Other sources	750	50
Total (including losses)	15,900	1500

3.1 Centralised production

More information and calculations regarding waste-to-energy-facilities can be found in Appendix 7d. The future centralised production will be limited to 3 x 100 MJ/s waste-to-energy facilities, located at three of the existing plant sites, where infrastructure are always available.

The annual heat production will be:



In the off-heating season, where the demand is covered mainly from solar energy systems, the waste facilities can generate power. The power generated can be:

3 PROIECTAREA SISTEMULUI DE PRODUCERE

Proiectarea sistemului de producere are la baza necesarul de energie (aprox. 15.100 TJ) si necesarul de capacitate (aprox. 1.500 MJ/s) estimate pentru anul 2020.

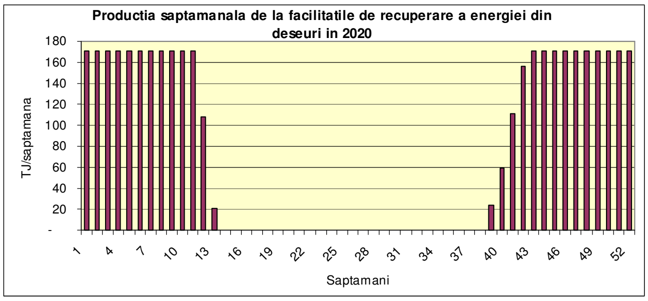
Structura propusa a sistemului de producere in 2020:

	TJ/an	MJ/s
Producere centralizata	4.350	300
Producere descentralizata	4.150	400
Energie solara	4.900	0
Acumulatoare de caldura	0	50
CAF-uri	1.750	700
Alte surse	750	50
Total (inclusive pierderi)	15,900	1500

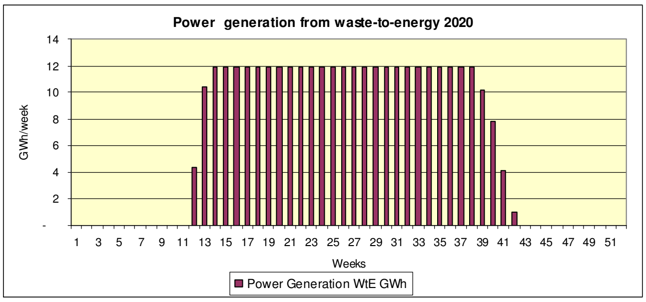
3.1 Producere centralizata

Informatii si calcule suplimentare privind facilitatile de incinerare a deseurilor se regasesc in Anexa 7d. Producerea centralizata viitoare va fi limitata la 3 x 100 MJ/s, capacitatea facilitatilor de incinerarea a deseurilor cu recuperarea energiei, localizate in trei dintre amplasamentele existente, unde infrastructura este intotdeauna disponibila.

Productia anuala de energie termica va fi:



In sezonul de vara, unde necesarul este acoperit in principal de sistemele pe baza de energie solara, facilitati de incinerare a deseurilor vor produce energie electrica. Energia electrica produsa poate fi:



Implementation

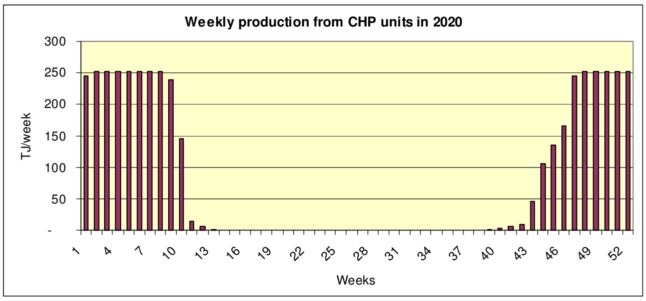
It will probably take at least five years before the sorting of waste making it suitable for incineration is established.

Also establishing the political framework for waste-to-energy, preparing tender documents, concession negotiation and construction of the facilities will take time.

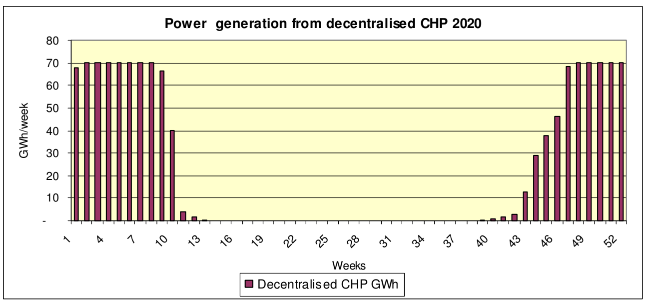
We forecast the first incineration line starting in 2015 and completion of construction of all three facilities and all 9 incineration line in operation before 2020.

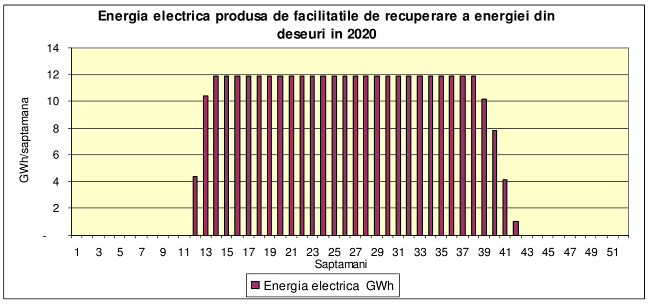
3.2 Decentralised plants

The decentralised units will have a capacity of about 400 MW / 400/MJ/s. However, the full capacity might not be utilised in 2020 if energy conservation and construction of waste-to-energy facilities progresses as planned. The heat production in 2020 is forecasted as:



The CHP units will generate electricity at a power:heat ratio of 1:1. The electricity production will thus be:





Implementarea

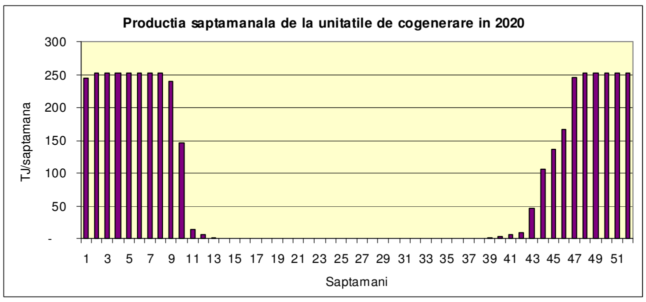
Probabil va dura cel putin cinci ani pana se va implementa o procedura pentru sortarea deseurilor corespunzatoare pentru incinerare.

De asemenea, stabilirea cadrului politic pentru transformarea deseurilor in energie, pregatirea documentatiilor de atribuire, negocierea concesiunilor si construirea facilitatilor va dura.

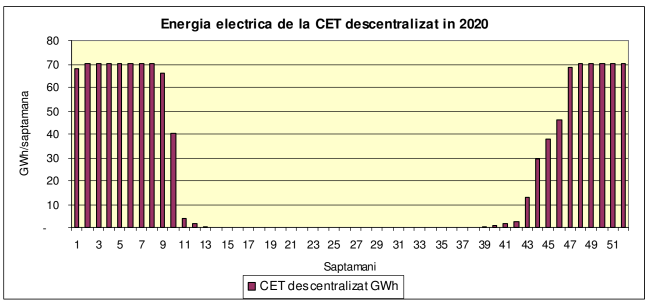
Putem estimam, cu privire la construirea primei linii de incinerare ca va putea incepe in 2015 iar finalizarea celor trei facilitati si punerea in functiune a 9 linii de incinerare se va face inainte de anul 2020.

3.2 Centrale in sistem descentralizat

Unitatile descentralizate vor avea o capacitate de aprox. 400 MW/ 400 MJ/s. Totusi, este posibil sa nu se utilizeze intreaga lor capacitate in anul 2020 daca conservarea energiei si construirea facilitatilor de incinerare a deseurilor progreseaza conform planului. Productia de energie termica in 2020 este estimata dupa cum urmeaza:



Unitatile de cogenerare vor produce energie electrica in proportie de 1:1 electric:termic. Productia de energie electrica va fi dupa cum urmeaza:



Implementation

It is important that the construction of the decentralised CHP is started without delay as production from these units will enable decommissioning of some of the existing worn out capacity and thus enable start of reconstruction of the primary network, too.

The decentralised plants shall be located on the transmission side but as close as possible to the new substation. Some of the old decommissioned substations would be a natural choice for location as the necessary infrastructure is necessary there.

Location of the CHP units shall be at strategically points when the transmission system, without CHP operation will have poor supply parameter in terms of pressure drop.

The sizing of the units shall correspond to the size of the nearby heat exchanger station(s). It is not the idea to transport decentralised production over long distances in the transmission system. With heat exchanger stations in the size of about 20 MJ/s the size of the CHP unit will typically be 12-14 MJ/sec (12-14 MW). A few larger CHP units might be constructed at the branches of the transmission system where there is no waste-to-energy facility connected and in the central part of the system.

Implementarea

Este important sa se demareze fara intarziere construirea centralelor de cogenerare descentralizate intrucat productia de la aceste unitati va permite dezafectarea unor capacitati existente depreciate si astfel se poate initia si reconstructia retelei primare.

Centralele descentralizate vor fi amplasate si conectate la reteaua de transport, insa vor fi cat mai aproape posibil de noile puncte termice. Unele puncte termice dezafectate ar trebuie sa fie alegerea normala pentru amplasamentul acestora dat fiind faptul ca la aceste amplasamente exista disponibila infrastructura necesara.

Amplasamentul unitatilor de cogenerare se va face in acele puncte strategice, in care, in absenta unitatilor de cogenerare sistemul de transport ofera parametri de furnizare scazuti, din punct de vedere al caderii de presiune.

Dimensionarea unitatilor trebuie sa corespunda cu dimensiunea statiilor de schimbatoare de caldura invecinate. Nu este recomandat ca in cazul productiei descentralizate sa existe distante lungi prin sistemul de transport. Daca statiile de schimbatoare de caldura au capacitati de 20 MJ/sec, unitatile de cogenerare vor avea tipic 12-14 MJ/sec (12-14 MW). Unitati de cogenerare ceva mai mari ar putea fi construite in acele arii ale sistemului de transport in care nu sunt conectate facilitati de incinerare a deseurilor sau in zona centrala a sistemului de transport.

3.3 Local Production

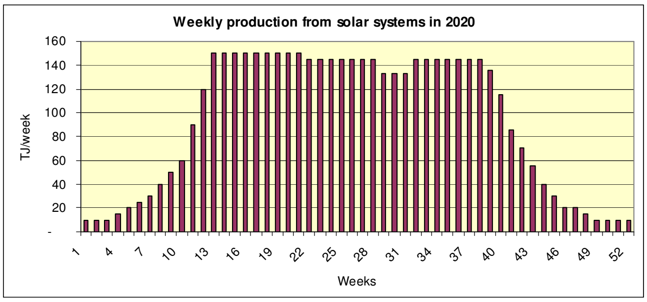
Local production comprises:

- Solar heating systems
- Heat-only-boilers
- Other sources (heat pumps and geothermal heat etc)

Solar heating systems

More information and detailed calculations regarding solar heating systems is found in Appendix 7a.

The estimated production will be:



Installation

Installation of solar heating systems should be integrated in the energy rehabilitation of the buildings, especially in construction of a new insulation envelope.

Heat storages are a condition for obtaining the full benefit of the solar panels. Heat storages will probably be most feasible to construct in the distribution systems. Thus, installation of solar panels must be integrated in the distribution network.

Installation should start as soon as the legal framework for subsidises is establish.

Heat-only-boilers

The estimated production from heat-only-boilers for 2020 is:

3.3 Producerea locala

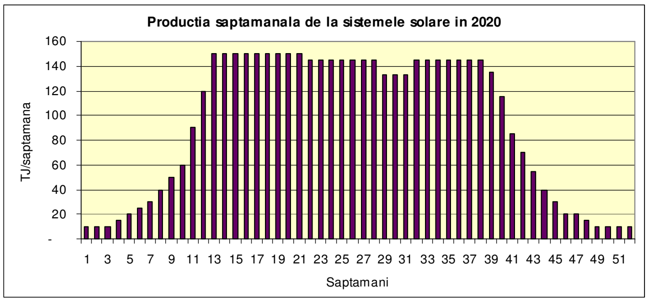
Producerea locala consta in:

- Sisteme pe baza de energie solara
- CAF-uri
- Alte surse (pompe de caldura si energie geotermala, etc)

Sistemele de incalzire pe baza de energie solara

Informatii si calcule suplimentare privind sistemele pe baza de energie solara sunt prezentate in Anexa 7a.

Productia estimata va fi:



Instalarea

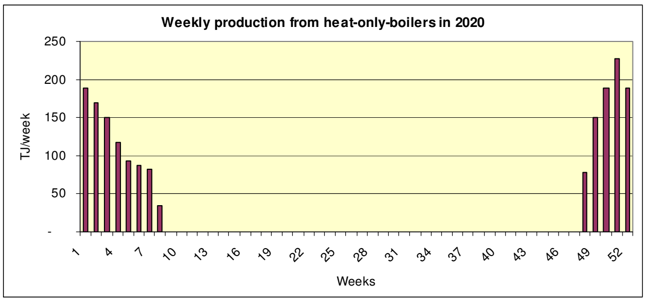
Instalarea sistemelor de incalzire pe baza de energie solara trebuie realizata integrat cu reabilitarea termica a cladirilor, amplasate in izolatia termica a acestora.

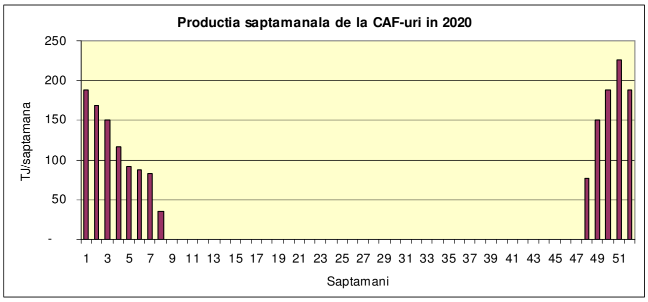
Acumulatoarele de caldura sunt o conditie pentru obtinerea in intregime a avantajului oferit de catre panourile solare. Cele mai fezabil va fi cand acumulatoarele de caldura vor fi construite si incorporate in sistemele de distributie. Astfel, instalarea panourilor solare trebuie integrata in reteaua de distributie.

Instalarea trebuie demarata imediat ce este stabilit cadrul legal care reglementeaza schemele de sprijin financiar.

CAF-urile

Productia estimata de la CAF-uri pentru anul 2020 este:





Installation

Installation of new local heat-only-boilers based on bio fuel (liquid or fluid) and decommissioning of the centralised heat-only-boilers should start immediately to enable start of reconstruction of the primary network.

The location of the local boilers must be considered in respect of the location of the heat exchanger station, the location of heat storage(s) and be located with the sizing of the network, the installation costs and the supply conditions in mind.

One of the decommissioned substations might be used for the local boilers as the infrastructure is already available.

Instalarea

Instalarea la nivel local a noilor CAF-uri pe baza de bio-combustibil (lichid sau fluid) cu dezafectarea celor centralizate trebuie demarata imediat, pentru a permite incepere reconstructiei retelei primare.

Amplasarea cazanelor locale trebuie hotarata luand in considerare locatia statiilor de schimbatoare de caldura, amplasarea acumulatorului/acumulatoarelor de caldura, de dimensiunile retelei, de costurile de instalare si de conditiile de furnizare.

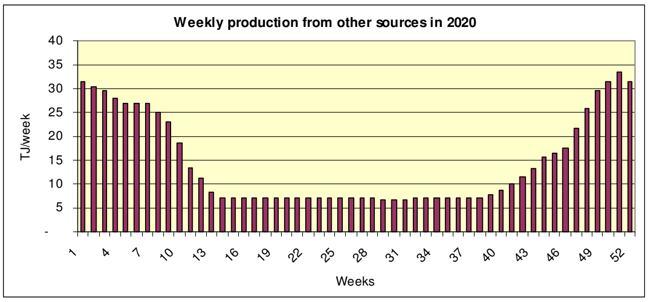
Unul dintre punctele termice dezafectate poate fi folosit pentru cazane locale luand in considerare faptul ca infrastructura este deja disponibila.

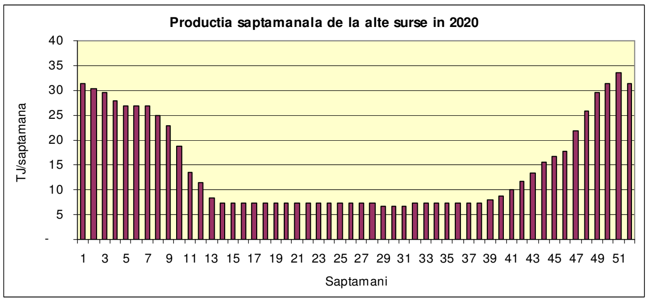
Other sources

The estimated production from other sources such as for example heat pumps and geothermal energy is forecasted to be about 5% of the total production:

Alte surse

Productia estimata de la alte surse, cum ar fi: pompele de caldura si energia geotermala este estimata a fi aprox. 5% din productia totala:





4 PRODUCTION COSTS

Calculation of the production costs are based on the established IRP-value and refined based on the production assessment performed in this report. Thus, the IRP-values are used as intended for determine the production system layout.

The production costs are calculated as short-term costs, medium term costs and long term costs and as fixed costs and marginal production costs.

4.1 Heat-only-boilers

The local boilers are assumed in the “container size” meaning up to 5 MJ/s. The capacity requirement will be about 775 MJ/s and the production requirement about 226,000 GJ in 2020.

Investment

We can establish the costs of establishing local heat-only-boilers as:

		Baseline	Short term	Medium term	Long term
Capacity	MJ/s/unit	5			
Price of boiler	EUR/MJ/s	50,000			
	EUR/unit	250,000			
Installation cost	EUR/unit	75,000			
Oil storage	EUR/unit	20,000			
Other costs	EUR/unit	17,250			
Total costs	EUR/unit	362,250			

Financing

The financing can be obtained either by the municipality guaranteeing a loan, by signing a concession agreement with a private investor or a combination of this (private partnership). However, in any way the investment will be handled as a commercial investment:

		Baseline	Short term	Medium term	Long term
Financial requirement	EUR	52,526,250			
Period	y	20			
Interest	%	12			
Annual financing costs	EUR	7,032,150	7,032,150	7,032,150	7,032,150
	EUR/MJ/s	9,700	9,700	9,700	9,700
	EUR/GJ	4.02	4.02	4.02	4.02

This value must be paid annually independent of how much the heat-only-boilers have or will produce.

Production costs

The cost of production, operation, maintenance and administration is calculated as:

		Baseline	Short term	Medium term	Long term
Production	GJ/y	1,751,381			
Boiler efficiency	%	95			
Fuel consumption	GJ/y	1,843,559			
Fuel price	EUR/GJ	12.00	12.94	17.05	23.47
	EUR/y	22,122,707	21,465,019	29,857,395	43,261,552
Operation & maintenance	EUR/y	262,631	287,745	416,107	681,007
Annual production costs	EUR/y	22,385,339	21,752,764	30,273,502	43,942,559
	EUR/GJ	12.78	12.42	17.29	25.09

Tariff structure

The tariff structure must be base on a capacity tariff and an energy tariff:

4 COSTURILE DE PRODUCERE

Calcularea costurilor de producere are la baza valorile IRP stabilite si revizuite pe baza estimarilor privind productia din acest raport. Prin urmare, valorile IRP sunt folosite pentru a determina schema sistemului de producere.

Costurile de producere sunt calculate ca si costuri pe termen scurt, costuri pe termen mediu, costuri pe termen lung, costuri fixe si costuri marginale de productie.

4.1 CAF-urile

Cazanele locale se presupune ca au dimensiunea unui “container”, insemnand max. 5 MJ/s. Cerinta de capacitate va fi de aprox. 775 MJ/s si cerinta de productie de cca 226.000 GJ in 2020.

Investitia

Putem stabili costurile pentru realizarea CAF-urilor dupa cum urmeaza:

		Baza	Termen scurt	Termen mediu	Termen lung
Capacitate	MJ/s/unit	5			
Costul cazanelor	EUR/MJ/s	50,000			
	EUR/unit	250,000			
Cost de instalare	EUR/unit	75,000			
Stocare pacura	EUR/unit	20,000			
Alte costuri	EUR/unit	17,250			
Costuri totale	EUR/unit	362,250			

Finantarea

Finantarea poate fi obtinuta fie printr-un imprumut garantat de Municipalitate, prin semnarea unui acord de concesiune cu un investitor privat sau prin combinarea acestora (parteneriat public-privat). Totusi, in oricare din cazuri, investitia va fi gestionata ca o investitie comerciala:

		Baza	Termen scurt	Termen mediu	Termen lung
Cerinta financiara	EUR	52,526,250	-	-	-
Perioada	y	20	-	-	-
Dobanda	%	12	-	-	-
Costuri anuale de finantare	EUR	7,032,150	7,032,150	7,032,150	7,032,150
	EUR/MJ/s	9,700	9,700	9,700	9,700
	EUR/GJ	4.02	4.02	4.02	4.02

Aceasta valoare trebuie platita anual independent de cum si cat vor produce CAF-urile.

Costurile de productie

Costurile de producere, exploatare, intretinere si administrare este calculat dupa cum urmeaza:

		Baza	Termen scurt	Termen mediu	Termen lung
Productie	GJ/y	1,751,381	-	-	-
Randamentul cazanului	%	95	-	-	-
Consum combustibil	GJ/y	1,843,559	-	-	-
Pretul combustibilului	EUR/GJ	12.00	12.94	17.05	23.47
	EUR/y	22,122,707	21,465,019	29,857,395	43,261,552
Exploatarea & Intretinerea	EUR/y	262,631	287,745	416,107	681,007
Costuri anuale de productie	EUR/y	22,385,339	21,752,764	30,273,502	43,942,559
	EUR/GJ	12.78	12.42	17.29	25.09

Structura tarifului

Structura tarifului trebuie sa aiba la baza doua componente una de capacitate si cealalta de consum

		Baseline	Short term	Medium term	Long term
Capacity tariff	EUR/y	7,032,150	7,032,150	7,032,150	7,032,150
	EUR/MJ/s	9,700	9,700	9,700	9,700
Production costs	EUR/GJ	12.78	12.42	17.29	25.09
Transmission tariff	EUR/GJ	7.30	7.73		
Distribution cost	EUR/GJ	20.11	15.28	10.18	10.99
Energy tariff	EUR/GJ	40.20	35.43	27.47	36.08

From these assessment we can establish the average cost of supplying heat from the heat-only-boilers as:

		Baseline	Short term	Medium term	Long term
Averege cost of supply	EUR/GJ	44.21	39.44	31.48	40.10

4.2 Solar heating systems

A "standard concept" of about 120 m^2 solar panels fitting on most buildings is assumed developed. Heat storage of about 50 l /m^2 panel is needed for obtaining the full benefit of the solar heating systems.

Investment

The price is established in Appendix 7a as:

		Baseline	Short term	Medium term	Long term
Annual production	GJ	4,886,900			
Production per m2 panel	KWh	500			
	GJ	1.8			
Necessary area	m2	2,714,944			
Standard system	m2	120			
	GJ/sys	216			
	EUR/sys	81,000			
Subsidises	EUR/sys	54,000			
Investment	EUR/sys	27,000			

Financing

The required investment is only about 1/3 of the total investment due to subsidise. This 1/3 treated as a commercial investment will cost:

		Baseline	Short term	Medium term	Long term
Financial requirement	EUR	610,862,500			
Period	y	20			
Interest	%	12			
Annual financing costs	EUR	81,781,526	81,781,526	81,781,526	81,781,526
	EUR/GJ	16.73	16.73	16.73	16.73

Production costs

The production costs are related to pumping costs and an annual service inspection of the systems:

		Baseline	Short term	Medium term	Long term
Operation & maintenance	EUR/y	3,054,313	3,151,522	3,184,954	3,229,884
Annual production cost	EUR/y	3,054,313	3,151,522	3,184,954	3,229,884
	EUR/GJ	0.63	0.64	0.65	0.66

Tariff structure

A cost related tariff will be:

		Baseline	Short term	Medium term	Long term
Capacity tariff	EUR/y	81,781,526	81,781,526	81,781,526	81,781,526
	EUR/GJ	16.73	16.73	16.73	16.73
Production costs	EUR/GJ	0.63	0.64	0.65	0.66
Transmission costs	EUR/GJ				
Distribution costs	EUR/GJ	20.11	15.28	10.18	10.99
Energy tariff	EUR/GJ	20.74	15.93	10.84	11.65

And we can establish an average cost of heat supply from solar heating systems at:

		Baseline	Short term	Medium term	Long term
Averege costs of supply	EUR/GJ	37.47	32.66	27.57	28.39

de energie.

		Baza	Termen scurt	Termen mediu	Termen lung
Capacitatea de tarifare	EUR/y	7,032,150	7,032,150	7,032,150	7,032,150
	EUR/MJ/s	9,700	9,700	9,700	9,700
Costuri de productie	EUR/GJ	12.78	12.42	17.29	25.09
Tarifare transport	EUR/GJ	7.30	7.73	-	-
Cost de distributie	EUR/GJ	20.11	15.28	10.18	10.99
Tarifare energie	EUR/GJ	40.20	35.43	27.47	36.08

Ca urmare a acestor estimari se poate stabili costul mediu de furnizare a energiei termice de la CAF-uri:

		Baza	Termen scurt	Termen mediu	Termen lung
Cost mediu de furnizare	EUR/GJ	44.21	39.44	31.48	40.10

4.2 Sistemele de incalzire pe baza de energie solara

Se presupune ca se va promova un "concept standard" de panouri solare amplasate pe cladiri avand aprox. 120 m^2. In vederea obtinerii in intregime a avantajului sistemelor de incalzire pe baza de energie solare este necesara realizarea unui sistem de acumulare acaldurii cu capaciatea de 50 l /m^2 panou solar.

Investitia

Pretul este stabilit in Anexa 7a dupa cum urmeaza:

		Baza	Termen scurt	Termen mediu	Termen lung
Productie anuala	GJ	4,886,900	-	-	-
Prodcutia pe m2 panou	KWh	500	-	-	-
	GJ	1.80	-	-	-
Suprafata necesara	m2	2,714,944	-	-	-
Sistem standard	m2	120	-	-	-
	GJ/sys	216	-	-	-
	EUR/sys	81,000	-	-	-
Subventii	EUR/sys	54,000	-	-	-
Investitie	EUR/sys	27,000	-	-	-

Finantarea

Investitia necesara este in final de cca 1/3 din investitia totala datorita schemelor de subventionare. Aceasta contributie de 1/3, tratata ca o investitie comerciala, va insemna:

		Baza	Termen scurt	Termen mediu	Termen lung
Investitia necesara	EUR	610,862,500	-	-	-
Perioada	y	20	-	-	-
Dobanda	%	12	-	-	-
Costuri anuale de finantare	EUR	81,781,526	81,781,526	81,781,526	81,781,526
	EUR/GJ	16.73	16.73	16.73	16.73

Costurile de producere

Costurile de producere sunt legate de costurile de pompare si reviziile anuale ale sistemelor:

		Baza	Termen scurt	Termen mediu	Termen lung
Exploatarea & Intretinerea	EUR/y	3,054,313	3,151,522	3,184,954	3,229,884
Costuri anuale de productie	EUR/y	3,054,313	3,151,522	3,184,954	3,229,884
	EUR/GJ	0.63	0.64	0.65	0.66

Structura tarifului

Costul aferent tarifului va fi:

		Baza	Termen scurt	Termen mediu	Termen lung
Tarif de capacitate	EUR/y	81,781,526	81,781,526	81,781,526	81,781,526
	EUR/GJ	16.73	16.73	16.73	16.73
Costuri de productie	EUR/GJ	0.63	0.64	0.65	0.66
Tarif de transport	EUR/GJ	-	-	-	-
Cost de distributie	EUR/GJ	20.11	15.28	10.18	10.99
Tarif de energie	EUR/GJ	20.74	15.93	10.84	11.65

Si putem stabili costul mediu de furnizare a energiei termice de la sistemele pe baza de energie solara:

		Baza	Termen scurt	Termen mediu	Termen lung
Cost mediu de furnizare	EUR/GJ	37.47	32.66	27.57	28.39

4.3 Decentralised CHP

The units are assumed in a size of about 10 MW / 10 MJ/s, which is a competitive sizing. The fuel should initially be natural gas but the units shall be prepared for shifting the bio diesel if/then this product become price competitive.

Investment

The price is established based on known prices in the same sizing:

		Baseline	Short term	Medium term	Long term
Capacity	MJ/s/unit	10			
	MW	10			
Price of Units	EUR/MJ/s	750,000			
	EUR/unit	7,500,000			
Installation cost	EUR/unit	1,875,000			
Other costs	EUR/unit	468,750			
Total costs	EUR/unit	9,843,750			

Financing

The financing can be obtained either by the municipality guaranteeing a loan, by signing a concession agreement with a private investor or a combination of this (private partnership). However, in any way the investment will be handled as a commercial investment:

		Baseline	Short term	Medium term	Long term
Financial requirement	EUR	393,750,000			
Period	y	20			
Interest	%	12			
Annual financing costs	EUR	52,714,770	52,714,770	52,714,770	52,714,770
	EUR/MJ/s	131,787	131,787	131,787	131,787
	EUR/GJ	11.97	11.97	11.97	11.97

Production costs

The heat production costs depends very much on the obtained income from sale of heat:

		Baseline	Short term	Medium term	Long term
Production	GJ/y	4,403,315	4,403,315	4,403,315	4,403,315
	MWh	1,223,143	1,223,143	1,223,143	1,223,143
Unit efficiency	%	85	85	85	85
Fuel consumption	GJ/y	10,360,741	10,360,741	10,360,741	10,360,741
Fuel price	EUR/GJ	9.00	9.86	14.26	23.34
	EUR/y	93,246,669	102,163,080	147,737,997	241,790,085
Operation & maintenance	EUR/y	11,812,500	11,930,625	13,584,375	14,765,625
Income from sale of power	EUR/y	79,504,297	85,620,012	91,735,727	97,851,442
Annual production costs	EUR/y	25,554,872	28,473,693	69,586,645	158,704,268
	EUR/GJ	5.80	6.47	15.80	36.04

Tariff structure

A cost related tariff will be:

		Baseline	Short term	Medium term	Long term
Capacity tariff	EUR/y	26,357,385	52,714,770	52,714,770	52,714,770
	EUR/MJ/s	65,893	131,787	131,787	131,787
Production costs	EUR/GJ	5.80	6.47	15.80	36.04
Transmission tariff	EUR/GJ				
Distribution cost	EUR/GJ	20.11	15.28	10.18	10.99
Energy tariff	EUR/GJ	25.92	21.75	25.99	47.03

And we can establish an average cost of heat supply from decentralized CHP at:

		Baseline	Short term	Medium term	Long term
Averege cost of supply	EUR/GJ	31.90	33.72	37.96	59.01

4.4 Waste-to-Energy

Description and calculation of the production costs for waste-to-energy facilities is presented in Appendix 7d.

4.3 Centrale de cogenerare descentralizate

Capacitatea unitatilor este estimata a fi aprox 10 MW/ 10 MJ/s, considerata o capacitate competitiva. Combustibilul ar trebui sa fie initial gaz natural insa unitatile trebuie pregatite pentru trecerea la bio-combustibil daca/cand acest produs va deveni competitiv din punct de vedere al pretului.

Investitia

Pretul este stabilit pe baza preturilor cunoscute pentru capacitati similare:

		Baza	Termen scurt	Termen mediu	Termen lung
Capacitate	MJ/s/unit	10	-	-	-
	MW	10	-	-	-
Cost per unitate	EUR/MJ/s	750,000	-	-	-
	EUR/unit	7,500,000	-	-	-
Cost de instalare	EUR/unit	1,875,000	-	-	-
Alte costuri	EUR/unit	468,750	-	-	-
Costuri totale	EUR/unit	9,843,750	-	-	-

Finantarea

Finantarea poate fi obtinuta fie printr-un imprumut garantat de Municipalitate, prin semnarea unui acord de concesiune cu un investitor privat sau prin combinarea acestora (parteneriat public-privat). Totusi, in oricare din cazuri investitia va fi gestionata ca o investitie comerciala:

		Baza	Termen scurt	Termen mediu	Termen lung
Necesar de finantat	EUR	393,750,000	-	-	-
Perioada	y	20	-	-	-
Dobanda	%	12	-	-	-
Costuri anuale de finantare	EUR	52,714,770	52,714,770	52,714,770	52,714,770
	EUR/MJ/s	131,787	131,787	131,787	131,787
	EUR/GJ	11.97	11.97	11.97	11.97

Costurile de producere

Costurile de producere ale energiei termice depind foarte mult de venitul obtinut din vanzarea acesteia:

		Baza	Termen scurt	Termen mediu	Termen lung
Productie	GJ/y	4,403,315	4,403,315	4,403,315	4,403,315
	MWh	1,223,143	1,223,143	1,223,143	1,223,143
Eficienta unitatii	%	85	85	85	85
Consumul de combustibil	GJ/y	10,360,741	10,360,741	10,360,741	10,360,741
Pretul combustibilului	EUR/GJ	9.00	9.86	14.26	23.34
	EUR/y	93,246,669	102,163,080	147,737,997	241,790,085
Exploatarea & Intretinerea	EUR/y	11,812,500	11,930,625	13,584,375	14,765,625
Venit din vanzarea energiei	EUR/y	79,504,297	85,620,012	91,735,727	97,851,442
Costuri anuale de productie	EUR/y	25,554,872	28,473,693	69,586,645	158,704,268
	EUR/GJ	5.80	6.47	15.80	36.04

Structura tarifului

Costul aferent tarifului va fi:

		Baza	Termen scurt	Termen mediu	Termen lung
Tarif de capacitate	EUR/y	26,357,385	52,714,770	52,714,770	52,714,770
	EUR/MJ/s	65,893	131,787	131,787	131,787
Costuri de productie	EUR/GJ	5.80	6.47	15.80	36.04
Tarif de transport	EUR/GJ	-	-	-	-
Cost de distributie	EUR/GJ	20.11	15.28	10.18	10.99
Tarif pe energie	EUR/GJ	25.92	21.75	25.99	47.03

Si putem stabili costul mediu de furnizare a energiei termice de la centralele de cogenerare descentralizate:

		Baza	Termen scurt	Termen mediu	Termen lung
Cost mediu de furnizare	EUR/GJ	31.90	33.72	37.96	59.01

4.4 Recuperarea energie din deseuri

Descrierea si calculul costurilor de productie pentru facilitatile de incinerare a deseurilor sunt prezentate

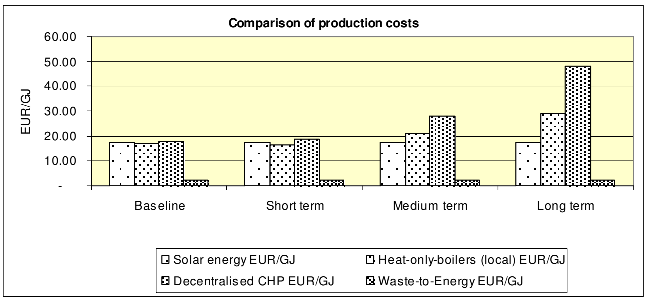
Based on these calculations can the tariff structure at the consumer level be established:

		Baseline	Short term	Medium term	Long term
Capacity tariff	EUR/y	-	-	-	-
	EUR/MJ/s	-	-	-	-
Production costs	EUR/GJ	2.15	2.15	2.15	2.15
Transmission tariff	EUR/GJ	7.30	7.73	4.63	4.63
Distribution cost	EUR/GJ	20.11	15.28	10.18	10.99
Energy tariff	EUR/GJ	29.57	25.16	16.97	17.77

4.5 Comparison of tariffs

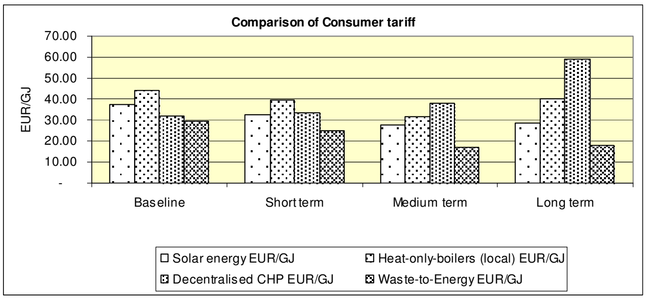
The calculated production tariffs are compared:

		Baseline	Short term	Medium term	Long term
Solar energy	EUR/GJ	17.36	17.38	17.38	17.38
Heat-only-boilers (local)	EUR/GJ	16.80	16.44	21.30	29.11
Decentralised CHP	EUR/GJ	17.78	18.44	27.77	48.01
Waste-to-Energy	EUR/GJ	2.15	2.15	2.15	2.15



However, when transmission and distribution costs are added the comparison is different:

		Baseline	Short term	Medium term	Long term
Solar energy	EUR/GJ	37.47	32.66	27.57	28.39
Heat-only-boilers (local)	EUR/GJ	44.21	39.44	31.48	40.10
Decentralised CHP	EUR/GJ	31.90	33.72	37.96	59.01
Waste-to-Energy	EUR/GJ	29.57	25.16	16.97	17.77



Solar heating

The main benefit of solar heating is that once it is installed and proper maintained the cost of heat production will be constant for the planning period, At consumer level the tariff will decrease as the distribution system is reconstructed, thermal loses, water losses and other operation and maintenance costs are reduced.

Heat-only-boilers

Subsidises are assumed (5-10%) as the boilers uses bio heating oil, a product less refined that bio diesel. This will causes a drop in the production price in short-term and medium-term perspective but as the subsidises is assumed removed in a long-term perspective when the bio heating oil is competitive do

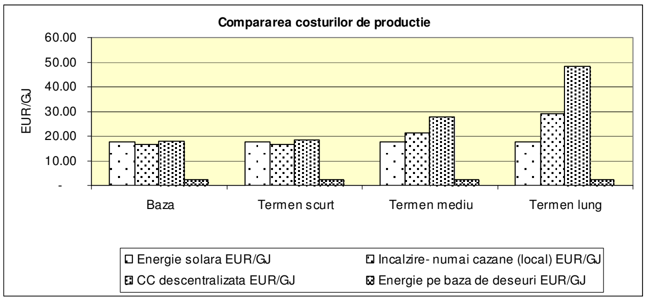
in Anexa 7d. Pe baza acestor calcule structura tarifului la nivel de consumator poate fi stabilita astfel:

		Baza	Termen scurt	Termen mediu	Termen lung
Tarif de capacitate	EUR/y	-	-	-	-
	EUR/MJ/s	-	-	-	-
Costuri de productie	EUR/GJ	2.15	2.15	2.15	2.15
Tarif de transport	EUR/GJ	7.30	7.73	4.63	4.63
Cost de distributie	EUR/GJ	20.11	15.28	10.18	10.99
Tarif pe energie	EUR/GJ	29.57	25.16	16.97	17.77

4.5 Compararea tarifelor

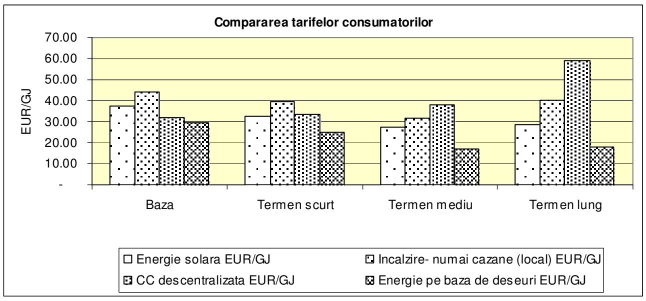
Tarifele de producere calculate sunt comparate mai jos:

		Baza	Termen scurt	Termen mediu	Termen lung
Energie solara	EUR/GJ	17.36	17.38	17.38	17.38
Incalzire- numai cazane (loca	EUR/GJ	16.80	16.44	21.30	29.11
CC descentralizata	EUR/GJ	17.78	18.44	27.77	48.01
Energie pe baza de deseuri	EUR/GJ	2.15	2.15	2.15	2.15



Totusi, daca se adauga costurile de transport si distributie comparatia este diferita:

		Baza	Termen scurt	Termen mediu	Termen lung
Energie solara	EUR/GJ	37.47	32.66	27.57	28.39
Incalzire- numai cazane (loca	EUR/GJ	44.21	39.44	31.48	40.10
CC descentralizata	EUR/GJ	31.90	33.72	37.96	59.01
Energie pe baza de deseuri	EUR/GJ	29.57	25.16	16.97	17.77



Incalzirea pe baza de energie solara

Principalul avantaj al incalzirii pe baza de energie solara este ca odata ce este instalata si intretinuta corespunzator, costul producerii de energie va fi constant pentru perioada planificata. La nivel de consumator, tariful va scadea pe masura ce sistemul de distributie este reconstruit, pierderile de caldura si apa sunt reduse impreuna cu alte costuri de exploatare si intretinere.

CAF-urile

Se considera ca va exista o schema de subventii de 5-10% utilizarea unui biocombustibil pentru cazane, care este ceva mai putin rafinat decat biodisel-ul. Acest lucru va conduce la o scadere a pretului de producere in termen scurt si mediu, dar luand in consideratie faptul ca pe termen lung aceasta to increasing oil and natural gas prices.

Decentralised CHP

The decentralised CHP plants will start as a relatively cheap production source will become more and more expensive as the natural gas price increases while the electricity price is kept almost constant.

Waste-to-Energy

Heat from waste-to-energy facilities will from the start be the cheapest source and as the transmission and distribution systems will be reconstructed the consumer price will decrease.

subventie va fi eliminata atunci cand acest biocombustibil va deveni competitiv datorita cresterii pretului la petrol si gaze naturale.

Unitati de cogenerare in sistem descentralizat

Unitatile de cogeneare descentralizate vor incepe ca fiind o sursa relativ ieftina de producere, dar va deveni din ce in ce mai scumpa ca urmare a cresterii pretului la gazele naturale, in timp ce pretul electricitatii este mai mult sau mai putin mentinut constant.

Recuperarea energiei din deseuri

Caldura produsa de facilitatile de incinerare a deseurilor va fi din start cea mai ieftina sursa de producere, in conditiile in care sistemele de transport si distributie vor fi reconstruite, iar pretul la consumator va scadea.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 7d: Waste-to-Energy as heat production source

Anexa 7d: Recuperarea energiei din deseuri si utilizarea ca sursa de producere de caldura

4				
3				
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Grontmij | Carl Bro

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Cuprins

1 INTRODUCTION

Instead, in Romania, on short and medium term, the main option in waste management, will be landfills, there is necessary to promote high ranked options for the waste management, in line with EU practices and to implement as much as possible methods for final elimination of the waste (for ex. thermal treatment).

Currently, in Europe, the thermal treatment of the waste represents 30% from the total method for management of the waste. The main types of waste to be incinerated are domestic waste 75%, dangerous waste 15% and slug from waste treatment plants 10%.

The mains thermal procedures used are: incineration, gasification, pyrolysis. The most used are incineration and gasification representing 95%, while pyrolysis is still tested on pilot installation.

Pyrolysis of low, medium and high temperature is under special preoccupation of the specialists, in order to be introduced on industrial scale, due to special advantage of these procedures.

Romania asked for a 3 years transition period until 2010, regarding implementation of EU Directive 2000/76/EC regarding waste incineration.

The above mentioned EU Directive was transposed in Romanian legislation by Government Decision 286/2005 regarding waste incineration and Plan for Implementation

The National Strategy for the waste management and in the National Plan for the waste management, approved by Government Decision no 1470/2004, is mentioned the followings (on chapter II.3.6.2):

Considering international experience, especially from EU, incineration is considered the most efficient method to treat the waste collected from different sources, before being finally deposited. The scope of incineration consists on:

- Reduce the volume of waste
- To destroy the dangerous biodegradable components
- to become inert - going into an inactive / inert
- to reduce organic carbon
- to recover the energy from waste

Consequently, according to the EU-waste directive also the priorities are: to avoid waste, to recycle waste, incineration with heat recovery, incineration without heat recovery.

In principle, the thermal treatment is recommend to be

1 INTRODUCERE

Cu toate ca pe termen scurt si mediu principala optiune de gestionare a deseurilor, in Romania, va fi in continuare depozitarea, este necesara promovarea unor optiuni superioare de gestionare a deseurilor si asigurarea alinierii la practicile europene de implementare, pe cat posibil, si a altor solutii de eliminare finala (ex. tratarea termica).

In momentul de fata, procedeele termice de tratare a deseurilor la nivelul Uniunii Europene au o pondere de 30% din totalul metodelor de tratare a deseurilor. Principalele tipuri de deseuri au fost deseuri menajere (75%), deseuri periculoase (15%) si namoluri de la statiile de epurare (10%).

Principalele procedee termice utilizate sunt incinerarea, gazeificarea si piroliza. Ponderea cea mai mare o reprezinta incinerarea si gazeificarea (95 %) in timp ce piroliza este inca la stadiul de instalatii pilot.

Se constata in ultimii ani o preocupare sustinuta din partea specialistilor privind trecerea de la faza pilot la cea industriala a procedeului de piroliza de joasa, medie si inalta temperatura datorita avantajelor oferite de acest procedeu.

Romania a solicitat o perioada de tranzitie de 3 ani pana in anul 2010 privind aplicarea Directivei nr. 2000/76/EC privind incinerarea deseurilor.

Transpunerea prevederilor directivei europene in legislatia romaneasca s-a facut prin Hotararea de Guvern nr. 286/2005 privind incinerarea deseurilor si Planul de implementare.

In Strategia nationala de gestionare a deseurilor si Planul National de gestionare a deseurilor, aprobate prin H.G. nr. 1470/2004, se mentioneaza faptul ca (in capitolul II.3.6.2) :

În baza experientei internationale, în special din Statele membre UE, incinerarea este cea mai eficienta metoda de tratare a deseurilor colectate în amestec din surse diferite, înainte de a fi depozitate final. Scopul incinerarii este:

- sa minimizeze volumul deseurilor;
- sa distruga componentele periculoase biodegradabile;
- sa inertizeze – trecerea într-o forma inactiva/ inerta;
- sa reduca carbonul organic;
- sa recupereze energia continuta în deseurile incinerabile.

In consecinta, in conformitate cu prevederile directivei trebuie preferate optiuni precum prevenirea used when:

- the quantity of available municipal waste is at least 150.000 t/y.
- there is no available a proper land on acceptable distance for a landfill
- in the area is an high demand for heating and power and no other method is considered more efficient than waste incineration, considering production of heat and power

While avoiding waste hardly cannot be the responsibility of the Municipality, meanwhile recycling and incineration with heat recovery are.

The Municipality has effectively started recycling of plastic, paper and others. However, these are still steps to be taken before a recycling scheme as seen in the more in this respect developed countries like Germany and France.

District heating in more northern countries is based on heat recovering from waste-to-energy facilities. Some smaller district heating systems are almost 100% supplied from waste-to-energy facilities. The greater Copenhagen area, which in term of annual production can be compared with Bucharest, is supplied about 60% from waste-to-energy facilities.

A typical treatment of waste scheme for more advanced municipalities is that about 35% of the waste is recycled or composted, about 60% is incinerated while 5% is special treated being hazard waste. The heating value for waste brought to incineration is about 9-10 GJ/t.

deseurilor, minimizarea cantitatilor si recuperarea/valorificarea, inclusiv prin tratare termica cu sau fara recuperarea caldurii.

In principiu, tratarea termica se poate aplica atunci cand :

- cantitatea de deseuri municipale disponibila este de minim 150.000 tone/an.
- nu exista teren disponibil pe o distanta acceptabila, pentru amplasarea unui depozit;
- în regiunea respectiva exista o cerere foarte mare de caldura si energie si nicio alta metoda de tratare nu este mai eficienta decât incinerarea deseurilor în ceea ce priveste generarea de energie si caldura.

In timp ce prevenirea producerii de deseuri nu poate fi responsabilitate Municipalitatii, reciclarea si incinerare cu recuperarea caldurii sunt responsabilitatile acesteia.

Municipalitate a inceput efectiv reciclarea plasticului, hartiei si a altora. Totusi, mai sunt de facut pasi importanti pana cand sa se poata considera implementata o schema de reciclarea utilizata in tari precum Germania si Franta.

Sistemul centralizat de incalzire in tarile nordice se bazeaza pe recuperarea caldurii din deseuri in statii de incinerare. Unele sisteme mici de termoficare sunt alimentate cu caldura 100% din statii de incinerare. Cea mai mare zona din Copenhaga, care in ceea ce priveste productia anuala de energie termica, este comparabila cu Bucurestiul, este alimentata in proportie de 60%, din statii de incinerare.

In mod uzual, in cazul municipalitatilor, aplicarea unei scheme avansate de tratare a desurilor, este aceea in care 35% din deseuri sunt reciclate sau compostate, 60% sunt incinerate, in timp ce doar 5% ajung sa fie depozitate. Valoarea calorica a deseurilor aduse spre a fi incinerate este de aproximativ 9-10 GJ/t.

2 REFERENCES

We have used three references for the calculations performed in this report:

1. The newest waste-to-energy facility with published costs, The Spokane waste facility in Washington State.

   http://spokanewastetoenergy.com/WastetoEnergy.htm
2. The initial estimates for construction a new production line at Nordforbrændingen, Denmark.
3. The presentation material “Waste-to-Energy in Denmark”, which is translated to Romanian for the purpose of this project.

The Spokane waste-to-energy incinerates 33 t/h in two incineration lines. The new production line at Nordforbrændingen will incinerate about 12-14 t/h in one line. Thus the two facilities are comparable.

In additional we have compared with the information available from the Municipal Waste Management Plan, where the investment costs for new waste-to-energy facilities with a capacity of 200.000t/y are around 120 million Euro.

2 REFERINTE

Au fost utilizate 3 referinte pantru calculele efectuate in acest raport:

1. Cea mai noua instalatie de incinerare, ale carei costuri sunt publice, in Statul Washington, localitatea Spokane. http://spokanewastetoenergy.com/WastetoEnergy.htm
2. Estimarile initiale pentru construirea unei noi linii de producere la Nordforbrændingen, Danemarca.
3. Materialul de prezentare, ”Energie din Deseuri in Danemarca”, care a fost tradus in limba romana pentru acest proiect.

Statia de incinerare de la Spokane incinereaza 33t/ora in doua unitati de incinerare. Unitatea noua de producere(o singura unitate) de la Nordforbrændingen va incinera aproximativ 12-14 t/h. In acest sens cele doua statii sunt comparabile.

Suplimentar am comparat informatiile cu cele din Planul Municipal de Gestionare a Deseurilor, in care costurile de investitii pentru o instalatie noua de 200.000 t/an cu valorificare energetica sunt de aproximativ 120 milioane €.

3 COST OF INCINERATION

3.1 The Spokane plant

The technical layout of the Spokane is two incineration lines incinerating 800 t/day and producing 16.1 MW. Cooling method: electrical air coolers.

The construction cost was in 1991 about 110 MUSD corresponding to about 160 MUSD in 2008 value with the same exchange between USD/EUR. However, the plant does not fully comply with EU environmental requirements – retrofitting the plant with dioxin neutralisation will probable cost about 10 MUSD. Hence, today's construction costs would be close to 170 MUSD.

The operation and maintenance costs was in 2006 14,8 MUSD/y and cost of ash disposal was 4.1 MUSD/y.

3.2 Nordforbrændingen

The indented new incineration line will have a capacity of about 320 t/day and will produce about 1.200.000 GJ/y

The budget for construction is 75 MEUR.

Based on experience from the existing 250 t/day incineration line the operation and maintenance costs is expected to be about 6 MEUR/y. The ashes will be recycled as filling materials.

If a second new line is build in sequence of the first it will be about 20% cheaper, cost about 60 MEUR.

3 COSTURILE INCINERARII

3.1 Statia din Spokane

Din punct de vedere tehnic in Spokane exista 2 unitati de incinerare cu o capacitate de 800t/zi si care produc 16,1 MW. Metoda de racire: cu aer si consum de electricitate.

Costurile de constructie au fost in 1991, de aproximativ 110 milioane USD, care corespund in preturi 2008 cu 160 milioane USD, cu aceeasi rata de schimb USD/Euro.Totusi, statia nu se conformeaza cu cerintele de mediu din Europa – reabilitarea statiei astfel incat sa poata neutraliza dioxina, ar adauga un cost de aproximativ 10 milioane USD. Astfel, astazi pretul ar putea fi de aproape 170 milioane USD.

Costurile de exploatare si intretinere au fost in 2006 cam 14,8 milioane USD/an, iar costurile pentru depozitarea cenusei de 4,1 milioane USD/zi

3.2 Nordforbrændingen

Unitatea noua de incinerare va avea o capacitate de aproape 320 t/zi si va produce aproximativ 1.200.000 GJ/an.

Bugetul alocat pentru constructie este de 75 milioane Euro.

In baza experientei obtinuta de la unitatile de incinerare existente avand capacitatea de 250 t/zi, costurile de exploatare si intretinere sunt preconizate a fi de 6 milioane Euro/an. Cenusa va fi reciclata si va fi folosita ca material de umplutura in constructii.

Daca o a doua linie ar fi construita in acelasi timp cu prima, aceasta ar putea fi cu 20% mai ieftina, costand deci cam 60 milioane de Euro.

4 PROPERTIES OF WASTE

We are informed by the Municipal Plan that the currently collected quantity of waste is 600,000 t per year. For comparison we know from western Europe that the quantities are significantly higher. As an example Amagerforbrændingen in Copenhagen serving a population of 500,000 inhabitants collect 420,000 t wastes for incineration in 2007[1]. Thus, the quantity of waste for incineration in Bucharest must be expected to increase heavily as the standard of living increases.

Using the values known from other countries regarding waste properties we can estimate the following current properties of waste for Bucharest:

Waste properties		Current	Future
Total quantity	t/y	600.000	2.666.667
Recycling and composting	%	35	35
	t/y	210.000	933.333
Special treatment	%	5	5
	t/y	30.000	133.333
Incineration	%	60	60
	t/y	360.000	1.600.000
Heating value	GJ/t	9,5	9,5
	GJ/y	3.420.000	15.200.000

4 PROPRIETATILE DESEURILOR

Ne-am informat si din Planul Municipala de gestionare a desurilor, ca se colecteaza in prezent o cantitate de 600,000 t/an. Prin comparatie cu tarile din Europa de Vest, stim ca aceste cantitati sunt cu mult mai mari. Ca un exemplu, statia Amagerforbrændingen, care serveste o populatie de 500,000 de locuitori, din Copenhaga, colecta in anul 2007[1], pentru incinerare 420,000 t de deseuri. In orice caz, cantitatea de deseuri pentru incinerare in Bucuresti, se asteapta sa creasca puternic ca urmare a cresterii nivelului de trai.

Utilizand valorile cunoscute din alte tari, referitor la proprietatile deseurilor, putem estima urmatoarele valori pentru desurile din Bucuresti:

Proprietatile desurilor		In prezent	In viitor
Cantitatea totala	t/an	600.000	2.666.667
Reciclare si compostare	%	35	35
	t/y	210.000	933.333
Tratament special	%	5	5
	t/y	30.000	133.333
Incinerare	%	60	60
	t/y	360.000	1.600.000
Coeficient caloric	GJ/t	9,5	9,5
	GJ/an	3.420.000	15.200.000

[1] http://www.amfor.dk/Forbraending.aspx

5 PROPOSED WASTE-TO-ENERGY FACILITIES

Incineration lines with a capacity of about 12-14 t/h seems to be the feasible sizing today.

We propose 3 waste-to-energy facilities each with 3 incineration lines established in Bucharest. If possible the location should be at the already existing CET's as the infrastructure is already available at these sites and the construction costs will thus be as low as possible.

Sizing to waste-to-energy facilities

		Line 1	Line 2	Line 3	Total
Facility 1					
Capacity	t/h	12	12	12	36
Operation	h/y	8.000	8.000	8.000	24.000
Annual incineration	t/y	96.000	96.000	96.000	288.000
Facility 2					
Capacity	t/h	12	12	12	36
Operation	h/y	8.000	8.000	8.000	24.000
Annual incineration	t/y	96.000	96.000	96.000	288.000
Facility 3					
Capacity	t/h	12	12	12	36
Operation	h/y	8.000	8.000	8.000	24.000
Annual incineration	t/y	96.000	96.000	96.000	288.000
All Plants		Facility 1	Facility 2	Facility 3	Total
Capacity	t/h	36	36	36	108
Operation	h/y	24.000	24.000	24.000	72.000
Annual incineration	t/y	288.000	288.000	288.000	864.000

The facilities will only produce 100% heat in the winter period. In the summer period the heat demand will be covered by solar energy and the plants will generate power.

We calculate the heat production as:

Heat production

		Facility 1	Facility 2	Facility 3	Total
Heating value of waste	GJ/t	9,5	9,5	9,5	9,5
Heat efficiency	%	90	90	90	90
Recovered heat	GJ/t	8,6	8,6	8,6	8,6
Heat production	GJ/h	308	308	308	923
Operation (100% equivalent)	h/y	2.200	2.200	2.200	2.200
Heat production	GJ/y	677.160	677.160	677.160	2.031.480

And the power generation as:

Power generation

		Facility 1	Facility 2	Facility 3	Total
Heat available	GJ/y	2,736,000	2,736,000	2,736,000	8,208,000
Heat used for heat production	GJ/y	752,400	752,400	752,400	2,257,200
Heat available for power	GJ/y	1,983,600	1,983,600	1,983,600	5,950,800
Power efficiency	%	25	25	25	25
Power generation	MWh/y	137,750	137,750	137,750	413,250

5 FACILITATI DE INCINERARE PROPUSE

Capacitatea de aproape 12-14 t/h pentru unitatile de incinerare, pare sa fie fezabila astazi.

Noi va propunem realizarea in Bucuresti, a 3 statii de incinerare a deseurilor. In masura in care este posibil, locatiile ar putea fi la CET-urile existente si se vor putea reduce, deoarece infrastructura exista si este disponibila, costurile de constructie cat de mult este posibil.

Dimensionarea facilitatilor de incinerare

		Line 1	Line 2	Line 3	Total
Facilitatea 1					
Capacitate	t/h	12	12	12	36
Exploatare	h/an	8.000	8.000	8.000	24.000
Incinerare anuala	t/an	96.000	96.000	96.000	288.000
Facilitatea 2					
Capacitate	t/h	12	12	12	36
Exploatare	h/an	8.000	8.000	8.000	24.000
Incinerare anuala	t/an	96.000	96.000	96.000	288.000
Facilitatea 3					
Capacitate	t/h	12	12	12	36
Exploatare	h/an	8.000	8.000	8.000	24.000
Incinerare anuala	t/an	96.000	96.000	96.000	288.000
Toate statiile de incinerare		Facilitatea 1	Facilitatea 2	Facilitatea 3	Total
Capacitate	t/h	36	36	36	108
Exploatare	h/an	24.000	24.000	24.000	72.000
Incinerare anuala	t/an	288.000	288.000	288.000	864.000

Facilitatile de incinerare vor produce in perioada de iarna 100% energie termica. In perioada de vara, necesarul de caldura va fi acoperit din energia solara, iar facilitatile vor produce electricitate.

Calculand productia de energie termica, obtinem urmatoarele:

Productia de caldura

		Facilitatea 1	Facilitatea 2	Facilitatea 3	Total
Coeficientul caloric al deseurilor	GJ/t	9,5	9,5	9,5	9,5
Eficienta termica	%	90	90	90	90
Recuperarea caldurii	GJ/t	8,6	8,6	8,6	8,6
Productia de caldura	GJ/h	308	308	308	923
Exploatare (100% echivalent)	h/an	2.200	2.200	2.200	2.200
Productia de caldura	GJ/an	677.160	677.160	677.160	2.031.480

In timp ce productia de electricitate va fi dupa cum urmeaza:

Productia de electricitate

		Facilitatea 1	Facilitatea 2	Facilitatea 3	Total
Energie termica disponibila	GJ/an	2.736.000	2.736.000	2.736.000	8.208.000
En termica pt. prod de en termica	GJ/an	752.400	752.400	752.400	2.257.200
En termica pt. prod de electricitate	GJ/an	1.983.600	1.983.600	1.983.600	5.950.800
Eficienta electricitate	%	25	25	25	25
Productia de electricitate	MWh/an	137.750	137.750	137.750	413.250

6 COST OF FACILITIES

Based on the information regarding cost of the reference plants described in section 3 we can estimate the cost of constructing the facilities as:

Cost of facilities

		Facility 1			
		Line 1	Line 2	Line 3	Total
Construction cost	EUR	75,000,000	60,000,000	60,000,000	195,000,000
Period	y	20	20	20	20
Interest	%	9	9	9	9
Loan service	EUR/y	8,215,986	6,572,789	6,572,789	21,361,563
		Facility 2			
		Line 1	Line 2	Line 3	Total
Construction cost	EUR	75,000,000	60,000,000	60,000,000	195,000,000
Period	y	20	20	20	20
Interest	%	9	9	9	9
Loan service	EUR/y	8,215,986	6,572,789	6,572,789	21,361,563
		Facility 3			
		Line 1	Line 2	Line 3	Total
Construction cost	EUR	75,000,000	60,000,000	60,000,000	195,000,000
Period	y	20	20	20	20
Interest	%	9	9	9	9
Loan service	EUR/y	8,215,986	6,572,789	6,572,789	21,361,563
		All Facilities			
		Facility 1	Facility 2	Facility 3	Total
Construction cost	EUR	195,000,000	195,000,000	195,000,000	585,000,000
Period	y	20	20	20	20
Interest	%	9	9	9	9
Loan service	EUR/y	21,361,563	21,361,563	21,361,563	64,084,688

We assume the 3 lines at each facility build in sequence and obtain a saving of 20% compared to the first line.

6 COSTUL FACILITATILOR DE INCINERARE

Pe baza informatiilor avute despre facilitatile de incinerare, la care s-a facut referire in sectiunea 3, se poate estima costul construirii unor asemenea facilitati de incinerare ca fiind:

Costul facilitatilor

		Facilitatea 1			
		Unitatea 1	Unitatea 2	Unitatea 3	Total
Cost de constructie	EUR	75.000.000	60.000.000	60.000.000	195.000.000
Perioada	an	20	20	20	20
Dobanda	%	9	9	9	9
Cheltuielile pt. credit	EUR/an	8.215.986	6.572.789	6.572.789	21.361.563
		Facility 2			
		Unitatea 1	Unitatea 2	Unitatea 3	Total
Cost de constructie	EUR	75.000.000	60.000.000	60.000.000	195.000.000
Perioada	an	20	20	20	20
Dobanda	%	9	9	9	9
Cheltuielile pt. credit	EUR/an	8.215.986	6.572.789	6.572.789	21.361.563
		Facilitatea 3			
		Unitatea 1	Unitatea 2	Unitatea 3	Total
Cost de constructie	EUR	75.000.000	60.000.000	60.000.000	195.000.000
Perioada	an	20	20	20	20
Dobanda	%	9	9	9	9
Cheltuielile pt. credit	EUR/an	8.215.986	6.572.789	6.572.789	21.361.563
		Toate statiile de incinerare			
		Facilitatea 1	Facilitatea 2	Facilitatea 3	Total
Cost de constructie	EUR	195.000.000	195.000.000	195.000.000	585.000.000
Perioada	an	20	20	20	20
Dobanda	%	9	9	9	9
Cheltuielile pt. credit	EUR/an	21.361.563	21.361.563	21.361.563	64.084.688

Considerand ca in fiecare facilitate de incinerare vor fi construite cate 3 unitati, pentru urmatoarele 2 unitati fata, se vor putea obtine reduceri de pret de 20% in comparatie cu prima unitate.

7 EXPENDITURES

The annual cost of waste incineration is calculated as:

Expenditures		
Loan service	EUR/y	64,084,688
Operation and maintenance	EUR/y	60,000,000
Total	EUR/y	124,084,688

7 CHELTUIELI

Costurile anuale pentru incinerarea deseurilor vor fi calculate dupa cum urmeaza:

Cheltuieli		
Cheltuielile pt. credit	EUR/an	64.084.688
Exploatare si intretinere	EUR/an	60.000.000
Total	EUR/an	124.084.688

8 INCOME

The waste facilities will obtain income from:

- Gate fee. Payment for waste delivered to the plant. Based on information found in the Municipal Plan for waste management in Bucharest, the gate fee for the waste incineration is variable. There is depending on market rate, capacity of the facilities, how old are the facilities and heat value of the waste. The waste incineration facilities from EU, having a capacity between 100.000-300.000 t/y, the related gate fee is between 90-140 €/t. For the calculation was selected a pessimistic value of 100 €/t.
- Sale of heat
- Sale of power
- Sale of green certificates if the legislation will consider waste as an eligible renewable source

As it is not known if the legislation regarding green certificated will consider waste as eligible renewable energy we have established two income scenarios:

1. Income without sale of green certificates
2. Income with sale of green certificates

8.1 Income without sale for green certificates

A non-profit operation is assumed, gate fee on EU pessimistic is assumed and sale of electricity is estimate to 70 EUR/MWh.

The heat tariff will then be:

Income (no green certificates)		
Gate fee	EUR/t	100
	t/y	864,000
	EUR/y	86,400,000
Sale of power	EUR/MWh	70
	MWh/y	413,250
	EUR/y	28,927,500
Sale of heat	EUR/GJ	2.16
	EUR/y	8,757,188

8.2 Income with sale of green certificates

Non-profit operation is assumed and the heat and electricity prices are maintained. Thus the gate fee is

8 VENITURI

Statiile de incinerare vor obtine venituri din:

- Taxe de incinerare. Plata pentru deseurile livrate de poarta statiei. Pe baza informatiilor obtinute si din Planul de gestionare al deseurilor din Municipiul Bucuresti, taxele de tratare pentru incinerarea deseurilor municipale solide variaza. Taxele de tratare depind de rata de piata, capacitatea instalatiei, vârsta si valorificarea energetica. Pentru incineratoarele conforme cu cele din UE si cu o capacitate de la 100.000 pâna la 300.000 t/an, taxele de tratare variaza între 90-140 €/t. Am ales pentru calcule valoare o valoare pesimista de 100€/t.
- Vanzarea de energie termica
- Vanzarea de electricitate
- Vanzarea de certificate verzi, in conditiile in care in legislatie, deseurile vor fi considerate ca sursa de energie regenerabila.

Intrucat nu este inca cunoscut, daca in legislatia secundara privind certificatele verzi, se vor considera deseurile ca si sursa de energie regenerabila, au fost stabilite doua scenarii privind veniturile:

1. Venituri fara vanzare de certificate verzi
2. Venituri cu vanzare de certificate verzi

8.1 Venituri fara vanzare de certificate verzi

S-a considerat ca exploatarea instalatiilor este o activitate non-profit, taxa de incinerare este o valoare pesimista, iar pretul de vanzarea pentru electricitate a fost estimat la 70 Euro/MWh.

In acest caz tariful energiei termice va fi:

Venituri (fara certificate verzi)		
Taxe de incinerare	EUR/t	100
	t/an	864.000
	EUR/an	86.400.000
Vanzarea de electricitate	EUR/MWh	70
	MWh/an	413.250
	EUR/an	28.927.500
Vanzarea de en termica	EUR/GJ	2,16
	EUR/an	8.757.188

8.2 Venituri cu vanzare de certificate verzi

S-a considerat ca exploatarea instalatiilor este o activitate non-profit, iat preturile pentru energie the variable income and this is calculated to:

Income (3 green certificates)		
Gate fee	EUR/t	57
	t/y	864,000
	EUR/y	49,248,000
Sale of power	EUR/MWh	70
	MWh/y	413,250
	EUR/y	28,927,500
Sale of green certificates	no/MWh	3
	no/MWh	1,239,750
Value of certificates	EUR/no	30
	EUR/y	37,192,500
Sale of heat	EUR/GJ	2.15
	EUR/y	8,716,688

Thus, with sale of green certificates it will be possible to reduce the gate fee from about 100 EUR/t to about 57 EUR/t

termica si electricitate sunt mentinute ca cele anterioare. In acest caz taxa de incinerare este un venit variabil si va fi calculata dupa cum urmeaza:

Venituri (cu 3 certificate verzi)		
Taxe de incinerare	EUR/t	57
	t/an	864.000
	EUR/an	49.248.000
Vanzarea de electricitate	EUR/MWh	70
	MWh/an	413.250
	EUR/an	28.927.500
Vanzare Certificate verzi	no/MWh	3
	no/MWh	1.239.750
Valoare certificate	EUR/nr	30
	EUR/an	37.192.500
Vanzarea de en termica	EUR/GJ	2,15
	EUR/an	8.716.688

In aceasta situatie prin vanzarea certificatelor verzi va fi posibil sa se reduca taxa de incinerare de la 100 Euro/t la aproape 57 Euro/t.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Part C: Appendixes

Appendix 8b: SWOT Analysis

Contract 4144 / 31.12.07

Strategia Energetica a Municipiului Bucuresti

Etapa a III-a: Strategia

Partea C: Anexe

Anexa 8b: Analiza SWOT

4				
3				
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ATH energ

Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

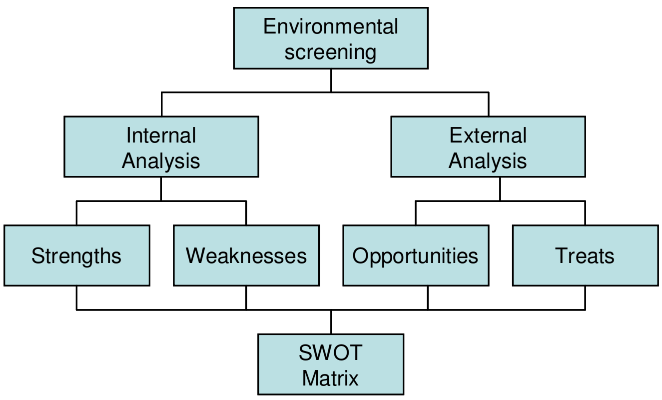
1.1 General

A screening of the internal and external environment is an important strategically planning process.

Environmental factors internal to the company usually can be classified as **strengths (S)** or **weaknesses (W)**, and those external to the company usually can be classified as **opportunities (O)** or **treats (T)**.

The SWOT analyses provides information that is helpful in matching the company's resources and capabilities to the environment in which it must operate.

The following diagram shows how a SWOT analysis fits into am environmental screening:



1.2 Orienting SWOT to the objectives

The performed SWOT analysis is oriented to the defined objectives of the Energy Strategy.

- **Climate**, CO_2 neutrality for year 2020 of the heat supply in Bucharest
- **Sustainability** for the district heating system
- **Quality of services** related to the populations used of heating and hot tap water

The SWOT analysis focuses on the district heating system.

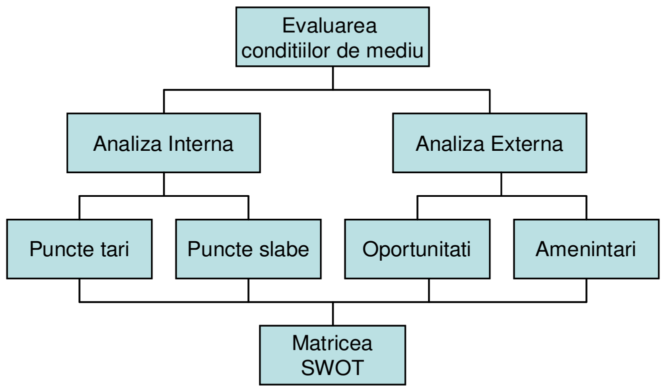
1 INTRODUCERE

1.1 Generalitati

Evaluarea conditiilor interne si externe de mediu reprezinta un important proces strategic de planificare. Factorii de mediu interni pentru o companie pot fi in mod normal clasificati ca puncte tari (S) sau puncte slabe (W) iar cei externi companiei pot fi clasificati ca si oportunitati (O) sau amenintari (T).

Analiza SWOT pune la dispozitie informatii, care sunt utile companiei in scopul de a aloca corespunzator resursele si capacitatile sale si a permite acesteia sa opereze in conditiile de mediu necesare.

Diagrama urmatoare arata cum o analiza SWOT se integreaza intr-o evaluare a conditiilor de mediu:



1.2 Orientarea analizei SWOT catre obiective

Realizarea analizei SWOT este orintata catre definirea obiectivelor Strategiei Energetice:

- **Obiectivul Climatic**, furnizarea caldurii in Bucuresti sa devina neutra din punct de vedere a emisiilor de CO_2 in 2020
- **Sustenabilitatea** pentru sistemul de incalzire centralizata
- **Calitatea serviciilor** furnizate populatiei care utilizeaza caldura si apa calda de consum

Analiza SWOT se concentreaza pe sistemul de incalzire centralizat.

2 INTERNAL ANALYSIS

2.1 Strengths

Established organisation

The existing organisations regarding production, transmission and distribution is an important strength which shall not be neglected in the process of reorganising the district heating sector. Key staff in the existing organisation might find themselves a key staff in the new organisations operated by private companies.

Knowledge, Know-how

The existing organisation has detailed knowledge and experience of the existing systems which will be highly important in the work of redesign and reconstruction of the systems.

Low disconnection rate

The disconnection rate is low in Bucharest and many disconnected consumers are currently reconnecting. A low disconnection rate will be highly appreciated by private investors

High collection rate

The collection rate is high in Bucharest – the main problem is delay in payments. A high collection rate will be appreciated by private investors.

2.2 Weaknesses

The weaknesses are elsewhere detailed assessed and thus only outline in this analysis.

High production costs

In spite of subsidises on fuels the production costs for heat and hot tap water is more than double of what it is in modern, well planned and well operated systems. The reason is the age of the system and the poor maintenance and relevant political influences on the

2 ANALIZA INTERNA

2.1 Puncte tari

Existenta unei Organizatii

Organizatia existenta pentru producere, transport si distributie este un punct tare, care nu trebuie neglijat in procesul reorganizarii sectorului de termoficare. Persoanele cheiei din cadrul organizatiei existente pot deveni la randul lor persoane cheiei in noua organizare in care operatorii sunt companii private.

Cunostinte , pricepere

Organizatia existenta detine cunostinte si experienta necesara asupra sistemului existent, care vor fi extrem de necesare in procesul de reproiectare si reconstructie a sistemelor.

Rata mica de deconectari de la sistem

Rata deconectarilor de la sistemul centralizat in Bucuresti este scazuta, iar o parte dintre consumatorii deconectati s-au reconectat. Aceasta situatie este apreciata puternic de catre posibilii investitori privati.

Rata ridicata de colectare

Rata de colectare in Bucuresti este ridicata, marea problema este considerata a fi intarzierea la plata. Aceasta situatie este apreciata puternic de catre posibili investitori privati.

2.2 Puncte slabe

Punctele slabe sunt evaluate detaliat in alta sectiune si in acest sens, in aceasta analiza sunt doar evidentiate.

Costuri mari de producere

In ciuda subventiilor la combustibil, costurile de producere pentru incalzire si apa calda de consum sunt mai mult de doua ori mai mari decat cele obtinute in sisteme moderne, bine planificate si corect exploatate. Motivele pentru aceasta situatie sunt management. The production system has passed it's useful lifetime but still it have to be maintained and life extended due to lack of initiatives regarding construction of new production units.

High transmission costs

The transmission costs are 3 to 4 time what it is in modern, well maintained and well operated systems. The initial design parameters have been maintained over 30-40 years in spite of the fact that the transmission system have never been operated at these parameters as the system is huge oversized. The operation concept also maintained over the last 30-40 years is far from modern operation concepts used in modern operation of district heating networks.

In spite of the fact that the maximum demand today is only about 50% of what's the system is designed for and future energy conservation is expected the system is still rehabilitated with same pipe diameters and lengths. Thus, the transmission system must be redesigned and reconstructed realising that the capacity requirement will be about 300 MJ/s in the future, a drop of more than 5,000 MJ/s from initial design and the system must be designed for pooled operation and variable flow control.

Old fashioned supply concept

The current direct supply concept with centralised preparation of hot tap water cannot cope with a modern "heat and hot tap water on demand" concept – the concept the consumers has if they individually supply with natural gas. In addition the direct supply concept is expensive to rehabilitate and expensive to operate.

Although the hopeless outdated supply concept and decreasing demand most rehabilitation performed the last two decades is replacement of worn-out system components but maintaining capacities in terms of pipe diameters and lengths.

The system must be redesigned and reconstructed to cope with installation of solar heating panels and heat storages. In reality this means that the current distribution systems must be replaced.

vechimea sistemului si proasta intretinere a acestuia, managementul deficitar si influentele politice considerabile asupra managementului. Sistemul de producere si-a depasit durata normata de viata, dar totusi trebuie intretinut si prelungita durara de viata datorita lipsei unor initiative de a se construi unitati noi de producere.

Costuri de transport ridicate

Costurile de transport sunt de 3 pana la 4 ori mai mari decat cele uzuale pentru un sistem modern, bine intretinut si exploatat corespunzator. Parametrii de proiectare initiali au fost utilizati timp de peste 30-40 de ani, in ciuda faptului ca sistemul de transport nu a fost niciodata exploatat la acesti parametri si in acelasi timp este puternic supradimensionat. Conceptul de exploatare este acelasi de acum 30-40 de ani, fiind departe de ceea ce reprezinta astazi conceptele moderne de exploatare in retelele de termoficare.

In ciuda faptului ca necesarul maxim de caldura astazi, reprezinta doar 50% din capacitatea pentru care sistemul a fost proiectat fiind asteptate in continuare reduceri ale consumului, ca urmare a implementarii masurilor de conservare a energiei, reabilitarea sistemului de transport se face cu mentinerea diametrelor si lungimilor initiale ale conductelor. Totusi sistemul de transport trebuie reproiectat si reconstruit luand in considerare ca cerinta de capacitate va fi de aproximativ 300 MJ/s in viitor, cu o reducere de mai mult de 5,000 MJ/s fata de proiectarea initiala, iar sistemul trebuie exploatat in inel utilizand conceptul de debit variabil.

Conceptul de furnizare demodat

Conceptul de furnizare actual cu preparare centralizata a apei calde de consum si racordare directa nu corespunde unui concept modern de furnizare "caldura si apa calda de consum la cerere". Aceasta situatie putand fi obtinuta doar daca furnizarea energiei termice se face individual prin cazane individuale pe baza de gaze naturale. Mai mult, conceptul de racordare directa este foarte scump de reabilitat si exploatat.

In timp ce conceptul invechit si fara speranta este mentinut si cererea de energie termica este in continua scadere, cele mai multe reabilitari din ultimele 2 decenii au constat in inlocuirea componenetelor sistemului invechit, dar au fost mentinute capacitatile initiale ca urmare a nemodificarii diametrelor si lungimilor.

Sistemul trebuie redimensionat si reconstruit pentru a putea sa se adapteze la instalarea panourilor solare si a sistemelor de acumulare a caldurii. In realitate, acest lucru inseamna ca intreg sistemul de distributie trebuie inlocuit.

Poor maintenance

The maintenance standard of production units, transmission system and distribution systems is poor although it has lately been improved for the production units.

Poor maintenance of the network is related to:

- Lack of budget for preventive maintenance. Thus, preventive maintenance is not performed.
- Huge water losses and poor water quality
- Lack of educated, engaged maintenance staff

Intretinere necorespunzatoare

Intretinerea standard a unitatilor de producere, a sistemului de transport si a sistemului de distributie este nesatisfacatoare, chiar daca ulterior a fost imbunatatita pentru unitatile de producere.

Intretinerea necorespunzatoare a retelelor se refera la:

- Lipsa unui buget pentru intretinerea preventiva. In acest sens intretinerea preventiva nu a fost facuta
- Imense pierderi de agent termic si proasta calitate a apei din retele
- Lipsa instruirii a personalului care este responsabil de intretinere.

Political decided tariffs

The current district heating tariffs are political decided and lack representation of the real costs structure. Thus, it is almost impossible to establish the true production costs, transmission costs and distribution costs.

It will be difficult to negotiate contracts with independent heat producers at these conditions.

Tarife stabilite pe criterii politice

Tarifele actuale in sistemele de termoficare sunt decise pe criterii politice iar structura acestora nu se bazeaza pe costuri reale. In acest fel este aproape imposibil de stabilit care sunt costurile reale de productie, de transport si distributie.

In aceste conditii, negocierea contractelor cu producatori independenti de energie termica va fi dificila.

Lack of motivated staff

The management behaviour and the employment conditions lack the motivation factors needed in a service company to fulfil the expectations of the customers.

The lack of motivation influences other harmful factors for example the lack of maintenance (staffs don't care about maintenance) and high operation costs (staffs don't care about optimising the system).

Lipsa motivarii personalului

Atitudinea managementului si conditia personalul prin lipsa unor factori necesari care sa genereze motivatie pun o companie de servicii in imposibilitatea de a atinge asteptarile clientilor.

Lipsa de motivatie influenteaza alti factori importanti, de exemplu lipsa de intretinere a instalatiilor (personalului nu ii pasa de intretinere) si costuri mari de exploatare (personalului nu ii pasa de optimizarea sistemului).

Business as usual attitude

The management of RADET seems very little interested in modernising company procedures (or rather implement some procedures) which could strengthen the company.

The operation department is allowed to continue operation as it has been performed since early days of the system. Introduction of modern operation methods and improvement of key parameters (benchmarks)

Atitudinea uzuala in afaceri

Managementul RADET-ului pare a fi foarte putin interesat in implementarea unor proceduri care sa conduca la modernizarea companiei (sau cel pution sa implementeze o parte de proceduri) care ar fi intarit compania.

Directiei exploatare ii este permis sa continue exploatarea sistemului asa cum se facea in vremea in care acesta a fost construit. Introducerea unor has never been requested.

Lack of timely management actions had lead to the current situation where RADET is declared bankrupt.

metode moderne de exploatare si imbunatatirea parametrilor cheie (benchmarks) nu au fost niciodata solicitate.

Lipsa unor actiuni din partea managementului in timp util, a condus la situatia existenta astazi, cand RADET este in pragul falimentului.

Corruption

Corruption is so integrated in the Romanian society as it is also found in the RADET organisation. If someone drought this statement it can simply be verified that it is true by comparison of the declared income of key persons within the organisation with the standard of living.

Unfortunately, corruption lead not only to increased costs but also to selection of bad solutions based on bad materials and reduced functional requirements.

Coruptia

Coruptia este atat de bine integrata in societatea romaneasca si desigur si in organizatia RADET. Daca cineva ar dori sa verifice aceasta declaratie, ar putea compara veniturile declarate ale persoanelor cheie din organizatie cu standardul acestora de viata.

Din nefericire, coruptia nu a condus numai la cresterea costurilor ci si la selectarea unor solutii proaste, bazate pe materiale de calitate slaba si cerinte functionale reduse.

3 EXTERNAL ANALYSIS

3.1 Opportunities

New possible business areas

About 65% of the current demand for heating and hot tap water is covered by district heating leaving about 30% as an unexplored potential for district heating. This potential is currently mainly supplied by individual natural gas heating.

Only very few new buildings are connected to the district heating but supplied by national gas due to the weaknesses of the district heating system. However, this will be changed after redesign, reconstruction and organisational changes and a new market potential will be available.

If decided that all district heating consumers shall benefit for solar energy, and not only the consumers living on the south side, it will can be a new business area for the distribution companies to install the solar panels and necessary heat storages and distribute the benefit of the solar energy equal to all consumers.

Political correctness

District heating is “political correct” as it holds the possibilities of energy conservation, increased efficiencies and fuel shift to reduce the emission of CO_2.

Promotion of district heating is found in a number of EU-directives and it also play and important role in the Romanian National Energy Strategy and National Strategy for accelerate development of the public services.

3.2 Treats

Disconnection of consumers

If the service level and compositeness is not improved disconnections from the system must be foreseen, especially of building which can benefit of solar energy.

3 ANALIZA EXTERNA

3.1 Oportunitati

Noi domenii posibile pentru afaceri

Aproximativ 65% din necesarul existent pentru caldura si apa calda de consum este acoperit de catre sistemul centralizat, lasand cam 30% din necesar ca pe un potential neexplorat pentru sistemul centralizat. In prezent acest potential este asigurat prin furnizarea energiei termice cu surse individuale pe baza de gaze naturale.

Doar foarte putine cladiri noi sunt conectate la termoficare, insa sunt incalzite cu gaze naturale datorita slabiciunilor sistemului de termoficare. Aceasta situatie se va schimba in urma reproiectarii, reconstruirii si schimbarilor organizationale si astfel va fi disponibil un nou potential de piata.

Daca se va decide ca toti consumatorii racordati la termoficare vor beneficia de energia solara si nu numai consumatorii amplasati spre sud, pentru companiile de distributie va aparea o noua afacere si anume aceea de a instala panouri solare si sistemele aferente necesare de acumulare a caldurii. Acest beneficiu din energia solara va fi distribuit in mod egal tuturor consumatorilor.

Corectitudinea din punct de vedere politic

Sistemul centralizat este ”politic corect” in masura in care detine posibilitatile de a conserva energia, a creste eficienta si a schimba combustibilul utilizat astfel incat sa fie in masura sa reduca emisiile de CO_2.

Promovarea sistemului centralizat este regasit intr-o serie de Directive ale UE si de asemenea joaca un rol important in Strategia Energetica Nationala a Romaniei si Strategia nationala privind accelerarea dezvoltarii serviciilor comunitare de utilitati publice.

3.2 Amenintari

Deconectarea consumatorilor

Daca nivelul serviciilor si structura nu sunt imbunatatite, atunci se prevad deconectari de la sistemul centralizat, in special in cazul cladirilor care pot beneficia de energie solara.

If this situation is allowed to occur the district heating system in Bucharest will never be feasible and attractive for the consumers.

Lack of Financing

Financing might be a treat for obtaining the objectives. Huge investments are necessary, estimated:

- Production system: 1,701,000,000 EUR
- Transmission system: 417,500,000 EUR
- Distribution system: 1,183,800,000 EUR
- Consumer installations: 1,800,000,000 EUR

This corresponds to an investment of about 3.400 EUR per supplied person. However, if currently discussed subsidise schemes for consumers are passed the costs related to consumers installation will be significant reduced.

Without these investments the district heating system will never be feasible and attractive for the consumers.

Daca se va permite ca aceasta situatie sa apara, sistemul de termoficare din municipiul Bucuresti nu va fi niciodata fezabil si nici atractiv pentru consumatori.

Lipsa surselor de finantare

Finantarea poate constitui o amenintare pentru atingerea obiectivelor. Investitii imense sunt necesare,estimandu-se pentru:

- Sistemul de producere: 1,701,000,000 EUR
- Sistemul de transport: 417,500,000 EUR
- Sistemul de distributie: 1,183,800,000 EUR
- Instalatiile consumatorilor: 1,800,000,000 EUR

Aceasta corespunde unei investitii de aproximativ 3.400 EUR pentru fiecare consumator. Totusi, in cazul in care schemele de suport financiar aflate in discutie pentru consumatori vor fi introduse, costurile aferente instalatiilor consumatorilor vor semnificativ reduse.

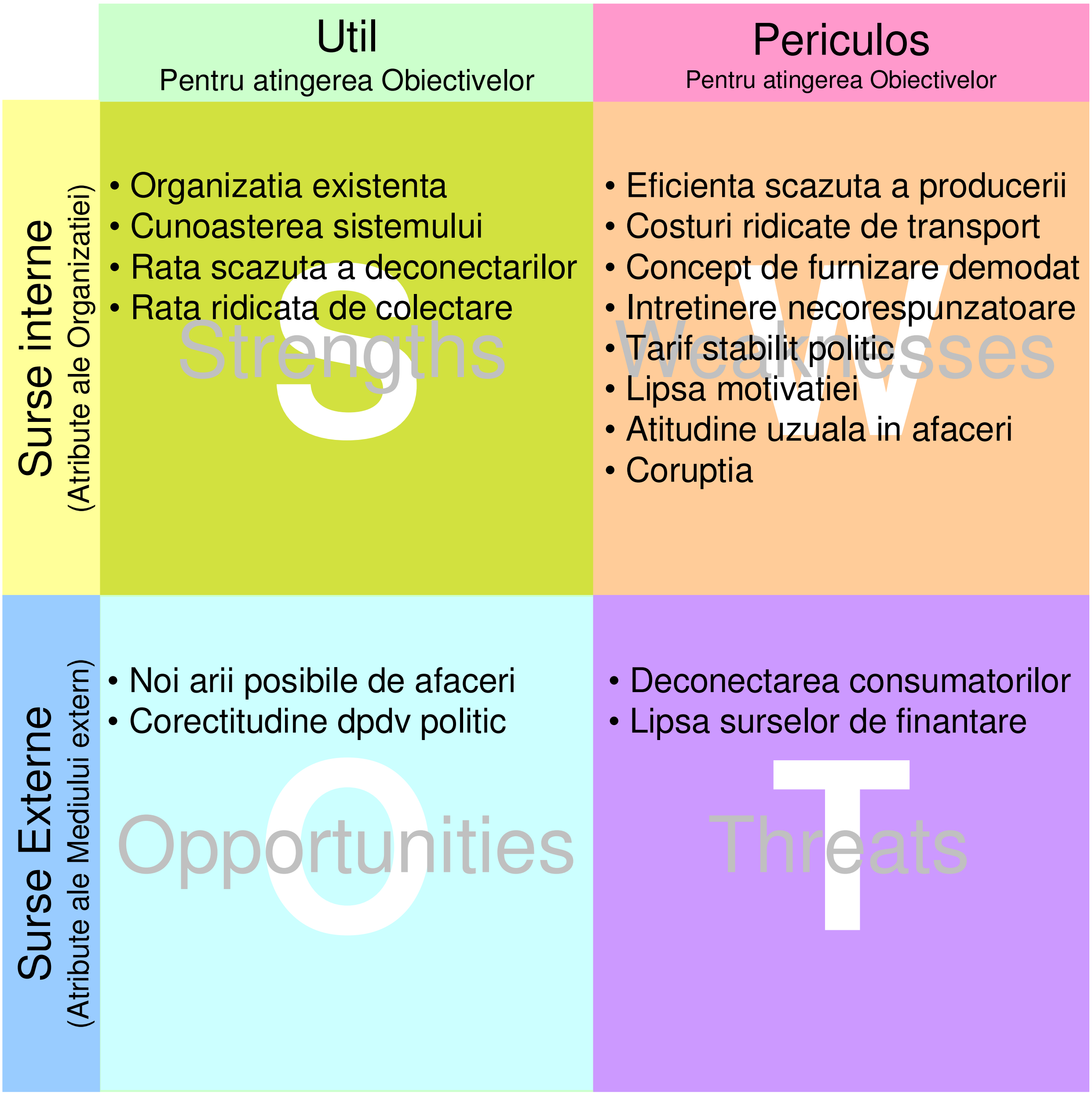
Fara aceste investitii sistemul de termoficare nu va niciodata fezabil si atractiv pentru consumatori.

4 THE SWOT MATRIX

The established SWOT matrix for the district heating system is show below:

4 MATRICEA SWOT

Matricea SWOT realizata pentru sistemul de termoficare este prezentata mai jos:



5 GENERATING STRATEGIES

5.1 General

The SWOT can be used as inputs to the creative generation of possible strategies by answering each of the following four questions:

1. How can we use and capitalise on each strength?
2. How can we improve each weakness?
3. How can we exploit and benefit from each opportunity?
4. How can we mitigate each treat?

5.2 Capitalise on strengths

Existing organisation

An existing, functional organisation will be appreciated by private investors/operators.

The existing organisation should be modernised and start working as a private company and the staff should be offered relevant training (English, PC etc). These both to give the employees a possibility of future employment with the private investor/operator and to be used as an active in the concession negotiations.

The strategy shall be to integrate the existing organisation as far as possible into the future private organisations.

Knowledge of the system

Knowledge of the system will be essential for a private operator. This knowledge is represented by key staff of RADET.

This staff should from the beginning of the negotiations be allocated to working groups with possible private operators.

The strategy shall be to offer staff with experience of the existing system to the private investors/operators.

5 GENERAREA STRATEGIILOR

5.1 Generalitati

Analiza SWOT poate fi utilizata ca inputuri pentru generarea creativa de strategii posibile prin oferirea de raspunsuri la urmatoarele patru intrebari:

1. Cum poate fi utilizat si capitalizat fiecare punct tare?
2. Cum poate fi imbunatatit fiecare punct slab?
3. Cum poate fi exploatata si obtinute beneficii din fiecare oprtunitate?
4. Cum poate fi redus riscul generat de fiecare amenintare?

5.2 Capitalizarea punctelor tari

Organizatia existenta

Investitorii/operatorii privati vor aprecia o organizatie existenta si functionala.

Organizatia existenta ar trebui modernizata si ar trebui sa inceapa sa functioneze ca si o companie privata, personalului ar trebui sa i se ofere instruiri relevante (limba engleza, utilizare PC, etc). Acestea amandoua, vor da personalului posibilitatea de a fi angajat in viitor de catre investitorul/operatorul privat si sa poata fi utilizat in mod atractiv in procesul de negociere a concesiunii.

Strategia trebuie sa se bazeze pe faptul ca organizatia existenta pe cat posibil sa fie integrata in organizatia viitoare privata.

Cunoasterea sistemului

Cunoasterea sistemului va fi esentiala pentru un operator privat. Aceaste cunoastere este reprezentata de catre personalul cheie al RADET.

Acest personal ar trebui sa fie alocat, inca de la inceputurile negocierilor, in grupuri de lucru, cu posibilii operatori privati.

Strategia va consta in oferirea personalului cu experienta in sistemul existent, operatorilor/investitorilor privati.

Low disconnection rate

The low disconnection rate must be maintained and seen as an active in concession negotiations. The higher the connection rate is the lower municipal guaranty will be requested by a private investor.

The low disconnection rate in Bucharest is exceptional for Romanian cities and should be highlighted when announcing tendering for concessions.

The strategy shall be to maintain the low disconnection rate.

Rata scazuta a deconectarilor

Rata scazuta a deconectarilor trebuie sa fie mentinuta si vazuta ca si negocieri atractive pentru concesiuni. O rata ridicata a conectarilor implica o garantie scazuta din partea municipalitatii, solicitata de altfel de un investitor privat.

Rata scazuta de deconectare in Bucuresti este o exceptie pentru orasele din Romania si trebuie subliniata atunci cand se va lansa procedura publica de achizitie.

Strategia va consta in mentinerea unei rate scazute a deconectarilor.

High collection rate

The high connection rate must be maintained and seen as an active in concession negotiations. Perhaps the municipality can avoid establishing payment guarantee when the collection rate is as high as it is.

The strategy shall be to maintain the current high collection rate.

Rata ridicata de colectare

Rata ridicata de colectare trebuie mentinuta si vazuta ca punct atractiv in negocierile concesiunii. Poate municipalitate va putea sa evite sa plateasca o garantie in conditiile in care exista o rata asa ridicata de colectare.

Strategia consta in mentinerea unei rate de colectare asa cum este ea in prezent.

5.3 Improve on weaknesses

Low production efficiencies

A modern production system must be established and improved efficiency obtained by used of state-of-the-art technologies and technical economical load dispatch.

To reach the necessary capital it will be necessary to invite private investors to obtain concessions for sale of power, sale of heat and, if this is the case, for incineration of waste.

Concessions must encourage the producers to operate with high efficiencies and to participate in a load dispatch, which will benefit the most efficient producers.

The strategy shall be to replace the existing production system with high efficient new units by inviting private investors/operators to participate in the modernisation.

High transmission costs

The transmission system must be redesigned and reconstructed. A reconstructed system with reduced diameters of pipes and reduced lengths will have significant lower heat losses and pumping costs.

The municipality should maintain the overall control of

5.3 Imbunatatirea punctelor slabe

Eficienta scazuta a producerii

Trebuie stabilit un sistem modern de producere si imbunatatita eficienta prin utilizare ultimei tehnologii disponibile si a dispecerizarii tehnico-economice.

Pentru a obtine capitalul necesar va fi obligatorie invitarea investitorilor privati de a participa intr-o competitie pentru obtinerea concesiunilor pentru vanzarea de electricitate, vanzarea de caldura si daca va fi cazul si pentru incinerarea deseurilor.

Concesiunile trebuie sa incurajeze producatorii sa exploateze cu eficienta ridicata si sa participe la dispecerizarea, din care sa beneficieze cei mai eficienti producatori.

Strategia va consta in inlocuirea sistemului existent de producere cu unitati noi, cu eficienta ridicata prin invitarea investitorilor/operatorilor privati sa participe in procesul de modernizare.

Costuri ridicate de transport

Sistemul de transport trebuie reproiectat si reconstruit. Un sistem reconstruit cu diametre reduse ale conductelor si cu lungimi reduse de trasee va avea pierderi de caldura si costuri de pompare semnificativ mai reduse.

the transmission system to ensure a controlling influence on the district heating system operation. Thus, the municipality should provide at least 51% of the necessary funding for reconstruction. Operating the system, partly investment and performance of technical economical load dispatch should be privatised.

The strategy shall be to redesign and reconstruct the current transmission system in respect of future required transmission capacities.

The strategy shall be to employ a private operator.

Municipalitate trebuie sa mentina controlul general asupra sistemului de transport astfel incat sa poata sa aiba un control in exploatarea sistemului de termoficare. In acest caz, municipalitatea ar trebui sa contribuie cu cel putin 51% din finantarea pentru reconstructie. Operarea sistemului, parte din investitii si operarea dispeceratului pe criterii tehnico-economice ar trebui privatizate.

Strategia consta in reproiectarea si construirea sistemului existent de transport tinand cont de cerintele de capacitate pentru acest sistem.

Strategia va consta in angajarea unui operator privat.

Old fashioned supply concept

Modernise the supply concept or the consumers will disconnect!

The current 4-pipe direct supply concept must be replaced with a modern 4-pipe system with local preparation of heating and hot tap water.

The distribution company must give-up being responsible for the condition of the internal building installations by separating the internal piping from the external piping by heating modules and the heating modules must be the responsibility and ownership of the building.

Modernisation of the internal installation must be a part of the energy renovation programme, which will be implemented in the years to come, heavily subsidised by the authorities.

The strategy shall be to redesign, reconstruct and privatise the distribution of heat.

Conceptul demodat de furnizare

Conceptul de furnizare trebuie modernizat, altfel consumatorii se vor deconecta!

Conceptul existent de racordare a consumatorilor utilizand 4 tevi, cu prepararea locala a incalzirii si a apei calde ce consum trebuie inlocuit.

Companiile de distrubutie trebui sa inceteze a mai fi responsabile pentru conditiile din instalatiile interioare ale cladirilor si acest lucru nu se poate intampla decat prin separarea retelelor interioare ale cladirilor de sistemul de termoficare cu module termice. Aceste module termice trebuie sa fie proprietatea cladirilor si de asemenea sa fie in responsabilitatea acestora.

Modernizarea instalatiilor interioare trebuie sa fie parte a programelor de reabilitare energetica, care vor trebui implementate in anii care urmeaza, puternic sustinute financiar de catre autoritati.

Strategia consta in reproiectare, reconstruire si privatizare a distributiei caldurii.

Poor maintenance

No private will allow the system he has invested in to corrode away in front of his eyes. Thus involving private investors will introduce preventive maintenance.

The strategy shall be to privatise the operation of the district heating system.

Intretinere necorespunzatoare

Nici un privat nu va permite ca sistemul in care a investit sa se corodeze sub ochii sai. Prin implicarea investitorilor privati se va introduce intretinerea preventiva.

Strategia consta in privatizarea exploatarii sistemului de termoficare.

Political decided heat tariffs

No private investor will accept a tariff heat fixed politically but will request his costs covered through a cost related tariff.

The strategy shall be to prepare for privatisation by introduction of a cost related tariff structure. If this is not possible from a legal point of view at least the municipality should initiate a study to establish the true cost and the costs structure of heat supply in

Tarife stabilite politic

Nici un investitor privat nu va accepta ca tariful sa fie stabilit pe criterii politice, dar va solicita ca sa-si acopere costurile printr-un tarif stabilit pe baza de costuri.

Strategia consta in pregatirea pentru privatizare prin introducerea unei structuri a tarifului pe baza costurilor intampinate. Daca acest lucru nu este posibil din punct de vedere legal, cel putin

Bucharest.

municipalitatea trebuie sa initieze un demers pentru stabilirea costurilor reale si o structura a costurilor in furnizarea cu caldura in Bucuresti.

Lack of motivation

The motivation of the staff is in general low due to management behaviour. The lack of motivation is understandable when one see the huge difference in standard of living of many of the managers and the ordinary staff. The difference is not in the salary level but shall be found elsewhere.

The strategy shall be to increase the motivation of the staff by introduction of modern management tools such as performance bonuses, education programmes and job development opportunities.

Lipsa motivatiei

Motivatia personalului este in general scazuta datorita atitudinii managementului. Lipsa motivatiei este de inteles cand se observa o diferente imensa intre standardúl de viata al multor manageri si personalul de rand. Diferenta nu se regaseste doar in nivelul de salarizare ci si in alta parte.

Strategia consta in cresterea motivarii personalului prin introducerea unor metode moderne manageriale ca: bonusuri pentru performante, programe de instruire si dezvoltarea oportunitatilor pentru angajati.

Business as usual attitude

It is difficult to see how the attitude of the current management can be changed. Perhaps it is easier to change the management! Private operators/investors will probably look for a quite different attitude of managers than what they will found between current managers. Thus, only few of the sitting managers should expect to maintain their position in a private organisation.

Atitudinea uzuala in afaceri

Este dificil de vazut cum se poate schimba atitudinea managementului existent. Poate mai usor este sa fie schimbat managementul! Operatorii/investitorii privati vor avea o cu totul alta atitudine in ceea ce priveste managementul decat cea a actualului management. In aceste conditii, foarte putini manageri existenti ar putea sa-si pastreze pozitiile intr-o organizatie privata.

Corruption

Better brains that what the Consultant’s can offer are trying to stop the corruption in Romania, so far with only little result.

Coruptia

Creiere superioare este ceea ce Consultantul poate sa ofere ca solutie pentru oprirea coruptiei in Romania, dar insa cu foarte scazute rezultate.

5.4 Exploit on Opportunities

New business areas

The opportunities regarding new business areas (solar heating operator/investor, connection of new consumers and energy conservation advisory etc) can only be exploited after the organisation has improved on weaknesses as the reputation of district heating today is so bad that most new consumers will not voluntarily connect to the system and introduction of mandatory connection to district heating will for the same reason not be political possible.

The strategy shall be to improve on weaknesses making mandatory connection to district heating acceptable both politically and by the consumers.

5.4 Expoatarea oportunitatilor

Arii noi pentru afaceri

Oportunitatile priviind noi arii de afaceri (operator/investitor in energia solara, conectarea noilor consumatori, consiliere in conservarea energiei, etc) pot fi exploatate numai dupa imbunatatirea reputatiei organizatiei, aceasta fiind atat de proasta, incat cei mai multi consumatori noi nu doresc conectarea la termoficare de buna voie. Introducerea conectarii obligatorii la termoficare nu va fi posibila din punct de vedere politic din acelasi motiv.

Strategia consta in eliminarea slabiciunilor, facand astfel posibila conectarea obligatorie la termoficare, devenind acceptabila atat din punctul de vedere al consumatorului cat si din punct de vedere politic.

Political correctness

To exploit the political correctness of district heating to provide funds and necessary changes in legislation the intentions of Bucharest Municipality must be demonstrated not only by preparing strategies but by real actions.

The strategy shall be to exploit the political correctness by immediately starting implementing the strategies according to the time table found in the Strategy Report.

Corectitudine din punct de vedere politic

Asigurarea corectitudinii din punct de vedere politic in sistemul de termoficare consta in asigurarea fondurilor si a modificarilor ncesare in legislatie. Intentiile Primariei Municipiului Bucuresti trebuie demonstrate nu numai prin intocmirea unei strategii ci si prin actiuni reale.

Strategia va trebui sa exploateze corectitudinea politica prin inceperea implementarii imediate a strategiilor in conformitate cu graficul de implementare inclus in Raportul privind Strategia.

5.5 Mitigate treats

Disconnection of consumers

The best, and probably the only way, to avoid that the consumers disconnect from the district heating system is to improve the general consumer satisfaction. This requires eliminating more of the weaknesses related to the conditions of supply.

The strategy shall be to improve the consumer satisfaction to avoid disconnection from the district heating system.

Lack of financing

If a good project is developed it will always be possible to establish financing to implement it!

Thus, there is attractive for the investors, if a predictable business environmental is ensured , mainly by stability and correlation between public utilities legislation (specifically for thermal energy, housing, renewable resources and waste management) with regulation for power production.

Institutional investors such as EIB and EBRD will request municipality or even state guarantee for lending money to reconstruction of the district heating system. This possibility should especially be used regarding redesign and reconstruction of the transmission system for which, the municipality should maintain a controlling position.

Private investors will look for business opportunities in a liberalised energy system and a guarantee for payment for produced power, heat and incinerated waste, when relevant.

Can the above conditions not be fulfilled it might be impossible to reach the objectives of the Energy Strategy.

The strategy shall be to liberalise and privatise the

5.5 Reducerea riscurilor generate de amenintari

Deconectarea consumatorilor

Cel mai bun si de altfel singurul mod de a evita deconectarea consumatorilor de la sistemul de termoficare este acela de a creste satisfacerea generala a consumatorului. Acest lucru necesita eliminarea slabiciunilor legate de conditiile de furnizare.

Strategia consta in imbunatatirea nivelului de satisfacere a consumatorului pentru a evita deconectarea de la sistemul de termoficare.

Lipsa finantarii

Daca un proiect bun este dezvoltat este foarte probabil sa se gaseasca si finantarea pentru implementarea acestuia!

De asemenea, daca se asigura un mediu de afaceri predictibil, in special prin stabilitatea si corelarea legislatiei sectoriale a utilitatilor publice (cu precadere cea a energiei termice, locuintei, resurselor regenerabile si salubritatii), inclusiv cu reglementarile energiei electrice, acesta ar fi atragator pentru investitori.

Investitori institutionali ca BEI sau BERD vor solicita Municipalitatii sau Guvernului garantii pentru imprumuturi necesare reconstructiei sistemului de termoficare. Aceasta posibilitate trebuie luata in considerare in ceea ce priveste reproiectarea si reconstruirea sistemului de transport pentru care municipalitatea trebuie sa-si mentina o pozitie de control.

Investitorii privati vor cauta oportunitati de afaceri in sistemul liberalizat de producere a energiei si o garantie pentru plata prin producerea electricitatii, energiei termice si incinerarii deseurilor, daca este relevant.

heat market and the waste incineration market according to the time frame found in the Energy Strategy.

Daca conditiile de mai sus nu vor putea fi indeplinite, vor fi imposibil de atins obiectivele Strategiei Energetice.

Strategia consta in liberalizarea si privatizarea pietii de energie termica si de incinerare a deseurilor, in conformitate cu graficul din Strategia Energetica.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 8c: Institutional analysis

Anexa 8c: Analiza institutionala

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1 INTRODUCTION

1.1 Organisational and institutional aspects

The radically technological development and huge needs for investments in order to achieve the objectives of the Energetic Strategy in Bucharest request major changes of the institutional and organisational framework for the organisations in charge with the future management of the energetic public utilities.

National Strategy underlines that under the public sector are not available financial resources for the modernisation of the entire energetic sector and accordingly privatisation/invitation of private investor is considered necessary.

There are necessary around 600,000,000 Euro for the establishment of 3 waste-to-energy facilities and for the reconstruction of transmission and distribution systems an other equal amount is requested. It seems being almost impossible for the local budget of Bucharest Municipality to finance or to guarantee 3.3 billion Euro for the next 12-15 years.

Only a modernised organisational and institutional framework is able to face in the future with the challenges. In this respect the organisational and institutional framework shall develop in a certain manner to be able to cope with privatisation process/private participation and to achieve the objective of the Energetic Strategy with fewer risks for Municipality.

Mainly, National Strategy and the goals of national strategic foreseen the establishment and development of the open local energy market and the privatisation of the operation of the services. These strategic objectives considered to have: as a general scope to obtain the best quality of the energetic services for the price paid(in or case for the Bucharest consumers) and also the major objectives in line with the general scope being:

- Improving the investment and operation in the field;
- Stimulate de private investments needed to achieve quality objectives and environmental strategy;
- Achieving institutional sustainability of the financing related investments, operating a quality, efficient and friendly environment and affordability of the users for local energy services.

Developing requirements of the above objectives,

1 INTRODUCERE

1.1 Chestiuni organizationale si institutionale

Modificarile tehnologice radicale si marimea investitiilor necesare atingerii obiectivelor strategiei energetice municipale, impun modificari majore ale cadrului institutional si organizatoric al gestionarii acestei transformari si a operarii pe viitor a utilitatilor energetice pentru Bucuresti.

Strategia nationala intelege ca sectorul public nu poate pune la dispozitie fondurile necesare pentru modernizarea sectorului energie termica si de aceea privatizare/participarea investitorilor privati este necesara.

Pentru a fi construite 3 facilitati de incinerare a deseurilor vor fi necesare investitii de cel putin 600,000,000 EUR, iar pentru reconstructia sistemului de transport si distributie vorbim de o suma similara. Pare aproape imposibil pentru pentru bugetul Primariei Municipiului Bucuresti sa finanteze sau sa garanteze finantari de mai mult de 3.3 miliarde Euro in urmatoriii 12-15 ani.

Un cadru organizational si institutional modernizat este acela care va putea face fata provocarilor viitorului. In acest sens, cadrul institutional si organizational trebuie sa se dezvolte astfel incat sa se poata adapta la privatizare si /sau participari ale privatilor, astfel incat sa se poata asigura atingerea obiectivelor propuse cu riscuri minime pentru Municipalitate.

In primul rand, atat strategia locala, cat si directiile strategiei nationale prevad crearea si dezvoltarea pietelor locale de energie termica si privatizarea operarii serviciilor. Aceste prevederi strategice au avut in vedere atat scopul general al obtinerii celui mai bun raport calitate / pret al serviciilor energetice (in cazul nostru pentru bucuresteni), cat si obiectivele majore care servesc acest scop, respectiv:

- eficientizarea operarii si realizarii investitiilor in domeniu;
- atragerea de fonduri private in investitiile necesare atingerii obiectivelor de calitate si de mediu ale strategiei;
- obtinerea sustenabilitatii institutionale corelate a finantarii investitiilor, a unei operari de calitate, eficiente si prietenoase cu mediul si a suportabilitatii de plata a utilizatorilor, pentru serviciile energetice locale.

Dezvoltand cerintele obiectivelor de mai sus, solutiile institutionale si organizatorice de creare a pietei institutional and organizational solutions for building of the local heat market must observe the following requirements / criteria and correlation between them:

1. Building and development of regulatory mechanisms to allow to open the local heat markets;
2. Achieving the sustainability for institutional improvements in the investment field;
3. Achieving institutional sustainability for effective operation of services;
4. Obtaining the legal, contractual and regulatory framework for attracting private investment necessary to achieve the objectives of quality and environmental strategy, with minimum risks for the municipality;
5. Achieving sustainability of institutional investment funds (to obtain financial sustainability of energetic services which ensure financial eligibility of the operators implicitly by maintaining tariffs at acceptable levels);
6. Municipality shall maintain the control of the results reached referring to the quality of services, and attract private funds for investments considering that the energy management services shall be performed by the private operators;
7. Providing in front of the citizens a functional mechanism for: monitoring and transparent regulation, objective and professional quality of energy services and the evolution and structure of tariffs.

In the following there will briefly propose solutions to meet these requirements, considering and being developed in Annex A.

To create and develop regulatory mechanisms and functioning of local markets heat is proposed below a scheme of relationships between key heat market players.

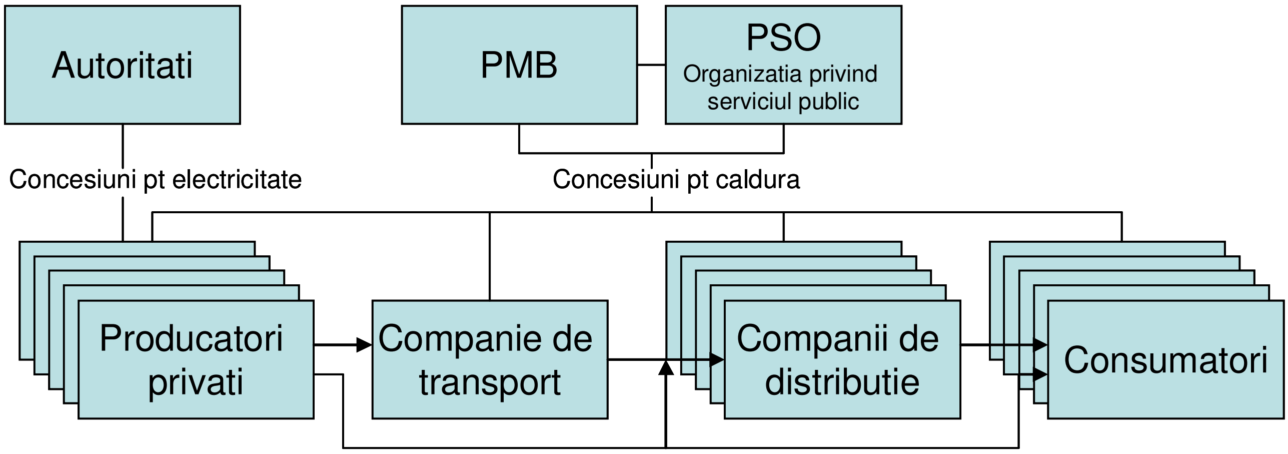
locale de energie termica trebuie sa urmareasca urmatoarele conditii / criterii[1], precum si concordanta dintre acestea:

1. crearea si dezvoltarea mecanismelor de reglementare si functionare a unei **piete locale a energiei termice**;
2. obtinerea sustenabilitatii institutionale pentru **eficientizarea realizarii investitiilor** in domeniu;
3. obtinerea sustenabilitatii institutionale pentru **operarea eficienta a serviciilor**;
4. obtinerea cadrului legal, contractual si de reglementare pentru **atragerea de fonduri private in investitii** necesare atingerii obiectivelor de calitate si de mediu ale strategiei, cu riscuri minime pentru Municipalitate;
5. obtinerea sustenabilitatii institutionale a finantarii investitiilor (obtinerea sustenabilitatii financiare a serviciilor energeticecare sa asigure bancabilitatea operatorilor, implicit prin **mentinerea tarifelor la nivele suportabile pentru utilizatori**);
6. asigurarea pentru Municipalitate a **controlului obtinerii si mentinerii rezultatelor scontate privind calitatea serviciilor**, prin atragerea de fonduri private pentru realizarea investitiilor si prin organizarea gestiunii serviciilor energetice catre operatori privati;
7. asigurarea pentru cetateni a functionarii unor mecanisme de monitorizare si reglementare transparenta, obiectiva si profesionista a **calitatii serviciilor energetice si a evolutiei si structurii tarifelor**.

In cele ce urmeaza se vor propune pe scurt solutii care sa respecte aceste cerinte, avand in vedere si considerentele dezvoltate in anexa A.

Pentru crearea si dezvoltarea mecanismelor de reglementare si functionare a unei **piete locale a energiei termice, s**e propune mai jos o schema a relatiilor dintre principalii actori ai pietei energiei termice.

[1] Referintele privesc in principal HCGMB 54/1997 si 234/1999 (Statutul Mun Buc., cu o serie de prevederi de luat in considerare cu privire la conditiile privatizarii de succes, vezi art. 15-20), strategia de restructurare si privatizare a RGAB, experienta gestionarii contractului de concesiune a serviciilor de apa- canal, experienta internationala obtinuta privind privatizarile utilitatilor publice – energie si apa canal si studiul TRAPEC pentru realizarea unui PPP pentru RADET – platit de Guvernul Elvetiei, care a aratat ca solutia cu risc minim pentru Municipalitate este concesiunea serviciilor prestate de RADET)/ *References relate primarily HCGMB 54/1997 and 234/1999 (status of MUN of Buc., With a series of provisions to consider on the success of privatization, see art. 15-20), the strategy of restructuring and privatization RGAB experience of managing a contract of concession of water-sewers, international experience acquired on the privatization of public utilities - energy and water -sewers and Trapec Study for a PPP for RADET - financed by the Government of Switzerland, which showed that the concession of services provided by RADETis the solution with minimum risk for the Municipality.*



The structure consists of separate companies for generation, transmission and distribution companies, which operate on the basis of concessions issued by the national authorities to produce electricity to the national grid and issued by the municipality for energy. Between different companies have established commercial contracts.

First stage of creating the conditions for functioning of the market will regulate heat transmission. There should be only one company responsible for transmission dispatching technically and economically. The transmission company will thus be organized as a company having only concession obtained from the Municipality for the heat transmission. Company will buy energy from producers and will provide to thermal substations, owned by the distribution companies or industrial consumers. Purchase and sale should be based on commercial contracts.

The transmission company will not be the only buyer, it must increasingly be limited to the transmission at a tariff regulated to be as small as possible (it is possible to impose the municipality in terms of the concession of transmission services for a maximum profit interest operator is compensated by the stability / period of such contracts and monopoly status of the transport infrastructure) that facilitate the interests of both producers and the distributors.

In the first stage, municipality should establish a public service organization (PSO), to monitor compliance concessions on production, transport and distribution and may take appropriate steps in terms of efficiency and lack of supply conditions.

In the second stage, in terms of regulating transmission, we can develop markets for energy production. Relations related the competiveness market which will be developed in the production of energy will have to take into account, besides the transmission of energy and heat demand forecast, also shall consider the effects of energy conservation and the future production of the energy will be based on waste incineration, by solar energy and other renewable energy sources.

Structura consta in separarea in companii de producere, transport si companii de distributie, care opereaza in baza unor concesiuni emise de catre autoritatile nationale pentru producerea electricitatii catre reteaua nationala si emise de catre Municipalitate pentru energia termica. Intre diferitele companii trebuie stabilite contracte comerciale.

Prima etapa a crearii conditiilor de functionare a pietei caldurii va fi reglementarea transportului. Ar trebui sa existe numai o singura companie de transport responsabila pentru dispecerizarea din punct de vedere tehnic cat si economic. Transportatorul va trebui astfel organizat ca societate unica avand obtinuta concesiune din partea Municipalitatii pentru serviciul de transport.

Compania de transport va achizitiona energie termica de la producatori si o va furniza punctelor termice detinute de catre companii de distributie, sau consumatori industriali. Achizitia si vanzarea trebuie sa se bazeze pe contracte comerciale.

Transportatorul nu va fi unicul achizitor, el trebuind tot mai mult sa se limiteze la activitatea de transport, la un tarif astfel reglementat, cat mai mic posibil (e posibil ca Municipalitatea sa impune in conditiile de concesiune a serviciilor de transport o limita maxima pentru profit, interesul operatorului fiind compensat de stabilitatea / durata unor astfel de contracte si de statutul de monopol al infrastructurii de transport) incat sa faciliteze atat interesul producatorilor, cat si al distribuitorilor.

Tot in prima etapa, Municipalitatea va trebui sa infiinteze o Organizatie privind serviciul public (OSP), care sa monitorizeze respectarea concesiunilor privind productia, transportul si distributia si sa poata lua masuri corespunzatoare in conditiile lipsei de eficienta si a unor conditii de furnizare nesatisfactoare.

In cea de a doua etapa, in conditiile reglementarii transportului, se va putea dezvolta piata productiei de energie termica. Relatiile concurentiale de piata ce se vor dezvolta la nivelul productiei de energie termica, Bucharest City Hall has to decide that the production units and waste-to-energy facilities should be constructed and provide concessions to candidates for supplying heat for a period of time in certain conditions, which will include, among others, the requirements specified by Municipal Energy Strategy. Production should be based on commercial contracts between production companies and the transmission company(distribution companies in case the production takes place at the decentralized level).

In the third stage, the market will be extended also at the distribution level, creating new concession opportunities for several sectors. The actors will stimulate the market so far the final production cost of heat, in the conditions where the transmission company will be limited to the transmission of heat. The decisions for optimal separation of the district heating zones for distribution can be taken only based on an assessment of the optimization of costs and tariffs and shall also consider the interests of private investors in distribution, which will have solutions for redesign of the transmission and distribution.

vor trebui sa tina seama, pe langa conditiile transportului energiei, si de cererea de caldura pe viitor, avand in vedere efectele conservarii energiei, precum si de faptul ca productia de baza va fi realizata prin incinerarea deseurilor, prin captarea energiei solare si prin alte surse regenerabile de energie.

Municipiul Bucuresti trebuie sa decida ce unitati si centrale trebuie construite si sa ofere candidatilor concesiuni pentru furnizarea caldurii pentru o perioada de timp in anumite conditii, care vor cuprinde, intre altele, cerintele precizate de strategie energetica municipala.

Producerea trebuie sa se bazeze pe contracte comerciale intre companiile producatoare si compania de transport (companii de distributie in cazul in care producerea are loc la nivel descentralizat)

In cea de a treia etapa, piata se va extinde si la nivelul distributiei, unde se vor putea concesiona serviciile de distributie pentru mai multe sectoare separate ale acesteia, actorii acestei piete stimuland in final producerea cat mai ieftina a caldurii, in conditiile in care transportatorul se va limita doar la serviciul de transport. Deciziile de separare optima a zonelor de distributie se vor putea lua numai pe baza unui studiu de optimizare a costurilor si de evaluare a intereselor investitorilor in distributie, care sa aiba la baza solutiile de reproiectarea sistemului de transport si distributie.

2 OBTAINING INSTITUTIONAL SUSTAINABILITY

Diagnosis of the strategy regarding RADET and Trapec study we showed institutional deficiencies.
Thus, it was found that the followings are missing:

- The contract of delegation between the municipalities and RADET with obligations and answers on indicators of performance and the management of assets;
- Updated of the strategy regarding the development of the services, which led to lack of investment opportunity and effectiveness;
- Procedures and local regulatory approval of tariffs;

Therefore, to streamline the investment necessary to achieve the objectives of the strategy should take into account the following measures:

- The energy strategy and development investment to achieve its objectives, stopping all investments not included in the Municipal Energetic Strategy;
- Investments by contracting procedures to maximize transparency and competition;
- Including investments as an obligations in the contract conditions of private operators (concession) results-oriented and based on measuring and monitoring the professional objectives and expected effects on the quality and efficiency of services (performance indicators of the result). This last measure is one of the most effective in terms of the complexity of processes is a great investment, such as transformation of the district heating in Bucharest, which require a level of the managerial performance, the only private incentives environment can achieve.

2 OBTINEREA SUSTENABILITATII INSTITUTIONALE

Diagnosticul strategiei privind RADET si studiul TRAPEC ne-a aratat lipsuri institutionale majore ale functionarii regiei. Astfel, s-a constatat ca lipsesc:

- Contractul de delegare dintre Municipalitate si RADET, cu obligatii si raspunderi privind indicatorii de performanta si modul de gestionare a patrimoniului;
- Strategia actualizata a dezvoltarii serviciilor, ceea ce a condus la realizarea de investitii lipsite de oportunitate si eficacitate;
- Proceduri locale de reglementare si aprobare a tarifelor;

De aceea, pentru eficientizarea realizarii investitiilor necesare atingerii obiectivelor strategiei trebuie avute in vedere urmatoarele masuri:

- aprobarea strategiei energetice si realizarea investitiilor pentru atingerea obiectivelor acesteia, stopand toate investitiile care nu se incadreaza in prevederile SEM;
- contractarea investitiilor prin proceduri de maximizare a transparentei si competitiei;
- includerea obligatiilor de investitii in obligatiile contractuale ale operatorilor privati (concesionari) orientate catre rezultate, respectiv pe baza masurarii si monitorizarii profesioniste si obiective a efectelor scontate privind calitatea si eficienta serviciilor (a indicatorilor de performanta de rezultat). Aceasta ultima masura este una dintre cele mai eficace, in conditiile in care complexitatea proceselor investitionale este deosebita, cum este cazul transformarii sistemului de termoficare din Bucuresti, care necesita un nivel managerial performant, pe care numai stimulentele mediului privat il poate atinge.

3 OBTAINING SUSTAINABILITY FOR EFFICIENT OPERATION AND SERVICES

A major interest resulting from the privatization of the management is considered also the efficiency in operation, but must be obtained through appropriate contractual and competitive.

Relevant efficiency can be obtained through the privatization of such services in certain circumstances. In the case of energy production, the most effective tool is a viable heat market. In the domain of transmission and distribution services the efficiency can be obtained through private operation of services in terms of results-oriented contracts, with performance indicators are well defined and clear provision for monitoring them. Also, the mechanisms for obtaining a market price of services and limiting the possibilities of uncontrolled growth rates needed to be established by the contract and monitoring and regulation.

Diagnosis on the structure of tariffs of RADET and discussion on this topic in the Energetic Municipal Committee shows that is very difficult at this time established a procedure for determining the rate similar to that found in Denmark. There is a lack of transparency and experience for an effective administrative structure and rate of expenditure included in the actual structure of the tariff from an operator as RADET with a big size and managing such a very complex network. There is missing an entire philosophy of maintaining the minimum level of expenditure, transparency, and an non-profit financial results managing public utilities with a monopoly regime, all these mentioned before being the basis of the procedure for determining tariff in Denmark. For these reasons, for establishing the tariff, we recommend to consider the experience encountered during the procedure of the concession of water and sewerage in Bucharest, which led to a quality / price particularly advantageous for the citizens.

The solution consists in determining the average rate during the concession as the sole criterion for awarding of the concession service on the basis of tendering procedures that maximize transparency and competition and the ownership of the concession of a contract covering all the obligations of quality of service (including investment), with the prior approval of the Municipality and the risks of financing investments.

Strong competition could generate a reduction of tariffs or at least maintain them at low levels by this procedure, even is considered the introduction in the

3 OBTINEREA SUSTENABILITATII PENTRU OPERAREA EFICIENTA A SERVICIILOR

Un interes major al privatizarii managementului este si eficienta in exploatare, care insa trebuie obtinuta prin mecanisme contractuale si concurentiale adecvate.

Eficienta deosebita se poate obtine astfel prin privatizarea serviciilor, in anumite conditii. In cazul serviciilor de productie de energie, cel mai eficace instrument este functionarea pietei serviciilor. In cazul serviciilor de transport si distributie eficienta sporita se poate obtine prin operarea privata a serviciilor, in conditiile unor contracte orientate catre rezultate, avand indicatori de performanta bine definiti si prevederi clare de monitorizare a acestora.

De asemenea, mecanismele de obtinere a unui tarif de piata al serviciilor si limitarea posibilitatilor de crestere necontrolata a tarifelor sunt necesare a fi instituite prin prevederile contractuale si de monitorizare si reglementare.

Diagnosticul cu privire la structura tarifelor RADET si discutiile pe aceasta tema din CME arata ca este deosebit de dificil de instituit la acest moment o procedura de stabilire a tarifului similara cu cea din Danemarca. Lipseste transparenta si experienta unui control administrativ eficace al structurii tarifului si a cheltuielilor reale incluse in tarif ale unui operator de marimea RADET si care gestioneaza o industrie de retea deosebit de complexa. Lipseste si o intreaga filosofie a cheltuielilor minime, a transparentei, a profitului 0 in cazul gestionarii unei utilitati publice cu regim de monopol, care sta la baza procedurii de stabilire a tarifului din Danemarca.

Din aceste motive, ca procedura de stabilire a tarifului recomandam sa fie folosita experienta intampinata in urma procesului de concesionare a serviciilor de apa si de canalizare din Bucuresti, care a condus la un raport calitate / pret deosebit de avantajos cetatenilor.

Solutia consta in stabilirea tarifului mediu pe durata concesiunii drept criteriu unic al incredintarii concesiunii serviciului, pe baza unor proceduri de licitatie care sa maximizeze transparenta si competitia si pe baza asumarii de catre concesionar a unui contract care sa cuprinda toate obligatiile de calitate a serviciului (inclusiv de investitii), aprobate anterior de catre Municipalitate si riscurile de finantare a investitiilor.

Concurenta puternica poate genera prin aceasta procedura o reducere a tarifelor sau cel putin o mentinere a acestora la nivele scazute, chiar in tariff the loan services as a cost, as happened in the concession of water-sewers.

Ttherefore, the establishment of the independent local regulatory structure for the monitoring of the quality and efficiency of the concessioner services (including tariff) is the most important target for the achieving and maintaining especially effective operation.

conditiile includerii in aceste tarife a unor cote importante pentru rambursarea finantarii investitiilor, asa cum s-a intamplat in cazul concesiunii serviciilor de apa-canal.

In aceasta solutie organizarea unei structuri independente de monitorizare si reglementare locala a calitatii si eficientei serviciilor concesionate (inclusiv a tarifului) este importanta pentru atingerea si mai ales mentinerea obiectivului de eficienta a operarii.

4 OBTAINING LEGAL FRAMEWORK FOR ATTRACTING PRIVATE INVESTMENT

Criterion 4 is to obtain the legal, contractual and regulatory framework for attracting private investment necessary to achieve the objectives of quality and environmental strategy, with minimum risks for the municipality.

Solutions related to the criterion (4) focus mainly to create the legal framework that allows viable heat market for each stage described above. Regulatory of the transmission system and establishing a strong entity (which works independent) monitoring and regulatory services, is the most important solution, in the first stage.

It is also necessary to enforce conditions for the private capital to comply with the provision of the energetic strategy and assuming through an agreement by the investors of the outcome indicators of investment, quantifiable and verifiable, which relate to indicators of quality of services and environmental. Establish benchmarks and operators of its monitoring and transparency is also a condition to minimize the risks of the Municipality and consumers.

Studies have also shown (see Trapec study) as a form of PPP (understanding this phrase broadly, as any kind of collaboration between private and public sectors and not as a form of contract), the concession of the services currently performed by RADET, is the way of management with minimum risky for municipalities, comparing also with the current management.

4 OBTINEREA CADRULUI LEGAL, PENTRU ATRAGEREA DE FONDURI PRIVATE

Criteriul 4 consta in obtinerea cadrului legal, contractual si de reglementare pentru atragerea de fonduri private in investitii necesare atingerii obiectivelor de calitate si de mediu ale strategiei, cu riscuri minime pentru Municipalitate.

Solutiile legate de criteriul (4) privesc in primul rand crearea cadrului legal care sa permita functionarea pietei energiei termice, pentru fiecare etapa descrisa mai sus. Reglementarea transportului energie si instituirea unei entitati puternice (care sa functioneze independent) de monitorizare si de reglementare a serviciilor, este cea mai importanta solutie, in prima etapa.

De asemenea, este necesara conditionarea aportului capitalului privat de respectarea prevederilor strategiei energetice, precum si de asumarea contractuala de catre investitori a unor indicatori de rezultat al investitiilor, cuantificabili si usor de verificat, care sa se refere la indicatorii de calitate ai serviciilor si de mediu.

Instituirea benchmarkingului operatorilor si al entitatii de monitorizare si transparenta acestuia este de asemenea o conditie de minimizare a riscurilor Municipalitatii si utilizatorilor.

Studiile au aratat totodata (a se vedea studiul TRAPEC) ca dintre formele de PPP (intelegand larg aceasta expresie, ca orice fel de colaborare intre sectorul public si privat si nu ca forma contractuala), concesiunea serviciilor prestate de RADET este modalitatea de gestiune cea mai putin riscanta pentru Municipalitate, inclusiv fata de gestiunea actuala.

5 BANKABLE OPERATORS AND MAINTAINING OF AFFORDABLE TARIFF

Criteria 5 consists in obtaining institutional sustainability of investment financing (obtaining financial sustainability of energy services to assure financial eligibility of the operators implicitly by maintaining tariffs at levels tolerable to users.

For compliance with criteria no (5) are both necessary conditions to stimulate the market for energy efficient products, as well as monitoring and ensuring transparency of regulatory charges, where appropriate.

In general, the schemes and the principle of the private financing of services of general interest at European level show that predictability (mainly by the stability of legislation and regulations), clarity of objectives, coherent and transparent processes for awarding of the contracts are the basic elements in the process of attracting the serious investors.

Also, studies for the preparation of the privatization must establish investment objectives and mechanisms to return them so that they do not exceed the level of affordability of the consumers.

Changing the current system of subsidies scheme and introducing a scheme of direct subsidy of disadvantaged social categories is a major solution, plus support schemes for energy conservation and promoting renewable energy.

5 BANCABILITATEA OPERATORILOR, SI MENTINEREA TARIFELOR

Criteriul 5 consta in Obtinerea sustenabilitatii institutionale a finantarii investitiilor (obtinerea sustenabilitatii financiare a serviciilor energetice care sa asigure bancabilitatea operatorilor, implicit prin mentinerea tarifelor la nivele suportabile pentru utilizatori

Pentru respectarea criterilui (5) sunt necesare atat conditii de stimulare a functionarii pietei productiei eficiente de energie, cat si asigurarea transparentei monitorizarii si reglementarii tarifelor, acolo unde este cazul.

In general, schemele si principiile de finantare privata a serviciilor de interes general la nivel european arata ca predictibilitatea (in principal prin stabilitatea legislatiei si reglementarilor), claritatea obiectivelor, coerenta contractelor si transparenta proceselor de incredintare a acestora sunt elemente ale atrargerii investitorilor seriosi.

De asemenea, studiile de pregatire a privatizarii trebuie sa stabileasca obiective de investitii si mecanisme de returnare a acestora astfel incat sa nu se depaseasca nivelul de suportabilitate la plata al utilizatorilor.

Modificarea sistemului actual de subventii si dirijarea lor numai pentru categoriile sociale defavorizate este o solutie majora, la care se adauga schemele de sprijin pentru conservarea energiei si promovarea energiei regenerabile.

6 CONTROL OF MUNICIPALITY ON OBTAIN AND MAINTAIN THE RESULTS

Another criteria is to ensure control for the municipality to obtain results and maintaining quality services by attracting private funds for investments and delegation of the energy management services to private operators.

Contractual control, when properly exercised, is considered more effective than administrative control. Therefore, fears towards privatization in the sense of "losing control" are not justified except in the event of institutional management contracts.

Enforcing of the acceptable contracts, mechanisms and institutions for effective regulation and monitoring of contracts lead to a strong control of the Municipality quality and efficiency of services managed by private operators.

Independent monitoring institution / regulatory framework is essential, however. Otherwise, the lack of administrative management of the services is considered in this case amplified by private interests for profit.

6 CONTROLUL MUNICIPALITATII PENTRU OBTINEREA SI MENTINEREA REZULTATELOR SCONTATE

Un alt criteriu este reprezentat de asigurarea pentru Municipalitate a controlului obtinerii si mentinerii rezultatelor scontate privind calitatea serviciilor, prin atragerea de fonduri private pentru realizarea investitiilor si prin organizarea gestiunii serviciilor energetice catre operatori privati.

Controlul contractual, atunci cand este exercitat corect, este considerat mult mai eficace decat controlul administrativ. De aceea temerile fata de privatizare in sensul ”pierderii controlului” nu sunt justificate decat in cazul incapacitatii institutionale de gestionare a contractelor.

Impunerea unor contracte satisfacatoare si a unor mecanisme si institutii de monitorizare si reglementare eficace a contractelor determina un control puternic al Municipalitatii asupra calitatii si eficientei serviciilor gestionate de operatori privati.

Independenta institutiei de monitorizare/reglementare este insa esentiala. Altfel, lipsurile gestiunii administrative a serviciilor sunt in acest caz amplificate de interesul privat pentru profit.

7 MECHANISMS FOR MONITORING AND REGULATION

There is very important to provide to the consumers a function of mechanisms for monitoring and transparent regulation, objective and professional service quality and evolution energy structure and rates.

Also, there is important to be ensured the transparency of the activity of monitoring and regulation of utilities and consumers participation in these activities to maintain its objectivity.

The main solution is to allow the independent functioning of monitoring organization and local regulations.

In developed countries, transparency and independent monitoring organization and regulation of quality and efficiency of services provided by investors / private operators is provided by the participation of the consumers in managing the institution, by specialists selected by the NGOs and civil society, with prestigious and wide representation.

7 MECANISME DE MONITORIZARE SI REGLEMENTARE

Este foarte importanta asigurarea pentru cetateni a functionarii unor mecanisme de monitorizare si reglementare transparenta, obiectiva si profesionista a calitatii serviciilor energetice si a evolutiei si structurii tarifelor.

De asemenea, este importanta transparenta activitatii de monitorizare si de reglementare a utilitatilor si participarea cetatenilor la aceste activitati, pentru asigurarea obiectivitatii acesteia.

Principala solutie este functionarea independenta a institutiei locale de monitorizare si de reglementare.

In tarile dezvoltate, independenta si transparenta institutiei de monitorizare si de reglementare a calitatii si eficientei serviciilor prestate de investitori/operatori privati este asigurata si prin reprezentarea cetatenilor in conducerea institutiei, prin specialisti selectati de catre organizatiile neguvernamentale civice si profesionale, cu prestigiu si cu larga reprezentare.

8 ANNEX A – ELEMENTS OF REFERENCE REGULATION AND REFORMS WAIT ENERGY SERVICES IN LOCAL

Energy services (electricity, gas, heat) are contained in European documents as the European Economic Service in the words of General Interest (continued EESGI). This phrase is used in Articles 16 and 86, paragraph 2, of the EU Treaty. Definition was made by the Green Paper and White Paper on Services of General Interest (SGI), documents issued by the Commission on 21.05.2003 and 12.05.2004 respectively.

According to SIG white book, they include a wide range of services defined by the fact that such are subject to specific obligations of public service under a criterion of general interest.

SGI include two categories: non-economic services of general interest and economic services of general interest (EESGI), which include energy services and local and which we will refer below. EESGI add to SGI definition mainly economic service and that usually represents the industries in the area of operation of the networks.

Universal service and local

Also, some of EESGI are regulated at EU level as a universal service (air transport and railways, electricity, post and telecommunications, telephony, etc.), the rest being covered unit, there is some regulation, for example on water quality or how to treat the waste, but not regarding the management of functioning markets these services (services water - sewers, sanitation, heating, public lighting, local public transport services, road maintenance, property management / condominiums, etc.). These services covered varied from country to country, are defined by Law 51/2001 of municipal services as public utilities. There is pointed to avoid misunderstanding that these public utilities not respect the principle of universality in the obligations for any SGI. European Commission draws prerspective in the Green Paper of SGI, by the phrase “controlled liberalization of services”.

8 ANEXA A - ELEMENTE DE REFERINTA ALE REGLEMENTARII SI REFORMELOR ASTEPTATE IN SERVICIILE ENERGETICE LOCALE

Serviciile energetice (electricitate, gaz, energie termica) sunt cuprinse la nivelul documentelor europene in sintagma *Serviciu Economic de Interes General* (in continuare SEIG). Aceasta sintagma este utilizata in **articolele 16 si 86, paragraf 2, din Tratatul UE**. Definirea notiunii s-a facut prin **Cartea verde** si **Cartea alba a Serviciilor de Interes General** (SIG), documente emise de Comisa Comunitatilor Europene la data de 21.05.2003 si respectiv 12.05.2004.

Conform cartii albe a SIG, acestea cuprind o gama foarte variata de servicii definite astfel prin faptul ca sunt supuse *obligatiilor specifice de serviciu public*[2] in virtutea unui criteriu de *interes general.*

SIG cuprind doua mari categorii : serviciile neeconomice de interes general si *serviciile economice de interes general (SEIG),* din care fac parte si serviciile energetice locale si la care ne vom referi in continuare. SEIG adauga definitiei SIG natura economica preponderenta a serviciului si de regula faptul ca reprezinta industrii de retele.

Servicii universale si locale

Totodata, o parte dintre SEIG sunt reglementate la nivelul UE ca servicii universale (transporturile aeriene si pe caile ferate, energia electrica, posta si telecomunicatiile, telefonia, etc), restul nefiind reglementate unitar, existand doar unele reglementari, privind de exemplu calitatea apei sau modul de tratere a deseurilor, dar nu si cu privire la modul de gestiune sau de functionare a pietelor acestor servicii (serviciile de apa- canal, salubritatea, incalzirea centralizata, iluminatul public, transportul public local, serviciile de intretinere a drumurilor, gestiunea imobilelor/ condominiilor, etc). Aceste servicii, reglementate divers, de la tara la tara, sunt definite de Legea 51/2001 ca servicii comunale de utilitati publice. A nu se intelege totusi ca aceste utilitati publice nu trebuie sa respecte principiul universalitatii, in cadrul obligatiilor specifice pentru orice SIG. Comisia Europeana traseaza totusi perspectivele in Cartea verde a SIG, prin sintagma liberalizarea controlata a serviciilor.

[2] Vezi anexa 1 - obligatii specifice SIG

Competence

Another distinction to be made for EESGI related to the level of competence where these services are managed, respectively al national or local level (depending on level of decentralization).

EESGI considered universal are managed in Romania at government level, and the majority of the services as so-called local public utilities are mostly managed at the municipal, town, or inter-communal level(county or regional). Exceptions are some services for local services such as heating system, which have not been fully decentralized to the local level (the case of Bucharest).

Type of Management

Regarding the type of management, starting with the erecting of Law 326/2001 in the Romanian, with French influence, the major distinction between management and direct management of delegation was introduced.

Instead a lack of definition of these organic notions, the provisions of Law 326/2001 were in line with general meaning of these expressions, and specifically the criterion given by the legal entity who will perform the services. Thus, direct administration was made by "organized specialized compartments" established within the own local organization and it is functioning in compliance with the internal rules for the organization (the relationship between operator and public authority is administrative - Vertical, subordination), and delegate management may be established only by the delegation to another operator, legal person different from the public administration, based on a delegated management contract (in which case the relationship becomes a contract - horizontal collaboration).

Subsequently, by Law 51/2006, the criteria for establishing the delegation of management was not so clear, for example a “Regia Autonomous” is acting as direct management and not as delegation. However, Trapec study on switching to delegate management and creating a PPP activity RADET, showed it was urgently necessary to establish a contract management of public goods and the assumption of achieving a quality level of benefits under performance indicators established by the public between RADET and the municipality.

Article 30 5 of GEO 13/2008, which amended law 51/2006 provides that type of contract to delegate management can be: **a)** the concession contract, or **b)** contract of public-private partnership. But missing in the law a definition of their application in our inconsistent we face the problem regarding inconsistency of the notion of contract for the public-

Competenta

O alta distinctie a SEIG trebuie facuta cu privire la nivelul de competenta la care se gestioneaza aceste servicii, national sau local (gradul de descentralizare).

SEIG cu caracter universal sunt in Romania gestionate la nivel guvernamental, iar majoritatea serviciilor constituind in majoritate asa numitele utilitati publice locale, sunt in mare parte gestionate la nivelul municipal, orasenesc, comunal sau intercomunal (judetean sau regional). Exceptie fac unele servicii de interes local, precum serviciile de incalzire centralizata, care nu au fost descentralizate in totalitate la nivel local (cazul Bucurestiului).

Modul de gestiune

Cu privire la modul de gestiune, incepand cu Legea 326/2001 in legislatia romana, de influenta franceza, s-a facut distinctia majora intre gestiunea directa si gestiunea delegata.

Desi a lipsit o definitie organica a acestor notiuni, prevederile Legii 326/2001 respectau sensul general al acestor expresii, respectiv criteriul dat de persoana juridica care presteaza serviciul. Astfel, gestiunea directa era realizata numai prin ”compartimentele specializate organizate în cadrul aparatului propriu al consiliului local”si functiona pe baza de regulament de organizare si functionare (relatia dintre operator si autoritatea publica fiind administrativa – verticala, de subordonare), iar gestiunea delegata putea fi realizata doar prin delegarea acesteia unui alt operator, persoana juridica diferita de administratia publica, pe baza unui contract de gestiune delegata (caz in care relatia devine contractuala – orizontala, de colaborare).

Ulterior, prin Legea 51/2006, criteriul de stabilire a delegarii gestiunii nu a mai fost atat de clar, considerandu-se de exemplu ca o regie cu personalitate juridica proprie este considerata totusi gestiune directa si nu delegata. Cu toate acestea, Studiul TRAPEC privind trecerea la gestiunea delegata si crearea unui PPP cu activitatea RADET, a aratat ca era imperios necesara realizarea intre Municipalitate si RADET a unui contract de administrare a bunurilor publice si de asumare a realizarii unui nivel de calitate a prestatiei conform indicatorilor de performanta stabiliti de autoritatea publica[3].

Art. 30 alin 5 din OUG 13/2008, care a modificat legea 51/2006, prevede ca tipul de contract de delegare a gestiunii poate fi: **a)** contract de concesiune sau **b)** contract de parteneriat public-privat. Lipsind insa in lege o definire a acestora, in aplicare ne lovim de inconsistenta notiunii de contract de parteneriat public-privat. Este cunoscut ca orice

[3] Conform Legii 326/2001 si apoi Legii 51/2006, lasand deocamdata la o parte contradictiile legislatiei privind delegarea in cazul regiilor si administratiilor cu personalitate juridica proprie.

private partnership. It is known that any contract between a public entity and a private partner, is a Public Private Partnership / PPP - therefore a concession contract is a PPP. Also, in a delegated management which involves the concession of an infrastructure and related contract services, how are the differences between the PPP and concession contract? We could appreciate that this provision aims simply just to avoid the application of the transparency and competition of the law regarding concession, creating such opportunity for legal by-pass of the competition on delegated management in awarding contracts to specific entities. Such questions are formulated also in the PPP Green Paper and the law of markets and public concession issued by the European Commission on 30.04.2004. Corrections in the legislation and secondary legislation will need to give answers to such questions, considering the mentioned document, which critics the using of the wording PPP as procedure for by-pass the public right of public markets and concession.

contract intre o entitate publica si un partener privat, constituie un parteneriat public privat / PPP – prin urmare un contract de concesiune este si un PPP. Totodata, intr-o gestiune delegata care presupune si concesiunea unei infrastructuri aferente serviciului, cum se deosebeste contractul de PPP de contractul de concesiune? Putem aprecia ca aceasta prevedere urmarea doar simpla evitare a aplicarii prevederilor de transparenta si concurenta ale legii concesiunii si crearea astfel a unei portite legale pentru ocolirea concurentei in atribuirea clientelara a contractelor de gestiune delegata. Astfel de intrebari le pune si **Cartea verde a PPP si dreptul comunitar al pietelor publice si concesiunii,** emis de Comisia Europeana la data de 30.04.2004. Corectiile legislative si legislatia secundara va trebui sa dea raspuns la astfel de intrebari, in lumina prevederilor documentului mentionat, care critica tocmai utilizarea sintagmei PPP ca procedura pentru ocolirea dreptului comunitar al pietelor publice si al concesiunii.

Opening the Market

By Green Paper of SGI, the European Commission shows that the direction of development of these services is “controlled liberalization”. Apparently contradictory terms. Control was always understood as regulators, in particular for the tariff, against liberalization (quality and customer orientation were not a relevant priority until now). And liberalization has been understood as mere deregulation.

It may be noted however that in domain of EESGI, the transition from administrative relationship, vertical, as considered the direct management (where the uncertain control is the characteristics, especially where it is a lack of a responsible and effective management - see RADET lack of regulation, lack of contract administration, lack of performance indicators, lack of investment strategy), to the delegation of the management and privatization of services (including concessions for infrastructure), which requires horizontal contractual relationship, we can talk about the strengthening control of the Municipality, but considering an another type of control, objective, transparent and possibly more effective, the contract, provided that the control mechanisms of correction and correct the performance of contracts to be allowed to operate.

In this process of liberalization, the "reform" of services, the Commission clearly shows what is the role of public authority: "to ensure proper functioning of markets and the rules of the game to all participants and to ensure the general interest"(see Green Paper SGI, released by the European Commission in 2003).

Deschiderea catre piata

Prin Cartea verde a SIG Comisia Europeana arata ca directia de dezvoltare a acestor servicii este catre liberalizarea lor controlata.[4] Termeni aparent contradictorii. Controlul a fost inteles mereu ca reglementare, in special a tarifului, contrara liberalizarii (calitatea si orientarea catre client nefiind o prioritate marcanta pana de curand). Iar liberalizarea a fost inteleasa ca simpla dereglementare.

Se poate constata insa ca in sfera SEIG, trecerea de la relatia administrativa, pe verticala, a gestiunii directe (unde exceleaza controlul subiectiv, mai ales acolo unde este lipsit de coordonatele unei gestiuni responsabile si eficiente – vezi RADET: lipsa regulament, lipsa contract de administrare, lipsa indicatori de performanta, lipsa strategie investitii), la gestiunea delegata si privatizarea serviciilor (inclusiv concesionarea infrastructurii aferente), ce impune relatia contractuala pe orizontala, putem vorbi despre intarirea controlului Municipalitatii asupra serviciului, dar prin institutirea unui alt tip de control, mai obiectiv, mai transparent si posibil mai eficace, cel contractual, cu conditia ca mecanismele de control si corectie a derularii corecte a contractelor sa fie lasate sa functioneze.

In acest proces de liberalizare, de “reforma” a serviciilor, Comisia arata cu claritate care este rolul autoritatii publice: "acela de a veghea la buna functionare a pietei si la respectarea regulilor jocului de catre toti participantii, precum si de a garanta interesul general" (a se vedea Cartea verde a SIG,

[4] Lipsa de detaliere a conceptului se datoreaza presiunii CEES si altor organisme europene care se opun privatizarii utilitatilor publice. A se vedea si Directiva ***Bolkenstein,*** care contine prevederi aparent contradictorii, ca nu se aplica unei lungi liste de SEIG, pentru ”linistea” acestor opozanti, numai pentru ca ideea pietei sa patrunde si sa dea roade, la inceput doar in anumite sectoare.

Article 3 paragraph 2 of Law 51/2006 provides the priority of general interest in the organization, management and control of public utilities, but do not guarantee it. This aspect shows inconsistencies of the Romanian legislation on the control of delegated management, there are more inconsistencies regarding monitoring of compliance of contracts the delegation of the management, the deficiencies focusing on lack of mechanisms for establishing regulatory authorities to operate truly independent, objective, professional and transparent for the benefit of general interest.

In relation to the future trend of liberalization of the services and the role of public Authority defined by the European Commission, we concluded, that the reforms shall consider in the future, taking into consideration that the administration has to maintain continuously **the control** for the observance of obligations specific SGI, this control to be done through contractual constrains (and less through institutional and financial constrains) managing principles, strategies, contracts, monitoring mechanisms and in general **the rules** of defense of the general interest, **and not money itself**, which should be managed effectively through market mechanisms, by private operators.

This perspective for the district heating system is strengthened by the new European Regulations. Thus, on 28 December 2006 entered into force the Directive 2006/123/EC on services in the Internal Market ("Services Directive" - **Bolkestein Directive**). This date represents the starting for countering of the next 3 (three) years for the implementation of the Directive, which includes the transposition into national law until 27 December 2009, when Romania, as a Member State should be able to ensure proper implementation of all the provisions of this important Community act. Coordinating institution at national level to work on transposing the Directive is the

lansata de Comisia Europeana in 2003).

Art. 3 alin 2 din legea 51/2006 prevede prioritatea interesului general in organizarea, gestionarea si controlul utilitatilor publice, dar nu garantarea acestuia, ceea ce arata insuficientele legislatiei romane cu privire la organizarea controlului gestiunii delegate, existand mai multe incoerente legate de urmarirea respectarii contractelor de gestiune delegata, deficientele concentrandu-se in lipsa mecanismelor de instituire a unor autoritati de reglementare care sa functioneze cu adevarat independent, obiectiv, profesionist si transparent, in beneficiul interesului general.

In raport cu tendinta de viitor de liberalizare a serviciilor si rolul autoritatii publice definit de Comisia Europeana, putem sa concluzionam ca reformele vor trebui sa faca astfel incat ca pe viitor, desi administratia publica va detine in continuare **controlul** respectarii obligatiilor specifice SIG, va face acest lucru preponderent prin parghii contractuale (si mai putin institutionale si financiare), gestionand principii, strategii, contracte, mecanisme de monitorizare si in general **reguli** de aparare a interesului general, **si nu in mod direct bani**, care trebuie sa fie gestionati eficient prin mecanismele pietei, de catre operatorii privati.

Aceasta perspectiva pentru serviciile de incalzire centralizata este intarita de noi reglementari europene. Astfel, la data de 28 decembrie 2006 a intrat în vigoare si Directiva 2006/123/CE privind serviciile pe Piața Internă („Directiva Servicii" - **Directiva Bolkenstein**). Această dată reprezintă începutul perioadei de 3 (trei) ani pentru punerea în aplicare a Directivei, ceea ce presupune **transpunerea acesteia în legislația națională până la data de 27 decembrie 2009,** dată la care România, ca stat membru, trebuie să poată garanta aplicarea corespunzătoare a tuturor dispozițiilor acestui important act comunitar[5]. Instituția coordonatoare la nivel național pentru activitățile

[5] Obiectivul Directivei este liberalizarea pieței serviciilor în Uniunea Europeană, prin stabilirea unui cadru juridic care să elimine obstacolele în calea liberei circulații a serviciilor şi a libertății de stabilire a furnizorilor de servicii între statele membre ale UE.
Pentru transpunerea Directivei, Guvernul României a aprobat în şedința din data de 31.10.2007 Memorandumul nr. 3047/AC/25.09.2007 cu tema „Adoptarea măsurilor necesare urgentării asumării transpunerii şi implementării Directivei 2006/123/CE privind serviciile pe Piața Internă („Directiva Servicii")". A se vedea si Ordinul nr. 1451/07.12.2007. Instituția coordonatoare la nivel național pentru activitățile privind transpunerea Directivei este Departamentul pentru Afaceri Europene.

[6] (8) Dispozițiile prezentei directive referitoare la libertatea de stabilire şi la libera circulație a serviciilor ar trebui aplicate doar în măsura în care activitățile respective sunt deschise concurenței, astfel încât statele membre să nu fie obligate să liberalizeze serviciile de interes economic general sau să privatizeze organismele publice care furnizează astfel de servicii, şi nici să desființeze monopolurile existente pentru alte activități sau anumite servicii de distribuție.
(17) Prezenta directivă reglementează numai serviciile furnizate în schimbul unei contrapartide economice. Serviciile de interes general nu intră în sfera de aplicare a definiției de la articolul 50 din tratat şi, în consecință, nu intră în sfera de aplicare a prezentei directive. **Serviciile de interes economic general sunt servicii care sunt furnizate în contrapartida unei remunerații şi, în consecință, intră în sfera de aplicare a prezentei directive[6].** Cu toate acestea, unele servicii de interes economic general, cum ar fi cele din domeniul transportului, sunt excluse din sfera de aplicare a prezentei directive iar alte servicii de interes economic general, de exemplu cele din domeniul serviciilor poştale, fac obiectul unei derogări de la dispoziția cu privire la libertatea de a presta servicii prevăzută de prezenta directivă. Prezenta directivă nu vizează finanțarea serviciilor de interes economic general şi nu se aplică schemelor de ajutoare oferite de statele membre în special în domeniul social, în conformitate cu normele comunitare privind concurența. Prezenta directivă nu se referă la măsurile ulterioare Cărții albe a Comisiei cu privire la serviciile de interes general.

European Affairs Department.

Looking at paragraphs 8 and 17 of the preamble and art. 2 of the Directive is seen as district heating services and hot tap water supply enter into scope, where, as said in the paragraph (8) of the preamble: "the respective activities are open to competition”. The expression is not very clear, because not specify any condition or reason for some EESGI or may be open competition.

However, it could be considered as grounds for opening to competition of certain "reasons in the public interest" such as consumer protection, the beneficiaries of services and workers; corectness of the trading, combat fraud, in the sense of getting through the pressure of competition quality reports / price improved services for consumers, limit fraud, etc.. Arguments in the sense that motivation comes from cross indicating the preamble paragraph 1-5 of Directive 2006/123/EC, which shows the benefits of market development. Thus, the grounds were used in the past to block the creation of local energy markets, can be present for opening arguments to the competition and elimination of barriers to training of local energy markets. Bolkestein Directive makes relevant steps in the preparation of market openness, transparency of institutionalization by operators, which make it more effective benchmarking.

Therefore, fully compatible with European specification guidelines in this respect, the creation of local markets for energy in national energy strategy and national strategy for accelerating the development of community public utility (approved by GD 246/2006), which mentions the art. 1 that is based on the following guidelines (relevant for solutions to be adopted by Municipal Energetic Strategy):

c. Community services market liberalization of public utilities and removal of all barriers from the legislation institutional that impede private investment in infrastructure related to public utilities;

d. promoting balanced contractual relations, result-oriented, based on the concept of delegated management;

e. building a system for monitoring and evaluating the performance of delegated management of community services of public utilities;

f. simplification of procedures for issuing permits, agreements, licenses and / or authorizations;

g. harmonization of legislation regarding subsidaries for community services of public utility law in this

privind transpunerea Directivei este Departamentul pentru Afaceri Europene.

Examinand paragrafele 8 si 17[6] din preambul si art. 2 al Directivei se poate observa ca serviciile centralizate de incalzire si acm intra in sfera de aplicare, in măsura in care, asa cum spune paragraful (8) din preambul : ”activităţile respective sunt deschise concurenţei”. Expresia nu este foarte clara, intrucat nu precizeaza vreo conditie sau motiv pentru ca unele SEIG pot fi sau sunt deschise concurentei.

Totusi, ar putea fi luate in considerare ca motive de deschidere catre concurenta anumite ”motive imperative de interes general” precum: protecţia consumatorilor, beneficiarilor serviciilor şi a lucrătorilor; loialitatea tranzacţiilor comerciale; combaterea fraudei, in sensul obtinerii prin presiunea concurentei a unor rapoarte calitate / pret a serviciilor imbunatatite pentru consumatori, limitarea fraudelor, etc. Argumentele in sensul acestei motivari vin din coroborarea cu precizarile de la paragraful 1-5 din preambulul Directivei 2006/123/CE, care arata beneficiile dezvoltarii pietei comunitare. Astfel, motive care au fost utilizate in trecut pentru blocarea crearii de piete locale de energie, pot constitui in prezent argumente pentru deschiderea catre concurenta si eliminarea barierelor de formare a pietelor locale de energie.

De aceea, consideram perfect compatibile cu orientarile europene precizarile in acest sens, ale crearii pietelor locale de energie termica, din Strategia energetica nationala si din Strategia naţionala privind accelerarea dezvoltării serviciilor comunitare de utilităţi publice (aprobata prin HG 246/2006), care mentioneaza la art. 1 ca are la baza următoarele orientari (relevante pentru solutiile ce trebuie adoptate de SEM):

c. liberalizarea pieţei serviciilor comunitare de utilităţi publice, precum şi eliminarea din legislaţie a tuturor barierelor instituţionale care împiedică investiţiile private în infrastructura aferentă utilităţilor publice;

d. promovarea relaţiilor contractuale echilibrate, orientate către rezultat, bazate pe conceptul gestiunii delegate;

e. instituirea unui sistem de monitorizare şi evaluare a executării contractelor de delegare a gestiunii serviciilor comunitare de utilităţi publice;

f. simplificarea procedurilor de emitere a avizelor, acordurilor, licenţelor şi/sau autorizaţiilor;

g. armonizarea legislaţiei cu privire la sistemul de subvenţii pentru sectorul serviciilor comunitare de utilităţi publice cu legislaţia comunitară în domeniu şi la îmbunătăţirea sistemului de tarifare;

h. adoptarea unor proceduri şi mecanisme specifice pentru monitorizarea şi evaluarea performanţelor area and improve the charging system;

h. adoption of procedures and mechanisms for monitoring and evaluating performance of community service public utility;

i. continuation of the decentralization process in view of limiting the scope of government intervention at the local level only for situations in which certain public services, programs or projects can not be achieved with local resources and local authorities, in accordance with the principles of the European self-local decentralization process will be conducted in compliance with the principle of effectiveness, economics, efficiency and quantification of results on 3 directions: strengthening of local autonomy, decentralization of administrative and fiscal decentralization;

m. public consultation to establish quality standards (performance indicators) for Community public utilities and their evaluation;

n. the extension of delegated management services Community-based public utility concession contracts and contracts for public-private partnership, promotion of privatization operators suppliers / providers of community services and public utilities to attract private investment in developing and modernizing the Community public utility;

s. eliminating distortions affecting competition in the Community services and public utilities reduced by appropriate rules influence the monopoly of these services;

t. changing the current system of subsidiaries for heat supplied to the population shift from subsidizing production gross heat to subsidize energy actually provided;

u. correlation between all provisions of the laws related to the establishing support measures which constitute State aid, with the legal framework;

v. promoting privatization of the heat production system, heat transmission and heat distribution systems and involvement of the private sector in financing, development and operation of new production capacity of thermal energy, cogeneration based on natural resources and clean and renewable (geothermal energy, solar, gas fermentation, biomass);

w. providing a base of operation for the cogeneration power dictated by the util heat demand, the potential of electricity to municipalities will be provided by the national power system through the system services and supply of energy compensation;

serviciilor comunitare de utilități publice;

i. continuarea procesului de descentralizare având în vedere limitarea sferei de intervenție a Guvernului la nivel local numai pentru situațiile în care anumite servicii publice, programe sau proiecte nu pot fi realizate cu resurse locale şi de către autoritățile locale, în conformitate cu principiile Cartei Europene a autoguvernării locale; procesul de descentralizare se va desfăşura cu respectarea principiului eficacității, economicității, eficienței şi cuantificării rezultatelor pe 3 direcții: întărirea autonomiei locale, descentralizarea administrativă şi descentralizarea fiscală;

m. consultarea publică pentru stabilirea standardelor de calitate (indicatorilor de performanță) pentru serviciile comunitare de utilități publice şi evaluarea acestora;

n. extinderea gestiunii delegate a serviciilor comunitare de utilități publice bazată pe contracte de concesiune şi contracte de parteneriat public-privat, promovarea privatizării operatorilor furnizori/prestatori ai serviciilor comunitare de utilități publice şi atragerea investițiilor private în dezvoltarea şi modernizarea sistemelor comunitare de utilități publice;

s. eliminarea distorsiunilor care afectează concurența pe piața serviciilor comunitare de utilități publice şi reducerea prin reglementări adecvate a influenței caracterului de monopol al acestor servicii;

t. schimbarea actualului sistem de acordare a subvenției pentru energia termică furnizată populației prin trecerea de la subvenționarea producției brute de energie termică la subvenționarea energiei termice efectiv furnizată;

u. compatibilizarea tuturor actelor normative care instituie măsuri de sprijin susceptibile a constitui ajutoare de stat, cu prevederile legale în domeniu;

v. promovarea privatizării operatorilor producători şi distribuitori de energie termică şi a implicării sectorului privat în finanțarea, realizarea şi exploatarea de noi capacități de producție a energiei termice, bazate pe cogenerare şi pe resurse naturale nepoluante şi regenerabile (energie geotermală, energie solară, gaz de fermentație, biomasă);

w. asigurarea unui regim de funcționare de bază pentru centralele în cogenerare dictat de necesarul urban de energia termică, diferența eventuală de energie electrică necesară municipalităților urmând a fi asigurată de Sistemul energetic național prin contracte de

x. to promote a political incentive to restore the villages that have abandoned the system of centralized heat supply back to the safe and cheap heating;

y. implementation of the heat metering programme at the level of the block and promoting the metering at level of individual dwellings;

z. clarify the role and tasks of the state, of the local government authorities, the national regulatory authorities and operators in order to provide operational and financial autonomy;

z1. developing an appropriate strategy, for the specific scope of public utility services, regarding the privatization of operators, including those of the centralized heating system and heating hot tap water;

z2. reorganizing the management of CHP units and transferring all their property in the administrative-territorial units and to clarify technical and legal status of heat and electric heat (cogeneration) administered by local authorities;

Considerations on competition mechanisms in the EESGI which is partly natural monopolies (infrastructure unique and captive consumers)

The role of competition is very important to obtain the best quality / price services to consumers for economic growth, social cohesion and other major effects, the consistency shown in the preamble to Directive Bolkestein.

For the beginning, within an EESGI, those activities can be opened with priority competition should be separated, in the case of centralized heat and these activities are the production of energy.

Competition in the market

Even for natural monopoly, **competition in the market** does not disappear altogether, is present in the labor market, and the limits of systems. Preventing abuse of monopoly is an obligation of local authorities, regulatory agencies are imposing as necessary, especially if private managers of the service (and how are delegated more responsibilities to the operator).

servicii de sistem şi furnizare de energie de compensare;

x. promovarea unei politici stimulative de readucere a localităților care au abandonat sistemul centralizat de alimentare cu energie termică înapoi la situația încălzirii sigure şi cu căldură ieftină;

y. implementarea programului de contorizare a căldurii la branşamentul utilizatorului prin contoare de bloc sau scară şi trecerea intensivă la contorizarea individuală a locuințelor;

z. clarificarea rolului şi atribuțiilor statutului, ale autorităților administrației publice locale, ale autorităților naționale de reglementare din domeniu şi ale operatorilor şi asigurarea autonomiei funcționale şi financiare a acestora;

z1. elaborarea unei strategii adecvate, specifice sferei serviciilor comunitare de utilități publice, cu privire la privatizarea operatorilor, inclusiv a celor din sectorul alimentării centralizate cu energie termică pentru încălzire şi prepararea apei calde de consum;

z2. reorganizarea gestiunii centralelor electrice de termoficare prin trecerea lor în totalitate în proprietatea unităților administrativ-teritoriale şi clarificarea statutului juridic şi tehnic al centralelor termice şi electrice de termoficare (cogenerare) administrate de autoritățile locale;

Consideratii privind mecanismele competitiei in cazul SEIG care constituie in parte monopoluri naturale (cu infrastructura unica si consumatori captivi)

Rolul competitiei este foarte important pentru obtinerea celui mai bun raport calitate / pret al serviciilor la consumatori, pentru cresterea economica, pentru coeziunea sociala si alte efecte importante, aratate cu consistenta in preambulul Directivei Bolkenstein.

Pentru inceput, trebuie separate acele activitati din cadrul unui SEIG care se pot deschide cu prioritate concurentei, in cazul sistemelor centralizate de caldura aceste activitati fiind cele de producere a energiei.

Competitia in cadrul pietei

Chiar si pentru serviciile monopol natural, **competitia in cadrul pietei** nu dispare cu totul, manifestandu-se pe piata muncii, ca si la limitele sistemelor. Prevenirea abuzului de monopol este o obligatie a autoritatii locale, agentiile de reglementare impunandu-se ca necesare, mai ales in cazul gestionarii private a serviciului (si cu cat sunt delegate mai multe resposabilitati operatorului).

Competition for market

Activities and infrastructure that have a natural monopoly or economic functions with captive consumers, the competition mechanism is manifested mainly for the market (ocuppied market during the recovery of investments) and not the latter. This feature requires certain provisions.

Thus, considering the size of investments needed in infrastructure and the need of maintaining a flat rates to recover the investment - to ensure affordability of the services, these factors determine long recovery and long-term contracts. Because in such a competition, opportunities for correction based on calls for competition are limited in time, require measures to get the achievement and maintenance of public interest objectives, and control made by the the public authorities of the liberalization of, in order it to be effective such as:

- Measures to maximize the competition by awarding the delegation of the management (maximum transparency and criteria;
- Contractual provisions for parties, balanced, clearly and unambiguously;
- Contractual provisions in order to maintain a pressure on the market operator, the winner of a delegated management contract (clear provision and easy to handling the termination of the contract if the operator fails to comply with contractual obligations);
- Provisions for an independent monitoring, far away from political influences, in order to reach the contract compliance of operators and defense against users abuse considering their dominant position;
- Institutionalization of transparency of the operators and benchmarking.

Competitia pentru piata

Pentru activitatile si infrastructura care au caracter de monopol natural sau din motive economice functioneaza cu consumatori captivi, mecanismul competitiei se manifeste preponderent **pentru piata** (pentru ocuparea pietei pe durata recuperarii investitiilor) si nu in cadrul acesteia. Aceasta particularitate impune anumite prevederi.

Astfel, avand in vedere marimea investitiilor necesare in infrastructura si nevoia aplatizarii ratelor de recuperare a investitiei – pentru asigurarea suportabilitatii de plata a serviciilor, aceste elemente determina durata mare de recuperare, respectiv contracte pe termen lung. Intrucat intr-o astfel de competitie posibilitatile de corectie prin apelul la piata sunt limitate in timp, necesita luare unor *masuri* de obtinere si mentinere a realizarii obiectivelor de interes public, respectiv *de control din partea autoritatilor publice a liberalizarii*, pentru ca aceasta sa fie eficace, precum:

- Masuri pentru maximizarea competitiei de incredintare a contractelor de gestiune delegata (transparenta maxima si criterii;
- Prevederi contractuale asiguratorii pentru parti, echilibrate, clare si fara ambiguitati;
- Prevederi contractuale pentru mentinerea presiunii pietei asupra operatorului castigator al unui contract de gestiune delegata (prevedere clare si usor de instrumentat de incetare a contractului in cazul in care operatorul nu-si respecta obligatiile contractuale) ;
- Prevederi de monitorizare independenta de influentele politice a respectarii obligatiilor contractuale ale operatorilor si de aparare a utilizatorilor de abuzul de pozitie dominanta a acestora;
- Institutionalizarea transparentei activitatii operatorilor si a benchmarkingului.

Approval of tariffs on the basis of coefficients of efficiency, service quality and development efforts

Introduction of index of efficiency in the tariff structure is also a method used by OFWAT (the regulatory agency in the UK), presented below.

a. Status of services before privatization generate many complaints, and the government had no funds for rehabilitation. In 1973, restructuring of the sector began with the creation of 10 high Autonomous Regia owned by the state corresponding to one region with about 5-8 million inhabitants, covering almost all territory of England.

Aprobarea tarifelor pe baza unor coeficienti de eficienta, calitate a serviciilor si eforturi de dezvoltare

Introducerea unor coeficienti de eficienta in structura tarifului este de asemenea o metoda, folosita de OFWAT (agentia de reglementare din Marea Britanie), prezentata in continuare.

a. Starea serviciilor inainte de privatizare genera numeroase reclamatii, iar guvernul nu avea fonduri pentru reabilitarea acestora. In 1973, restructurarea sectorului a inceput cu crearea a 10 mari regii de stat, in tot atatea regiuni cu cca 5-8 mil. locuitori, acoperind aproape tot teritoriul Angliei. Regiile au fost transformate in societati

Autonomous Regia were transformed into companies whose shares were then sold in 1989, in a broader process of privatization (the government-held golden action). In this process, coherent legislation and creation of effective regulatory agency of the Water (OFWAT) had a fundamental role. Agency followed the accuracy of the indicators and the compliance rates and investments. In collaboration with other institutions there were followed the regulatory indicators of water quality, environment, indicators of efficiency of operation, etc.., The regulatory activity being focused on results to the client, the satisfaction of the consumer, for example: one of the important parameters is monitored while waiting to respond to complaints, which should not exceed 15 seconds (!); not accidentally the entire service is lead practically from the dispatch center for complaints, and other dispatch centers are coordinated by the public relation department received from the working public (consumer demands). The effects of privatization in terms of principles and mechanisms implemented in the UK are extremely beneficial to all chapters: increase quality of service, rates minimum in terms of increased investment for modernization and expansion, reducing complaints, reducing water losses, reduce working time to remedy defects, etc.;

b. the rates are approved by OFWAT and pursued by the following formula: RPI + K, where RPI is the price index due to inflation, and K depends on four factors: (-) X - efficiency factor (reduction of losses and costs being the main concerns of operators), (+) Q - quality factor, depending on costs incurred to increase the quality, (+) V - development factor (depending on costs incurred for development), and (+) S - factor of improvement and extending services to clients;

c. the regulation authority has created a system of comparative competition between the 10 similar companies privatized in the UK and that one step further to pass on direct competition, the best companies can take over in management areas, the companies with lower performance;

d. the correction is particularly effective as multiple: OFWAT, water Inspectorate, Environment Agency, civil society (organizations of consumer protection), shareholders and Government, OFWAT, water Inspectorate and Environment Agency can penalty with very large amounts (a million of pounds) for breach of indicators of quality and efficiency established, institutions are themselves under the

comerciale, ale caror actiuni au fost apoi vandute in 1989, intr-un amplu proces de privatizare (Guvernul si-a retinut actiunea de aur). In acest proces, coerenta legislatiei si crearea efectiva a Agentiei de reglementare a sectorului apei (OFWAT) au avut un rol fundamental. Agentia urmareste cu acuratete respectarea indicatorilor legati de tarife si investitii, iar in colaborare cu celelalte institutii de reglementare se urmaresc indicatorii de calitate a apei, a mediului, indicatorii de eficienta, de operativitate, etc., intreaga activitatea de reglementare fiind concentrata asupra rezultatelor obtinute la nivelul clientului, asupra multumirii clientului consumator; de exemplu: unul din parametrii importanti monitorizati este timpul de asteptare pentru a raspunde la reclamatii, care nu trebuie sa depaseasca 15 secunde (!); nu intamplator intregul serviciu se conduce practic din sala de primire a reclamatiilor, dispeceratul si celelalte centre de decizie subordonandu-se comenzilor primite din compartimentul de lucru cu publicul (cerintelor consumatorilor); efectele privatizarii in conditiile principiilor si mecanismelor puse in aplicare in Marea Britanie sunt deosebit de benefice la toate capitolele: cresterea calitatii serviciilor, tarife minime in conditiile unor investitii crescute pentru modernizari si extinderi, diminuarea reclamatiilor, reducerea pierderilor de apa, reducerea timpilor de lucru pentru remedierea unei defectiuni, etc;

b. tarifele sunt aprobate si urmarite de OFWAT dupa urmatoarea formula: RPI + K, in care RPI reprezinta pretul indexat datorita inflatiei, iar K depinde de patru factori: (-)X - factor de eficienta (reducerea pierderilor si costurilor de expoatare fiind una din principalele preocupari ale operatorilor), (+)Q - factor de calitate , depinzand de costurile atrase pentru cresterea calitatii, (+)V - factor de dezvoltare (depinzand de costurile atrase pentru dezvoltare), si (+)S - factor de imbunatatire si de extindere a serviciilor catre clienti;

c. regimul de reglementare a creat un sistem de competitie comparativa, intre cele 10 societati similare privatizate din Marea Britanie, urmand ca intr-o etapa viitoare sa se treaca la competitie directa, societatile cele mai performante putand prelua in gestiune noi zone, de la societati cu performante mai scazute;

d. sistemul de corectie este deosebit de eficace, fiind multiplu: OFWAT, Inspectorat apa potabila, Agentia de mediu, societatea civila (organizatii de protectie a consumatorilor), actionari si Guvern; OFWAT, Inspectoratul de apa potabila si Agentia de mediu pot da amenzi foarte mari (de milioane de lire), pentru nerespectarea indicatorilor de calitate si eficienta stabiliti, institutii aflate si ele continuous monitoring of the civil society on the other hand, the shareholders can change the management in case of failure and not reached the expected profits (if case of warning, correcting unfavorable tariffs or penalties issued by regulatory agencies) and the Government may cancel the operating license granted to the company, if found duplication of irregularities, leading to order the sale of shares to other owners, who obtained a license for operating area, this correction scheme is promoted the democratic principle of separation of powers (in the idea of generation "healthy conflict"), the principle being followed straight by the operators in the company, which creates real self systems;

e. the property - although they were converted into shares and sold all assets related to service water and sewage, the property is very practically appropriated to the concession, the private operator owns, uses but does not fully-owned assets was, as we saw in section d) above, raising license forcing the sale of shares you get a license;

As a secondary conclusion, as seen, the efficiency is increased when there are effective mechanisms for correction of errors of management.

sub lupa societatii civile; pe de alta parte, actionarii schimba managerii in cazul nerealizarii profiturilor scontate (in cazul avertizarii, corectarii defavorabile a tarifelor sau amendarii de catre agentiile regulatoare), iar Guvernul poate anula licenta de operare acordata societatii, in cazul repetarii neregurilor constatate, ceea ce conduce la obligarea vanzarii actiunilor altor proprietari, care au obtinut licenta pentru operare pentru zona respectiva; tot acest sistem de corectie este promovat de principiul democratic al separatiei puterilor (in ideea generarii “conflictului sanatos”), principiu urmarit cu cerbicie si de operatori in interiorul societatilor, unde se creaza adevarate sisteme de autoreglare;

e. regimul proprietatii - desi au fost transformate in actiuni si vandute toate bunurile aferente serviciului de apa si de canalizare, regimul proprietatii este practic foarte apropriat de cel al concesiunii, in care operatorul privat poseda, utilizeaza dar nu dispune deplin de bunurile aflate in proprietatea sa, dupa cum am vazut la pct d) de mai sus, ridicarea licentei fortand vanzarea actiunilor celui ce obtine licenta;

Ca o concluzie secundara, dupa cum s-a vazut, eficienta este crescuta atunci cand exista mecanisme de corectie eficace a erorilor manageriale.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Part C: Appendixes

Appendix 9b: Heat tariff structure and tariff development

Contract 4144 / 31.12.07

Strategia Energetica a Municipiului Bucuresti

Etapa a III-a: Strategia

Partea C: Anexe

Anexa 9b: Structura tarifului energiei termice si evolutia acestuia

4				
3				
2	25.09.2009	Corrections	GMCB	haa
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Edition	Date	Changes	Prepared by:	Approved by:

ATH energ

Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

Having established the production cost structure in Part C Appendix 9a we discuss an appropriate tariff structure and establish the current and forecasted tariffs in this report.

1 INTRODUCERE

Urmare a stabilirii structurii costurilor de productie in Partea C Anexa 9a, in acest raport consideram o structura corespunzatoare a tarifului si stabilim tariful actual si cel prognozat.

2 TARIFF STRUCTURE

We recommend a tariff structure based on:

- Connection Fee.
- Administration Fee.
- Capacity Tariff.
- Energy Tariff.

2.1 Connection Fee

The Connection Fee is a one-time payment to cover the cost of connecting the consumers to the district heating network.

The Connection Fee should cover:

- Establishment of branch
- Stop-valves
- Meter installation
- Inspection/testing on commissioning

The Connection Fee typically varies between 1,200 EUR and 3.500 EUR.

2.2 Administration Fee

Administration fee is also sometimes called Meter Fee.

The Administration Fee should cover the administration costs related to the installation (meter reading, billing, collection etc) and also administration costs paid to the transmission company. Thus the Administration Fee is calculated as:

Total administration costs =

Distribution company administration costs +

Administration fee paid to transmission company

and

Administration Fee =

Total administration costs / number of connections

The Administration Fee could be supplemented by a pricelist for services such as:

- Extra meter reading
- Control of meter on request (if no error is found)
- Announcement for overdue payment
- Closing/opening with payment overdue

The Administration Fee is typically in the level of 60-70 EUR/connection in system performing

2 STRUCTURA TARIFULUI

Recomandam o structura a tarifului pe baza:

- Taxa de racordare
- Taxa de administrare
- Tarif de capacitate
- Tarif de energie

2.1 Taxa de racordare

Taxa de racordare este o plata unica care va acoperi costul de conectare a consumatorilor la reteaua de termoficare.

Taxa de racordare ar trebui sa acopere:

- Realizarea racordului
- Vanele de separare
- Instalatia de contorizare
- Verificarea/testarea la punerea in functiune.

Taxa de racordare in mod normal este intre 1.200 EUR si 3.500 EUR.

2.2 Taxa de administrare

Taxa de administrare este uneori denumita si Taxa de contorizare.

Taxa de administrare ar trebui sa acopere costurile de administrare aferente instalarii (citirea contorului, facturare, colectarea datelor etc) si costurile de administrare platite companiei de transport. Astfel, taxa de administrare este calculata dupa cum urmeaza:

Total costuri de administrare =

Costuri de administrare companie de distributie +

Taxa de administrate platita companiei de transport

si

Taxa de administrare =

Total costuri de administrare / nr. racorduri

Taxa de administrare poate fi suplimentata cu o lista de preturi pentru servicii, cum ar fi:

- Citire contor extra
- Verificarea contorului la cerere (daca nu se descopera nici o eroare)
- Notificarea privind facturi restante
- Inchiderea/deschiderea cu plata restanta.

In general taxa de administrare este de 60-70

Benchmarking.

EUR/racord intr-un sistem cu benchmarking.

2.3 Capacity Tariff

The capacity fee should cover the cost of having the requested capacity available in terms of:

- Sufficient distribution capacity
- Sufficient transmission capacity
- Sufficient production capacity

Thus, the Capacity Tariff is calculated as:

Total capacity costs =

Capacity cost of distribution system (fixed costs) +

Capacity tariff paid to transmission company

and

Capacity tariff =

Total capacity costs /

Total installed consumer capacity

The capacity costs are typically in the level of 40 – 50 EUR/kW installed in systems performing Benchmarking.

In almost all district heating systems we see increasing capacity tariffs due to decrease in sale (energy conservation etc) and difficulties in reducing the costs correspondingly for the district heating companies.

Capacity tariff are seen based on m^2 or m^3 connected in many district heating systems by the principle of having a capacity tariff is the same.

2.3 Tariful de capacitate

Tariful de capacitate ar trebui sa acopere costul pentru a avea capacitatea solicitata in sensul de:

- Capacitate de distributie suficienta
- Capacitate de transport suficienta
- Capacitate de productie suficienta

Astfel, tariful de capacitate este calculat dupa cum urmeaza:

Total costuri capacitate =

Cost capacitate sistem de distributie (costuri fixe) +

Tarif de capacitate plati companiei de transport

si

Tarif de capacitate =

Total costuri de capacitate/

Total capacitate instalata la consumator

Costurile de capacitate sunt in general de nivelul a 40 – 50 EUR/kW instalat pentru sistemele cu benchmarking.

In majoritatea sistemelor de termoficare vedem majorarea tarifelor de capacitate datorita scaderii vanzarilor (conservarea energiei etc) si dificultatilor companiilor de termoficare de a reduce costurile corespunzator.

Tariful de capacitate are la baza suprafata in m^2 sau volumul in m^3 racordat/a, regasindu-se in multe sisteme de termoficare, iar principiul este similar.

2.4 Energy Tariff

The Energy Tariff should cover the costs of energy production and losses in the systems, calculated as:

Total cost of energy =

Energy tariff paid to transmission company +

Own energy production costs +

Heat losses in the distribution system +

Variable distribution costs

and

Energy tariff =

Total cost of energy / Total sale

The Energy Tariff is typically in the level of 15 – 18 EUR/GJ (exclusive taxes) for large district heating system performing Benchmarking. The Energy Tariff is higher in smaller district heating systems.

The Energy Tariff should be adjusted according to the obtained cooling giving a reduction in the tariff in case

2.4 Tariful pe energie

Tariful pe energie va acoperi costurile de producere a energiei si pierderile din sistem, astfel:

Total cost energie =

Tarif pe energie platit companiei de transport +

Costurile proprii de producere ale energiei +

Pierderile de caldura din sistemul de distributie +

Costurile variabile de distributie

si

Tariful pe energie =

Total cost energie / Total vanzare

In general tariful pe energie este de 15 – 18 EUR/GJ (fara taxe) pentru sistemele de termoficare mari cu benchmarking. Tariful pe energie este mai mare pentru sistemele de termoficare mici.

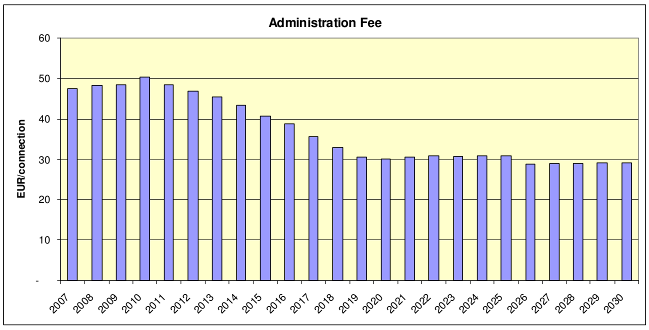
Tariful pe energie ar trebui ajustat conform racirii obtinute, cu o reducere a tarifului in cazul obtinerii of better cooling than for example 35 ^{0}C and an increase in tariff in case of less cooling. A typical reduction factor in systems performing Benchmarking is in the level of 0.20 – 0.25 EUR/^{0}C.

unei raciri mai mari de 35 ^{0}C si o crestere a tarifului in cazul unei raciri mai scazute decat 35 ^{0}C. Factorul de reducere tipic pentru sistemele cu benchmarking este de nivelul a 0,20 – 0,25 EUR/^{0}C.

3 TARIFF DEVELOPMENT

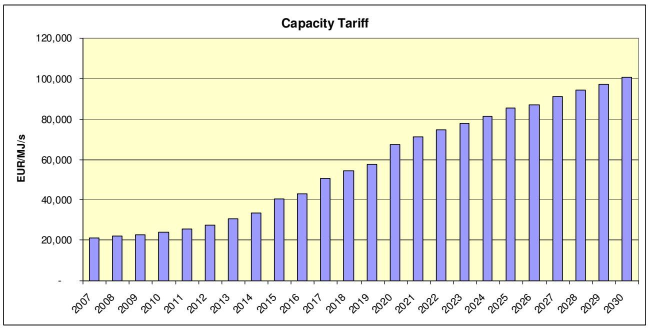
3.1 Administration Fee

The administration fee is expected to decrease as the private operator increase the efficiency of the organisation.



3.2 Capacity Tariff

The capacity tariff will increase as new production capacity is commissioned and the value of the production system is increased.



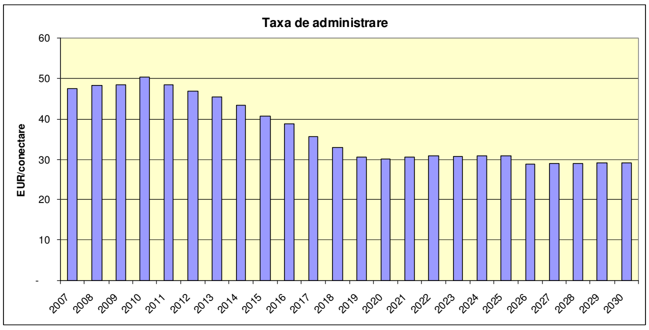
3.3 Energy Tariff

The energy tariff will decrease as the impact of the investments in terms of “cheap” energy from solar panels and waste-to-energy facilities are obtained.

3 EVOLUTIA TARIFULUI

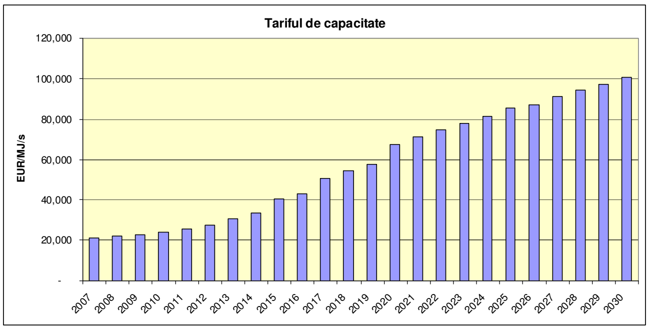
3.1 Taxa de administrare

Se estimeaza ca taxa de administrare va scadea odata cu cresterea eficientei organizatiei si cu aparitia investitorii privati.



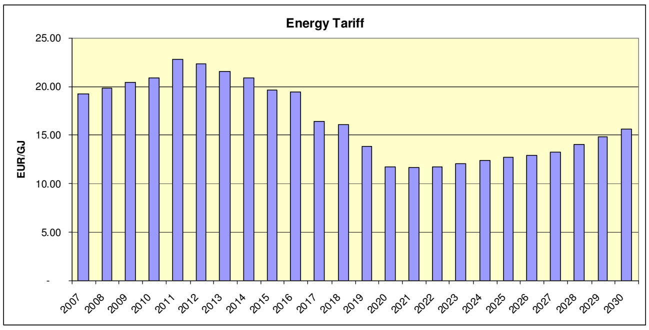
3.2 Tariful de capacitate

Tariful de capacitate va creste odata cu punere in functiune a noilor capacitati de producere si cu cresterea valorii sistemului de producere.



3.3 Tariful pe energie

Tariful pe energie va scadea datorita impactului investitiilor in energie “ieftina” de la panourile solare si de la facilitatile de incinerare a deseurilor.

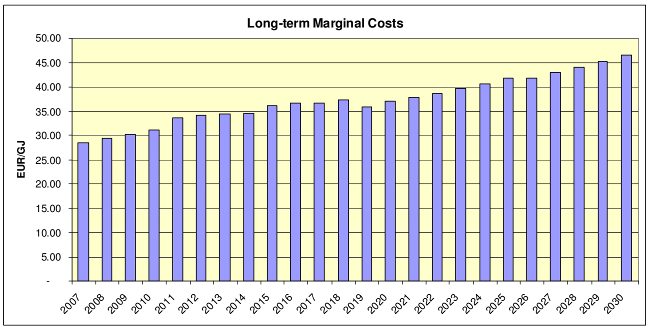


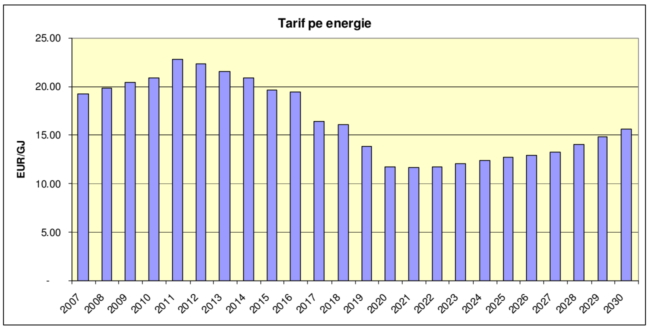
3.4 Long-term Marginal Costs

The long-term marginal costs, calculated as:

(All expenditures – All incomes) / heat production

Will increase due to the increase in value of the production system.



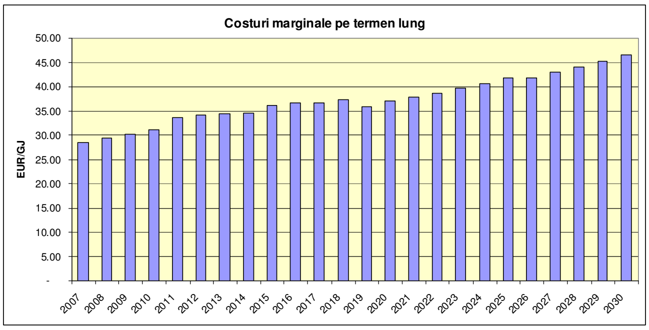


3.4 Costuri marginale pe termen lung

Costurile marginale pe termen lung sunt calculate dupa cum urmeaza:

(Total cheltuieli – total venituri)/ productie energie termica

Acestea vor creste datorita majorarii valorii sistemului de producere.



DISPATCH

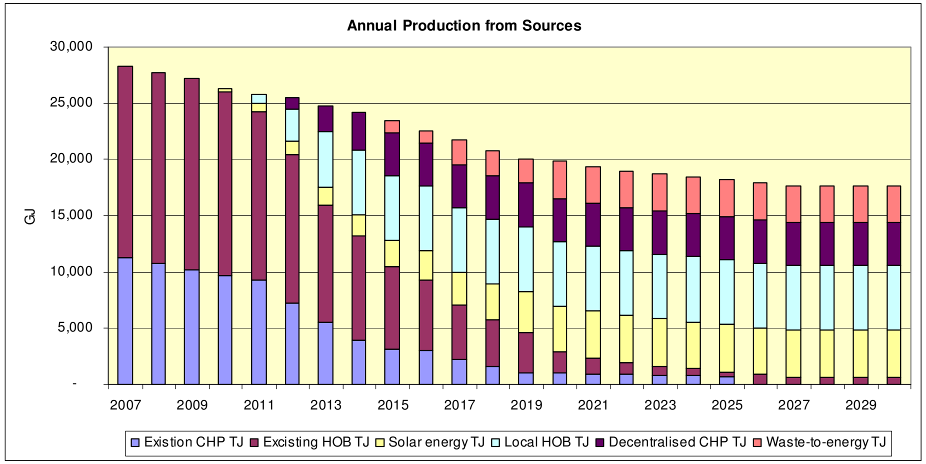
Demand forecast

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity demand	MJ/s	3,000	2,925	2,851	2,748	2,676	2,633	2,578	2,523	2,441	2,361	2,254	2,127	2,031	1,964	1,899	1,836	1,775	1,715	1,657	1,601	1,546	1,515	1,485	1,455
Energy demand	TJ	20,950	20,531	20,112	19,484	19,065	18,855	18,646	18,436	18,017	17,598	16,970	16,341	15,922	15,713	15,503	15,294	15,084	14,875	14,665	14,456	14,246	14,246	14,246	14,246

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity available																									
Existing CHPs	MJ/s	600	600	600	600	600	500	400	300	250	250	200	150	100	100	100	100	100	100	100					
Existing HOBs	MJ/s	2,500	2,500	2,400	2,300	2,100	1,800	1,450	1,300	1,100	1,000	850	800	750	550	450	500	350	300	250	250	250	200	150	100
Solar energy	MJ/s				5	10	17	22	27	32	37	42	47	52	57	60	60	60	60	60	60	60	60	60	60
Local HOB	MJ/s					100	350	600	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Decentralised CHP	MJ/s						100	250	350	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Waste-to-energy	MJ/s									100	100	200	200	200	300	300	300	300	300	300	300	300	300	300	300
Total	MJ/s	3,100	3,100	3,000	2,905	2,810	2,767	2,722	2,677	2,582	2,487	2,392	2,297	2,202	2,107	2,010	2,060	1,910	1,860	1,810	1,710	1,710	1,660	1,610	1,560
Reserve	MJ/s	100	175	149	157	134	134	144	154	141	126	138	170	171	143	111	224	135	145	153	109	164	145	125	105

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Energy balance																									
Consumer demand	TJ	20,950	20,531	20,112	19,484	19,065	18,855	18,646	18,436	18,017	17,598	16,970	16,341	15,922	15,713	15,503	15,294	15,084	14,875	14,665	14,456	14,246	14,246	14,246	14,246
Transmission losses	%	20	20	20	20	20	20	18	16	14	12	11	10	9	8	7	6	6	6	6	6	6	6	6	6
	TJ	4,190	4,106	4,022	3,897	3,813	3,771	3,356	2,950	2,522	2,112	1,867	1,634	1,433	1,257	1,085	918	905	892	880	867	855	855	855	855
Distribution losses	%	15	15	15	15	15	15	15	15	16	16	17	17	17	18	18	18	18	18	18	18	18	18	18	18
	TJ	3,143	3,080	3,017	2,923	2,860	2,828	2,797	2,765	2,883	2,816	2,885	2,778	2,707	2,828	2,791	2,753	2,715	2,677	2,640	2,602	2,564	2,564	2,564	2,564
Production requirement	TJ	28,283	27,717	27,151	26,303	25,737	25,454	24,799	24,151	23,422	22,525	21,721	20,753	20,062	19,798	19,379	18,964	18,704	18,444	18,185	17,925	17,665	17,665	17,665	17,665

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Energy production																									
Existion CHP	TJ	11,313	10,747	10,210	9,699	9,215	7,295	5,544	3,950	3,127	2,971	2,258	1,609	1,019	968	920	874	830	788	749					
Excisting HOB	TJ	16,970	16,970	16,941	16,253	15,002	13,129	10,386	9,204	7,375	6,284	4,748	4,080	3,628	1,971	1,400	1,031	815	597	376	866	606	606	606	606
Solar energy	TJ				350	700	1,200	1,550	1,900	2,250	2,600	2,950	3,300	3,650	4,000	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Local HOB	TJ					821	2,873	4,925	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746	5,746
Decentralised CHP	TJ						958	2,394	3,352	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830	3,830
Waste-to-energy	TJ									1,094	1,094	2,189	2,189	2,189	3,283	3,283	3,283	3,283	3,283	3,283	3,283	3,283	3,283	3,283	3,283
Total	TJ	28,283	27,717	27,151	26,303	25,737	25,454	24,799	24,151	23,422	22,525	21,721	20,753	20,062	19,798	19,379	18,964	18,704	18,444	18,185	17,925	17,665	17,665	17,665	17,665
Balance	TJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



TRANSMISSION AND DISTRIBUTION TARIFFS

Transmission tariff

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sale from transmission	GJ	24,092,500	23,610,650	23,128,800	22,406,025	21,924,175	21,683,250	21,442,325	21,201,400	20,899,720	20,413,680	19,854,315	19,118,970
Transmission tariff	EUR/GJ	7.60	7.60	7.60	7.60	7.33	7.08	6.83	6.59	6.36	6.14	5.92	5.72
	EUR	183,103,000	179,440,940	175,778,880	170,285,790	160,791,899	153,459,082	146,442,592	139,729,268	132,920,090	125,284,913	117,587,104	109,268,905
Fixed costs	EUR	128,172,100	125,608,658	123,045,216	119,200,053	112,554,330	107,421,357	102,509,814	97,810,488	93,044,063	87,699,439	82,310,973	76,488,233
	EUR/GJ	5.32	5.32	5.32	5.32	5.13	4.95	4.78	4.61	4.45	4.30	4.15	4.00
Variable costs	EUR	54,930,900	53,832,282	52,733,664	51,085,737	48,237,570	46,037,725	43,932,778	41,918,781	39,876,027	37,585,474	35,276,131	32,780,671
	EUR/GJ	2.28	2.28	2.28	2.28	2.20	2.12	2.05	1.98	1.91	1.84	1.78	1.71

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Sale from transmission	GJ	18,628,740	18,540,750	18,293,540	18,046,330	17,799,120	17,551,910	17,304,700	17,057,490	16,810,280	16,810,280	16,810,280	16,810,280
Transmission tariff	EUR/GJ	5.52	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32	5.32
	EUR	102,740,788	98,676,565	97,360,878	96,045,190	94,729,503	93,413,815	92,098,127	90,782,440	89,466,752	89,466,752	89,466,752	89,466,752
Fixed costs	EUR	71,918,552	69,073,596	68,152,614	67,231,633	66,310,652	65,389,671	64,468,689	63,547,708	62,626,727	62,626,727	62,626,727	62,626,727
	EUR/GJ	3.86	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73	3.73
Variable costs	EUR	30,822,236	29,602,970	29,208,263	28,813,557	28,418,851	28,024,145	27,629,438	27,234,732	26,840,026	26,840,026	26,840,026	26,840,026
	EUR/GJ	1.65	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60

Distribution tariff

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sale from distribution	GJ	20,950,000	20,531,000	20,112,000	19,483,500	19,064,500	18,855,000	18,645,500	18,436,000	18,017,000	17,598,000	16,969,500	16,341,000
Distribution tariff	EUR/GJ	7.62	7.78	7.94	8.19	8.58	8.90	9.22	9.56	10.02	10.52	11.18	11.90
	EUR	159,639,000	159,639,000	159,639,000	159,639,000	163,629,975	167,720,724	171,913,742	176,211,586	180,616,876	185,132,298	189,760,605	194,504,620
Fixed costs	EUR	111,747,300	111,747,300	111,747,300	111,747,300	114,540,983	117,404,507	120,339,620	123,348,110	126,431,813	129,592,608	132,832,424	136,153,234
	EUR/GJ	5.33	5.44	5.56	5.74	6.01	6.23	6.45	6.69	7.02	7.36	7.83	8.33
Variable costs	EUR	47,891,700	47,891,700	47,891,700	47,891,700	49,088,993	50,316,217	51,574,123	52,863,476	54,185,063	55,539,689	56,928,182	58,351,386
	EUR/GJ	2.29	2.33	2.38	2.46	2.57	2.67	2.77	2.87	3.01	3.16	3.35	3.57

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Sale from distribution	GJ	15,922,000	15,712,500	15,503,000	15,293,500	15,084,000	14,874,500	14,665,000	14,455,500	14,246,000	14,246,000	14,246,000	14,246,000
Distribution tariff	EUR/GJ	12.52	13.01	13.51	13.70	13.89	14.08	14.28	14.49	14.70	14.70	14.70	14.70
	EUR	199,367,236	204,351,417	209,460,202	209,460,202	209,460,202	209,460,202	209,460,202	209,460,202	209,460,202	209,460,202	209,460,202	209,460,202
Fixed costs	EUR	139,557,065	143,045,992	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141
	EUR/GJ	8.77	9.10	9.46	9.59	9.72	9.86	10.00	10.14	10.29	10.29	10.29	10.29
Variable costs	EUR	59,810,171	61,305,425	62,838,061	62,838,061	62,838,061	62,838,061	62,838,061	62,838,061	62,838,061	62,838,061	62,838,061	62,838,061
	EUR/GJ	3.76	3.90	4.05	4.11	4.17	4.22	4.28	4.35	4.41	4.41	4.41	4.41

PRODUCTION TARIFFS

Existing CHP, 1

Production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Heat:																									
Available Capacity	MJ/s	600	600	600	600	600	500	400	300	250	250	200	150	100	100	100	100	100	100	100	-	-	-	-	-
Energy production	GJ	11,313,000	10,747,350	10,209,983	9,699,483	9,214,509	7,294,820	5,544,063	3,950,145	3,127,198	2,970,838	2,257,837	1,608,709	1,018,849	967,906	919,511	873,536	829,859	788,366	748,948	-	-	-	-	-
Electricity:																									
Cm value	Ration	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Energy production	MWh	785,625	746,344	709,027	673,575	639,896	506,585	385,004	274,316	217,167	206,308	156,794	111,716	70,753	67,216	63,855	60,662	57,629	54,748	52,010	-	-	-	-	-

Cost of production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capital costs	EUR	36,000,000	37,080,000	38,192,400	39,338,172	40,518,317	34,778,222	28,657,255	22,137,730	19,001,551	19,571,598	16,126,997	12,458,105	8,554,565	8,811,202	9,075,538	9,347,804	9,628,239	9,917,086	10,214,598	-	-	-	-	-
Fixed	EUR	36,000,000	37,080,000	38,192,400	39,338,172	40,518,317	34,778,222	28,657,255	22,137,730	19,001,551	19,571,598	16,126,997	12,458,105	8,554,565	8,811,202	9,075,538	9,347,804	9,628,239	9,917,086	10,214,598	-	-	-	-	-
Variable	EUR																								
O&M costs	EUR	18,000,000	18,540,000	19,096,200	19,669,086	20,259,159	17,389,111	14,328,628	11,068,865	9,500,776	9,785,799	8,063,498	6,229,052	4,277,283	4,405,601	4,537,769	4,673,902	4,814,119	4,958,543	5,107,299	-	-	-	-	-
Fixed	EUR	10,800,000	11,124,000	11,457,720	11,801,452	12,155,495	10,433,467	8,597,177	6,641,319	5,700,465	5,871,479	4,838,099	3,737,431	2,566,370	2,643,361	2,722,662	2,804,341	2,888,472	2,975,126	3,064,380	-	-	-	-	-
Variable	EUR	7,200,000	7,416,000	7,638,480	7,867,634	8,103,663	6,955,644	5,731,451	4,427,546	3,800,310	3,914,320	3,225,399	2,491,621	1,710,913	1,762,240	1,815,108	1,869,561	1,925,648	1,983,417	2,042,920	-	-	-	-	-
Administration costs	EUR	300,000	309,000	318,270	327,818	337,653	289,819	238,810	184,481	158,346	163,097	134,392	103,818	71,288	73,427	75,629	77,898	80,235	82,642	85,122	-	-	-	-	-
Fixed	EUR	240,000	247,200	254,616	262,254	270,122	231,855	191,048	147,585	126,677	130,477	107,513	83,054	57,030	58,741	60,504	62,319	64,188	66,114	68,097	-	-	-	-	-
Variable	EUR	60,000	61,800	63,654	65,564	67,531	57,964	47,762	36,896	31,669	32,619	26,878	20,764	14,258	14,685	15,126	15,580	16,047	16,528	17,024	-	-	-	-	-
Sale of power	EUR	(51,065,625)	(49,967,714)	(48,893,408)	(47,842,200)	(46,813,593)	(38,172,584)	(29,881,498)	(21,929,285)	(17,881,504)	(17,497,052)	(13,696,692)	(10,051,660)	(6,557,033)	(6,416,057)	(6,278,111)	(6,143,132)	(6,011,055)	(5,881,817)	(5,755,358)	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	(51,065,625)	(49,967,714)	(48,893,408)	(47,842,200)	(46,813,593)	(38,172,584)	(29,881,498)	(21,929,285)	(17,881,504)	(17,497,052)	(13,696,692)	(10,051,660)	(6,557,033)	(6,416,057)	(6,278,111)	(6,143,132)	(6,011,055)	(5,881,817)	(5,755,358)	-	-	-	-	-
Fuel costs	EUR	129,591,299	128,036,203	126,499,769	124,981,772	123,481,990	101,666,839	80,357,469	59,544,885	49,025,288	48,436,985	38,284,593	28,368,883	18,685,638	20,414,059	20,363,024	20,312,117	20,261,336	20,210,683	20,160,156	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	129,591,299	128,036,203	126,499,769	124,981,772	123,481,990	101,666,839	80,357,469	59,544,885	49,025,288	48,436,985	38,284,593	28,368,883	18,685,638	20,414,059	20,363,024	20,312,117	20,261,336	20,210,683	20,160,156	-	-	-	-	-
Taxes	EUR	-	-	-	-	12,348,199	10,166,684	8,035,747	5,954,488	9,805,058	9,687,397	7,656,919	5,673,777	5,605,691	6,124,218	6,108,907	6,093,635	6,078,401	6,063,205	6,048,047	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	12,348,199	10,166,684	8,035,747	5,954,488	9,805,058	9,687,397	7,656,919	5,673,777	5,605,691	6,124,218	6,108,907	6,093,635	6,078,401	6,063,205	6,048,047	-	-	-	-	-
Other costs	EUR	2,715,000	2,796,450	2,880,344	2,966,754	3,055,756	2,622,858	2,161,235	1,669,554	1,433,034	1,476,025	1,216,244	939,549	645,157	664,512	684,447	704,980	726,130	747,914	770,351	-	-	-	-	-
Fixed	EUR	2,715,000	2,796,450	2,880,344	2,966,754	3,055,756	2,622,858	2,161,235	1,669,554	1,433,034	1,476,025	1,216,244	939,549	645,157	664,512	684,447	704,980	726,130	747,914	770,351	-	-	-	-	-
Variable	EUR																								

Tariff structure

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total fixed costs	EUR	49,755,000	51,247,650	52,785,080	54,368,632	55,999,691	48,066,401	39,606,715	30,596,187	26,261,727	27,049,579	22,288,853	17,218,139	11,823,122	12,177,816	12,543,150	12,919,445	13,307,028	13,706,239	14,117,426	-	-	-	-	-
Specific fixed costs	EUR/MJ/s	82,925	85,413	87,975	90,614	93,333	96,133	99,017	101,987	105,047	108,198	111,444	114,788	118,231	121,778	125,432	129,194	133,070	137,062	141,174	-	-	-	-	-
Total variable costs	EUR	85,785,674	85,546,289	85,308,495	85,072,770	97,187,791	80,674,547	64,290,931	48,034,531	44,780,821	44,574,269	35,497,097	26,503,385	19,459,467	21,899,146	22,024,054	22,147,760	22,270,377	22,392,016	22,512,789	-	-	-	-	-
Specific variable costs	EUR/GJ	7.58	7.96	8.36	8.77	10.55	11.06	11.60	12.16	14.32	15.00	15.72	16.47	19.10	22.63	23.95	25.35	26.84	28.40	30.06	-	-	-	-	-
Average tariff	EUR/GJ	11.98	12.73	13.53	14.38	16.62	17.65	18.74	19.91	22.72	24.11	25.59	27.18	30.70	35.21	37.59	40.14	42.87	45.79	48.91	-	-	-	-	-

PRODUCTION TARIFFS

Existing CHP, 2

Data for capacity cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Value of capacity	EUR/MJ/s	500,000	515,000	530,450	546,364	562,754	579,637	597,026	614,937	633,385	652,387	671,958	692,117	712,880	734,267	756,295	778,984	802,353	826,424	851,217	876,753	903,056	930,147	958,052	986,793
	EUR	300,000,000	309,000,000	318,270,000	327,818,100	337,652,643	289,818,519	238,810,459	184,481,080	158,346,260	163,096,648	134,391,638	103,817,540	71,288,044	73,426,686	75,629,486	77,898,371	80,235,322	82,642,382	85,121,653	-	-	-	-	-
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Interest	%	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Data for O&M cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Data for Administrative cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Data for power income calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Power tariff	EUR/GJ	65.00	66.95	68.96	71.03	73.16	75.35	77.61	79.94	82.34	84.81	87.35	89.98	92.67	95.45	98.32	101.27	104.31	107.44	110.66	113.98	117.40	120.92	124.55	128.28
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Data for fuel cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Data for fuel cost calculation																									
Natural gas price	EUR/GJ	7.33	7.62	7.93	8.25	8.58	8.92	9.28	9.65	10.03	10.43	10.85	11.29	11.74	13.50	14.17	14.88	15.63	16.41	17.23	18.09	18.99	19.94	20.94	21.99
Price excalation	%		4	4	4	4	4	4	4	4	4	4	4	4	15	5	5	5	5	5	5	5	5	5	5
Overall efficiency	%	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fuel for heating	GJ	14,141,250	13,434,188	12,762,478	12,124,354	11,518,137	9,118,525	6,930,079	4,937,681	3,908,998	3,713,548	2,822,296	2,010,886	1,273,561	1,209,883	1,149,389	1,091,920	1,037,324	985,457	936,184	-	-	-	-	-
Fuel for power	GJ	3,535,313	3,358,547	3,190,620	3,031,089	2,879,534	2,279,631	1,732,520	1,234,420	977,249	928,387	705,574	502,722	318,390	302,471	287,347	272,980	259,331	246,364	234,046	-	-	-	-	-

Data for tax calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Tax level	%					10	10	10	10	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30

PRODUCTION TARIFFS

Existing HOB, 1

Production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Heat:																									
Available Capacity	MJ/s	2,500	2,500	2,400	2,300	2,100	1,800	1,450	1,300	1,100	1,000	850	800	750	550	450	500	350	300	250	250	250	200	150	100
Energy production	GJ	16,969,500	16,969,500	16,941,218	16,253,242	15,001,766	13,129,030	10,385,652	9,203,815	7,374,502	6,284,202	4,748,323	4,079,561	3,628,071	1,970,644	1,400,039	1,031,204	815,101	596,814	376,452	865,620	605,840	605,840	605,840	605,840
Electricity:																									
Cm value	Ration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy production	MWh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cost of production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capital costs	EUR	22,500,000	23,175,000	22,915,440	22,619,449	21,272,117	18,780,240	15,582,382	14,389,524	12,541,024	11,742,959	10,280,960	9,966,484	9,623,886	7,269,242	6,125,988	7,010,853	5,054,825	4,462,689	3,830,474	3,945,389	4,063,750	3,348,530	2,586,740	1,776,228
Fixed	EUR	22,500,000	23,175,000	22,915,440	22,619,449	21,272,117	18,780,240	15,582,382	14,389,524	12,541,024	11,742,959	10,280,960	9,966,484	9,623,886	7,269,242	6,125,988	7,010,853	5,054,825	4,462,689	3,830,474	3,945,389	4,063,750	3,348,530	2,586,740	1,776,228
Variable	EUR																								
O&M costs	EUR	11,250,000	11,587,500	11,457,720	11,309,724	10,636,058	9,390,120	7,791,191	7,194,762	6,270,512	5,871,479	5,140,480	4,983,242	4,811,943	3,634,621	3,062,994	3,505,427	2,527,413	2,231,344	1,915,237	1,972,694	2,031,875	1,674,265	1,293,370	888,114
Fixed	EUR	6,750,000	6,952,500	6,874,632	6,785,835	6,381,635	5,634,072	4,674,715	4,316,857	3,762,307	3,522,888	3,084,288	2,989,945	2,887,166	2,180,773	1,837,797	2,103,256	1,516,448	1,338,807	1,149,142	1,183,617	1,219,125	1,004,559	776,022	532,868
Variable	EUR	4,500,000	4,635,000	4,583,088	4,523,890	4,254,423	3,756,048	3,116,476	2,877,905	2,508,205	2,348,592	2,056,192	1,993,297	1,924,777	1,453,848	1,225,198	1,402,171	1,010,965	892,538	766,095	789,078	812,750	669,706	517,348	355,246
Administration costs	EUR	187,500	193,125	190,962	188,495	177,268	156,502	129,853	119,913	104,509	97,858	85,675	83,054	80,199	60,577	51,050	58,424	42,124	37,189	31,921	32,878	33,865	27,904	21,556	14,802
Fixed	EUR	150,000	154,500	152,770	150,796	141,814	125,202	103,883	95,930	83,607	78,286	68,540	66,443	64,159	48,462	40,840	46,739	33,699	29,751	25,536	26,303	27,092	22,324	17,245	11,842
Variable	EUR	37,500	38,625	38,192	37,699	35,454	31,300	25,971	23,983	20,902	19,572	17,135	16,611	16,040	12,115	10,210	11,685	8,425	7,438	6,384	6,576	6,773	5,581	4,311	2,960
Sale of power	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fuel costs	EUR	155,509,559	161,729,941	167,918,807	167,543,681	160,828,785	146,381,902	120,426,439	110,991,393	92,488,439	81,966,846	64,411,244	57,553,034	53,230,911	33,250,181	24,803,635	19,182,681	15,920,818	12,240,023	8,106,671	19,572,623	14,383,646	15,102,828	15,857,970	16,650,868
Fixed	EUR																								
Variable	EUR	155,509,559	161,729,941	167,918,807	167,543,681	160,828,785	146,381,902	120,426,439	110,991,393	92,488,439	81,966,846	64,411,244	57,553,034	53,230,911	33,250,181	24,803,635	19,182,681	15,920,818	12,240,023	8,106,671	19,572,623	14,383,646	15,102,828	15,857,970	16,650,868
Taxes	EUR	-	-	-	-	16,082,878	14,638,190	12,042,644	11,099,139	18,497,688	16,393,369	12,882,249	11,510,607	15,969,273	9,975,054	7,441,091	5,754,804	4,776,245	3,672,007	2,432,001	5,871,787	4,315,094	4,530,849	4,757,391	4,995,261
Fixed	EUR																								
Variable	EUR	-	-	-	-	16,082,878	14,638,190	12,042,644	11,099,139	18,497,688	16,393,369	12,882,249	11,510,607	15,969,273	9,975,054	7,441,091	5,754,804	4,776,245	3,672,007	2,432,001	5,871,787	4,315,094	4,530,849	4,757,391	4,995,261
Other costs	EUR	1,696,875	1,747,781	1,728,206	1,705,883	1,604,272	1,416,343	1,175,171	1,085,210	945,802	885,615	775,356	751,639	725,801	548,222	462,002	528,735	381,218	336,561	288,882	297,548	306,475	252,535	195,083	133,957
Fixed	EUR	1,696,875	1,747,781	1,728,206	1,705,883	1,604,272	1,416,343	1,175,171	1,085,210	945,802	885,615	775,356	751,639	725,801	548,222	462,002	528,735	381,218	336,561	288,882	297,548	306,475	252,535	195,083	133,957
Variable	EUR																								

Tariff structure

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total fixed costs	EUR	31,096,875	32,029,781	31,671,048	31,261,963	29,399,838	25,955,857	21,536,151	19,887,522	17,332,740	16,229,747	14,209,144	13,774,511	13,301,012	10,046,698	8,466,626	9,689,584	6,986,190	6,167,808	5,294,035	5,452,856	5,616,442	4,627,948	3,575,090	2,454,895
Specific fixed costs	EUR/MJ/s	12,439	12,812	13,196	13,592	14,000	14,420	14,853	15,298	15,757	16,230	16,717	17,218	17,735	18,267	18,815	19,379	19,961	20,559	21,176	21,811	22,466	23,140	23,834	24,549
Total variable costs	EUR	160,047,059	166,403,566	172,540,087	172,105,270	181,201,540	164,807,441	135,611,530	124,992,420	113,515,234	100,728,378	79,366,820	71,073,548	71,141,001	44,691,200	33,480,133	26,351,341	21,716,453	16,812,005	11,311,151	26,240,063	19,518,263	20,308,964	21,137,020	22,004,335
Specific variable costs	EUR/GJ	9.43	9.81	10.18	10.59	12.08	12.55	13.06	13.58	15.39	16.03	16.71	17.42	19.61	22.68	23.91	25.55	26.64	28.17	30.05	30.31	32.22	33.52	34.89	36.32
Average tariff	EUR/GJ	11.26	11.69	12.05	12.51	14.04	14.53	15.13	15.74	17.74	18.61	19.71	20.80	23.27	27.78	29.96	34.95	35.21	38.50	44.11	36.61	41.49	41.16	40.79	40.37

PRODUCTION TARIFFS

Existing HOB, 2

Data for capacity cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Value of capacity	EUR/MJ/s	75,000	77,250	79,568	81,955	84,413	86,946	89,554	92,241	95,008	97,858	100,794	103,818	106,932	110,140	113,444	116,848	120,353	123,964	127,682	131,513	135,458	139,522	143,708	148,019
	EUR	187,500,000	193,125,000	190,962,000	188,495,408	177,267,638	156,502,000	129,853,187	119,912,702	104,508,532	97,857,989	85,674,669	83,054,032	80,199,050	60,577,016	51,049,903	58,423,778	42,123,544	37,189,072	31,920,620	32,878,238	33,864,586	27,904,419	21,556,163	14,801,899
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Interest	%	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Data for O&M cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Data for Administrative cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Data for power income calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Power tariff	EUR/GJ	65.00	66.95	68.96	71.03	73.16	75.35	77.61	79.94	82.34	84.81	87.35	89.98	92.67	95.45	98.32	101.27	104.31	107.44	110.66	113.98	117.40	120.92	124.55	128.28
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Data for fuel cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Data for fuel cost calculation																									
Natural gas price	EUR/GJ	7.33	7.62	7.93	8.25	8.58	8.92	9.28	9.65	10.03	10.43	10.85	11.29	11.74	13.50	14.17	14.88	15.63	16.41	17.23	18.09	18.99	19.94	20.94	21.99
Price excalation	%		4	4	4	4	4	4	4	4	4	4	4	4	15	5	5	5	5	5	5	5	5	5	5
Overall efficiency	%	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fuel for heating	GJ	21,211,875	21,211,875	21,176,522	20,316,552	18,752,207	16,411,288	12,982,065	11,504,769	9,218,127	7,855,252	5,935,404	5,099,451	4,535,089	2,463,304	1,750,049	1,289,005	1,018,876	746,018	470,566	1,082,025	757,300	757,300	757,300	757,300
Fuel for power	GJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data for tax calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Tax level	%					10	10	10	10	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30

PRODUCTION TARIFFS

Solar Heating, 1

Production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Heat:																									
Available Capacity	MJ/s	-	-	-	5	10	17	22	27	32	37	42	47	52	57	60	60	60	60	60	60	60	60	60	60
Energy production	GJ	-	-	-	350,000	700,000	1,200,000	1,550,000	1,900,000	2,250,000	2,600,000	2,950,000	3,300,000	3,650,000	4,000,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000
Electricity:																									
Cm value	Ration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy production	MWh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cost of production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capital costs	EUR	-	-	-	1,216,494	2,408,659	4,087,838	5,227,323	6,343,609	7,437,047	8,507,982	9,556,754	10,583,700	11,589,151	12,573,436	13,070,086	12,939,385	12,809,992	12,681,892	12,555,073	12,429,522	12,305,227	12,182,174	12,060,353	11,939,749
Fixed	EUR	-	-	-	1,216,494	2,408,659	4,087,838	5,227,323	6,343,609	7,437,047	8,507,982	9,556,754	10,583,700	11,589,151	12,573,436	13,070,086	12,939,385	12,809,992	12,681,892	12,555,073	12,429,522	12,305,227	12,182,174	12,060,353	11,939,749
Variable	EUR																								
O&M costs	EUR	-	-	-	405,498	802,886	1,362,613	1,742,441	2,114,536	2,479,016	2,835,994	3,185,585	3,527,900	3,863,050	4,191,145	4,356,695	4,313,128	4,269,997	4,227,297	4,185,024	4,143,174	4,101,742	4,060,725	4,020,118	3,979,916
Fixed	EUR	-	-	-	243,299	481,732	817,568	1,045,465	1,268,722	1,487,409	1,701,596	1,911,351	2,116,740	2,317,830	2,514,687	2,614,017	2,587,877	2,561,998	2,536,378	2,511,015	2,485,904	2,461,045	2,436,435	2,412,071	2,387,950
Variable	EUR	-	-	-	162,199	321,154	545,045	696,976	845,815	991,606	1,134,398	1,274,234	1,411,160	1,545,220	1,676,458	1,742,678	1,725,251	1,707,999	1,690,919	1,674,010	1,657,270	1,640,697	1,624,290	1,608,047	1,591,967
Administration costs	EUR	-	-	-	30,412	60,216	102,196	130,683	158,590	185,926	212,700	238,919	264,592	289,729	314,336	326,752	323,485	320,250	317,047	313,877	310,738	307,631	304,554	301,509	298,494
Fixed	EUR	-	-	-	24,330	48,173	81,757	104,546	126,872	148,741	170,160	191,135	211,674	231,783	251,469	261,402	258,788	256,200	253,638	251,101	248,590	246,105	243,643	241,207	238,795
Variable	EUR	-	-	-	6,082	12,043	20,439	26,137	31,718	37,185	42,540	47,784	52,918	57,946	62,867	65,350	64,697	64,050	63,409	62,775	62,148	61,526	60,911	60,302	59,699
Sale of power	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fuel costs	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxes	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other costs	EUR	-	-	-	82,620	163,588	277,632	355,022	430,837	505,099	577,834	649,063	718,810	787,097	853,946	887,677	878,800	870,012	861,312	852,699	844,172	835,730	827,373	819,099	810,908
Fixed	EUR	-	-	-	82,620	163,588	277,632	355,022	430,837	505,099	577,834	649,063	718,810	787,097	853,946	887,677	878,800	870,012	861,312	852,699	844,172	835,730	827,373	819,099	810,908
Variable	EUR																								

Tariff structure

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total fixed costs	EUR	-	-	-	1,566,743	3,102,152	5,264,794	6,732,356	8,170,040	9,578,297	10,957,571	12,308,303	13,630,924	14,925,861	16,193,537	16,833,182	16,664,850	16,498,202	16,333,220	16,169,887	16,008,189	15,848,107	15,689,626	15,532,729	15,377,402
Specific fixed costs	EUR/GJ				4.48	4.43	4.39	4.34	4.30	4.26	4.21	4.17	4.13	4.09	4.05	4.01	3.97	3.93	3.89	3.85	3.81	3.77	3.74	3.70	3.66
Total variable costs	EUR	-	-	-	168,282	333,198	565,484	723,113	877,533	1,028,791	1,176,937	1,322,018	1,464,078	1,603,166	1,739,325	1,808,029	1,789,948	1,772,049	1,754,328	1,736,785	1,719,417	1,702,223	1,685,201	1,668,349	1,651,665
Specific variable costs	EUR/GJ	-	-	-	0.48	0.48	0.47	0.47	0.46	0.46	0.45	0.45	0.44	0.44	0.43	0.43	0.43	0.42	0.42	0.41	0.41	0.41	0.40	0.40	0.39
Average tariff	EUR/GJ	-	-	-	4.96	4.91	4.86	4.81	4.76	4.71	4.67	4.62	4.57	4.53	4.48	4.44	4.39	4.35	4.31	4.26	4.22	4.18	4.14	4.10	4.05

PRODUCTION TARIFFS

Solar Heating, 2

Data for capacity cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Installation costs	EUR/GJ	29.85	29.55	29.26	28.96	28.67	28.39	28.10	27.82	27.54	27.27	27.00	26.73	26.46	26.19	25.93	25.67	25.42	25.16	24.91	24.66	24.42	24.17	23.93	23.69
	EUR	-	-	-	10,137,452	20,072,155	34,065,315	43,561,022	52,863,408	61,975,390	70,899,846	79,639,616	88,197,500	96,576,262	104,778,630	108,917,385	107,828,212	106,749,930	105,682,430	104,625,606	103,579,350	102,543,556	101,518,121	100,502,940	99,497,910
Price excalation	%		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Interest	%	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Data for O&M cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Data for Administrative cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Data for power income calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Power tariff	EUR/GJ	65.00	66.95	68.96	71.03	73.16	75.35	77.61	79.94	82.34	84.81	87.35	89.98	92.67	95.45	98.32	101.27	104.31	107.44	110.66	113.98	117.40	120.92	124.55	128.28
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Data for fuel cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Data for fuel cost calculation																									
Natural gas price	EUR/GJ		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Price excalation	%		4	4	4	4	4	4	4	4	4	4	4	4	15	5	5	5	5	5	5	5	5	5	5
Overall efficiency	%	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fuel for heating	GJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fuel for power	GJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data for tax calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Tax level	%					10	10	10	10	20	20	20	20	30	30	30	30	30	30	30	30	30	30	30	30

PRODUCTION TARIFFS

Local HOB, 1

Production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Heat:																									
Available Capacity	MJ/s	-	-	-	-	100	350	600	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Energy production	GJ	-	-	-	-	820,800	2,872,800	4,924,800	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600
Electricity:																									
Cm value	Ratio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy production	MWh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cost of production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capital costs	EUR	-	-	-	-	2,025,916	7,303,427	12,895,765	15,496,411	15,961,303	16,440,142	16,933,346	17,441,347	17,964,587	18,503,525	19,058,631	19,630,389	20,219,301	20,825,880	21,450,657	22,094,176	22,757,002	23,439,712	24,142,903	24,867,190
Fixed	EUR	-	-	-	-	2,025,916	7,303,427	12,895,765	15,496,411	15,961,303	16,440,142	16,933,346	17,441,347	17,964,587	18,503,525	19,058,631	19,630,389	20,219,301	20,825,880	21,450,657	22,094,176	22,757,002	23,439,712	24,142,903	24,867,190
Variable	EUR																								
O&M costs	EUR	-	-	-	-	337,653	1,217,238	2,149,294	2,582,735	2,660,217	2,740,024	2,822,224	2,906,891	2,994,098	3,083,921	3,176,438	3,271,732	3,369,884	3,470,980	3,575,109	3,682,363	3,792,834	3,906,619	4,023,817	4,144,532
Fixed	EUR	-	-	-	-	202,592	730,343	1,289,576	1,549,641	1,596,130	1,644,014	1,693,335	1,744,135	1,796,459	1,850,352	1,905,863	1,963,039	2,021,930	2,082,588	2,145,066	2,209,418	2,275,700	2,343,971	2,414,290	2,486,719
Variable	EUR	-	-	-	-	135,061	486,895	859,718	1,033,094	1,064,087	1,096,009	1,128,890	1,162,756	1,197,639	1,233,568	1,270,575	1,308,693	1,347,953	1,388,392	1,430,044	1,472,945	1,517,133	1,562,647	1,609,527	1,657,813
Administration costs	EUR	-	-	-	-	8,441	30,431	53,732	64,568	66,505	68,501	70,556	72,672	74,852	77,098	79,411	81,793	84,247	86,775	89,378	92,059	94,821	97,665	100,595	103,613
Fixed	EUR	-	-	-	-	6,753	24,345	42,986	51,655	53,204	54,800	56,444	58,138	59,882	61,678	63,529	65,435	67,398	69,420	71,502	73,647	75,857	78,132	80,476	82,891
Variable	EUR	-	-	-	-	1,688	6,086	10,746	12,914	13,301	13,700	14,111	14,534	14,970	15,420	15,882	16,359	16,849	17,355	17,876	18,412	18,964	19,533	20,119	20,723
Sale of power	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fuel costs	EUR	-	-	-	-	8,521,636	31,018,754	55,302,008	67,099,769	69,783,760	72,575,111	75,478,115	78,497,240	81,637,129	93,882,699	98,576,833	103,505,675	108,680,959	114,115,007	119,820,757	125,811,795	132,102,385	138,707,504	145,642,879	152,925,023
Fixed	EUR																								
Variable	EUR	-	-	-	-	8,521,636	31,018,754	55,302,008	67,099,769	69,783,760	72,575,111	75,478,115	78,497,240	81,637,129	93,882,699	98,576,833	103,505,675	108,680,959	114,115,007	119,820,757	125,811,795	132,102,385	138,707,504	145,642,879	152,925,023
Taxes	EUR	-	-	-	-	852,164	3,101,875	5,530,201	6,709,977	13,956,752	14,515,022	15,095,623	15,699,448	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	852,164	3,101,875	5,530,201	6,709,977	13,956,752	14,515,022	15,095,623	15,699,448	-	-	-	-	-	-	-	-	-	-	-	-
Other costs	EUR	-	-	-	-	118,600	427,555	754,940	907,186	934,401	962,433	991,306	1,021,046	1,051,677	1,083,227	1,115,724	1,149,196	1,183,672	1,219,182	1,255,757	1,293,430	1,332,233	1,372,200	1,413,366	1,455,767
Fixed	EUR	-	-	-	-	118,600	427,555	754,940	907,186	934,401	962,433	991,306	1,021,046	1,051,677	1,083,227	1,115,724	1,149,196	1,183,672	1,219,182	1,255,757	1,293,430	1,332,233	1,372,200	1,413,366	1,455,767
Variable	EUR																								

Tariff structure

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total fixed costs	EUR	-	-	-	-	2,353,861	8,485,669	14,983,267	18,004,892	18,545,039	19,101,390	19,674,432	20,264,665	20,872,605	21,498,783	22,143,746	22,808,059	23,492,301	24,197,070	24,922,982	25,670,671	26,440,791	27,234,015	28,051,035	28,892,566
Specific fixed costs	EUR/MJ/s	-	-	-	-	23,539	24,245	24,972	25,721	26,493	27,288	28,106	28,950	29,818	30,713	31,634	32,583	33,560	34,567	35,604	36,672	37,773	38,906	40,073	41,275
Total variable costs	EUR	-	-	-	-	9,510,549	34,613,611	61,702,673	74,855,754	84,817,900	88,199,842	91,716,739	95,373,978	82,849,739	95,131,686	99,863,291	104,830,726	110,045,762	115,520,754	121,268,676	127,303,152	133,638,482	140,289,685	147,272,525	154,603,558
Specific variable costs	EUR/GJ	-	-	-	-	11.59	12.05	12.53	13.03	14.76	15.35	15.96	16.60	14.42	16.56	17.38	18.25	19.15	20.11	21.11	22.16	23.26	24.42	25.63	26.91
Average tariff	EUR/GJ	-	-	-	-	14.45	15.00	15.57	16.16	17.99	18.68	19.39	20.13	18.05	20.30	21.23	22.22	23.24	24.32	25.44	26.62	27.86	29.16	30.51	31.94

PRODUCTION TARIFFS

Local HOB, 2

Data for capacity cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Value of capacity	EUR/MJ/s	150,000	154,500	159,135	163,909	168,826	173,891	179,108	184,481	190,016	195,716	201,587	207,635	213,864	220,280	226,888	233,695	240,706	247,927	255,365	263,026	270,917	279,044	287,416	296,038
	EUR	-	-	-	-	16,882,632	60,861,889	107,464,707	129,136,756	133,010,859	137,001,184	141,111,220	145,344,556	149,704,893	154,196,040	158,821,921	163,586,579	168,494,176	173,549,001	178,755,471	184,118,136	189,641,680	195,330,930	201,190,858	207,226,584
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Interest	%	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Data for O&M cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Data for Administrative cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Data for power income calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Power tariff	EUR/GJ	80.00	82.40	84.87	87.42	90.04	92.74	95.52	98.39	101.34	104.38	107.51	110.74	114.06	117.48	121.01	124.64	128.38	132.23	136.19	140.28	144.49	148.82	153.29	157.89
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Data for fuel cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Data for fuel cost calculation																									
Natural gas price	EUR/GJ	8.43	8.77	9.12	9.48	9.86	10.26	10.67	11.09	11.54	12.00	12.48	12.98	13.50	15.52	16.30	17.11	17.97	18.87	19.81	20.80	21.84	22.93	24.08	25.29
Price excalation	%		4	4	4	4	4	4	4	4	4	4	4	4	15	5	5	5	5	5	5	5	5	5	5
Overall efficiency	%	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Fuel for heating	GJ	-	-	-	-	864,000	3,024,000	5,184,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000	6,048,000
Fuel for power	GJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data for tax calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Tax level	%					10	10	10	10	20	20	20	20	-	-	-	-	-	-	-	-	-	-	-	-

PRODUCTION TARIFFS

Decentralised CHP, 1

Production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Heat:																									
Available Capacity	MJ/s	-	-	-	-	-	100	250	350	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Energy production	GJ	-	-	-	-	-	957,600	2,394,000	3,351,600	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400
Electricity:																									
Cm value	Ration	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Energy production	MWh	-	-	-	-	-	266,000	665,000	931,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000	1,064,000

Cost of production

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capital costs	EUR	-	-	-	-	-	11,129,031	28,657,255	41,323,762	48,643,971	50,103,290	51,606,389	53,154,581	54,749,218	56,391,695	58,083,445	59,825,949	61,620,727	63,469,349	65,373,430	67,334,632	69,354,671	71,435,312	73,578,371	75,785,722
Fixed	EUR	-	-	-	-	-	11,129,031	28,657,255	41,323,762	48,643,971	50,103,290	51,606,389	53,154,581	54,749,218	56,391,695	58,083,445	59,825,949	61,620,727	63,469,349	65,373,430	67,334,632	69,354,671	71,435,312	73,578,371	75,785,722
Variable	EUR																								
O&M costs	EUR	-	-	-	-	-	3,709,677	9,552,418	13,774,587	16,214,657	16,701,097	17,202,130	17,718,194	18,249,739	18,797,232	19,361,148	19,941,983	20,540,242	21,156,450	21,791,143	22,444,877	23,118,224	23,811,771	24,526,124	25,261,907
Fixed	EUR	-	-	-	-	-	2,225,806	5,731,451	8,264,752	9,728,794	10,020,658	10,321,278	10,630,916	10,949,844	11,278,339	11,616,689	11,965,190	12,324,145	12,693,870	13,074,686	13,466,926	13,870,934	14,287,062	14,715,674	15,157,144
Variable	EUR	-	-	-	-	-	1,483,871	3,820,967	5,509,835	6,485,863	6,680,439	6,880,852	7,087,277	7,299,896	7,518,893	7,744,459	7,976,793	8,216,097	8,462,580	8,716,457	8,977,951	9,247,290	9,524,708	9,810,449	10,104,763
Administration costs	EUR	-	-	-	-	-	46,371	119,405	172,182	202,683	208,764	215,027	221,477	228,122	234,965	242,014	249,275	256,753	264,456	272,389	280,561	288,978	297,647	306,577	315,774
Fixed	EUR	-	-	-	-	-	37,097	95,524	137,746	162,147	167,011	172,021	177,182	182,497	187,972	193,611	199,420	205,402	211,564	217,911	224,449	231,182	238,118	245,261	252,619
Variable	EUR	-	-	-	-	-	9,274	23,881	34,436	40,537	41,753	43,005	44,295	45,624	46,993	48,403	49,855	51,351	52,891	54,478	56,112	57,796	59,529	61,315	63,155
Sale of power	EUR	-	-	-	-	-	(24,669,352)	(63,523,582)	(91,601,005)	(107,827,469)	(111,062,293)	(114,394,162)	(117,825,987)	(121,360,767)	(125,001,590)	(128,751,637)	(132,614,187)	(136,592,612)	(140,690,390)	(144,911,102)	(149,258,435)	(153,736,188)	(158,348,274)	(163,098,722)	(167,991,684)
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	(24,669,352)	(63,523,582)	(91,601,005)	(107,827,469)	(111,062,293)	(114,394,162)	(117,825,987)	(121,360,767)	(125,001,590)	(128,751,637)	(132,614,187)	(136,592,612)	(140,690,390)	(144,911,102)	(149,258,435)	(153,736,188)	(158,348,274)	(163,098,722)	(167,991,684)
Fuel costs	EUR	-	-	-	-	-	20,679,170	53,765,841	78,283,064	93,045,014	96,766,814	100,637,487	104,662,986	108,849,506	125,176,931	131,435,778	138,007,567	144,907,945	152,153,342	159,761,010	167,749,060	176,136,513	184,943,339	194,190,506	203,900,031
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	20,679,170	53,765,841	78,283,064	93,045,014	96,766,814	100,637,487	104,662,986	108,849,506	125,176,931	131,435,778	138,007,567	144,907,945	152,153,342	159,761,010	167,749,060	176,136,513	184,943,339	194,190,506	203,900,031
Taxes	EUR	-	-	-	-	-	2,067,917	5,376,584	7,828,306	18,609,003	19,353,363	20,127,497	20,932,597	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																								
Variable	EUR	-	-	-	-	-	2,067,917	5,376,584	7,828,306	18,609,003	19,353,363	20,127,497	20,932,597	-	-	-	-	-	-	-	-	-	-	-	-
Other costs	EUR	-	-	-	-	-	744,254	1,916,454	2,763,527	3,253,066	3,350,658	3,451,177	3,554,713	3,661,354	3,771,195	3,884,330	4,000,860	4,120,886	4,244,513	4,371,848	4,503,004	4,638,094	4,777,236	4,920,554	5,068,170
Fixed	EUR	-	-	-	-	-	744,254	1,916,454	2,763,527	3,253,066	3,350,658	3,451,177	3,554,713	3,661,354	3,771,195	3,884,330	4,000,860	4,120,886	4,244,513	4,371,848	4,503,004	4,638,094	4,777,236	4,920,554	5,068,170
Variable	EUR																								

Tariff structure

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total fixed costs	EUR	-	-	-	-	-	14,136,188	36,400,684	52,489,787	61,787,977	63,641,617	65,550,865	67,517,391	69,542,913	71,629,200	73,778,076	75,991,419	78,271,161	80,619,296	83,037,875	85,529,011	88,094,882	90,737,728	93,459,860	96,263,656
Specific fixed costs	EUR/MJ/s	-	-	-	-	-	141,362	145,603	149,971	154,470	159,104	163,877	168,793	173,857	179,073	184,445	189,979	195,678	201,548	207,595	213,823	220,237	226,844	233,650	240,659
Total variable costs	EUR	-	-	-	-	-	(429,121)	(536,309)	54,637	10,352,946	11,780,075	13,294,679	14,901,169	5,165,741	7,741,227	10,477,003	13,420,028	16,582,781	19,978,423	23,620,842	27,524,688	31,705,410	36,179,302	40,963,548	46,076,265
Specific variable costs	EUR/GJ	-	-	-	-	-	(0.45)	(0.22)	0.02	2.70	3.08	3.47	3.89	1.35	2.02	2.74	3.50	4.33	5.22	6.17	7.19	8.28	9.45	10.69	12.03
Average tariff	EUR/GJ	-	-	-	-	-	-	-	15.68	18.83	19.69	20.58	21.52	19.50	20.72	22.00	23.34	24.76	26.26	27.85	29.51	31.28	33.13	35.09	37.16

PRODUCTION TARIFFS

Decentralised CHP, 2

Data for capacity cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Value of capacity	EUR/MJ/s	800,000	824,000	848,720	874,182	900,407	927,419	955,242	983,899	1,013,416	1,043,819	1,075,133	1,107,387	1,140,609	1,174,827	1,210,072	1,246,374	1,283,765	1,322,278	1,361,946	1,402,805	1,444,889	1,488,236	1,532,883	1,578,869
	EUR	-	-	-	-	-	92,741,926	238,810,459	344,364,682	405,366,426	417,527,419	430,053,241	442,954,839	456,243,484	469,930,788	484,028,712	498,549,573	513,506,061	528,911,242	544,778,580	561,121,937	577,955,595	595,294,263	613,153,091	631,547,684
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Interest	%	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Data for O&M cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Data for Administrative cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Data for power income calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Power tariff	EUR/GJ	80.00	82.40	84.87	87.42	90.04	92.74	95.52	98.39	101.34	104.38	107.51	110.74	114.06	117.48	121.01	124.64	128.38	132.23	136.19	140.28	144.49	148.82	153.29	157.89
Price excalation	%		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Data for fuel cost calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Data for fuel cost calculation																									
Natural gas price	EUR/GJ	8.43	8.77	9.12	9.48	9.86	10.26	10.67	11.09	11.54	12.00	12.48	12.98	13.50	15.52	16.30	17.11	17.97	18.87	19.81	20.80	21.84	22.93	24.08	25.29
Price excalation	%		4	4	4	4	4	4	4	4	4	4	4	4	15	5	5	5	5	5	5	5	5	5	5
Overall efficiency	%	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Fuel for heating	GJ	-	-	-	-	-	1,008,000	2,520,000	3,528,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000
Fuel for power	GJ	-	-	-	-	-	1,008,000	2,520,000	3,528,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000	4,032,000

Data for tax calculation

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Tax level	%					10	10	10	10	20	20	20	20	-	-	-	-	-	-	-	-	-	-	-	-

PRODUCTION TARIFFS

Waste-to-Energy, 1

Production

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Heat:																								
Available Capacity	MJ/s	-	-	-	-	-	-	-	100	100	200	200	200	300	300	300	300	300	300	300	300	300	300	300
Energy production	GJ	-	-	-	-	-	-	-	1,094,400	1,094,400	2,188,800	2,188,800	2,188,800	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200
Electricity:																								
Cm value	Ration	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Energy production	MWh	-	-	-	-	-	-	-	137,750	137,750	275,500	275,500	275,500	413,250	413,250	413,250	413,250	413,250	413,250	413,250	413,250	413,250	413,250	413,250

Cost of production

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capital costs	EUR	-	-	-	-	-	-	-	26,879,245	27,416,830	55,930,332	57,048,939	58,189,918	89,030,574	90,811,185	92,627,409	94,479,957	96,369,556	98,296,948	100,262,887	102,268,144	104,313,507	106,399,777	108,527,773
Fixed	EUR	-	-	-	-	-	-	-	26,879,245	27,416,830	55,930,332	57,048,939	58,189,918	89,030,574	90,811,185	92,627,409	94,479,957	96,369,556	98,296,948	100,262,887	102,268,144	104,313,507	106,399,777	108,527,773
Variable	EUR																							
O&M costs	EUR	-	-	-	-	-	-	-	13,439,622	13,708,415	27,965,166	28,524,469	29,094,959	44,515,287	45,405,593	46,313,705	47,239,979	48,184,778	49,148,474	50,131,443	51,134,072	52,156,754	53,199,889	54,263,886
Fixed	EUR	-	-	-	-	-	-	-	8,063,773	8,225,049	16,779,100	17,114,682	17,456,975	26,709,172	27,243,356	27,788,223	28,343,987	28,910,867	29,489,084	30,078,866	30,680,443	31,294,052	31,919,933	32,558,332
Variable	EUR	-	-	-	-	-	-	-	5,375,849	5,483,366	11,186,066	11,409,788	11,637,984	17,806,115	18,162,237	18,525,482	18,895,991	19,273,911	19,659,390	20,052,577	20,453,629	20,862,701	21,279,955	21,705,555
Administration costs	EUR	-	-	-	-	-	-	-	223,994	228,474	466,086	475,408	484,916	741,921	756,760	771,895	787,333	803,080	819,141	835,524	852,235	869,279	886,665	904,398
Fixed	EUR	-	-	-	-	-	-	-	179,195	182,779	372,869	380,326	387,933	593,537	605,408	617,516	629,866	642,464	655,313	668,419	681,788	695,423	709,332	723,518
Variable	EUR	-	-	-	-	-	-	-	44,799	45,695	93,217	95,082	96,983	148,384	151,352	154,379	157,467	160,616	163,828	167,105	170,447	173,856	177,333	180,880
Sale of power	EUR	-	-	-	-	-	-	-	(11,342,343)	(11,682,613)	(24,066,183)	(24,788,168)	(25,531,813)	(39,446,651)	(40,630,051)	(41,848,952)	(43,104,421)	(44,397,553)	(45,729,480)	(47,101,364)	(48,514,405)	(49,969,838)	(51,468,933)	(53,013,001)
Fixed	EUR																							
Variable	EUR	-	-	-	-	-	-	-	(11,342,343)	(11,682,613)	(24,066,183)	(24,788,168)	(25,531,813)	(39,446,651)	(40,630,051)	(41,848,952)	(43,104,421)	(44,397,553)	(45,729,480)	(47,101,364)	(48,514,405)	(49,969,838)	(51,468,933)	(53,013,001)
Gate fee	EUR	-	-	-	-	-	-	-	(28,800,000)	(28,800,000)	(57,600,000)	(57,600,000)	(57,600,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)
Fixed	EUR																							
Variable	EUR	-	-	-	-	-	-	-	(28,800,000)	(28,800,000)	(57,600,000)	(57,600,000)	(57,600,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)	(86,400,000)
Fuel costs	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																							
Variable	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxes	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed	EUR																							
Variable	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other costs	EUR	-	-	-	-	-	-	-	2,027,143	2,067,686	4,218,079	4,302,441	4,388,490	6,714,389	6,848,677	6,985,650	7,125,363	7,267,871	7,413,228	7,561,493	7,712,723	7,866,977	8,024,317	8,184,803
Fixed	EUR	-	-	-	-	-	-	-	2,027,143	2,067,686	4,218,079	4,302,441	4,388,490	6,714,389	6,848,677	6,985,650	7,125,363	7,267,871	7,413,228	7,561,493	7,712,723	7,866,977	8,024,317	8,184,803
Variable	EUR																							

Tariff structure

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total fixed costs	EUR	-	-	-	-	-	-	-	37,149,356	37,892,343	77,300,380	78,846,388	80,423,315	123,047,672	125,508,626	128,018,798	130,579,174	133,190,758	135,854,573	138,571,664	141,343,098	144,169,960	147,053,359	149,994,426
Specific fixed costs	EUR/MJ/s	-	-	-	-	-	-	-	371,494	378,923	386,502	394,232	402,117	410,159	418,362	426,729	435,264	443,969	452,849	461,906	471,144	480,567	490,178	499,981
Total variable costs	EUR	-	-	-	-	-	-	-	(34,721,695)	(34,953,552)	(70,386,899)	(70,883,299)	(71,396,846)	(107,892,152)	(108,716,462)	(109,569,091)	(110,450,963)	(111,363,026)	(112,306,262)	(113,281,682)	(114,290,330)	(115,333,280)	(116,411,644)	(117,526,566)
Specific variable costs	EUR/GJ	-	-	-	-	-	-	-	(31.73)	(31.94)	(32.16)	(32.38)	(32.62)	(32.86)	(33.11)	(33.37)	(33.64)	(33.92)	(34.21)	(34.50)	(34.81)	(35.13)	(35.46)	(35.80)
Average tariff	EUR/GJ								2.22	2.69	3.16	3.64	4.12	4.62	5.11	5.62	6.13	6.65	7.17	7.70	8.24	8.78	9.33	9.89

PRODUCTION TARIFFS

Waste-to-Energy, 2

Data for capacity cost calculation

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Value of capacity	EUR/MJ/s	1,950,000	1,989,000	2,028,780	2,069,356	2,110,743	2,152,958	2,196,017	2,239,937	2,284,736	2,330,431	2,377,039	2,424,580	2,473,071	2,522,533	2,572,984	2,624,443	2,676,932	2,730,471	2,785,080	2,840,782	2,897,597	2,955,549	3,014,660
	EUR	-	-	-	-	-	-	-	223,993,705	228,473,579	466,086,102	475,407,824	484,915,980	741,921,450	756,759,879	771,895,076	787,332,978	803,079,637	819,141,230	835,524,055	852,234,536	869,279,227	886,664,811	904,398,107
Price excalation	%	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Interest	%	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Data for O&M cost calculation

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Data for Administrative cost calculation

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual costs	%	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Data for power income calculation

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Power tariff	EUR/GJ	66.95	68.96	71.03	73.16	75.35	77.61	79.94	82.34	84.81	87.35	89.98	92.67	95.45	98.32	101.27	104.31	107.44	110.66	113.98	117.40	120.92	124.55	128.28
Price excalation	%	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Data for gate fee calculation

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Incinerated waste	GJ								2,736,000	2,736,000	5,472,000	5,472,000	5,472,000	8,208,000	8,208,000	8,208,000	8,208,000	8,208,000	8,208,000	8,208,000	8,208,000	8,208,000	8,208,000	8,208,000
Heating value	GJ/t	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Incinerated waste	t	-	-	-	-	-	-	-	288,000	288,000	576,000	576,000	576,000	864,000	864,000	864,000	864,000	864,000	864,000	864,000	864,000	864,000	864,000	864,000
Gate fee	EUR/t	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Price excalation	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data for fuel cost calculation

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Data for fuel cost calculation																								
Natural gas price	EUR/GJ	7.62	7.93	8.25	8.58	8.92	9.28	9.65	10.03	10.43	10.85	11.29	11.74	13.50	14.17	14.88	15.63	16.41	17.23	18.09	18.99	19.94	20.94	21.99
Price excalation	%	4	4	4	4	4	4	4	4	4	4	4	4	15	5	5	5	5	5	5	5	5	5	5
Overall efficiency	%	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Fuel for heating	GJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fuel for power	GJ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data for tax calculation

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Tax level	%																							

CALCULATION OF TRANSMISSION POOL PRICE

Energy procurement

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Existing CHP	GJ	11,313,000	10,747,350	10,209,983	9,699,483	9,214,509	7,294,820	5,544,063	3,950,145	3,127,198	2,970,838	2,257,837	1,608,709	1,018,849	967,906	919,511	873,536	829,859	788,366	748,948	-	-	-	-	-
Existing HOB	GJ	16,969,500	16,969,500	16,941,218	16,253,242	15,001,766	13,129,030	10,385,652	9,203,815	7,374,502	6,284,202	4,748,323	4,079,561	3,628,071	1,970,644	1,400,039	1,031,204	815,101	596,814	376,452	865,620	605,840	605,840	605,840	605,840
Solar systems	GJ	-	-	-	350,000	700,000	1,200,000	1,550,000	1,900,000	2,250,000	2,600,000	2,950,000	3,300,000	3,650,000	4,000,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000
Local HOB	GJ	-	-	-	-	820,800	2,872,800	4,924,800	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600	5,745,600
Decentralised CHP	GJ	-	-	-	-	-	957,600	2,394,000	3,351,600	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400	3,830,400
Waste-to-energy	GJ		-	-	-	-	-	-	-	1,094,400	1,094,400	2,188,800	2,188,800	2,188,800	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200	3,283,200
Total	GJ	28,282,500	27,716,850	27,151,200	26,302,725	25,737,075	25,454,250	24,798,515	24,151,160	23,422,100	22,525,440	21,720,960	20,753,070	20,061,720	19,797,750	19,378,750	18,963,940	18,704,160	18,444,380	18,184,600	17,924,820	17,665,040	17,665,040	17,665,040	17,665,040

Capacity procurement

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Existing CHP	MJ/s	600	600	600	600	600	500	400	300	250	250	200	150	100	100	100	100	100	100	100	-	-	-	-	-
Existing HOB	MJ/s	2,500	2,500	2,400	2,300	2,100	1,800	1,450	1,300	1,100	1,000	850	800	750	550	450	500	350	300	250	250	250	200	150	100
Solar systems	MJ/s	-	-	-	5	10	17	22	27	32	37	42	47	52	57	60	60	60	60	60	60	60	60	60	60
Local HOB	MJ/s	-	-	-	-	100	350	600	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Decentralised CHP	MJ/s	-	-	-	-	-	100	250	350	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Waste-to-energy	MJ/s	-	-	-	-	-	-	-	-	100	100	200	200	200	300	300	300	300	300	300	300	300	300	300	300
Total	MJ/s	3,100	3,100	3,000	2,905	2,810	2,767	2,722	2,677	2,582	2,487	2,392	2,297	2,202	2,107	2,010	2,060	1,910	1,860	1,810	1,710	1,710	1,660	1,610	1,560

Energy sale

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Transmission losses	GJ	4,190,000	4,106,200	4,022,400	3,896,700	3,812,900	3,771,000	3,356,190	2,949,760	2,522,380	2,111,760	1,866,645	1,634,100	1,432,980	1,257,000	1,085,210	917,610	905,040	892,470	879,900	867,330	854,760	854,760	854,760	854,760
Total sale	GJ	24,092,500	23,610,650	23,128,800	22,406,025	21,924,175	21,683,250	21,442,325	21,201,400	20,899,720	20,413,680	19,854,315	19,118,970	18,628,740	18,540,750	18,293,540	18,046,330	17,799,120	17,551,910	17,304,700	17,057,490	16,810,280	16,810,280	16,810,280	16,810,280

Capacity sale

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Transmission capacity	MJ/s	100	175	149	157	134	134	144	154	141	126	138	170	171	143	111	224	135	145	153	109	164	145	125	105
Total sale	MJ/s	3,000	2,925	2,851	2,748	2,676	2,633	2,578	2,523	2,441	2,361	2,254	2,127	2,031	1,964	1,899	1,836	1,775	1,715	1,657	1,601	1,546	1,515	1,485	1,455

Procurement tariffs, energy

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Existing CHP	EUR	85,785,674	85,546,289	85,308,495	85,072,770	97,187,791	80,674,547	64,290,931	48,034,531	44,780,821	44,574,269	35,497,097	26,503,385	19,459,467	21,899,146	22,024,054	22,147,760	22,270,377	22,392,016	22,512,789	-	-	-	-	-
	EUR/GJ	7.58	7.96	8.36	8.77	10.55	11.06	11.60	12.16	14.32	15.00	15.72	16.47	19.10	22.63	23.95	25.35	26.84	28.40	30.06	-	-	-	-	-
Existing HOB	EUR	160,047,059	166,403,566	172,540,087	172,105,270	181,201,540	164,807,441	135,611,530	124,992,420	113,515,234	100,728,378	79,366,820	71,073,548	71,141,001	44,691,200	33,480,133	26,351,341	21,716,453	16,812,005	11,311,151	26,240,063	19,518,263	20,308,964	21,137,020	22,004,335
	EUR/GJ	9.43	9.81	10.18	10.59	12.08	12.55	13.06	13.58	15.39	16.03	16.71	17.42	19.61	22.68	23.91	25.55	26.64	28.17	30.05	30.31	32.22	33.52	34.89	36.32
Solar systems	EUR	-	-	-	168,282	333,198	565,484	723,113	877,533	1,028,791	1,176,937	1,322,018	1,464,078	1,603,166	1,739,325	1,808,029	1,789,948	1,772,049	1,754,328	1,736,785	1,719,417	1,702,223	1,685,201	1,668,349	1,651,665
	EUR/GJ	-	-	-	0.48	0.48	0.47	0.47	0.46	0.46	0.45	0.45	0.44	0.44	0.43	0.43	0.43	0.42	0.42	0.41	0.41	0.41	0.40	0.40	0.39
Local HOB	EUR	-	-	-	-	9,510,549	34,613,611	61,702,673	74,855,754	84,817,900	88,199,842	91,716,739	95,373,978	82,849,739	95,131,686	99,863,291	104,830,726	110,045,762	115,520,754	121,268,676	127,303,152	133,638,482	140,289,685	147,272,525	154,603,558
	EUR/GJ	-	-	-	-	11.59	12.05	12.53	13.03	14.76	15.35	15.96	16.60	14.42	16.56	17.38	18.25	19.15	20.11	21.11	22.16	23.26	24.42	25.63	26.91
Decentralised CHP	EUR	-	-	-	-	-	(429,121)	(536,309)	54,637	10,352,946	11,780,075	13,294,679	14,901,169	5,165,741	7,741,227	10,477,003	13,420,028	16,582,781	19,978,423	23,620,842	27,524,688	31,705,410	36,179,302	40,963,548	46,076,265
	EUR/GJ	-	-	-	-	-	(0.45)	(0.22)	0.02	2.70	3.08	3.47	3.89	1.35	2.02	2.74	3.50	4.33	5.22	6.17	7.19	8.28	9.45	10.69	12.03
Waste-to-energy	EUR		-	-	-	-	-	-	-	(34,721,695)	(34,953,552)	(70,386,899)	(70,883,299)	(71,396,846)	(107,892,152)	(108,716,462)	(109,569,091)	(110,450,963)	(111,363,026)	(112,306,262)	(113,281,682)	(114,290,330)	(115,333,280)	(116,411,644)	(117,526,566)
	EUR/GJ		-	-	-	-	-	-	-	(31.73)	(31.94)	(32.16)	(32.38)	(32.62)	(32.86)	(33.11)	(33.37)	(33.64)	(33.92)	(34.21)	(34.50)	(34.81)	(35.13)	(35.46)	(35.80)

Procurement tariffs, capacity

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Existing CHP	EUR	49,755,000	51,247,650	52,785,080	54,368,632	55,999,691	48,066,401	39,606,715	30,596,187	26,261,727	27,049,579	22,288,853	17,218,139	11,823,122	12,177,816	12,543,150	12,919,445	13,307,028	13,706,239	14,117,426	-	-	-	-	-
	EUR/MJ/s	82,925	85,413	87,975	90,614	93,333	96,133	99,017	101,987	105,047	108,198	111,444	114,788	118,231	121,778	125,432	129,194	133,070	137,062	141,174	-	-	-	-	-
Existing HOB	EUR	31,096,875	32,029,781	31,671,048	31,261,963	29,399,838	25,955,857	21,536,151	19,887,522	17,332,740	16,229,747	14,209,144	13,774,511	13,301,012	10,046,698	8,466,626	9,689,584	6,986,190	6,167,808	5,294,035	5,452,856	5,616,442	4,627,948	3,575,090	2,454,895
	EUR/MJ/s	12,439	12,812	13,196	13,592	14,000	14,420	14,853	15,298	15,757	16,230	16,717	17,218	17,735	18,267	18,815	19,379	19,961	20,559	21,176	21,811	22,466	23,140	23,834	24,549
Solar systems	EUR	-	-	-	1,566,743	3,102,152	5,264,794	6,732,356	8,170,040	9,578,297	10,957,571	12,308,303	13,630,924	14,925,861	16,193,537	16,833,182	16,664,850	16,498,202	16,333,220	16,169,887	16,008,189	15,848,107	15,689,626	15,532,729	15,377,402
	EUR/MJ/s				313,349	310,215	307,113	304,042	301,001	297,991	295,012	292,061	289,141	286,249	283,387	280,553	277,748	274,970	272,220	269,498	266,803	264,135	261,494	258,879	256,290
Local HOB	EUR	-	-	-	-	2,353,861	8,485,669	14,983,267	18,004,892	18,545,039	19,101,390	19,674,432	20,264,665	20,872,605	21,498,783	22,143,746	22,808,059	23,492,301	24,197,070	24,922,982	25,670,671	26,440,791	27,234,015	28,051,035	28,892,566
	EUR/MJ/s	-	-	-	-	23,539	24,245	24,972	25,721	26,493	27,288	28,106	28,950	29,818	30,713	31,634	32,583	33,560	34,567	35,604	36,672	37,773	38,906	40,073	41,275
Decentralised CHP	EUR	-	-	-	-	-	14,136,188	36,400,684	52,489,787	61,787,977	63,641,617	65,550,865	67,517,391	69,542,913	71,629,200	73,778,076	75,991,419	78,271,161	80,619,296	83,037,875	85,529,011	88,094,882	90,737,728	93,459,860	96,263,656
	EUR/MJ/s	-	-	-	-	-	141,362	145,603	149,971	154,470	159,104	163,877	168,793	173,857	179,073	184,445	189,979	195,678	201,548	207,595	213,823	220,237	226,844	233,650	240,659
Waste-to-energy	EUR		-	-	-	-	-	-	-	37,149,356	37,892,343	77,300,380	78,846,388	80,423,315	123,047,672	125,508,626	128,018,798	130,579,174	133,190,758	135,854,573	138,571,664	141,343,098	144,169,960	147,053,359	149,994,426
	EUR/MJ/s		-	-	-	-	-	-	-	371,494	378,923	386,502	394,232	402,117	410,159	418,362	426,729	435,264	443,969	452,849	461,906	471,144	480,567	490,178	499,981

Transmission costs

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Fixed costs	EUR	111,747,300	111,747,300	111,747,300	111,747,300	114,540,983	117,404,507	120,339,620	123,348,110	126,431,813	129,592,608	132,832,424	136,153,234	139,557,065	143,045,992	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141	146,622,141
Variable costs	EUR	54,930,900	53,832,282	52,733,664	51,085,737	48,237,570	46,037,725	43,932,778	41,918,781	39,876,027	37,585,474	35,276,131	32,780,671	30,822,236	29,602,970	29,208,263	28,813,557	28,418,851	28,024,145	27,629,438	27,234,732	26,840,026	26,840,026	26,840,026	26,840,026

Capacity tariff

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity costs	EUR	192,599,175	195,024,731	196,203,427	198,944,638	205,396,524	219,313,416	239,598,792	252,496,537	297,086,949	304,464,856	344,164,400	347,405,252	350,445,894	397,639,698	405,895,549	412,714,296	415,756,197	420,836,531	426,018,919	417,854,533	423,965,460	429,081,417	434,294,215	439,605,087
Capacity sale	MJ/s	3,000	2,925	2,851	2,748	2,676	2,633	2,578	2,523	2,441	2,361	2,254	2,127	2,031	1,964	1,899	1,836	1,775	1,715	1,657	1,601	1,546	1,515	1,485	1,455
Capacity tariff	EUR/MJ/s	64,200	66,668	68,813	72,387	76,761	83,289	92,944	100,061	121,687	128,968	152,710	163,344	172,561	202,459	213,730	224,793	234,281	245,392	257,104	261,053	274,251	283,225	292,516	302,136

Energy tariff

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Energy costs	EUR	300,763,632	305,782,137	310,582,246	308,432,058	336,470,647	326,269,687	305,724,715	290,733,654	259,650,025	249,091,423	186,086,585	171,213,531	139,644,504	92,913,402	88,144,311	87,784,270	90,355,309	93,118,645	95,773,420	96,740,370	99,114,074	109,969,897	121,469,824	133,649,283
Energy sale	GJ	24,092,500	23,610,650	23,128,800	22,406,025	21,924,175	21,683,250	21,442,325	21,201,400	20,899,720	20,413,680	19,854,315	19,118,970	18,628,740	18,540,750	18,293,540	18,046,330	17,799,120	17,551,910	17,304,700	17,057,490	16,810,280	16,810,280	16,810,280	16,810,280
Capacity tariff	EUR/GJ	12.48	12.95	13.43	13.77	15.35	15.05	14.26	13.71	12.42	12.20	9.37	8.96	7.50	5.01	4.82	4.86	5.08	5.31	5.53	5.67	5.90	6.54	7.23	7.95

Average tariff

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity cost	EUR	192,599,175	195,024,731	196,203,427	198,944,638	205,396,524	219,313,416	239,598,792	252,496,537	297,086,949	304,464,856	344,164,400	347,405,252	350,445,894	397,639,698	405,895,549	412,714,296	415,756,197	420,836,531	426,018,919	417,854,533	423,965,460	429,081,417	434,294,215	439,605,087
Energy cost	EUR	300,763,632	305,782,137	310,582,246	308,432,058	336,470,647	326,269,687	305,724,715	290,733,654	259,650,025	249,091,423	186,086,585	171,213,531	139,644,504	92,913,402	88,144,311	87,784,270	90,355,309	93,118,645	95,773,420	96,740,370	99,114,074	109,969,897	121,469,824	133,649,283
Total cost	EUR	493,362,807	500,806,868	506,785,673	507,376,696	541,867,171	545,583,104	545,323,507	543,230,192	556,736,974	553,556,279	530,250,985	518,618,783	490,090,398	490,553,101	494,039,860	500,498,565	506,111,506	513,955,176	521,792,339	514,594,903	523,079,534	539,051,315	555,764,038	573,254,369
Energy sale	GJ	24,092,500	23,610,650	23,128,800	22,406,025	21,924,175	21,683,250	21,442,325	21,201,400	20,899,720	20,413,680	19,854,315	19,118,970	18,628,740	18,540,750	18,293,540	18,046,330	17,799,120	17,551,910	17,304,700	17,057,490	16,810,280	16,810,280	16,810,280	16,810,280
Average tariff	GJ	20.48	21.21	21.91	22.64	24.72	25.16	25.43	25.62	26.64	27.12	26.71	27.13	26.31	26.46	27.01	27.73	28.43	29.28	30.15	30.17	31.12	32.07	33.06	34.10

CALCULATION OF TARIFFS BASED ON COST STRUCTURE

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Connection fee	EUR	Consumer pay the cost of branch and meter installation. Consumer own and pay internal building installations.											
Administration fee	EUR	629,919	639,056	642,178	668,328	693,958	725,081	760,837	780,946	793,852	818,027	810,797	809,132
Number of connections	No	13,278	13,278	13,278	13,278	14,340	15,487	16,726	18,065	19,510	21,071	22,756	24,577
Administration tariff	EUR/conn.	47	48	48	50	48	47	45	43	41	39	36	33
Capacity cost	EUR	191,969,256	194,385,675	195,561,249	198,276,310	204,702,566	218,588,336	238,837,956	251,715,591	296,293,098	303,646,829	343,353,603	346,596,119
Installed capacity	MJ/s	9,000	8,776	8,554	8,245	8,027	7,900	7,734	7,570	7,324	7,082	6,761	6,380
Capacity tariff	EUR/MJ/s	21,330	22,150	22,862	24,048	25,500	27,671	30,883	33,251	40,454	42,874	50,784	54,321
Energy cost	EUR	403,586,232	407,506,119	411,207,610	407,409,495	433,797,210	422,623,629	401,231,615	385,515,910	353,711,115	342,216,586	278,290,897	262,345,589
Energy sale	GJ	20,950,000	20,531,000	20,112,000	19,483,500	19,064,500	18,855,000	18,645,500	18,436,000	18,017,000	17,598,000	16,969,500	16,341,000
Energy tariff	EUR/GJ	19.26	19.85	20.45	20.91	22.75	22.41	21.52	20.91	19.63	19.45	16.40	16.05
Average tariff	EUR/GJ	28.46	29.35	30.20	31.12	33.53	34.05	34.37	34.61	36.12	36.75	36.68	37.31

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Connection fee	EUR												
Administration fee	EUR	806,828	820,442	834,660	846,554	839,820	842,499	845,240	783,159	789,484	791,466	793,438	795,395
Number of connections	No	26,543	27,339	27,339	27,339	27,339	27,339	27,339	27,339	27,339	27,339	27,339	27,339
Administration tariff	EUR/conn.	30	30	31	31	31	31	31	29	29	29	29	29
Capacity cost	EUR	349,639,066	396,819,256	405,060,888	411,867,742	414,916,377	419,994,032	425,173,680	417,071,374	423,175,976	428,289,951	433,500,776	438,809,691
Installed capacity	MJ/s	6,093	5,892	5,697	5,508	5,324	5,145	4,971	4,802	4,638	4,545	4,454	4,365
Capacity tariff	EUR/MJ/s	57,388	67,347	71,097	74,777	77,936	81,633	85,531	86,855	91,247	94,234	97,327	100,530
Energy cost	EUR	219,945,429	183,821,797	180,190,635	179,435,887	181,612,220	183,980,850	186,240,919	186,813,163	188,792,161	199,647,983	211,147,910	223,327,369
Energy sale	GJ	15,922,000	15,712,500	15,503,000	15,293,500	15,084,000	14,874,500	14,665,000	14,455,500	14,246,000	14,246,000	14,246,000	14,246,000
Energy tariff	EUR/GJ	13.81	11.70	11.62	11.73	12.04	12.37	12.70	12.92	13.25	14.01	14.82	15.68
Average tariff	EUR/GJ	35.82	37.01	37.80	38.72	39.60	40.66	41.75	41.83	43.01	44.13	45.31	46.53

Bucharest Municipality

Primaria Muncipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 10a: Financial requirements

Anexa 10a: Cerinte financiare

4				
3				
2	25.09.2009	Corrections	GMCB	haa
1	29.06.2009	First edition	GMCB	haa
0	10.04.2009	Draft version	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

Table of content

Cuprins

1 INTRODUCTION

This appendix verifies the investments necessary for obtaining the established goals. Detailed calculations in this respect are found in relevant specific appendixes to the Strategy Report.

Costs for energy rehabilitation of buildings are not included.

All values in this appendix are in 2007 EUR.

1 INTRODUCERE

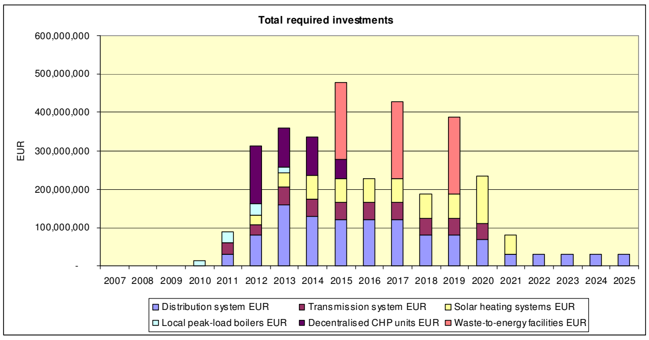
Aceasta anexa analizeaza investitiile necesare pentru obtinerea obiectivelor stabilite. Calculele detaliate aferente se regasesc in anexele relevante la Strategie.

Costurile pentru reabilitarea termica a cladirilor nu sunt incluse.

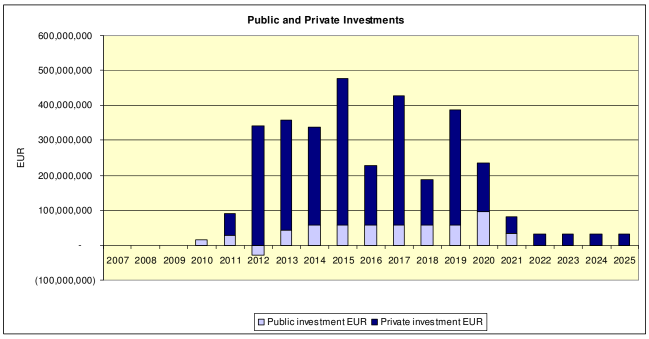
Toate valorile din anexa sunt la valoarea Euro din anul 2007.

2 OVERVIEW

The total required investments are calculated to 3,266,400,000 EUR:



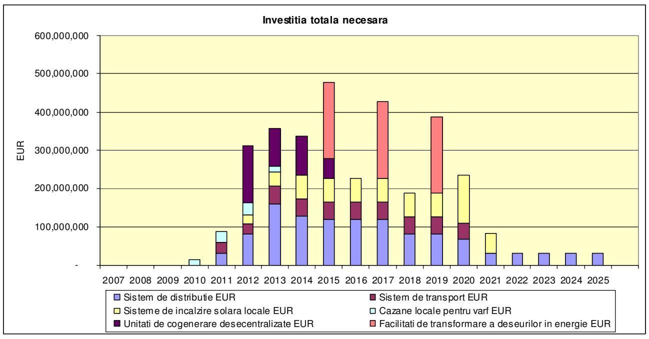
About 546,926,000 EUR is public investment, mainly as supply for installation of solar heating systems. About 2,719,474,000 EUR is private investments:



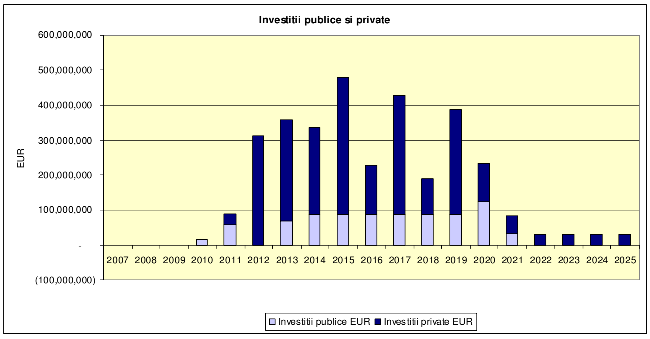
The negative public investment in 2012 indicates that the concessionaire is expected to reimburse the Municipality for investment in local peak-load boilers in the years prior to the concession commence.

2 CADRUL GENERAL

Investitia totala necesara calculata este de 3.266.400.000 EUR.



Aproximativ 546.926.000 EUR reprezinta investitie publica, in principal pentru furnizarea sistemelor de incalzire solara si aprox. 2.719.474.000 EUR este investitie privata:

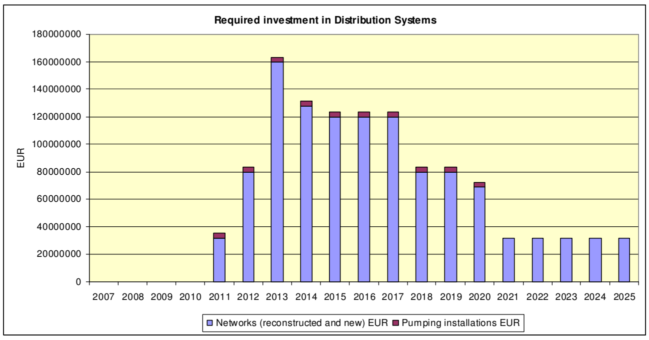


Valoarea negativa a investitiei publice in anul 2012 indica faptul ca se preconizeaza ca investiile in cazanelor locale pentru varf din anii anteriori concesionarii vor fi rambusate Municipalitatii de catre concesionar.

3 DISTRIBUTION SYSTEMS

3.1 Total investments required

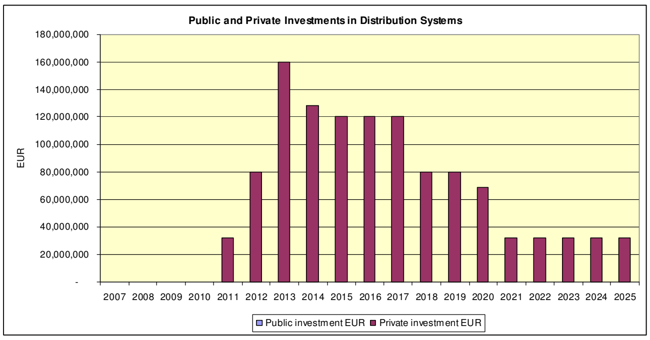
The total investment required for reconstruction of networks, extension of the networks to connect new consumes and construction of new pumping installations is calculated to 1,183,800,000 EUR:



Cost of branches, meter installations and separation valves etc is not included in the calculation as new and reconnected consumers will pay for these installations according to the costs (between about 2,500 EUR for a house and about 10,000 EUR for a large apartment block).

3.2 Sources of investment

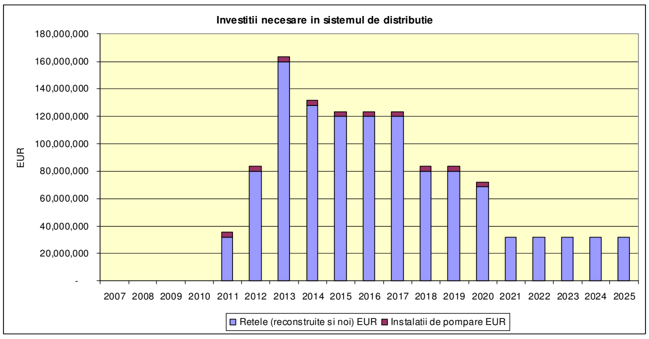
When privatised the Municipality of Bucharest will be released from the burden of financing the distribution systems. However, as the redesign and reconstruction cannot await the privatisation, which will be from 2012 at the earliest, the Municipality must finance 32,000,000 EUR for redesign, reconstruction and extension of the networks to supply new consumers – this investment is assumed reimbursed by the Concessionaire after taking-over of the system.



3 SISTEMELE DE DISTRIBUTIE

3.1 Investitiile totale necesare

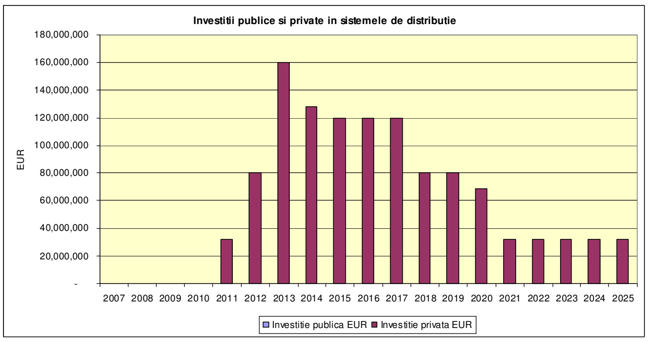
Investitia totala necesara pentru reconstruirea retelelor, extinderea retelelor in vederea bransarii noilor consumatori si construirea de noi instalatii de pompare a fost calculata la 1.183.800.000 EUR:



Costul ramurilor, instalatiilor de contorizare si vanelor de separare etc nu este inclus in calcule intrucat noii consumatori si cei care se vor rebransa vor plati pentru acestea pe baza costului real (intre cca 2.500 EUR pentru o casa si cca 10.000 EUR pentru un bloc mare de apartamente).

3.2 Sursele de investitie

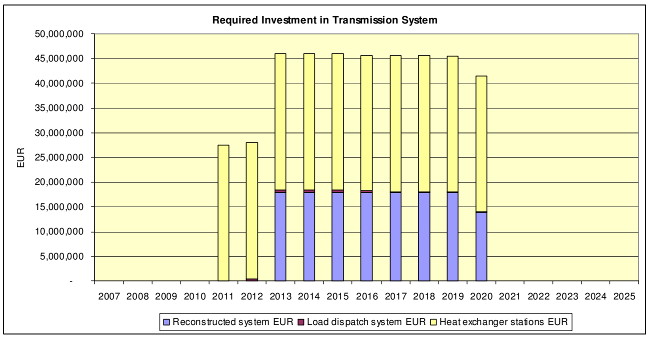
In urma privatizarii Municipiul Bucuresti va fi eliberat de povara finantarii sistemelor de distributie. Cu toate acestea, intrucat reproiectarea si reconstruirea nu pot astepta privatizarea, care se va face cel mai devreme incepand cu anul 2012, Primaria trebuie sa finanteze 32.000.000 EUR pentru reproiectare, reconstruire si extinderea retelelor pentru alimentarea noilor consumatori – aceasta investie se estimeaza ca va fi rambursata de Concesionar dupa preluarea sistemului.



4 TRANSMISSION SYSTEM

4.1 Total investments required

The total investments required for reconstruction of the transmission system and introduction of a SCADA System with technical-economical dispatch software is calculated to 417,500,000 EUR:

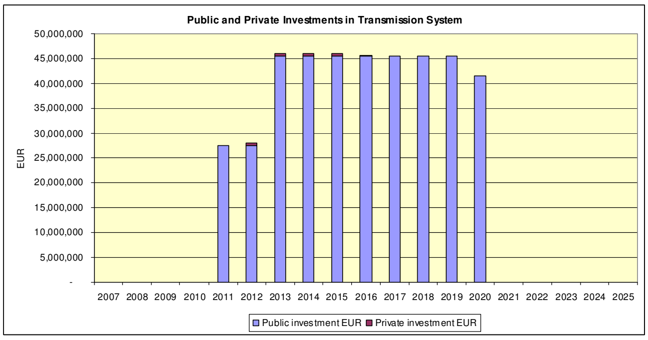


The calculated investments assume that existing installations can be a part of the reconstructed system and only be replaced when worn-out.

4.2 Sources of investment

The transmission system is assumed being the property of the Municipality of Bucharest while administration, operation, maintenance and performance of technical-economical load dispatch is outsourced.

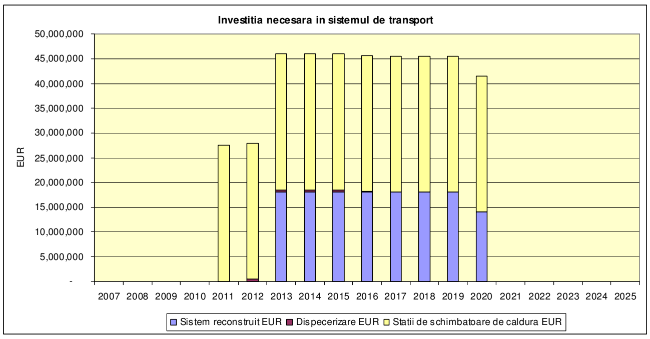
The Municipality must provide 415 MEUR and the Concessionaire 2.5 MEUR:



4 SISTEMUL DE TRANSPORT

4.1 Investitia totala necesara

Investitia totala necesara pentru reconstruirea sistemului de transport si introducerea unui sistem SCADA dotat cu software pentru dispecerizarea economica si tehnica este calculata la 417.500.000 EUR:

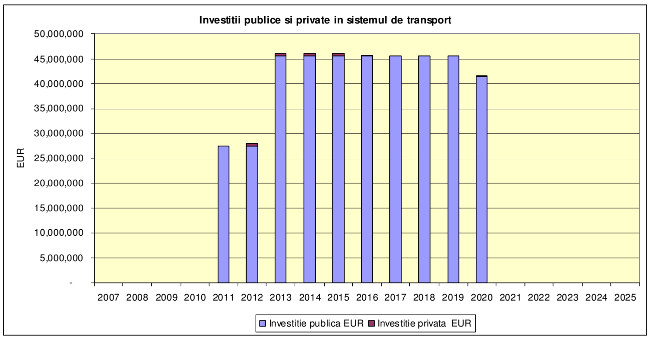


Investitiile calculate preconizeaza ca instalatiile existente pot fi incorporate in sistemul reconstruit si vor fi inlocuite doar cand se vor deprecia.

4.2 Surse de investitie

Se presupune ca sistemul de transport este in proprietarea Municipiului Bucuresti in timp ce administrarea, operarea, intretinerea si dispecerizarea tehnico-economica sunt externalizate.

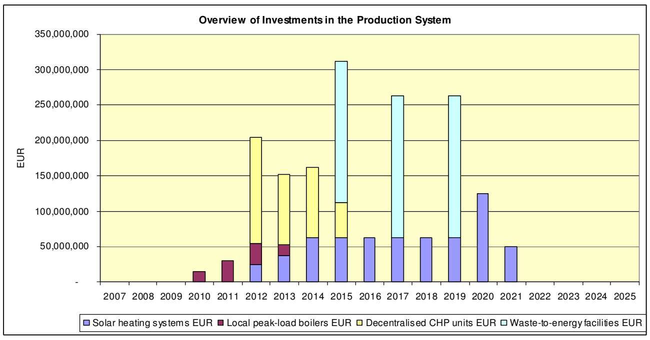
Primaria trebuie sa asigure 415 milioane EUR si Concesionarul 2.5 milioane EUR.



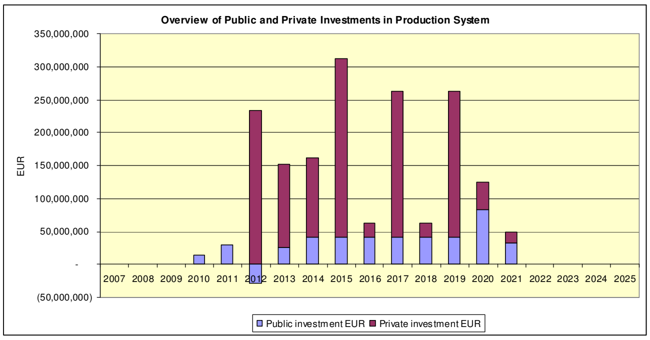
5 PRODUCTION SYSTEM

5.1 Overview

The total necessary investment in the production system is calculated to 1,701 MEUR assuming that a part of the existing heat-only-boilers can be used as local peak-load boilers in the reconstructed production system:



The production system is assumed privatised and the concessionaires must provide 1,294 MEUR while the public support to solar heating systems will be 407 MEUR:



Construction of local peak-load boilers cannot await privatisation, which can at the earliest be from 2012, as urgent reconstruction of the transmission system cannot be performed without the local boilers. However, the public investment is assumed reimbursed by the private investors when the concession period starts.

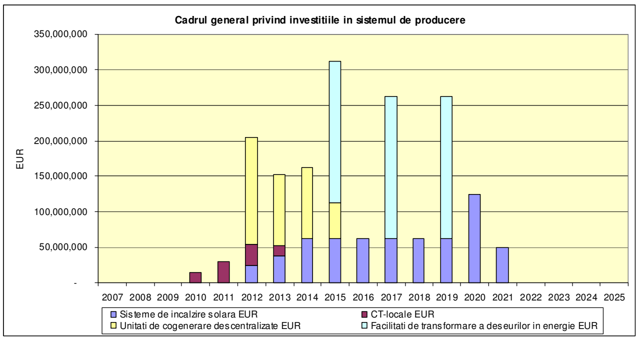
5.2 Solar Heating Systems

A total investment of 611 MEUR is calculated necessary for installing solar heating system. The support scheme currently in the approval phase is expected to provide 407 MEUR leaving 204 MEUR to

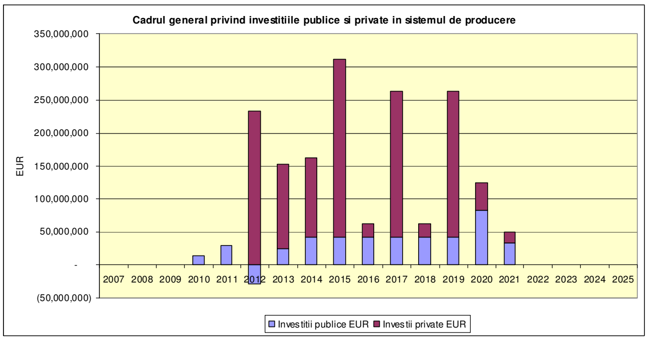
5 SISTEMUL DE PRODUCERE

5.1 Cadru general

Investitia totala necesara in sistemul de producere este calculata de 1.701 milioane EUR presupunand ca o parte din CT-urile existente pot fi folosite ca CT-uri locale in sistemul de producere reconstruit:



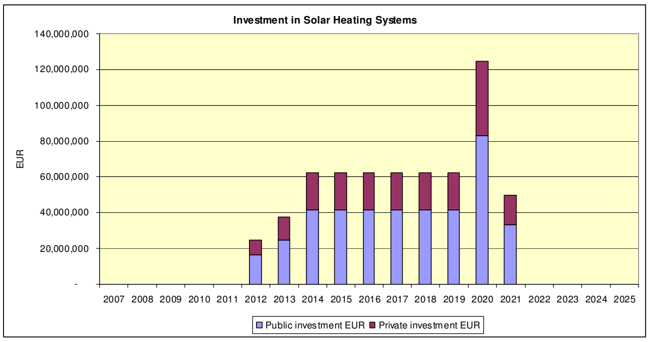
Se estimeaza ca sistemul de producere va fi privatizat si concesionarii trebuie sa asigure 1.294 milioane EUR in timp ce sprijinul public pentru sistemele solare va fi de 407 M EUR.



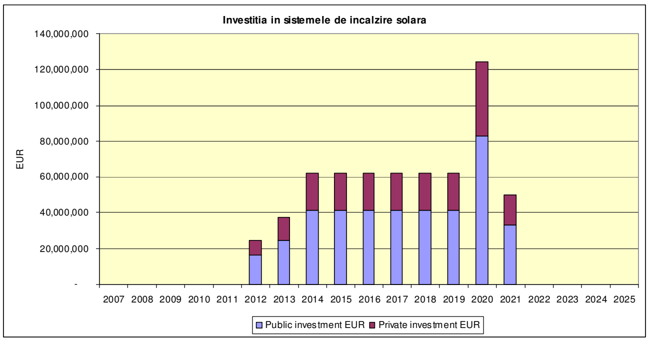
Construirea CT-locale nu poate astepta privatizarea, care poate fi realizata cel mai devreme in anul 2012 intrucat reconstruirea sistemului de transport nu poate fi realizata fara cazanele CT-locale. Totusi, se estimeaza ca investitia publica va fi rambursata de investitorii privati cand va incepe perioada de concesiune.

5.2 Sistemele de incalzire solara

Pentru instalarea sistemelor de incalzire solara este necesara o investitie totala de 611 MEUR. Schema de sprijin actuala, aflata in faza de aprobare, poate finanta 407 MEUR, diferenta de 204 MEUR urmand a be finance by the concessionaires.



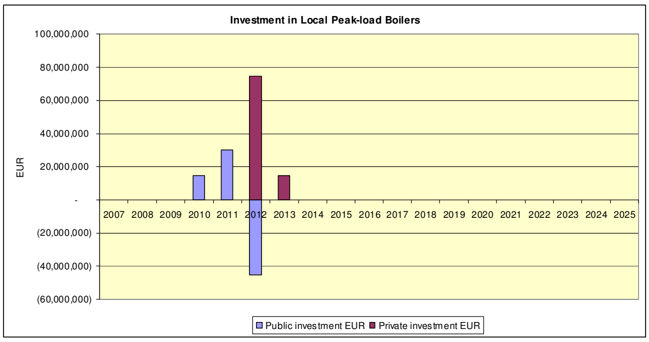
fi finantata de concesionari.



5.3 Local Peak-load Boilers

The total required investment is 90 MEUR provided by the concessionaires.

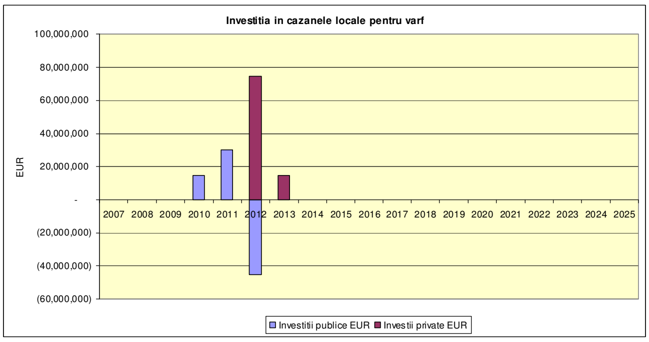
As discussed in section 5.1 the Municipality must invest until the concession periods starts in 2012 after when, the public investment is reimbursed.



5.3 Cazanele locale pentru varf

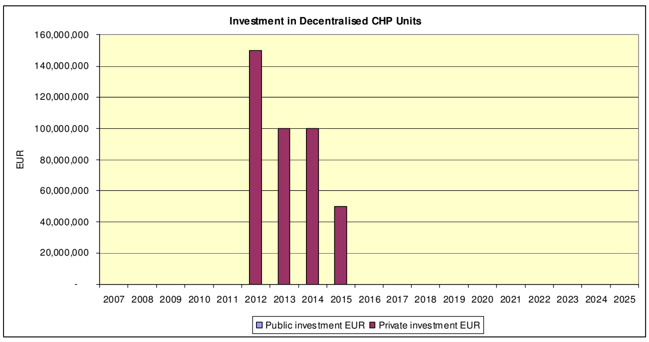
Investitia totala necesara este de 90 MEur va fi finantata de concesionari.

Conform descrierii din sectiunea 5.1 Primaria trebuie sa investeasca pana la inceperea perioada de consionare in 2012, dupa care investitia publica va fi rambursata.



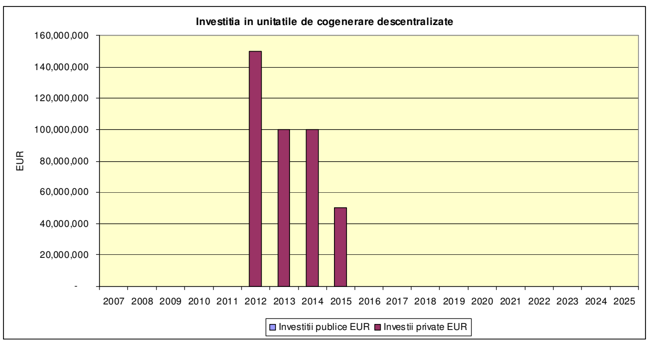
5.4 Decentralised CHP

An investment of 400 MEUR in decentralised CHP units is needed. There is no public financing involved.



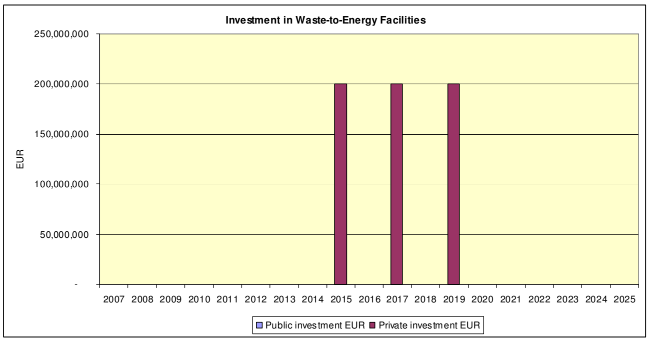
5.4 CET descentralizat

Investitia necesara in unitatile de cogenerare descentralizare este de 400 MEUR. Aceasta nu implica finantare publica.



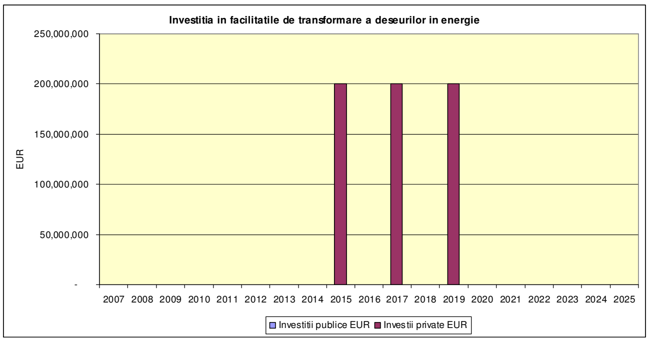
5.5 Waste-to-Energy Facilities

The investment required for construction of the waste-to-energy facilities is calculated to 600 MEUR. There is no public investment involved regarding energy production.



5.5 Facilitatile de incinerare a deseurilor

Investitia necesara pentru construirea facilitatilor de incinerare a deseurilor este calculata la 600 MEur si nu implica investitii publice privind producerea de energie.



CALCULE PRIVIND SISTEMUL DE DISTRIBUTIE

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Retea de distributie exsitenta																				
Lungime	m	834,000	834,000	834,000	834,000	794,000	754,000	714,000	674,000	634,000	594,000	554,000	514,000	474,000	434,000	394,000	354,000	314,000	274,000	234,000
Valoarea sistemului de incalzire	EUR/m	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	EUR	250,200,000	250,200,000	250,200,000	250,200,000	238,200,000	226,200,000	214,200,000	202,200,000	190,200,000	178,200,000	166,200,000	154,200,000	142,200,000	130,200,000	118,200,000	106,200,000	94,200,000	82,200,000	70,200,000
Valoarea sistemului de acm	EUR/m	200	200	200	200	200	200	200	200	200	200	200	200	200	200					
	EUR	166,800,000	166,800,000	166,800,000	166,800,000	158,800,000	150,800,000	142,800,000	134,800,000	126,800,000	118,800,000	110,800,000	102,800,000	94,800,000	86,800,000	-				

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Puncte termice existente																				
Numar	nr	682	682	682	682	620	558	496	434	372	310	248	186	124	62					
Valoare PT	EUR/nr	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
	EUR	272,800,000	272,800,000	272,800,000	272,800,000	248,000,000	223,200,000	198,400,000	173,600,000	148,800,000	124,000,000	99,200,000	74,400,000	49,600,000	24,800,000	-	-	-	-	-

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Reconstruirea sitemului de distributie																				
Lungime	m					40,000	140,000	340,000	500,000	650,000	800,000	950,000	1,050,000	1,150,000	1,236,000	1,276,000	1,316,000	1,356,000	1,396,000	1,436,000
Valoarea sistemului de incalzire	EUR/m	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
	EUR	-	-	-	-	32,000,000	112,000,000	272,000,000	400,000,000	520,000,000	640,000,000	760,000,000	840,000,000	920,000,000	988,800,000	1,020,800,000	1,052,800,000	1,084,800,000	1,116,800,000	1,148,800,000

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Noi statii de schimbatoare de caldura (statii de pompare)																				
Numar	nr					10	20	30	40	50	60	70	80	90	100	100	100	100	100	100
Valoare PT	EUR/nr	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
	EUR	-	-	-	-	3,500,000	7,000,000	10,500,000	14,000,000	17,500,000	21,000,000	24,500,000	28,000,000	31,500,000	35,000,000	35,000,000	35,000,000	35,000,000	35,000,000	35,000,000

Rezumat, valori

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Retea existenta	EUR	166,800,000	166,800,000	166,800,000	166,800,000	158,800,000	150,800,000	142,800,000	134,800,000	126,800,000	118,800,000	110,800,000	102,800,000	94,800,000	86,800,000	-	-	-	-	-
Puncte termice existente	EUR	272,800,000	272,800,000	272,800,000	272,800,000	248,000,000	223,200,000	198,400,000	173,600,000	148,800,000	124,000,000	99,200,000	74,400,000	49,600,000	24,800,000	-	-	-	-	-
Valoarea sistemului existent	EUR	439,600,000	439,600,000	439,600,000	439,600,000	406,800,000	374,000,000	341,200,000	308,400,000	275,600,000	242,800,000	210,000,000	177,200,000	144,400,000	111,600,000	-	-	-	-	-
Reconstruirea si extinderea retelelor	EUR	-	-	-	-	32,000,000	112,000,000	272,000,000	400,000,000	520,000,000	640,000,000	760,000,000	840,000,000	920,000,000	988,800,000	1,020,800,000	1,052,800,000	1,084,800,000	1,116,800,000	1,148,800,000
Statii de schimbatoare de caldura noi	EUR	-	-	-	-	3,500,000	7,000,000	10,500,000	14,000,000	17,500,000	21,000,000	24,500,000	28,000,000	31,500,000	35,000,000	35,000,000	35,000,000	35,000,000	35,000,000	35,000,000
Valoarea sistemului reconstruit	EUR	-	-	-	-	35,500,000	119,000,000	282,500,000	414,000,000	537,500,000	661,000,000	784,500,000	868,000,000	951,500,000	1,023,800,000	1,055,800,000	1,087,800,000	1,119,800,000	1,151,800,000	1,183,800,000
Valoare totala sistem de distributie	EUR	439,600,000	439,600,000	439,600,000	439,600,000	442,300,000	493,000,000	623,700,000	722,400,000	813,100,000	903,800,000	994,500,000	1,045,200,000	1,095,900,000	1,135,400,000	1,055,800,000	1,087,800,000	1,119,800,000	1,151,800,000	1,183,800,000
Cerinte financiare	EUR		-	-	-	32,000,000	80,000,000	160,000,000	128,000,000	120,000,000	120,000,000	120,000,000	80,000,000	80,000,000	68,800,000	32,000,000	32,000,000	32,000,000	32,000,000	32,000,000
Investii publice	EUR																			
Investitii private	EUR	-	-	-	-	32,000,000	80,000,000	160,000,000	128,000,000	120,000,000	120,000,000	120,000,000	80,000,000	80,000,000	68,800,000	32,000,000	32,000,000	32,000,000	32,000,000	32,000,000

CALCULE PRIVIND SISTEMUL DE TRANSPORT

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Sistem existent de transport																				
Lungime	m	510,000	510,000	510,000	510,000	462,000	414,000	366,000	318,000	270,000	222,000	174,000	126,000	78,000	30,000	30,000	30,000	30,000	30,000	30,000
Valoare sistem	EUR/m	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
	EUR	765,000,000	765,000,000	765,000,000	765,000,000	693,000,000	621,000,000	549,000,000	477,000,000	405,000,000	333,000,000	261,000,000	189,000,000	117,000,000	45,000,000	45,000,000	45,000,000	45,000,000	45,000,000	45,000,000

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Reconstruirea sistemului de transport																				
Lungime	m							9,000	18,000	27,000	36,000	45,000	54,000	63,000	70,000	70,000				
Valoare sistem	EUR/m	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	EUR	-	-	-	-	-	-	18,000,000	36,000,000	54,000,000	72,000,000	90,000,000	108,000,000	126,000,000	140,000,000	140,000,000	-	-	-	-

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Sistem de dispecerizare																				
Valoare sistem	EUR						500,000	1,000,000	1,500,000	2,000,000	2,200,000	2,300,000	2,400,000	2,450,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Noi statii de schimbatoare de caldura	(statii de pompare)																			
Numar	nr	-	-	-	-	10	20	30	40	50	60	70	80	90	100	100	100	100	100	100
Valoare sistem	EUR/nr	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000
	EUR	-	-	-	-	27,500,000	55,000,000	82,500,000	110,000,000	137,500,000	165,000,000	192,500,000	220,000,000	247,500,000	275,000,000	275,000,000	275,000,000	275,000,000	275,000,000	275,000,000

Rezumat, valori

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Sistem existent	EUR	765,000,000	765,000,000	765,000,000	765,000,000	693,000,000	621,000,000	549,000,000	477,000,000	405,000,000	333,000,000	261,000,000	189,000,000	117,000,000	45,000,000	45,000,000	45,000,000	45,000,000	45,000,000	45,000,000
Sistem reconstruit	EUR	-	-	-	-	-	-	18,000,000	36,000,000	54,000,000	72,000,000	90,000,000	108,000,000	126,000,000	140,000,000	140,000,000	-	-	-	-
Dispecer economico-financiar	EUR	-	-	-	-	-	500,000	1,000,000	1,500,000	2,000,000	2,200,000	2,300,000	2,400,000	2,450,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Statii de schimbatoare de caldura	EUR	-	-	-	-	27,500,000	55,000,000	82,500,000	110,000,000	137,500,000	165,000,000	192,500,000	220,000,000	247,500,000	275,000,000	275,000,000	275,000,000	275,000,000	275,000,000	275,000,000
Valoarea totala a sitemului de trasport	EUR	765,000,000	765,000,000	765,000,000	765,000,000	693,000,000	621,500,000	568,000,000	514,500,000	461,000,000	407,200,000	353,300,000	299,400,000	245,450,000	187,500,000	187,500,000	47,500,000	47,500,000	47,500,000	47,500,000
Cerinte financiare	EUR		-	-	-	27,500,000	28,000,000	46,000,000	46,000,000	46,000,000	45,700,000	45,600,000	45,600,000	45,550,000	41,550,000	-		-	-	-
Investitii publice	EUR		-	-	-	27,500,000	27,500,000	45,500,000	45,500,000	45,500,000	45,500,000	45,500,000	45,500,000	45,500,000	41,500,000	-		-	-	-
Investitii private	EUR	-	-	-	-	-	500,000	500,000	500,000	500,000	200,000	100,000	100,000	50,000	50,000	-		-	-	-

CALCULE REFERITOR LA SISTEMUL DE PRODUCERE

Generalitati

Cadrul general privind investitiile in sistemul de producere

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Sisteme de incalzire solara	EUR	-	-	-	12,469	124,694	24,801,612	37,408,163	62,346,939	62,346,939	62,346,939	62,346,939	62,346,939	62,346,939	124,693,878	49,877,551	-	-	-	-
CT-locale	EUR	-	-	-	15,000,000	30,000,000	30,000,000	15,000,000	-	-	-	-	-	-	-	-	-	-	-	-
Unitati de cogenerare descentralizate	EUR	-	-	-	-	-	150,000,000	100,000,000	100,000,000	50,000,000	-	-	-	-	-	-	-	-	-	-
Facilitati de incinerare	EUR	-	-	-	-	-	-	-	-	200,000,000	-	200,000,000	-	200,000,000	-	-	-	-	-	-

Sistemul de Producere

Investitii in sisteme de energie solara

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Investitii publice	EUR	-	-	-	8,305	83,046	16,517,874	24,913,837	41,523,061	41,523,061	41,523,061	41,523,061	41,523,061	41,523,061	83,046,122	33,218,449	-	-	-	-
Investitii private	EUR	-	-	-	4,165	41,648	8,283,738	12,494,327	20,823,878	20,823,878	20,823,878	20,823,878	20,823,878	20,823,878	41,647,755	16,659,102	-	-	-	-

Investitia in cazanele locale pentru varf

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Investitii publice	EUR	-	-	-	15,000,000	30,000,000	(45,000,000)	-	-	-	-	-	-	-	-	-	-	-	-	-
Investii private	EUR	-	-	-	-	-	75,000,000	15,000,000	-	-	-	-	-	-	-	-	-	-	-	-

Investitii in unitati de cogenerare descentralizate

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Investitii publice	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Investii private	EUR	-	-	-	-	-	150,000,000	100,000,000	100,000,000	50,000,000	-	-	-	-	-	-	-	-	-	-

Investitia in facilitatile de transformare a deseurilor in energie

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Investitii publice	EUR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Investii private	EUR	-	-	-	-	-	-	-	-	200,000,000	-	200,000,000	-	200,000,000	-	-	-	-	-	-

Bucharest Municipality | **Primaria Muncipiului Bucuresti**

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 10b: Investment sources

Anexa 10b: Surse de finantare

4				
3				
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ATH energ Grontmij | Carl Bro

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Cuprins

1 INTRODUCTION

This appendix verifies the investment sources necessary for obtaining the established goals.

Primary legislation in Romania, in close correlation with the European legislation requires the maintenance of efficient and sustainable district heating system, thus ensuring the achievement of Government policy regarding public utilities including district heating systems in accordance with the National Development Plan economic and social life of the country, through:

- Approving and updating the National Energy Strategy;
- Provision of government guarantees to obtain loans necessary internal and external development and technical infrastructure of local municipal or county;
- The state budgetary allocation for infrastructure of technical utilities development and of local interest, or intercommunity, considering observance of the principle of subsidiary and proportionality.

Also, the government supports local government authorities through administrative measures, legislative and economic-financial, in order to develop and improve quantitative and qualitative services of public utilities and insurance officials and exploitation in conditions of safety and economic efficiency of municipal infrastructure and technical related.

The membership of the European Union requires the implementation of directives on energy efficiency to end users and energy services, high-efficiency cogeneration, that the environmental standards and compliance with commitments assumed by Romania through the Accession Treaty. District heating systems and use of modern technologies of production, transport and distribution of thermal energy provides the following advantages:

- High energy efficiency;
- Possibility to use several types of fuel, use of energy waste resulting from industrial processes - hot water, steam and renewable resources
- Solar energy, geothermal water, biomass, bio-fuels, waste and other combustible waste, etc..;
- Simple operation to the consumer, not engage in activities to supply fuel, maintenance, supervision, etc. operation.;
- Safety for the consumer, compared to individual sources;
- Pollution reduced by location of sources of heat outside the habitable zone and a low

1 INTRODUCERE

Aceasta anexa analizeaza sursele de finantare necesare pentru indeplinirea obiectivelor stabilite. Legislatia primara din Romania, in stransa corelare cu legislatia europeana impune mentinerea eficienta si durabila a sistemelor de incalzire centralizata, astfel Guvernul asigura realizarea politicii generale a statului in domeniul serviciilor de utilitati publice inclusiv a sistemelor de incalzire centralizata in concordanta cu obiectivele Planului national de dezvoltare economico-sociala a tarii, prin:

- aprobarea si actualizarea Strategiei Energetice Nationale;
- acordarea garantiilor guvernamentale pentru obtinerea creditelor interne si externe necesare dezvoltarii infrastructurii tehnico-edilitare de interes local sau judetean;
- acordarea de transferuri de la bugetul de stat pentru dezvoltarea infrastructurii tehnico-edilitare de interes local, intercomunitar sau judetean, cu respectarea principiului subsidiaritatii si proportionalitatii.

De asemenea, Guvernul sprijina autoritatile administratiei publice locale prin masuri administrative, legislative si economico-financiare, in scopul dezvoltarii si imbunatatirii cantitative si calitative a serviciilor de utilitati publice si al asigurarii functionarii si exploatarii in conditii de siguranta si eficienta economica a infrastructurii tehnico-edilitare aferente acestora.

Calitatea de stat membru al Uniunii Europene impune aplicarea directivelor privind eficienta energetica la utilizatorii finali si serviciile energetice, cogenerarea de inalta eficienta, incadrarea in normele de mediu, precum si respectarea angajamentelor asumate de Romania prin tratatul de aderare. Incalzirea urbana prin sisteme centralizate si utilizarea tehnologiilor moderne de producere, transport si distributie a energiei termice ofera urmatoarele avantaje:

- eficienta energetica ridicata;
- posibilitatea utilizarii mai multor tipuri de combustibili, utilizarea energiei reziduale rezultate in urma unor procese industriale - apa fierbinte, abur si a resurselor regenerabile
- energie solara, apa geotermala, biomasa, biocombustibili, deseuri menajere, alte deseuri combustibile etc.;
- exploatare simpla din partea consumatorului, care nu se implica in activitati de

level of pollutant emissions;

- Facilitating the implementation of policy (local) investment in energy efficiency, improve environmental quality;

From the above, financing sources for these investments can be identified by the scheme of financial support government guaranteed bank loans or even borrow (Bucharest Municipality) and not less relevant the private investments.
As noted in Annex 10, the total investment for redesign and reconstruction of heating system Bucharest is about Euro 3,266,400,000, of which 546,926,000 Euro approximately 17%, public investment will be, the rest representing private investment.
In line with the recommendations included in the earlier main reports, in this Annex it will be focused on the options currently available for the Municipality to provide investment financing for redesign and reconstruction of the heating system.

aprovizionare cu combustibil, intretinere, supravegherea functionarii etc.;

- siguranta pentru consumator, comparativ cu sursele individuale;
- poluarea redusa, prin amplasarea surselor de energie termica in afara zonei locuibile si realizarea unui nivel redus de emisii poluante;
- facilitatea aplicarii unor politici (locale) de investitii, in domeniul eficientei energetice, al imbunatatirii calitatii mediului etc.;

Fata de cele de mai sus sursele de finantare pentru aceste investitii pot fi identificate prin scheme de suport financiar guvernamentale, credite bancare garantate de stat sau chiar de imprumutat (Primaria Municipiului Bucuresti) si nu in ultima instanta investitiile private.

Asa cum se mentioneaza in Anexa 10a, investitiile totale pentru reproiectarea si reconstructia sistemului de termoficare din Municipiul Bucuresti este de circa 3,266,400,000 Euro, din care 546,926,000 Euro aproximativ 17%, vor reprezenta investitii publice, restul reprezentand investitii private.

In corelare cu recomandarile incluse in Rapoartele principale anterioare, in aceasta anexa se va insista asupra optiunilor aflate in prezent la indemana Primariei de a asigura finantarea investitiilor pentru reproiectarea si reconstructia sistemului de incalzire centralizata.

2 MAIN FINANCING OPPORTUNITIES

2.1 Public investments

As a general feature, there shall be mentioned that for any scheme of financing, representing investment of public funds, about half of the promoted investment project should be ensured by Bucharest City Hall. The consultant has identified the following funding schemes, operating at the time of preparing this report:

2.1.1 Programme "District heating 2006-2015 heat and comfort"

Development of district heating systems (named SACET) is the strategic option of the Romanian Government, as indicated by the Government Decision no. 882/2004 approving the National Strategy on the supply of heat through the localities of production and centralized distribution and Government Decision no. 1.069/2007 to approve Romania's energy strategy for the period 2007-2020.

The component "Rehabilitation of district heating systems", part of funding program "District heating 2006-2015 - heat and comfort" is performed over a period of 8 years and the funds allocated from the state budget, consists on a total amount of 2120 million lei, divided on the annually basis for a period 8 years in equal parts, every year since 2008 have been allocated annually 265 million lei. Following recommendations made in the strategy, the criteria of eligibility for both the beneficiary and for projects to be funded, will be fulfilled.

By the government program, there is possible to be covered up to 40% of the investment projects to be implemented in the transmission system, provided that, the selection of projects shall have to consider that the order of execution of the modernization works in the district heating system, shall be from source to consumer.

2 PRINCIPALELE OPORTUNITATI DE FINANTARE

2.1 Investitii din fonduri publice

Ca o caracteristica generala, trebuie mentionat faptul ca pentru orice schema de finantare reprezentand investitii din fonduri publice, aproximativ jumatate din valoarea de investitii a proiectului formulat ar trebui asigurata de catre Primaria Municipiului Bucuresti. Consultantul a identificat urmatoarele scheme de finantare, operationale la momentul intocmirii prezentului raport:

2.1.1 Programul "Termoficare 2006-2015 caldura si confort"

Dezvoltarea sistemelor de alimentare centralizata cu energie termica (SACET) este optiunea strategica a Guvernului Romaniei, asa cum reiese din Hotararea Guvernului nr. **882/2004** pentru aprobarea Strategiei nationale privind alimentarea cu energie termica a localitatilor prin sisteme de producere si distributie centralizate si din Hotararea Guvernului nr. **1.069/2007** pentru aprobarea Strategiei energetice a Romaniei pentru perioada 2007-2020.

Componenta "Reabilitarea sistemului centralizat de alimentare cu energie termica", finantarea programului "Termoficare 2006-2015 caldura si confort" se realizeaza pe o perioada de 8 ani, iar fondurile alocate de la bugetul de stat, in suma totala de 2.120 milioane lei, se esaloneaza pe perioada realizarii programului in transe anuale, astfel pe o perioada 8 ani, in fiecare an incepand cu 2008 au fost alocati anual 265 milioane de lei.

Urmand recomandarile formulate in cadrul Strategiei, conditiile de eligibilitate atat pentru beneficiar cat si pentru proiectele ce urmeaza a fi finantate, vor putea fi indeplinite.

Prin programul guvernamental se va putea acoperi pana la 40% din valoarea proiectelor de investitii necesar a fi facute in sistemul de transport, cu mentiunea ca selectia proiectelor va trebui sa tina cont de faptul ca ordinea de executie a lucrarilor de modernizare in sistemul de termoficare, va fi dinspre consumator catre sursa.

2.1.2 European Investment Bank loans

The mission of EIB is to further the objectives of the European Union by making long-term finance available for sound investment.

To receive financial support, the projects and programmes must be viable in four fundamental areas: economic, technical, environmental and financial. The bank will appraise each investment project thoroughly and follow it through to completion. For the loan operations and the bank has mainly the ability to attract other financing, having a range of funding possibilities.

EIB offer the most convenient terms and conditions, due to the fact that the financial soundness derives from the strength and commitment of their shareholders and record of achievement. EIB policies are established in close coordination with the Member States and the other Institutions of the European Union, cooperating closely with the business and banking sectors and the main international organizations in the field.

Loans conditions mainly are described by followings:

Clients

EIB clients are public and private sector bodies and enterprises. The project promoted by the public or private client must be in line with the lending objectives of the EIB and be economically, financially, technically and environmentally sound.

Sectors

The EIB finances a broad range of projects in all sectors of the economy. Projects must adhere to at least one of the EIB lending objectives.

Financing Facilities

As a rule, the Bank lends up to 50% of the investment costs of a project.

The EIB has two main financing facilities:

Individual loans: provided to viable and sound projects and programmes costing more than EUR 25 million which are in line with EIB lending objectives.

Individual loans (direct loans) are granted to projects where the total investment cost exceeds EUR 25 million.

The EIB may finance a maximum of 50% of the total cost of any project.

Individual loans are available to promoters in both the public and private sectors, including banks.

Conditions:

The conditions of financing are adapted to the

2.1.2 Credite oferit de catre institutii financiar bancare (Banca Europeana de Investitii)

Misiunea BEI este de a indeplini in continuare obiectivele Uniunii Europene oferind pe termen lung posibilitati de finantare pentru investitii cu impact mare.

Pentru a primi sprijin financiar, programele si proiectelor trebuie sa fie viabile din punct de vedere al criteriilor din patru domenii fundamentale: economice, tehnice, de mediu si financiare. Banca va evalua fiecare proiect de investitii inca de la inceput, urmarindu-l pana la finalizare. Pentru operatiunile de imprumut banca are in principal si capacitatea de a atrage alte surse de finantare, avand o gama larga de posibilitati in acest sens.

BEI ofera cei mai convenabili termeni si conditii, datorita faptului ca detine o soliditate financiara sustinuta de puterea si angajamentul actionarilor sai si datorita utilizarii experientei obtinute. Politicile BEI sunt stabilite in stransa coordonare cu Statele Membre si cu celelalte institutii ale Uniunii Europene, cooperarii stranse cu mediul de afaceri si a sectoarele bancare si cu principalele organizatii internationale in domeniu.

Conditiile de creditare sunt urmatoarele:

Clienti

Clientii BEI sunt autoritati publice si organizatii din sectorul privat si intreprinderi. Proiectul promovat de catre un client din sectorul public sau privat, trebuie sa fie in concordanta cu cerintele BEI din punct de vedere economic, financiar, tehnic si ecologic.

Sectoare

BEI finanteaza o gama larga de proiecte din toate sectoarele economiei. Proiectele trebuie sa respecte cel putin un obiectiv al imprumuturilor BEI.

Servicii de finantare

De regula, Banca ofera pana la 50% din costurile de investitii ale unui proiect.

BEI considera doua facilitati de finantare:

Imprumuturi individuale: cu conditia de a promova proiecte si programe viabile si cu impact mare in conditiile in care costa mai mult de 25 milioane EUR si sunt in conformitate cu obiectivele de imprumut ale BEI.

BEI poate finanta maxim 50% din costul total al oricarui proiect.

Imprumuturi individuale sunt disponibile pentru promotorii din sectorul public si cel privat, inclusiv de banci.

Conditii:

Conditiile de finantare sunt adaptate in functie de tipul investment type. Adequate security is needed, such as that provided by a bank or banking syndicate, a financial institution, or a large diversified parent company with a good credit rating.

Interest Rates:

The Bank can offer:

fixed rates

revisable fixed rates

convertible rates (allowing for the change of interest rate formula during the life of the loan at predetermined dates or periods.)

Fees:

The EIB does not normally charge commitment fees or non-utilisation fees. Fees for a project's appraisal and required legal services may be applicable in certain cases.

Currencies:

The EIB Group's financial accounts are in Euro (EUR).

Repayment:

Repayment is normally on a semi-annual or annual basis. Grace periods for capital repayment may be granted for the construction phase of the project.

Intermediated loans: credit lines to banks and financial institutions to help them to provide finance to small and medium-sized enterprises with eligible investment programmes or projects costing less than EUR 25 million. Microfinance has also been provided by the EIB in some countries.

EIB intermediated loans are lines of credit or indirect loans designed to permit the financing of projects with a total investment cost of less than EUR 25 million.

An EIB credit line may finance a maximum of 50% of the total cost of any project.

Credit lines are granted to intermediary banks and financing institutions in the country in which the project is based. These institutions pass on the EIB funds to the promoters, generally SMEs and local authorities.

To qualify as an SME, a company must have fewer than 250 employees, an annual turnover not exceeding EUR 50 million, and an annual balance sheet total of up to EUR 43 million.

Conditions:

The conditions of financing (interest rate, grace period, loan period etc) are determined by the respective EIB partner bank. Maturities typically range between 5 and 12 years.

Lending decisions under these schemes remain with the financial intermediaries.

de investitii. Sunt necesare masuri de securizare a imprumutului si sunt similare cu cele prevazute de catre o banca sau sindicalizare bancara, o institutie financiara, sau o mare societatea-mama diversificata cu rating bun.

Rata dobanzii:

Banca poate oferi:
rate fixe
rate fixe revizuibile
rate convertibile (pentru a permite schimbarea ratei dobanzii in timpul de viata a imprumutului pe baza unei formule cu date predeterminate sau perioade.)
Taxe:
BEI nu aplica in mod normal taxe de angajare sau de neutilizare a creditului. Pot fi aplicabile in anumite cazuri taxe pentru evaluarea unui proiect si pentru anumite servicii juridice necesare.

Moneda:
Grupul financiar BEI detine conturile in Euro(EUR).
Rambursarea:
Rambursarea este in mod normal semi-anuala sau anuala. Pot fi acordate perioade de gratie la rambursarea ratei de capital pentru faza de construirea a proiectului.
Imprumuturi intermediare: linii de credit pentru banci si institutii financiare pentru a le ajuta sa ofere finantare intreprinderilor mici si mijlocii, in cadrul unor programe de investitii eligibile sau proiecte evaluate la mai putin de 25 milioane EUR. BEI a furnizat chiar si microfinantare in unele tari.
Imprumuturile intermediare acordate de catre BEI sunt linii de credit sau imprumuturi indirecte destinate sa permita finantarea de proiecte sau investitii cu un cost total mai mic de 25 milioane EUR.
O linie de credit BEI poate finanta maxim 50% din costul total al proiectului orice.
Liniile de credit sunt acordate bancilor intermediare si de finantare a institutiilor din tara in care proiectul se implementeaza. Fondurile BEI trec prin aceste institutii pentru a ajunge la promotori, in general, IMM-urilor si autoritati locale.
Pentru a se incadra in categoria IMM-uri, o companie trebuie sa aiba mai putin de 250 de angajati, o cifra de afaceri anuala care nu depaseste 50 milioane de Euro, si un bilant anual total de pana la 43 milioane Euro.
Conditii:
Conditiile de finantare (rata dobanzii, perioada de gratie, perioada de imprumut, etc) sunt determinate de respectivii parteneri bancari ai BEI. Perioada de returnare este de obicei intre 5 si 12 de ani.
Deciziile de creditare in cadrul acestor sisteme raman la nivelul intermediarilor financiari.
Cerintele pentru aplicarea la o asemenea varianta de creditare poate varia in functie de intermediarii

Requirements for application may vary according to the respective intermediary.

financiari respectivi.

2.1.3 European Bank for Reconstruction and Development loans

The EBRD is the largest single investor in central and eastern Europe and the CIS.

Direct investments generally range from €5 million to €230 million. Smaller projects are financed both directly by the EBRD and through financial intermediaries. EBRD is supporting local commercial banks, micro-business banks, equity funds and leasing facilities.

EBRD investments in private sector projects range from **€5 million - €250 million**; the average amount is €25 million. The Bank takes a flexible approach and tailors solutions to the needs of private investors. The Bank finances privatizations and restructures. It also supports municipal services and the infrastructure that underpins the private sector.

EBRD funding criteria for projects from €5 million - €250 million

- The project must be located in an EBRD country of operation (Romania is included) .
- It must have good prospects of being profitable.
- Significant equity contributions in cash or in kind are required from the project sponsor.
- The project must benefit the local economy.
- It must satisfy EBRD's evironmental standards as well as those of the host country.

Smaller projects are almost always financed through financial intermediaries. In exceptional circumstances, the EBRD can consider financing smaller projects.

Project structure

The Bank tailors solutions to client and project needs and to the specific situation of the country, region and sector. It assigns a dedicated team of specialists with expertise in project finance, the region and sector, law and environment.

- The EBRD funds up to 35% of the total project cost for a greenfield project or 35% of the long-term capitalisation of an established

2.1.3 Credite oferit de catre institutii financiar bancare (Banca Europeana de Reconstructie si Dezvoltare)

BERD este cel mai mare investitor unitar, in Europa Centrala si de Est si in tarile CSI.

Investitiile directe variaza in general, de la 5 milioane Euro la 230 de milioane de Euro. Proiecte mai mici sunt finantate atat direct, de catre BERD cat si prin intermediari financiari. BERD sprijina banci comerciale locale, banci pentru micro-afaceri, fonduri de capital, facilitati de leasing.

BERD a investit in sectorul privat pentru proiecte ce variaza de la 5 milioane Euro - 250 milioane Euro, suma medie este de 25 milioane de Euro. Banca are o abordare flexibila si adapteaza solutii la nevoile investitorilor privati. Banca finanteaza privatizari si restructurari. De asemenea, sprijina si serviciile municipale de infrastructura care stau la baza sectorului privat.

Criterii de finantare BERD pentru proiectele de la 5 milioane - 250 milioane Euro

- Proiectul trebuie sa fie situat intr-o tara in care opereaza BERD (Romania este inclusa).
- Trebuie sa aiba perspective bune in ceea ce priveste profitabilitatea.
- Sunt solicitate contributii semnificative de capital, in numerar sau de natura celor solicitate de sponsorul proiectului.
- De proiectul respectiv trebuie sa beneficieze economia locala.
- Trebuie sa indeplineasca standardele de mediu ale BERD, precum si de cei din tara gazda.

Proiectele mai mici sunt aproape intotdeauna finantate prin intermediari financiari. In situatii exceptionale, BERD poate lua in considera finantarea unor proiecte mai mici.

Structura Proiectului

Banca adapteaza solutii pentru nevoile clientului si proiectului si a situatiei specifice de tara, regiune si sector. Proiectului i se atribuie o echipa de specialisti cu expertiza in finantarea de proiecte, in regiune si sector, juristi si in protectia mediului.

- BERD finanteaza pana la 35% din costul total al proiectului pentru un proiect greenfield sau company.

- Additional funding by sponsors and other co-financiers is required. The EBRD may identify additional resources through its syndications programme.
- Typical private sector projects are based on at least one-third equity investment.
- Significant equity contributions are required from the sponsors. Sponsors should have a majority shareholding or adequate operational control.

Excluded sectors the EBRD does not finance

- Defence-related activities
- Tobacco industry
- Substances banned by international law
- Stand-alone gambling facilities.

In addition, the Bank may not finance certain products or processes due to their environmentally harmful nature or if adverse impact cannot be adequately mitigated.

The EBRD's loans are structured with a high degree of **flexibility** to provide loan profiles that match client and project needs. This approach determines each loan currency and interest rate formula.

The basis for a loan is the expected **cash flow** of the project and the ability of the client to repay the loan over the agreed period. The **credit risk** can be taken entirely by the Bank or may be partly syndicated to the market. A loan may be secured by a borrower's assets and/or it may be converted into shares or be equity-linked. Full details are negotiated with the client on a case-by-case basis.

Loan features

- Minimum €5 - 15 million, although this can be smaller in some cases.
- Fixed or floating rate.
- Senior, subordinated, mezzanine or convertible debt.
- Denominated in major foreign or local currencies.
- Short to long-term maturities, from 5 to 15 years.

35% din capitalizarea pe termen lung a unei companii infiintate.

- Este necesara finantarea suplimentara prin sponsori si alti co-finantatori. BERD poate identifica resurse suplimentare prin programele sale de sindicalizare.
- Proiecte tipice din sectorul privat se bazeaza pe cel putin o treime de investitii de capital.
- Contributii semnificative de capital sunt necesare din partea sponsorilor. Sponsorii ar trebui sa aiba un actionariat majoritar sau un control operational corespunzatoare.

Sectoare excluse de la finantarea BERD

- activitati legate de Aparare
- Industria tutunului
- substante interzise de dreptul international
- facilitati de jocuri de noroc.

In plus, Banca nu poate finanta anumite produse sau procese, datorita naturii lor daunatoare mediului sau daca impactul negativ nu poate fi atenuat in mod adecvat.

Creditele BERD sunt structurate cu un grad ridicat de flexibilitate pentru a oferi profilul care se potriveste imprumutului si care corespunde cu nevoile clientului si ale proiectului. Aceasta abordare determina o formula pentru fiecare imprumut referitor la moneda si la rata dobanzii.

Baza pentru un imprumut este fluxul de numerar asteptat al proiectului si capacitatea clientului de a rambursa imprumutul in termenul agreat. Riscul de credit poate fi luat in intregime de catre Banca sau poate fi partial sindicalizat pe piata. Un imprumut poate fi asigurat de catre activele imprumutatului si/ sau ar putea fi convertite in actiuni sau sa fie legate de capital. Detalii complete sunt negociate cu clientul de la caz la caz.

Caracteristicile creditului

- Minimum intre 5 si 15 milioane Euro, desi poate fi mai mic, in unele cazuri.
- Rate ale dobanzilor fixe sau variabile.
- Datorii senior, subordonate, intermediare sau convertibile.
- Exprimat in monede straine sau locale.
- Scadente pe termen lung, scurt de la 5 la 15 ani.
- Pot fi incorporate perioade de gratie specifice fiecarui proiect.

- Project-specific grace periods may be incorporated.

Interest rates

EBRD loans are based on current market rates and are priced competitively. Financial terms can be discussed in detail with banking staff once a project has been presented to the Bank. The EBRD does not subsidize projects, nor does it offer soft loans.

The Bank offers both fixed and floating interest rates:

- Fixed rate basis, linked to a floating rate such as LIBOR.
- Floating rate basis with a cap or a collar.

As the type rate directly affects profitability, project's financial structure should preferably include both floating and fixed rate loans. The mix is evaluated with respect to client and project sensitivities to interest rate movements.

Fees and charges

A margin is added on to the base rate. The margin is a combination of country risk and project-specific risk. This information is confidential to the client and the Bank.

In addition to the margin, the Bank may charge some of the following fees and commissions:

- Front-end commission, paid up-front.
- Commitment fee, payable on the committed but undisbursed loan amount.
- Loan conversion fee, paid at the time of interest rate or currency conversion on the amount which is to be converted.
- Prepayment, cancellation and late payment fees are also charged if necessary.

In line with commercial practice, sponsors will be obliged to reimburse the Bank for out-of-pocket expenses, such as fees for technical consultants, outside legal counsel and travel expenses.

Other lending terms

Full lending terms are negotiated with the client for each project.

Recourse
Recourse to a sponsor is not required. However, the EBRD may seek specific performance and completion

Ratele dobanzilor

Imprumuturile BERD se bazeaza pe ratele curente de piata si sunt la preturi competitive. Conditiile financiare pot fi discutate in detaliu cu personalul bancar, de indata ce proiectui a fost prezentat bancii. BERD nu subventioneaza proiecte, nici nu ofera imprumuturi speciale.

Banca ofera rate ale dobanzilor atat fixe cat si variabile:

- rata de baza fix, legate de o rata variabila, cum ar fi rata LIBOR.
- rata de baza variabila cu prag maxim si minim.

Avand in vedere ca tipul ratei afecteaza in mod direct profitabilitatea, un structura financiara a proiectului ar trebui sa includa atat rate ale dobanzii fixe cat si variabile. Un mix este evaluat cu privire la client si senzitivitatile acestui proiect pentru a selecta acea varianta optima.

Taxelor si comisioane

La rata de baza se adauga o marja. Marja este o combinatie a riscului de tara si a riscului specific de proiect. Aceste informatii sunt confidentiale intre client si banca.

In plus fata de marja, Banca poate aplica unele din urmatoarele taxe si comisioane:

- comision front-end, platit in avans.
- comision de angajament, se plateste la suma netrasa din imprumut.
- taxa de conversie a imprumutului, se plateste la momentul conversiei cu rata dobanzii de atunci si in functie de suma care este supusa conversiei.
- Comision de plata anticipata, de anulare si de plata cu intarziere; taxele percepute sunt aplicate, daca este necesar.

In conformitate cu practica comerciala, sponsorii, vor fi obligati sa ramburseze Bancii cheltuielile altele decat banii de diurna, pentru consultanti tehnici, cu exceptia asistentei juridice si a cheltuielile de deplasare.

Alti termeni de creditare

guarantees plus other forms of support from sponsors of the kind that are normal practice in limited-recourse financing.

Insurance
The Bank requires project companies to obtain insurance against normally insurable risks. Examples include theft of assets, outbreak of fire, specific construction risks. The EBRD does not require insurance against political risk or non-convertibility of the local currency.

Security
The EBRD usually requires the companies it finances to secure the loan with project assets. These can include:

- Mortgage on fixed assets, such as land, plant and other buildings.
- Mortgage on movable assets, such as equipment, other business assets.
- Assignment of the company's insurance policy and other contractual benefits.

Covenants
Typical project finance covenants are required as part of the loan package. Such covenants, limiting indebtedness and specifying certain financial ratios and various other issues, will be negotiated.

Loan repayment

Repayment is normally in equal, semi-annual installments. Longer maturities may be considered on an exceptional basis, for example, up to 15 years for large infrastructure operations.

Hedging possibilities

The Bank can help manage financial risks associated with a project's assets and liabilities. This covers foreign exchange risk, interest rate risk and commodity price risk. Risk hedging instruments include currency swaps, interest rate swaps and options and commodity swaps (a derivative in which two parties agree to exchange one stream of cash flows against another).

Termenii finali de creditare sunt negociati cu clientul pentru fiecare proiect.

Apelul
Recurgerea la un sponsor nu este necesara. Cu toate acestea, BERD poate solicita garantiile specifice de performanta si finalizare plus alte forme de sprijin de la sponsori, de genul celor care se practica in mod normal in apelurile limitate de finantare.

Asigurari
Banca cere companiilor pe care le finanteaza asigurari normale impotriva riscurilor. Exemplele include:

- Ipotecari de active fixe, terenuri, fabrici sau alte cladiri,
- Ipotecari de active circulante echipamente sau alte active ale afacerii.
- Cesionarea politelor de asigurare si a altor beneficii contractuale.

Conventii
Conventii tipice pentru finantarea unui proiect sunt necesare, ca parte a pachetului de imprumut. Astfel, vor fi negociate acorduri, limitand gratul de indatorare si specificand anumite raporturi financiare si diverse alte probleme,.

Rambursarea imprumutului

Rambursarea este, in mod normal, in rate egale, semi-anuale. Pot fi considerate scadente mai lungi, in mod exceptional, de exemplu, pana la 15 ani pentru proiecte mari de infrastructura.

Posibilitatile de acoperire

Banca poate ajuta la gestionarea riscurilor financiare asociate cu un proiect al activelor si pasivelor. Acest lucru se refera la riscul valutar, riscul ratei dobanzii si a preturilor de risc. Includ instrumente de acoperire a riscurilor de swap valutar, rata dobanzii de swap si optiuni de swap(o varianta prin care partile accepta sa compenseze datoriile).

3 PRIVATE INVESTMENTS

As mentioned in Appendix 10, following the privatization of services operating, Bucharest City Hall will be released from the financial burden generated by the distribution and production of heat systems. Mainly private investment may come from the investor's own sources, but most are credits granted by commercial banks. There shall be no restriction in terms of perspective on the provision of loans opportunities.

As described above, private companies are also eligible to obtain funding from the European financial institutions and banks, in terms of the investment projects refer to the redesign and reconstruction of infrastructure for public utilities. There shall be imposed by the tender dossiers for the awarding of concession containing all necessary requirements to be fulfilled by the concessionaire during the concession period rely on funding investments.

In addition, during the interval starting with the date of preparation of this report until 2013, there is available an other funding opportunity, offered by structural funds.

Further, there will be made a brief presentation of the financial support granted for investment projects in exploiting renewable energy resources for producing green energy under Axis 4 of the Sectoral Operational Program on increasing economic competitiveness - Major Domain of Intervention I 2 (DMI2) – Valuing the resources
renewable energy to produce green energy. Operation - Support to investment for modernisation and erection of new capacity to combine production of electricity and heat by valorisation of renewable energy: biomass, hydropower resources (in the low power capacity <10 MW), solar, wind, bio-fuels, and geothermal resources other renewable energy sources.

3.1 Structural funds

Projects financed under this operation can be of type: project development of new capabilities for the production of electricity and heat, both for their own consumption and for energy supply in the transmission and distribution, by exploiting renewable energy resources (biomass, resources micro hydropower, wind, biofuels-produced or purchased on the market, geothermal resources and other renewable resources)

3 INVESTITII DIN FONDURI PRIVATE

Asa cum s-a mentionat si in Anexa 10a, in urma privatizarii serviciilor de operare, Primaria Municipiului Bucuresti va fi eliberata de povara finantarii sistemelor de distributie si a sistemului de producere a energiei termice.

In principal investitiile private pot proveni din sursele proprii ale investitorului, dar de cele mai multe ori sunt credite acordate de banci comerciale. Nu se prevede nici o restrictie in ceea ce priveste perspectiva acordarii creditelor.

Asa cum este descris mai sus, companiile private sunt de asemenea eligibile pentru a obtine finantare din partea institutiilor financiar bancare europene, in conditiile in care proiecte de investitii se refera la reproiectarea si reconstructia infrastructurii pentru utilitatile publice.

Prin caietele de sarcini pentru incheierea concesiunilor se vor putea impune cerinte pe care trebuie sa le indeplineasca concesionarul pe perioada concesiunii privind asigurarea finantarii.

In plus, la data intocmirii prezentului raport pana in anul 2013, este disponibila o alta oportunitate de finantare, oferita de fondurile structurale.

In cele ce urmeaza se va face o scurta prezentare a sprijinului financiar acordat pentru proiectele de investitii in valorificarea resurselor regenerabile de energie pentru producerea energiei verzi in cadrul Axei 4 a Programului Operational Sectorial Cresterea Competitivitatii Economice – Domeniul Major de Interventie I 2 (DMI2) – Valorificarea resurselor regenerabile de energie pentru producerea de energie verde. Operatiunea - Sprijinirea investitiilor in modernizarea si realizarea de noi capacitati de producere a energiei electrice si termice prin valorificarea resurselor regenerabile de energie: biomasa, resurse hidroenergetice (in capacitati de mica putere < 10 MW), solare, eoliene, biocombustibili, resurse geotermale si alte surse regenerabile de energie.

3.1 Fonduri structurale

Proiectele finantate in cadrul acestei operatiuni pot fi de tipul: proiecte de realizare de noi capacitati de producere a energiei electrice si termice, atat pentru consumul propriu cat si pentru furnizarea de energie in reteaua de transport si distributie, prin valorificarea resurselor regenerabile de energie (biomasei, a resurselor micro hidroenergetice, eoliene, a biocombustibilului - fie produs, fie achizitionat de pe and projects to modernize the production capacities. There will be financed the projects including cogeneration by exploiting renewable energy. Eligible applicants in the following categories:

- The local administrations, Associations between local authorities (established under Law no. 215/2001, with subsequent amendments);
- Companies that fall into the category of small, medium and large (as defined under Law no. 346/2004 with subsequent amendments)

piata, a resurselor geotermale si a altor resurse regenerabile) si proiecte de modernizare a capacitatilor de producere. Se finanteaza inclusiv proiecte de cogenerare prin valorificarea resurse regenerabile de energie.

Sunt eligibili solicitantii din urmatoarele categorii:

- Autoritatile administratiilor publice locale, Asociatiile de Dezvoltare Intercomunitara (constituite conform prevederilor Legii nr. 215/2001, cu modificarile si completarile ulterioare);
- Societati comerciale care se incadreaza in categoria intreprinderilor mici, mijlocii si mari (Definite conform Legii nr. 346/2004 cu modificarile si completarile ulterioare).

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Raport privind Strategia

Part C: Appendixes

Partea C: Anexe

Appendix 11a: Posibilities of reducing energy consumption for the transport sector

Anexa 11a: Posibilitati privind reducerea consumului de energie in sectorul transporturilor

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2	15.09.2009	Strategies for public transport included in report	GMCB	haa
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ATH energ Grontmij | Carl Bro

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1 INTRODUCTION

The transport sector consumes about 30% of all energy consumed in the EU and the consumption is increasing. The two main consumers are road transport and air transport.

The increasing consumption of fuels for cars is not only related to an increasing number of cars and more driving as this should be compensated by improved efficiency. The increasing consumption of fuels is mainly related to waste of energy (unnecessary losses) from cars stuck in traffic congestion burning fuel for light, air conditioning/heating and stand-still losses in the engines.

Bucharest is far from unique in respect of waste of energy related to traffic congestion. This problem is seen in most of Europe’s old cities as these were not designed for the number of cars seen today.

In the communist time Bucharest was planned for having about 500,000 to 600,000 cars. The number of cars exceeds today the double number and of cause this gives a number of problems.

This report does not pretend to give a prescription for solving the transport problems in Bucharest but focus on possible actions to implement to reduce the waste of energy of today and in this way reduce the global impact and improve the air quality in the capitol.

1 INTRODUCERE

In sectorul transport se consuma aproximativ 30% din cantitatea de energie consumata in Uniunea Europeana si acest consum este in crestere. Cei mai mari consumatori de energie sunt transportul rutier si transportul aerian.

Cresterea consumului de combustibil pentru autoturisme nu este legata numai de cresterea numarului de masini, ci mai mult depinde de extinderea utilizarii acestora, care ar trebui compensat cu imbunatatirea eficientei. Prin cresterea consumului de combustibil este in principal determinata irosirea energiei (pierderi care nu sunt necesare) cu ocazia blocajelor in trafic a masinilor, cand se consuma combustibil pentru iluminat, aer conditionat/ incalzire si pierderile la stationare in motoare.

Bucurestiul este un oras de departe unic in ceea ce priveste irosirea energiei in timpul blocajelor in trafic. Aceasta problema a fost intampinata de cele mai multe orase vechi din Europa, care nu au fost proiectate pentru numarul mare de masini care se inregistraza in prezent.

In perioada comunista, a fost planificat ca in Bucuresti sa poata circula intre 500,000 si 600,000 de masini. In prezent sunt in circulatie aproximativ de doua ori mai multe masini ceea ce genereaza un numar de probleme.

Prin acest raport nu se intentioneaza a se oferi solutiile care ar putea rezolva definitiv problema transportului in Bucuresti, insa se concentreaza pe anumite actiuni posibil a fi implementate care ar putea reduce risipa de energie curenta si in acest fel sa conduca la reducerea impactului global si sa imbunatateasca calitatea aerului .

2 PRIVATE TRANSPORT

2.1 Main problem areas

The main problem areas in respect of waste of energy for transports are identified as being:

- Illegal parking
- Bad driver behaviour
- Lack of law enforcement
- Too many cars (congestion)

Illegal parking

Illegal parking is one of the main reasons for slowing the traffic and leading to traffic congestion. The trend seems to be: "If you turn on the emergency flashing you can park everywhere". The result is that even on main roads with three or four lanes only one is available for driving.

This problem should be solved with high priority. It might be possible that the problem is difficult to solve in areas with narrow streets and high population but there should be no excuse for illegal parking in areas with parking facilities available a for example in Unirii square or Alba Julia square.

The Municipality of Bucharest has started towing illegal parked cars and this will for sure improve the situation in a longer perspective when the drives learn that illegal parking has serious consequences.

Bad driver behaviour

Bad driver behavior is not related to a special Romania mentality as cultivated driving is found all over Romania outside Bucharest.

The bad behaviour is seen everywhere and comprises violations which are so serious that the driver should have his driving permission confiscated on the spot.

Obviously, as the police drive with the same mentality, the bad driving behaviour has no consequences.

Bad behaviour such as for example blocking the intersections, passing at red light, use of the wrong lane, change of lane and taking-over in the intersections slow down the traffic and consequently causes traffic congestion.

2 TRANSPORTUL PRIVAT

2.1 Principale domenii cu probleme

Principalele domenii cu probleme in ceea ce priveste risipirea energiei in domeniul transportului sunt identificate ca fiind:

- Parcarea ilegala
- Comportamentul neadecvat al soferilor
- Lipsa de fermitate in aplicarea legilor
- Prea multe masini

Parcarea ilegala

Parcarea ilegala este unul din principalele motive de incetinire a traficului, aceasta ducand la aglomerarea traficului. Pare a fi la moda sa aprinzi luminile de avarie si astfel sa porti parca oriunde. Rezultatul este ca si pe bulevardele mari cu 3 sau 4 benzi pe sens doar una dintre benzi poate fi folosita pentru circulatie.

Rezolvarea acestei probleme trebuie considerata ca fiind prioritara. Este posibil ca aceasta problema sa fie dificil de rezolvat pe stradute inguste si populate, dar nu pot fi gasite scuze pentru parcarea ilegala in zone cu facilitati de parcare existente, cum ar fi Piata Unirii sau Piata Alba Iulia.

Primaria Municipiului Bucuresti a inceput sa ridice masinile parcate ilegal si aceasta va imbunatati cu siguranta situatia pe termen lung, atunci cand soferii vor realiza ca parcarea ilegala le va aduce in acelasi timp probleme serioase.

Comportamentul neadecvat al soferilor

Comportamentul neadecvat al soferilor nu este legat de o mentalitate specific romaneasca regasindu-se oricum si in afara Bucurestiului, in toata tara.

Comportamentul neadecvat poate fi surprins peste tot si cuprinde incalcari ale Codului Rutier atat de serioase incat soferului ar trebui sa-i fie ridicat permisul pe loc.

Evident ca atat timp cat politistii conduc cu aceeasi mentalitate, acest comportament in trafic nu are consecinte.

Comportamentul neadecvat in trafic se poate rezuma de exemplu la blocarea intersectiilor, trecerea pe culoarea rosie a semaforului, utilizarea gresita a benzilor de circulatie, schimbarea benzilor de circulatie si intoarcerea autovehiculului in intersectii. Toate acestea duc la aglomerarea traficului.

Lack of law enforcement

Speed restrictions are the only traffic violation seen effectively enforced. Is that because the human factor is removed making the over-speed detection automatically?

Lack of law enforcement regarding parking is in many situations the reason for traffic congestion. Obviously, emergency flashing is believed to give the driver the right to part as he whish and often 6-lane boulevards are blocked in 4-lanes by parked and stopped cars leaving only 2-lanes for driving. In the few places (for example in Boulevard Margheru) where parking and stopping restriction are enforces the traffic is moving with an acceptable speed. The Municipality has started to remove illegal parked cars in area where pay-parking is available. Hopefully this will lead to construction of more parking houses and thus in a long term perspective solve some of the problems.

Using the wrong lane and changing lane again and again are other offences not enforced. One can ask why the Municipality spend money on painting lines on the road when most drives does not follow the lanes and are crossing the lanes in intersections without consequences.

Lipsa de fermitate in aplicarea legilor

Limitarea vitezei autovehiculelor este singura regula de circulatie a carei incalcare este pedepsita efectiv. Se intampla oare asta deoarece factorul uman a fost inlocuit in acest caz de radarele ce inregistreaza automat depasirea vitezei de circulatie?

Lipsa de fermitate in aplicarea legilor, in ceea ce priveste parcarea este in multe situatii motivul pentru un trafic aglomerat. Evident, luminile de avarie par sa dea posibilitatea soferilor sa parcheze oriunde isi doresc si deseori bulevarde de 6 benzi sunt blocate pe 4 benzi de masinile oprite, in timp ce pentru circulatie sunt folosite doar celelalte 2 benzi. In cateva locuri, (de exemplu pe Bulevardul Magheru) unde parcarea si oprirea autovehiculelor nu este permisa, traficul are o viteza acceptabila. Municipalitatea a inceput ridicarea masinilor parcate ilegal, in zonele unde exista parcari cu plata. Speram ca aceasta va duce la constructia mai multor parcari, pe termen lung, ducand la rezolvarea in parte a problemelor.

Folosirea gresita a benzilor de circulatie si schimbarea frecventa a acestora sunt alte incalcari ale regulilor ce nu sunt pedepsite. Ne putem intreba de ce Primaria cheltuieste bani pentru trasarea benzilor de circulatie cand majoritatea soferilor nu tine seama de ele, trecand in intersectii si in apropierea acestora de pe o banda pe alta fara a fi pedepsiti.

Too many cars

The main reason for traffic congestion is too many cars allowed driving and parking on the public road system. The traffic congestion caused by private cars causes indirect problems such as long waiting time for emergency assistance and consequently loss of lives and valuables and an inappropriate public transport as busses and trams are stuck in the same traffic congestion as private cars.

Prea multe masini

Motivul principal pentru prezenta unui trafic aglomerat il reprezinta faptul ca este permis ca prea multe masini sa circule si sa parcheze pe drumurile publice.

Traficul aglomerat generat de autovehiculele private da nastere unor probleme indirecte cum ar fi pierderea de timp in cazul asistentei medicale de urgenta, ce duce inevitabil la pierderi de vieti omenesti, sau un sistem public de transport neadecvat, deoarece tramvaiele si autobuzele sunt si ele pierdute in traficul generat de autovehiculele private.

2.2 Possible measures

Illegal parking

2.2 Masuri Posibile

Parcarea ilegala

Illegal parking should be defined as parking outside official parking boxes and parking in the parking boxes without paying the parking fee fixed by the Municipality.

It should also be established that the public roads in general are for driving and short-term parking for shopping and similar purposes while long-tem parking is a private business in private parking areas and parking houses.

Experience from other cities in the EU tells that when the parking fee exceed 3-4 EUR/h (not tax deductible) it is possible to find parking places even in the city centres. A pricing of 3-4 EUR/h is also necessary if private parking houses or underground parking shall be established as it will cost about 300.000 EUR to establish one parking place. The general approach for fixing the parking fee for an area should be:

- If there are no parking places available the fee is too low.
- If there are few parking places available the fee is appropriate.
- If there are many parking places available the fee is too high or not necessary.

Income for Copenhagen Municipality from parking fees in was in 2005 about 15,000,000 EUR and the budget for 2009 is about 25,000,000 EUR, money used in the general municipality budget. A special private company “Copenhagen Parking” is established for contracting of the parking services from international parking operators. The biggest operator in Copenhagen is the international known EURO PARK company but also a large number of smaller companies provide services for “Copenhagen Parking”. The solution implemented in Copenhagen as here outlined is more or less the same as found in most West-European large cities and this should also be the concept for Bucharest.

Parcarea ilegala poate fi definita ca fiind parcarea in afara locurilor de parcare oficiale precum si parcarea pe locurile de parcare fara a plati taxa fixata de Primarie pentru aceasta.

Poate fi deasemenea stabilit ca drumurile publice trebuie folosite in general pentru circulatia autovehiculelor si pentru parcarea pe termen redus (pentru cumparaturi sau scopuri similare) in timp ce parcarea pe termen lung este o afacere privata ce se desfasoara in zone private de parcare sau in parcari supraetajate.

Experienta altor orase din statele Uniunea Europeana, demonstreaza ca atunci cand taxele de parcare depasesc 3-4 Euro/ora(taxe nedeductibile) este posibil sa existe locuri de parcare chiar in centrul orasului. Un tarif de 3-4 Euro/ora este necesar in conditiile in care se vor construi parcari privare in cladiri sau in garaje subterane, iar costul mediu pentru un astfel de spatiu de parcare ajunge la aproximativ 300.000 Euro. Abordarea generala pentru stabilirea tarifului de parcare intr-o anumita zona ar trebui sa fie:

- Daca in zona nu sunt disponibile locuri de parcare, tariful este prea scazut
- Daca in zona sunt putine locuri de parcare, tariful este corespunzator
- Daca in zona sunt foarte multe locuri de parcare libere, tariful este prea mare sau spatiul deparcare nu este necesar.

Veniturile incasate de catre Primaria din Copenhaga din plata locurilor de parcare a fost in anul 2005 de aproximativ 15.000.000 Euro, iar venitul preconizat in 2009 va fi de aproximativ 25.000.000 Euro, care se considera venit la bugetul general al Municipalitatii. “Copenhagen Parking” este o companie infiintata pentru a contracta serviciile de parcare cu operatori internationali pentru spatii de parcare. Cel mai mare operator care opereaza in Copenhaga este o companie internationala “EURO PARK company”, insa exista un numar mare de alte mici companii care oferea servicii pentru “Copenhagen Parking”. Solutiile implementate in Copenhaga, asa cum au fost descrise, reprezinta mai mult sau mai putin solutiile adoptate in cele mai multe orase mari din vestul Europei, care deasemenea ar putea fi corespunzatoare si pentru Bucuresti

Improvement of public transport

Other measures such as increased parking fees, congestion charges etc should only be implemented when the public transport is improved and has become an attractive alternative to private transport. To become an attractive alternative the capacity must be increased (there should in principle be seats available

Imbunatatirea transportului public

Alte masuri ca de exemplu cresterea tarifelor de parcare, taxe de aglomeratie, etc, trebuie implementare doar in conditiile in care trasportul public este imbunatatit si poate deveni o varianta atractiva versus transportul particular. Pentru a deveni o varianta atractiva, capacitatea sa trebuie sa at almost all times), the speed should be improved (it should be faster to use public transport than private) and the price must be reasonable (far cheaper than using and parking own car).

Increased capacity

Increased capacity of the public transport should in an ideal situation be obtained by extension of the metro to remove the transport from the surface roads. However, as this is very expensive is might be necessary also to extent the number of busses and trams.

Increased speed

The metro is already today the fastest mean of transport in Bucharest. On the other hand using busses and trams is probably the slowest mean of transport.

Measures to increase the speed of the public transport could be to introduce special buss lanes in the boulevards with more than two lanes and introduce priority for busses and trams at traffic lights letting the busses and trams having green lights some 10 sec before the private traffic.

However, these measures are only useful if it is strongly enforced that driving in the buss and tram lanes and blocking these lanes are not allowed and penalised.

Reduced number of cars

The most efficient measure to reduce the traffic congestion is to reduce the number of cars. Second best option is to increase the road capacity but this is only possible to very limited extent inside the Bucharest city limit where the congestion is worst.

Known measures are:

- Congestion pricing
- Road pricing
- Traffic control

Congestion pricing

Congestion pricing or congestion charge is a system of surcharging users of a transport network in periods of peak demand to reduce traffic congestion. Examples include some toll-like road pricing fees, and higher peak charges for utilities, public transport and slots in canals and airports. This variable pricing strategy

creasca (in principiu ar trebui sa existe locuri libere in orice moment al zilei), viteza trebuie imbunatatita(ar trebui sa fie mai rapid sa utilizezi transportul public decat cel privat) si pretul trebuie sa fir rezonabil(cu mult mai ieftin decat utilizand si parcand masina privata).

Cresterea capacitatii

Cresterea capacitatii transportului public ar trebui, in situatia ideala, sa constea in inlocuirea traficului de suprafata cu cel subteran. Avand in vedere faptul ca aceasta solutie este foarte scumpa, ar putea fi posibil de asemenea marirea numarului de autobuze si tramvaie.

Cresterea vitezei

Astazi, metroul reprezinta cea mai rapida solutie de transport in Bucuresti. Pe de alta parte utilizarea autobuzelor si tramvaielor reprezinta cel mai incet mijloc de transport.

In vederea cresterii vitezei de deplasare a mijloacelor de transport in comun, ar putea fi introduse benzi speciale, dedicate autobuzelor, in cazul bulevardelor largi cu mai mult de doua benzi de circulatie si alocarea suplimentara a unei perioade de timp 10 sec suplimentar pentru autobuze si tramvaie la semafor, inaintea traficului cu masini private.

Totusi, aceste masuri devin utile doar in cazul in care traficul pe aceste benzi va fi strict interzis masinilor private, fiind astfel pedepsita utilizarea si blocarea acestora.

Numar de masini redus

Cea mai eficienta masura de reducere a blocajelor in trafic este aceea de a reduce numarul de masini. Cea de-a doua optiune considerata eficienta este aceea de a creste capacitatea de trafc a drumurilor, dar aceasta este foarte limitata in interiorul Bucurestiului in zonele in care blocajele sunt cele mai dificile.

Masurile cunoscute sunt:

- Taxa de aglomeratie
- Taxa de drum
- Controlul traficului

Taxa de aglomeratie

Taxa de aglomeratie reprezinta un sistem de supratax are a utilizatorilor infrastructurii de transport in perioadele de varf in scopul de a reduce aglomerarea traficului. Exemple ar putea fi taxa de drum variabila, cu atat mai mare pentru utilitati, transport public si sloturi in pasaje si aeroporturi.

regulates demand, making it possible to manage congestion without increasing supply. Market economics theory, which encompasses the congestion pricing concept, postulates that users will be forced to pay for the negative externalities they create, making them conscious of the costs they impose upon each other when consuming during the peak demand, and more aware of their impact on the environment.

The application on urban roads is limited to a small percentage of cities, including London, Stockholm, Singapore and Milan, as well as a few smaller towns. Four general types of systems are in use; a cordon area around a city centre, with charges for passing the cordon line; area wide congestion pricing, which charges for being inside an area; a city centre toll ring, with toll collection surrounding the city; and corridor or single facility congestion pricing, where access to a lane or a facility is priced.

Implementation of congestion pricing has reduced congestion in urban areas, but has also sparked criticism and public discontent. Critics maintain that congestion pricing is not equitable, places an economic burden on neighbouring communities, has a negative effect on retail businesses and on economic activity in general, and is just another tax.

A survey of economic literature on the subject, however, finds that most economists agree that some form of road pricing to reduce congestion is economically viable; although there is disagreement on what form road pricing should take. They primarily argue that recent advances in technology have significantly reduced the previously high transaction costs of toll collection. Fuel taxes are not effective in reducing highway congestion, and tolls are the direct method. Also, concerns regarding fossil fuel supply and urban transport high emissions of greenhouse gases in the context of climate change have renewed interest in congestion pricing, as it is considered one of the demand-side mechanisms that can contribute to curb oil consumption

One of the most efficient systems is the London Transport congestion charge system where car pay a charge according to size of the car and the pollution from the car. The charge in London is today up to 10 £/day (about 12 €/day) – when the car enter the zone the number plate is recognised by a camera and compared against a data base there payments are registered. If the payment cannot be recognised a penalty of 120 £ (about 140 €) is automatically send to the owner of the car. The charge can be paid at numerous shops, on-line or by mobile phone.

It is estimated that about 30% less cars passes the congestion charge zone. The impact is, together with traffic control measures, a significant reduced traffic time and measurable improvement of the air quality in London. The energy conservation is calculated to be about 35-40%.

Aceasta strategie cu preturi variabile controleaza cererea, facand posibil gestionarea aglomeratiei fara a creste furnizarea. Teoria economiei de piata, care include si conceptul taxelor de aglomeratie, prevede ca utilizatorii sa fie fortati sa plateasca pentru consecintele negative pe care le genereaza, constientizandu-i asupra costurilor care le sunt impuse, atunci cand utilizeaza facilitatile in perioadele de varf si mai mult constientizandu-i despre impactului acestui consum asupra mediului.

Aplicarea acestui concept pe drumurile din mediu urban este limitat la procent mic de orase, incluzand orase mari ca Londra, Stockholm, Singapore si Milano dar si un numar de orase mici. In general sunt utilizate patru tipuri de sisteme in functiune; un cordon in jurul centrului, cu taxe aplicate in conditiile in care se intra in zona delimitata; arii largi cu taxe de aglomeratie; o taxa de zona centrala a orasului, cu statii de taxare inconjurand orasul; si coridor sau facilitate unica de taxa de aglomeratie, atunci cand accesul este taxat intr-o anumita banda sau facilitate .

Implementarea taxelor de aglomeratie a redus aglomeratia in zonele urbane, dar in acelasi timp a suscitat critici si dezaprobare publica. Criticile sustin ca taxa de aglomeratie nu este echitabila, plaseaza o sarcina economica comunitatilor invecinate, are un efect negativ asupra afacerilor legate de comert si activitatilor economice in general si pur si simplu este o alta taxa suplimentara.

Totusi, in literatura de specialitate pe acest subiect, exista opinii ale celor mai multi economisti, care sunt de acord cum ca anumite forme ale taxei de aglomeratie din punct de vedere economic sunt viabile pentru reducerea blocajelor in trafic, in acelasi timp exista opinii divergente in ceea ce priveste forma pe care trebuie sa o imbrace taxa de aglomeratie. Ei au argumentat initial ca recentele dezvoltari ale tehnologiei au redus semnificativ costurile ridicate, generate de tranzactiile pentru colectarea taxelor. Taxele pe combustibili nu au fost eficiente in reducerea traficului pe autostrazi ci plata la statiile de taxare. Totusi, anumite ingrijorari referitor la furnizarea combustibililor fosili, precum si cantitatea imensa de emisii de gaze cu efect de sera, produse de transportul in mediul urban au reinnoit interesul pentru taxele de aglomerare, fiind considerate ca fiind unul din mecanismele de gestionare a consumului, care ar putea contribui la limitarea consumului de petrol.

Unul dintre cele mai eficiente sisteme este implementat la Londra. Sistemul de taxare de aglomeratie se bazeaza pe plata unei taxe pe autoturism in functie de marime si gradul de poluare. Aceasta taxa este in prezent in Londra pana la 10 £/zi(circa 12 Euro/zi), iar cand un autoturism patrunde in zona, numarul de inregistrare este citit de o camera si comparat cu o baza de date, in care sunt

Public controversy. Experience from the cities where congestion pricing has been implemented shows that social and political acceptability is key. Public discontent with congestion pricing, or rejection of congestion pricing proposals, is due mainly to the inequality issues, the economic burden on neighbouring communities, the effect on retail businesses and the economic activity in general, and the fears that the revenues will become just another tax.

Congestion pricing remains highly controversial with the public both before and after implementation. This has in part been resolved through referendums, such as after the seven-month trial period in Stockholm; however this creates a debate as to where the border line for the referendum should go, since it often is the people living outside the urban area who have to pay the tax, while the external benefit is granted those who live within the area. In Stockholm there was a majority in the referendum within the city border (where the votes counted), but not outside.

Some concerns have also been expressed regarding the effects of cordon area congestion pricing on economic activity and land use, as the benefits are usually evaluated from the urban transportation perspective only. However, congestion pricing schemes have been used with the main objective of improving urban quality and to preserve historical heritage in the small cities.

The effects of a charge on business have been disputed; reports have shops and businesses being heavily impacted by the cost of the charge, both in terms of lost sales and increased delivery costs in London, while others show that businesses were then supporting the charge six months after implementation. Reports show business activity within the charge zone had been higher in both productivity and profitability and that the charge had a "broadly neutral impact" on the London wide economy, while others claim an average drop in business of 25% following the 2007 extension.

inregistrate platile efectuate. In cazul in care plata nu se regaseste in baza de date, proprietarului autoturismului ii este transmisa o amenda de 120£ (aprox. 140 Euro). Taxa poate fi platita in diferite magazine, on-line sau prin telefonul mobil. S-a estimat ca se va inregistra o scadere accesului in zona taxata cu circa 30%. In prezent, impactul este reprezentat de o scadere semnificativa a traficului si de o imbunatatire masurabila a calitatii aerului in Londra. Conservarea energiei este calculata ca fiind in jur de 35-40%.

Controversa publica. Experienta inregistrata in orasele in care taxa de aglomeratie a fost implementata arata ca acceptabilitate sociala si politica, reprezinta cheia succesului. Lipsa de satisfactie publica referitor la taxa de aglomerare, sau respingerea propunerilor pentru introducerea acesteia, se datoreaza aspectelor privind inechitatea, incarcarea comunitatilor invecinate, efectul asupra activitatilor de retail si a activitatilor economice in general si suspiciunea ca aceste venituri vor deveni doar o alta taxa.

Taxele de aglomeratie raman puternic controversate public atat inainte cat si dupa implementare. Aceasta situatie a putut fi rezolvata in anumite parti prin referendum, ca de exemplu, in Stockholm dupa o perioad de proba de 7 luni; timp in care se crease o controversa legata de limita(granita de aplicare) a acestei taxe. Vazuta astfel, persoanele locuind in afara ariei delimitate trebuind sa plateasca pentru a avea acces, in timp ce beneficiul extern este oferit celor care locuiesc in acea arie. In Stockholm a fost inregistrata o majoritate, cu ocazia referendumului in interiorul granitei orasului (in care s-au numarat voturile) si nu in exteriorul orasului.

Au mai fost exprimate unele ingrijorari legate de efectele ariei delimitate pentru aplicarea taxei de aglomeratie, asupra activitatilor economice si utilizarea proprietatilor, in conditiile in care beneficiile au fost evaluate numai din perspectiva transportului urban. Totusi schemele privind taxa de aglomeratie au fost utilizate considerand ca obiectivul principal il constituie imbunatatirea calitatii mediului urban si conservarea mostenirilor istorice in orasele mici.

Efectele unei taxe asupra mediului de afaceri a fost disputat; in rapoarte fiind relatat impactul puternic asupra magazinelor si a mediului de afaceri generat de taxe, atat in ceea ce priveste scaderea vanzarilor cat si datorita cresterii costurilor de aprovizionare in Londra, in timp altii au aratat ca afacerilor au fost sustinute dupa sase luni de la implementare. In alte rapoarte se arata ca afacerile, in zona de aplicare a taxei au crescut atat din punct de vedere al productivitatii cat si al profitabilitati si ca la scara larga impactul in Londra este considerat neutru, in timp ce altii reclama ca s-a inregistrat o scadere a afacerilor cu 25%. in urma extinderii din anul 2007.

Road pricing

Road pricing is an economic concept regarding the various direct charges applied for the use of roads. The road charges includes fuel taxes, licence fees, parking taxes, tolls, and congestion charges, including those which may vary by time of day, by the specific road, or by the specific vehicle type, being used. Road pricing has two distinct objectives: revenue generation, usually for road infrastructure financing, and congestion pricing for demand management purposes. Toll roads are the typical example of revenue generation. Charges for using high-occupancy toll lanes or urban tolls for entering a restricted area of a city are typical examples of using road pricing for congestion management purposes.

Facing rising levels of traffic congestion, European governments are giving serious consideration to nationwide road pricing schemes. Some of these could exploit the new Galileo satellite positioning system, although it is possible to arrange road pricing using various different technologies. A satellite based system would entail vehicles containing a satellite tracking device which would determine which roads were being driven along, for how far and at what time of day. This information would then be sent to a central computer system, and the appropriate charges levied against the driver.

Germany

Schemes for charging trucks (lorries) in Germany (by the company Toll Collect) and Austria are already underway. The German scheme began on January 1, 2005, trucks pay between €0.09 and €0.14 per km depending on their emission levels and number of axles. The expensive scheme, combining satellite technology with other technologies, suffered numerous delays before implementation, whilst a scheme using much simpler technology in Austria was up and running in 2004.

Italy

A traffic charge program in Milan, called "Ecopass", began on a trial basis on January 2, 2008. It exempts vehicles compliant with the Euro3 and Euro4 emission standards or higher, as well as several alternative fuel vehicles. Residents within the restricted zone, called ZTL (Italian: Zone a Traffico Limitato), may purchase a discounted annual pass. Although the program is operationally similar to existing congestion pricing schemes, its main objective is to reduce air pollution from vehicle emissions rather than relieve traffic congestion. The program was extended until December 31, 2009, and a public consultation will be conducted to decide if the charge should become permanent.

Taxa de drum

Taxa de drum este un concept economic referitor la taxe directe si variate aplicate pentru utilizarea soselelor. Taxele de drum includ: taxa pe combustibil, taxa de permis auto, taxa de parcare, statii de taxare si taxe de aglomerare, inclusiv acele taxe care ar putea sa varieze in functie de perioada zilei, tipul soselei, sau tipul de vehicul. Taxa de drum are doua obiective majore: generare de venituri, in mod normal petru finantarea infrastructurii drumurilor si taxe de aglomerare cu scopul gestionarii cererii. Statiile de taxare sunt exemple tipice pentru generarea veniturilor. Taxele pentru ocuparea benzilor de circulatie sau platile la statiile de taxare pentru accesul in zona urbana cu restrictie sunt exemple tipice pentru aplicarea taxei de drum in scopul gestionarii aglomerarii.

Pentru a face fata cresterii nivelului de aglomerare a traficului, Guvernele Europene iau in considerare serios introducerea la scara nationala a schemelor pentru taxele de drum. Unele dintre acestea ar putea utiliza noul sistem de pozitionare prin satelit - Galileo, in timp ce este de asemenea posibil sa se organizeze taxe de drum utilizand alte tehnologii diferite. Un sistem bazat pe satelit ar putea monitorizare vehicule dotate cu sisteme GPS, putand astfel inregistra informatii privitoare la: categoria de drum utilizata de catre vehicul, lungimea drumului si perioada din zi cand a fost utilizat acel drum. Aceste informatii ar putea fi transmise catre un sistem central de computere care ar calcula si emite taxele aferente pe care le va plati utilizatorul masinii.

Germania

In prezent, in Germania sunt implementate scheme pentru taxarea camioanelor (prin compania Toll Collect) si in Austria se pregateste introducerea acestora. Schema germana a fost introdusa incepand cu 01.01.2005, astfel camioanele platesc intre 0.09 Euro/km si 0.14 Euro/km, depinzand de nivelul de emisii si numarul de axe. Schemele extensive, utilizand tehnologia pe baza de sateliti combinata cu alte tehnologii, au suferit intarzieri semnificative inainte de a fi implementate, in timp ce o schema utilizand tehnologii mult mai simple, este in functiune in Austria inca din 2004.

Italia

In Milano, un program pentru introducerea taxei de aglomeratie, numit “Ecopass” a fost introdus in sistem de testare incepand cu 02.01.2008. Prin acest sistem sunt scutite vehiculele care sunt conforme cu standardele Euro 3 si Euro 4 (sau superior) privind limitarea emisiilor sau vehiculele care utilizeaza combustibili alternativi. Rezidentii din zonele cu restrictii, numiti ZTL (in italiana: Zone a Traffico

Malta

A fully automated system called a Controlled Vehicular Access (CVA) system has been launched in Malta's capital city of Valletta since May 1, 2007. When compared to other countries that make use of congestion charging models, the Maltese system makes use of a wider array of innovations including variable payments according to the duration of stay, flexible exemption rules, including exemptions for residents within the charging zone, and monthly or quarterly billing options for vehicle owners. Pre-payment facilities, including direct debit arrangements and purposely designed vouchers, are also available. The billing system was designed in Malta and has been described as a state of the art 'next generation congestion charge billing solution'. The Valletta Congestion Charge, which is also known as Valletta CVA, was recently nominated for the Best European Transport Strategy Award. Public voting is still underway.

Norway

One of the earliest schemes was introduced in Bergen in Norway in 1986. Only traffic entering the town is charged and only during weekdays from 6:00 a.m. through 10:00 p.m. Public service vehicles pay no charge.

Bergen has now a fully automated toll plaza system that is based on passing without stopping for all traffic. There are no coin slots or manual service. A similar system was introduced for the Oslo Toll Ring from February 2, 2008. To ensure interoperability of electronic fee collection in Norway a system called AutoPASS is used throughout the country for toll roads and congestion charging schemes etc. Most local drivers have purchased a tag which is automatically read on passing the detectors. As of February 2008[update], there will be six fully automated schemes in operation. Motorists without a tag pay a fee at a manual barrier.

Sweden

Stockholm has a pricing system, Stockholm congestion tax, in use on a permanent basis since August 1, 2007, after having had a seven month trial period from January 3 to July 31, 2006. The City Centre is within the congestion tax zone. All the entrances and exits of this area have unmanned control points operating with automatic number plate recognition. All vehicles entering or exiting the congestion tax affected area, with a few exceptions, have to pay 10–20 SEK (1.09–2.18 EUR, 1.49–2.98 USD) depending on the time of day between 06:30 and 18:29. The maximum tax amount per vehicle per day is 60 SEK (6.53 EUR, 8.94 USD). Payment is done by various means within 14 days after one has passed one of the control points, one cannot pay at the control points.

Limitato), ar putea beneficia de o reducere anuala a taxei de acces. De altfel, programul este similar din punct de vedere operational cu alte scheme de taxe de aglomerare, avand ca principal obiectiv reducerea nivelului de poluare generat de autovehicule, prioritar obiectivului de a reduce aglomerarea. Programul a fost extins pana la 31.12.2009 si s-a hotarat consultarea publica pentru a se stabili daca aceasta taxa va deveni permanenta.

Malta

Un sistem complet automatizat, numit Controlul Accesului Vehiculelor (CVA) a fost lansat in capitala Maltei, Valletta incepand cu 01.05.2007. Comparand acest sistem cu sisteme din alte tari care utilizeaza modele de taxare a aglomeratiei, sistemul maltez utilizeaza o gama larga de inovatii, incluzand plata variabila in conformitate cu durata de stationare, reguli flexibile incluzand exceptii pentru rezidentii din zonele in care sunt aplicate taxele, cu optiuni de plata a taxelor de catre utilizatorii vehiculelor atat lunat cat si trimestrial. Sunt disponibile atat facilitati pentru plata in avans, chiar si aranjamente pentru debitarea directa, precum si vouchere particularizate pentru acest scop. Sistemul de facturare a fost proiectat in Malta si a fost descris ca fiind ultima tehnologie disponibila in materie “generatia urmatoare pentru solutii de facturare a taxei de aglomeratie”. Sistemul de taxare a aglomeratiei din Valletta, cunoscut si sub denumirea de Valletta CVA, a fost recent nominalizat pentru trofeul “Cea mai buna Strategie de Transport Europeana”. Votul public este inca in desfasurare.

Norvegia

Una dintre cele mai timpurii scheme introduse a fost in Bergen in Norvegia in 1986. Doar autovehiculele care intrau in oras erau taxate, in zilele lucratoare, intre 6:00 a.m si 10:00 p.m. Autovehiculele aferente transportului in comun erau scutite de la plata.

In prezent, in Bergen exista un sisteme complet automatizat de taxare, care se bazeaza pe trecere fara a oprit traficul. Nu exista automate de parcare cu monede sau servicii manuale. Un sistem similar de taxare a fost introdus pentru zona centrala din Oslo, incepand cu 02.02.2008. Pentru a asigura interoperabilitatea cu colectare automata de taxe, in intreaga tara se folosesc sisteme de taxare a drumurilor si a aglomeratiei, etc. Marea majoritate a soferilor locali achizitioneaza tichete care sunt citite automat la trecerea prin dreptul unor detectoare. In februarie 2008(actualizat), existau in functiune sase scheme complet automatizate. Motociclistii fara tichet platesc o taxa la trecerea unei bariere manuale.

Suedia

In Stockholm exista un sistem de taxare a aglomeratiei in functiune din 01.08.2007, dupa o fost perioada de testare de sapte luni, intre 03 ianuarie-31 iulie 2006. Centru orasului este considerat zona in

United Kingdom

Until February 18, 2007 the congestion charge applied to drivers within the highlighted area. UK governments have periodically considered the possibility of using road pricing since the early 1960s, when the Smeed Report considered how to implement congestion charging.

Durham became the first city in the UK to have a permanent congestion charge in 2002. London has had a congestion charge in the central area since 2003. The organisation responsible for the charge is Transport for London (TfL). The fee was introduced on February 17, 2003. Initially set at £5, then raised on July 4, 2005 to £8, the daily charge must be paid by the registered keeper of a vehicle that is on public roads in the congestion charge zone between 7 a.m. and 6 p.m. (previously 6:30 p.m.), Monday to Friday. Failure to pay the charge means a fine of at least £50. The charge area was extended into parts of West London on February 19, 2007.

A scheme similar to the one in London is proposed in Manchester, covering a wider area but with a much smaller daily charging window covering the morning and evening rush hours. A scheme for Cambridge is currently under consideration and the subject of heated public debate, with council surveys showing that a majority of Cambridge-area residents reject the scheme. A scheme for Edinburgh was rejected in a public referendum in February 2005. On 2008-03-05, councils from across the West Midlands, including those from Birmingham and Coventry, rejected the idea of imposing road pricing schemes on the area, this was despite promises from central government of transport project funding in exchange for the implementation of a road pricing pilot scheme. Similar schemes proposed for cities in the East Midlands have also been dropped.

Extensive studies are being done on introducing a scheme for all UK vehicles, with an aim to implementation at the earliest around 2013. In October 2005 the UK government suggested they explore "piggy-backing" road pricing on private sector technologies, such as usage based insurance (also known as pay-as-you-drive, or PAYD). This method would avoid a large-scale public sector procurement exercise, but such products are unlikely to penetrate the mass market. If introduced, this scheme would likely see a charge being levied per kilometre depending on the time of day, the road being driven along, and perhaps the type of vehicle. For example, a large car driving along the western section of the M25 in rush hour would pay a high charge; a small car driving along a rural lane would pay a much lower charge. The very highest charges would be likely in the most congested urban areas. It is expected that rural motorists would benefit the most from such a scheme, perhaps by paying less through road pricing

care se aplica taxe de aglomeratie. La toate intrarile si iesirile din aceasta zona sunt instalate posturi de control automatizate, prevazute cu cititoare pentru numerele de inmatriculare. Toate vehiculele care intra si ies din zona taxabila, cu mici exceptii, trebuie sa plateasca intre 10–20 SEK (1.09–2.18 Euro, 1.49–2.98 USD), depinzand de intervalul din zi cuprins intre 06:30 si 18:29. Suma maxima taxabila pentru un autovehicul este de 60 SEK (6.53 EUR, 8.94 USD). Plata putandu-se face prin diferite metode, in termen de 14 zile de la data la care s-a trecut pe langa un post de control si la care nu se poate face plata.

Marea Britanie

Incepand cu 18.02.2007 a fost introdusa taxa de aglomeratie pentru soferii care intrau in zona delimitata. Guvernul din Marea Britanie a luat in considerare constant posibilitatea introducerii taxei de drum inca din 1960, cand Raportul Smeed a evaluat modul de introducere a taxei de aglomeratie.

Durham a devenit primul oras din Marea Britanie in 2002, care a avut sistem permanent de taxare a aglomeratiei. Londra a avut un sistem de taxare a aglomeratiei in zona centrala din 2003. Organizatia responsabila pentru incasarea este Transport for London (TfL). Taxa a fost introdusa in 17.02.2003. A fost fixata initial o taxa de £5, iar in 04.07.2005, aceasta a ajuns la £8, taxa zilnica trebuind a fi platita de catre proprietarul inregistrat al autovehicolului, care circula in zona centrala delimitata intre orele 7 a.m. si 6 p.m. (anterior 6:30 p.m.), intre luni si vineri. Neplata acestei taxe conducea la aplicarea unei amenzi de £50. Zona centrala delimitata a fost extinsa in alte parti din vestul Londrei, incepand cu 19.02.2007.

O schema similara cu cea din Londra a fost propusa in Manchester, acoperind o arie destul de vasta, dar aplicandu-se doar in intervale de timp cu mult mai mici, si anume in perioadele de varf de trafic, dimineata si dupa-amiaza. In prezent, se afla in discutie pentru Cambridge o schema care a generat puternice dezbateri publice. Studiul facut de consiliul local a aratat faptul ca un numar relevat de persoane rezidente in zona Cambridge sunt impotriva introducerii acestei scheme. La Edinburgh, a fost respinsa prin referendum public, introducerea unei asemenea scheme, in februarie 2005. In 05.03.2008, consiliile din West Midlands, inclusiv cele din Birmingham si Coventry au respins ideea impunerii unor scheme de taxe de drum pilot in zona. Acest lucru s-a intamplat in ciuda promisiunilor primite din partea guvernului central, ca in contrapartida, acesta va finanta un proiect in infrastructura de transport. Alte scheme similare propuse in orase din the East Midlands au fost suspendate.

La introducerea unor scheme pentru toate autovehiculele din Marea Britanie au fost realizate studii extinse, avandu-se ca obiectiv introducerea than they do at present through petrol and car taxes, whereas urban motorists would pay much more than they presently do. However, this is highly dependent on whether such a scheme would be designed to be either revenue neutral or congestion neutral. A revenue neutral scheme would replace (at least in part) petrol and vehicle taxes, and would be such that Treasury revenue under the new scheme would equal the revenue from current taxes. A congestion neutral scheme would be designed so that growth in congestion levels would stop as a result of the new charges; the latter scheme would require significantly higher (and increasingly higher) charges than the revenue neutral scheme and so would be unpopular with the UK's 30 million motorists. The carbon emission consequence of moving from fuel duty to a charge per mile has been raised as a concern by some environmentalists, as has any diversionary response from heavily trafficked (and hence more expensive) roads.[specify] The UK government announced funding for road pricing research in seven local areas in November 2005.

In June 2005, Transport Secretary Alistair Darling announced the current proposals to introduce road pricing. Every vehicle would be fitted with a satellite receiver to calculate charges, with prices (including fuel duty) ranging from £0.2 per mile on uncongested roads to £1.34 on the most congested roads at peak times.

A 2007 online petition against road pricing, started by Peter Roberts and hosted by the British government attracted over 1.8 million signatures, equivalent to 6% of the entire driving population. Over 150,000 signatures were added during the last day before the petition closed on February 20, 2007. In reply, the prime minister e-mailed the petitioners outlining his rationale, denying that the proposals were to introduce a stealth tax or increase surveillance, and promising 'debate' before a decision was made as to whether to introduce a national scheme.

Denmark

Denmark will introduce a road pricing system from 2015. Income from this system will partly be used to reduce the very high Danish registration fees on private cars and the annual car tax, which is also very high in Denmark, to a level closer to the EU Average,

acestora cel mai devreme in 2013. In octombrie 2005, Guvernul din Marea Britanie a sugerat explorarea aplicarii taxei de drum pe principiul "pusculitei", pe baza tehnologiei sectorului privat, utilizarea in sistem asigurare (cunoscuta sub numele de platesti-cat-conduci, sau PAYD). Această metodă ar evita achiziţiile la scară largă în sectorul public, dar astfel de produse fara dubiu pătrund în masă pe piaţă. Dacă ar fi introdusa, aceasta schema ar implica o taxa aplicata pe Km, depinzand de perioada din zi, categoria de drum utilizata si poate de tipul autovehiculului. De exemplu, o masina de categorie mare, conducand in zona vestica a M25, la o ora de varf, va plati o taxa mare, in timp ce o masina de categorie mica, ruland pe drumuri rurale, va plati o taxa mult mai mica. Cele mai mari taxe vor putea fi in cele mai aglomerate zone urbane. Se asteapta ca cei care vor beneficia cel mai mult de pe urma introducerii acestor scheme sunt motociclistii care utilizeaza drumurile secundare, platind chiar mai putin decat platesc in prezent, prin taxa de drum inclusa in benzina sau taxa pe autovehicule. Motociclistii care vor utiliza drumurile urbane aglomerate vor plati mai mult decat platesc in prezent. Totusi, acest lucru depinde foarte mult de tipul schemei, daca o asemenea schema ar putea fi proiectata incat sa devina neutra din punct de vedere al veniturilor sau al aglomerarii. O schema neutra din punct de vedere al veniturilor ar putea inlocui(cel putin in parte) taxele pe benzina si pe autovehicule si s-ar putea ajunge la faptul ca veniturile bugetare in condiile noii scheme sa ajunga egale cu cele obtinute in prezent din taxele deja aplicate. O schema neutra din punct de vedere al aglomerarii ar putea fi proiectata, astfel incat cresterea nivelului de aglomerare ar putea sa se opreasca in urma introducerii noilor taxe. O schema ulterioara ar solicita taxe semnificativ mai ridicate (crescand mereu) decat cele provenite din aplicarea unei scheme neutre din punct de vedere al veniturilor, aceasta actiune va deveni total nepopulara in contextul in care in Marea Britanie sunt inregistrati 30,000,000 de motociclisti. Consecintele emisiilor de CO_2, ca urmare a mutarii responsabilitatilor alocate combustibililor, catre o taxa pe mila a aparut cu ingrijorare in fata unor specialisti in protectia mediului, neavand raspunsuri referitoare la ingreunarea traficului (si in consecinta drumuri mai scumpe). Guvernul britanic a anuntat alocarea de fonduri pentru cercetari in domeniul taxei de drum, in sapte zone in noiembrie 2005.

In iunie 2005, Secretarul de Stat pentru transport Alistair Darling, a anuntat propuneri de a introduce taxe de drum. Fiecare autovehicul va fi dotat cu un sistem GPS, urmarit prin satelit, calculandu-se astfel taxele care trebuie achitate, cu preturile (incluzand accizele pe combustibil) cuprinse intre £0.2 per mila pentru drumuri neaglomerate pana la £1.34 per mila pentru drumurile cele mai aglomerate la orele de varf.

In 2007, impotriva acestui demers a fost elaborata o scrisoare publica de catre Peter Roberts, insotita de 1.8 milioane de semnaturi, reprezentand 6% din populatia cu permise de conducere. Peste 150,000 de semnaturi au fost adaugate in ultimele zile inainte de termenul limita de transmitere a scrisorii si anume 20.02.2007. In replica, primul ministru a raspuns prin e-mail petitionarilor mentionandu-si justificarile, negand faptul ca aceasta metoda nu are nimic de face cu introducerea unei taxe ascunse sau cu cresterea gradului de supraveghere a populatiei, promitand dezbateri publice inainte de luarea deciziei finale de a introduce o schema nationala.

Danemarca

Danemarca va introduce un sistem de taxe de drum incepand cu 2015. Veniturile incasate prin acest sistem vor fi partial utilizate pentru a se reduce taxa de prima inmatriculare pentru autovehiculele private, precum si taxa anuala pe autovehicul, taxe care sunt foarte ridicate in comparatie cu media din tarile UE.

Traffic control

Traffic control to limit the impact of traffic congestion includes the use of CCTV (close circuit television) and other means of monitoring traffic by local or State roadways authorities to manage traffic flows and providing advice concerning traffic congestion.

The information obtained from the CCTV allow the traffic dispatcher to control the flow of traffic by changing the intervals between red and green light and in this way allow car to get out of congestion areas and at the same time avoiding more cars entering the zone before the problem is solved. London Transport operates today a very advanced and this has been the model of many other cities as it could also be the model for Bucharest.

It is verified that today it is possible to pass through City of London (the central part of London) in 15-20 minutes. Before introduction of traffic control and other previously described measures it took more than one hour in many situations.

Controlul traficului

Controlul traficului pentru limitarea impactului generat de aglomerari, include si utilizarea unor camere de luat vederi(circuit inchis de televiziune) precum si alte mijloace privind monitorizarea traficului de catre autoritatile locale sau cele responsabile pentru administrarea drumurilor si se manifesta prin gestionarea intensitatii traficului, oferind sfaturi in ceea ce priveste evitarea blocarii traficului.

Informatii primite de la camerele de luat vederi permit dispecerilor sa controleze intensitatea traficului prin modificarea intervalelor pentru culorile rosu si verde, astfel restrictionand accesul in zona blocata pana aceasta situatie nu se deblocheaza. London Transport opereaza in prezent un sistem foarte avansat, fiind chiar un model pentru multe alte orase, chiar si pentru Bucuresti.

Este verificat astazi ca fiind posibila traversarea prin centrul Londrei in circa 15-20 de minute. Inainte de introducerea controlului traficului si a celorlalte masuri descrise anterior, acest lucru era posibil intr-o ora sau chiar mai mult in anumite situatii.

3 PUBLIC TRANSPORT

3.1 Trams

Current situation

The trams in Bucharest drives currently 21.65 million km per year using 66.58 GWh/y. This gives a specific consumption (benchmark) of 3.08 kWh/km.

The trams are a mix of old trams based on 1960 technology and modern trams based on best available technology at the turn of the century.

Planned development

Extension of the tram operation is planned. In year 2020 it is expected that the services will be extended by about 50% to about 32 million km.

A replacement programme for old trams is elaborated and most of the current old trams are expected replaced by 2030 (or before if financing will be available).

Energy conservation

Modern trams with best available technology are at least 30% more efficient than the old trams still in operation. However, as the tram system is developed a higher service speed will be introduced increasing the consumption. A realistic forecast will thus be that the specific consumption will decrease with about 20% from 3.08 kWh/km to about 2.45 kWh/km in 2030.

Strategy

The recommended strategies regarding tram services are:

- To continue the ongoing modernisation programme and insure funds for replacement of old equipment
- To ensure best available technology

3 TRANSPORTUL IN COMUN

3.1 Tramvaie

Situatia existenta

In prezent, in Bucuresti tramvaiele parcurg 21,65 milioane km pe an consumand 66,58 GWh/an. Pe baza acestor date se poate calcula consumul specific (valoare de benchmarking) reprezentand 3,08 kWh/km.

Vagoanele aflate in functiune sunt un mix intre tramvaie vechi, cu tehnologie aferenta anului 1960, dar si tramvaie moderne bazate pe cea mai buna tehnologia disponibila la inceputul secolului 21.

Planul de dezvoltare

Extinderea sistemului de tramvaie este planificata. In anul 2020, se asteapta ca serviciile sa fie extinse cu aproape 50%, ajungandu-se la o distanta parcursa pe an, de 32 milioane km.

A fost elaborat un program de inlocuire a vagoanelor vechi, astfel incat, in masura in care fondurile vor fi disponibile, parcul de vagoane sa fie complet inlocuit in 2030 sau mai devreme.

Conservarea energiei

Tramvaiele moderne bazate pe cea mai buna tehnologie disponibila sunt cu cel putin 30% mai eficiente decat tramvaiele vechi aflate in prezent in exploatare. Totusi, in conditiile in care sistemul de tramvaie se va dezvolta ca un sistem cu viteza de rulare crescuta, consumul de energie va creste. Astfel, o prognoza realistica va lua in considerare o scadere la nivelul anului 2030, a consumului cu aproximativ 20% si implicit a valorii de benchmarking de la 3,08 kWh/k m la aproximativ 2,45 kWh/km.

Strategia

Strategiile recomandate pentru sistemul de transport cu tramvaie sunt:

- Continuarea programelor de modernizare aflate in derulare si asigurarea fondurilor necesare inlocuirii echipamentelor vechi.
- Obtinerea asigurarii privind disponibilitatea

introduced when equipment is changed (perhaps accept a higher price if the consumption is lower)

- Improve the conditions for trams. Where possible establish special tram lanes and fine cars blocking the lanes.
- Update the development plan in coordination with other public services. Perhaps hybrid busses running on gas should replace trams in the narrow streets.

celei mai bune tehnologii, atunci cand echipamentele vechi sunt inlocuite (chiar acceptarea unui pret mai ridicat, daca consumul este mai redus).

- Imbunatatirea conditiilor pentru tramvaie. Acolo unde este posibil stabilirea unor culoare speciale pentru tramvaie si evitarea blocarii acestora de catre autoturisme.
- Actualizarea planului de dezvoltare in coordonare cu celelalte servicii publice. Poate fi considerata ca o solutie, in zonele in care strazile sunt inguste, tramvaiele sa fie inlocuite de autobuze hibrid, sau cu cele functionand cu gaz.

3.2 Trolley busses

Current situation

The trolley busses in Bucharest drives currently 12.55 million km per year using 34.39 GWh/y. This gives a specific consumption (benchmark) of 2.74 kWh/km.

The trolley busses are a mix of old trolley based on 1960 technology and modern trolleys based on best available technology at the turn of the century.

Planned development

Extension of the trolley operation is planned. In year 2020 it is expected that the services will be extended by about 45-50% to about 17.5 million km.

A replacement programme for old trolleys is elaborated and most of the current old trolleys are expected replaced by 2030 (or before if financing will be available).

Energy conservation

Modern trolleys with best available technology are at least 40% more efficient than the old trolleys still in operation. However, as the trolley system is developed a higher service speed will be introduced increasing the consumption. A realistic forecast will thus be that the specific consumption will decrease with about 20% from 2.74 kWh/km to about 2.2 kWh/km in 2030.

3.2 Troleibuze

Situatia actuala

In sistemul de troleibuze din Bucuresti se ruleaza in prezent aproximativ 12,55 milioane km pe an, consumand 34,39 GWh/an. Acestea conduc la calcularea unei valori de benchmarking privind consumul specific de 2,74 kWh/km.

Sistemul de troleibuze este un mix format din troleibuze vechi cu tehnologie la nivelul anului 1960 si troleibuze noi cu cea mai buna tehnologie disponibila la inceputul secolului 21.

Planificarea dezvoltarii

Extinderea sistemului de troleibuze este planificata. In anul 2020 se asteapta ca serviciile sa fie extinse cu aproape 45-50%, ajungandu-se la o distanta parcursa pe an de 17,5 milioane km.

A fost elaborat un program de inlocuire a troleibuzelor vechi, astfel incat, in masura in care fondurile vor fi disponibile, parcul acestora va fi complet inlocuit in 2030, sau mai devreme.

Conservarea energiei

Troleibuzele moderne bazate pe cea mai buna tehnologie disponibila sunt cu cel putin 40% mai eficiente decat troleibuzele vechi aflate in prezent in exploatare. Totusi, in conditiile in care sistemul de troleibuze se va dezvolta ca un sistem cu viteza de rulare crescuta, consumul de energie va creste. Astfel, o prognoza realistica va lua in considerare o scadere la nivelul anului 2030, a consumului cu aproximativ 20% si implicit a valorii de benchmarking de la 2,74 kWh/km, la aproximativ 2,2 kWh/km.

Strategy

The recommended strategies regarding trolley services are:

- To continue the ongoing modernisation programme and insure funds for replacement of old equipment
- To ensure best available technology introduced when equipment is changed (perhaps accept a higher price if the consumption is lower)
- Improve the conditions for trolley busses and other busses. Where possible establish special bus lanes and fine cars blocking the lanes.
- Update the development plan in coordination with other public services. Perhaps hybrid busses running on electricity with gas engine back-up should replace trolleys when this technology is developed further than it is today.

Strategia

Strategiile recomandate pentru sistemul de transport cu tramvaie sunt:

- Continuarea programelor de modernizare aflate in derulare si asigurarea fondurilor necesare inlocuirii echipamentelor vechi.
- Obtinerea asigurarii privind disponibilitatea celei mai bune tehnologii, atunci cand echipamentele vechi sunt inlocuite (chiar acceptarea unui pret mai ridicat, daca consumul este mai redus).
- Imbunatatirea conditiilor pentru troleibuze si alte tipuri. Acolo unde este posibil stabilirea unor culoare speciale pentru troleibuze si evitarea blocarii acestora de catre autoturisme.
- Actualizarea planului de dezvoltare in coordonare cu celelalte servicii publice. Atunci cand tehnologia va fi mai dezvoltata decat este in prezent, poate fi considerata ca o solutie, inlocuirea troleibuzelor cu autobuze hibrid functionand electric si avand ca rezerva motoare cu gaz.

3.3 Diesel busses

Current situation

The current bus services are 62.41 million km per year using 979 TJ diesel fuel per year.

Most of the old 60'ties technology busses are replaced with modern state-of-art technology but so far no concept busses using alternative energy source than diesel oil are found in Bucharest.

In spite of modern technology the diesel busses is still a significant contributor to bad air quality in Bucharest.

3.3 Autobuze diesel

Situatia actuala

In prezent, in Bucuresti autobuzele parcurg 62,41 milioane km pe an, consumand 979 TJ motorina/an. Cele mai multe autobuze cu tehnologie aferenta anilor 60' au fost inlocuite cu autobuze din ultima generatie in materie de tehnologie (combustibil - motorina), insa conceptul de autobuze utilizand surse alternative de energie nu a fost introdus inca in Bucuresti

In ciuda faptului ca tehnologia este moderna, autobuzele diesel contribuie semnificativ la proasta calitate a aerului din Bucuresti.

Planned development

The bus services are planned extended with 20-30% to about 70 million km in year 2020.

The environmental impact of bus driving is recognised by the operator and the goal is to continuously reduce the impact.

Planul de dezvoltare

Extinderea sistemului de autobuze este planificata. In anul 2020 se asteapta ca serviciile sa fie extinse cu aproape 20-30%, ajungandu-se la o distanta parcursa pe an de 70 milioane km.

Impactul utilizarii autobuzelor asupra mediului este recunoscut de catre operator, iar obiectivul ramane acela de a-l reduce in mod continuu.

Energy conservation

The motor technology is constantly improving due to lowering of the emission limits in EU legislation and in National legislation. This together with introduction of hybrid technology where breaking energy is obtained in batteries and used for acceleration will constantly reduce the specific energy consumption. A reduction from 15.68 MJ/km today to about 12.5 MJ/km in year 2030 can be expected.

Strategy

The recommended strategies regarding diesel busses are:

- To shift fuel from diesel to gas when busses are replaced. This requires filling stations on the route and will thus not be feasible for all lines.
- To replace worn-out busses with hybrid busses using electricity accumulated during the night with fuel engine as back-up.
- To improve the traffic conditions for busses. Where possible introduce special bus lanes and fine cars blocking the lanes.

3.4 Metro

Current situation

The current metro system is 124.4 km and the services consume 145.7 GWh per year.

Planned development

An extensive expansion of the metro system is planned. Within the next 20 years the system will grow from the current 124.4 km to 310.8 km. At the same time the train frequency will be increased.

For providing the additional services the consumption will grow from the current 145.7 GWh to 576.6 GWh.

Conservarea energiei

Tehnologia pentru motoare este constant imbunatatita ca urmare a cerintelor UE si a legislatiei nationale, de a limita emisiile. Acestea, impreuna cu introducerea tehnologiei hibride, conform careia energia se acumuleaza in baterii si ulterior este folosita pentru accelerare, vor contribui in mod constant la reducerea consumului specific de energie. Astfel, se va putea astepta la o scadere la nivelul anului 2030, a consumului specific de la15,68 MJ/km, la aproximativ 12,50 MJ/km.

Strategia

Strategiile recomandate pentru sistemul de transport cu autobuze diesel sunt:

- Inlocuirea motorinei cu gaz, odata cu reinoirea parcului de autobuze. Acest aspect necesita construirea statiilor de alimentare pe trasee, iar acest lucru nu va fi fezabil pentru toate liniile.
- Inlocuirea autobuzelor uzate moral si fizic cu autobuze hibrid, care isi vor incarca bateriile electrice in timpul noptii si vor avea ca rezerva motoare cu gaz.
- Imbunatatirea conditiilor de trafic pentru autobuze. Acolo unde va fi posibil se vor introduce culoare speciale pentru autobuze, evitandu-se blocarea acestora de catre autoturisme.

3.4 Metroul

Situatia actuala

Sistemul actual de metrou are o lungime de 124,4 km, iar consumul de energie este de 145,7 GWh/an.

Planul de dezvoltare

Extinderea sistemului de metrou este planificata. In urmatorii 20 de ani, sistemul se va extinde de la 124,4 km cat este in prezent, la 310,8 km. In acelasi timp, se preconizeaza cresterea frecventei trenurilor.

Pentru serviile suplimentare care vor fi puse la dispozitie, consumul de energie va creste de la 145,7 GWh, cat este in prezent, la 576,6 GWh.

Energy conservation

The operator has included and improved efficiency of about 10% in his calculation of the future energy consumption.

To the extent it will be possible to move transport from private cars to the metro the energy conservation will be significant. The thump rule is that a train transport passengers with only 10% energy consumption compared to private cars with 2 persons.

Strategy

It is generally recognised that best way to ease traffic congestion problems is to move as much as possible of the traffic underground and/or over ground. Thus, in must large cities construction works extension current train systems or construction of new train systems is ongoing. Bucharest is following the same development trend.

The strategy is thus very simple: Extent the metro system as fast as possible.

Conservarea energiei

Pentru consumul viitor de energiei, operatorul serviciilor si-a inclus in calculele sale cresterea eficientei cu aproximativ 10%.

Prin inlocuirea transportului privat (autoturisme) cu sistemul de metrou, conservarea energiei obtinute va fi relevanta. Raportul este urmatorului : un tren de pasageri consuma doar 10% din energia consumata de catre un autoturism privat care transport 2 persoane.

Strategia

Este general recunoscut, ca cea mai buna metoda pentru a imbunatati traficul de suprafata si a reduce aglomerarea este aceea de a dirija traficul de suprafata catre cel pe sub pamant. Astfel, in cele mai multe orase mari, se afla in derulare lucrari de constructii pentru sisteme noi de metrou, sau extinderea celor existente. In Bucuresti, se regaseste aceeasi tendinta de dezvoltare.

In acest sens strategia este foarte simpla: extinderea sistemului de metrou cat mai repede posibil.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Part C: Appendixes

Appendix 5a: Benchmarking

Contract 4144 / 31.12.07

Strategia energetica a Municipiului Bucuresti

Etapa III: Strategia

Partea C: Anexe

Anexa 5a: Benchmarking

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ATH energ

Grontmij | Carl Bro

Table of content

Cuprins

1 INTRODUCTION

1.1 Definition

Benchmarking is the process of comparing the cost, cycle time, productivity, or quality of a specific process or method to another that is widely considered to be an industry standard or best practice. Essentially, benchmarking provides a snapshot of the performance of your business and helps you understand where you are in relation to a particular standard. The result is often a business case for making changes in order to make improvements. The term benchmarking was first used by cobblers to measure ones feet for shoes. They would place the foot on a "bench" and mark to make the pattern for the shoes. Benchmarking is most used to measure performance using a specific indicator (cost per unit of measure, productivity per unit of measure, cycle time per unit of measure or defects per unit of measure) resulting in a metric of performance that is then compared to others

1.2 District heating and Benchmarking

The benchmarking principles have been used within the district heating sector for more than a decade to compare the performance of district heating companies.

Danish District Heating Association and Swedish District Heating Association were the first to establish a benchmarking. In the beginning the benchmarking only comprised very few parameters. The today used benchmarking system was introduced for the heating season 2001/2002 and the system is still improved.

From Denmark and Sweden the benchmarking for comparison of performance was adopted in many countries and comparable systems are today adopted in the countries around the Baltic Sea, Ukraine and the Check republic. Thus, the comparison can today be performed on international basic.

Benchmarking values are today used by the public authorities to establish the performance of private and public district heating companies.

1 INTRODUCERE

1.1 Definitie

Benchmarking-ul reprezinta procesul de comparare a costurilor, ciclului de productie, productivitatii sau calitatii unui anumit proces sau metoda cu altele care, in general sunt considerate a fi standard sau cele mai bune. In mod esential, valorile de referinta ofera o imagine instantanee a randamentului afacerii dumneavoastra si va ajuta sa intelegeti unde va aflati luand in considerare un anumit standard. Adesea, rezultatul conduce la realizarea unor schimbari cu scopul de a imbunatati. Termenul benchmarking (analiza comparativa) a fost folosit prima data de cizmari pentru a lua masuri pentru pantofi. Acestia puneau piciorul pe o “placa” si marcau forma pentru pantofi. Benchmarking-ul este de cele mai multe ori folosita pentru a masura performanta folosind un indicator specific (cost per unitate de masura, productivitatea per unitate de masura, ciclul de timp pe unitate de masura sau defecte per unitate de masura) avand ca rezultat o unitate de masura pentru performanta care este ulterior comparata cu altele.

1.2 Termoficarea si Benchmarking-ul

Principiile benchmarking-ului au fost folosite in sectorul termoficarii de mai mult de 10 ani in vederea compararii performantei companiilor de termoficare.

Asociatia Daneza pentru Termoficare si cea suedeza au fost primele care au stabilit sistemul de benchmarking. La inceput benchmarking-ul cuprindea foarte putini parametrii. Analiza comparativa folosita astazi a fost introdusa pentru sezonul de incalzire 2001/2002 si este intr-un proces continuu de imbunatatire.

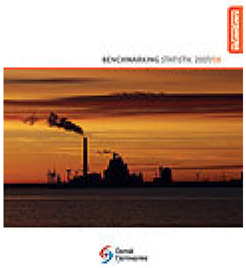
Benchmarking-ul din Danemarca si Suedia, pentru compararea performantei a fost adoptat in multe tari si in prezent, astfel de sisteme de comparare sunt adoptate in tarile din jurul Marii Baltice, Ucraina si Republica Ceha. Asadar, astazi comparatia poate fi realizata la nivel international.

In prezent, valorile de referinta sunt folosite de autoritatile publice pentru a stabili performanta companiilor de termoficare publice si private.

2 EXAMPLE OF BENCHMARKING

2 EXEMPLU DE BENCHMARKING

The annual benchmarking report from Danish District Heating Association 2007/2008 is used as an example of how benchmarking is performed. The report can in full, original version be seen on www.danskfjernvarme.dk but unfortunately only in Danish. In this section we present a description of the report with translation of key sections of the report.



Raportul anual privind Benchmarking-ul Asociatiei Daneze pentru termoficare 2007/2008 este folosit drept exemplu pentru a demonstra cum functioneaza acesta. Raportul poate fi consultant in intregime pe www.danskfjernvarme.dk, insa din pacate este in limba daneza. In aceasta sectiune va prezentam o descriere a raportului cu o traducere a sectiunilor importante din raport.

2.1 Content of the benchmarking report

2.1 Continutul raportului de benchmarking

The report is in two sections, one with general information about district heating in Denmark and one with specific information about the performance of the almost 600 district heating companies in Denmark participating in Danish District Heating Association.

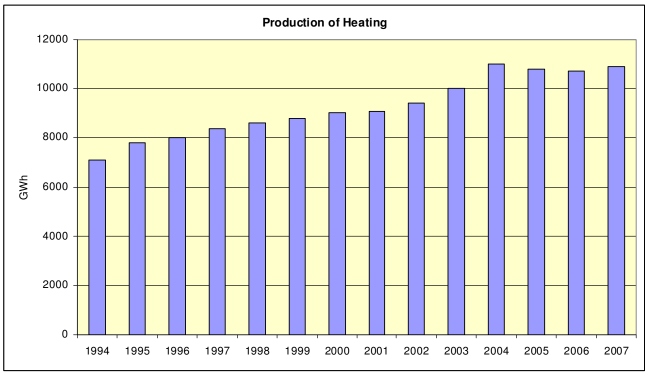
Raportul este impartiti in doua sectiuni, una cu informatii generale privind incalzirea centralizata in Danemarca si una cu informatii specifice privind cele circa 600 de companii de termoficare din Danemarca afiliate la Asociatia daneza pentru termoficare.

General statistic information

Informatii statistice generale

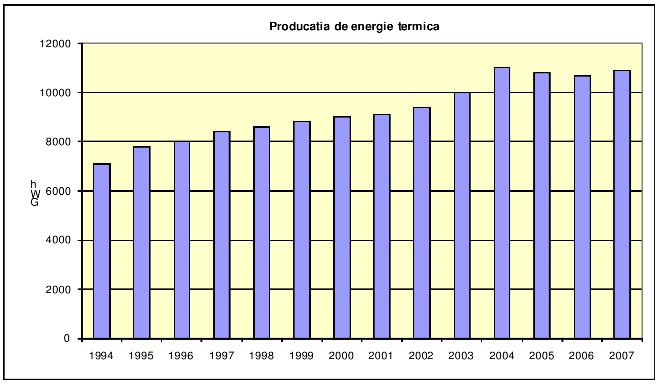
Production of Heating

The development in production of heating in Denmark is shown in the figure below:



Productia de energie termica

Dezvoltarea productiei de energie termica in Danemarca este prezentata in figura de mai jos:



The production sources were in 2007:

Source	GWh	%
Centralised CHP	15,127	45
Decentralised CHP	11,931	35
Heat-only boilers	6,682	20

Sursele de productie in anul 2007 au fost:

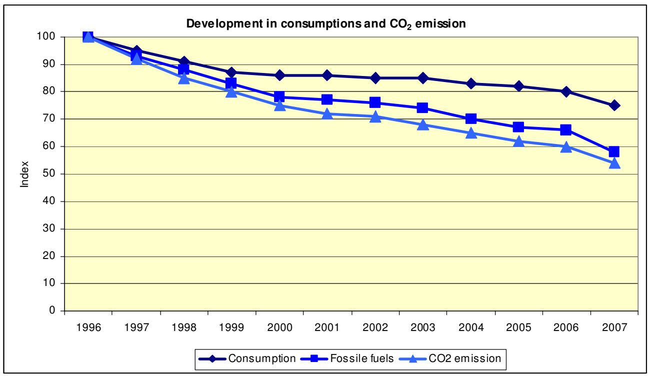
Sursa	GWh	%
Cogenerare centralizata	15.127	45
Cogenerarea descentralizata	11.931	35
CAF-uri	6.682	20

The fuel used for production of heating was in 2007:

Type of fuel	TJ	%
Hard coal	9,100	27
Natural gas	9,664	29
Oil	1,299	4
Industrial surplus energy	922	3
Waste	6,892	20
Bio-mass	5,470	16
Bio-gas	274	1
Others	117	0
Total	33.739	100

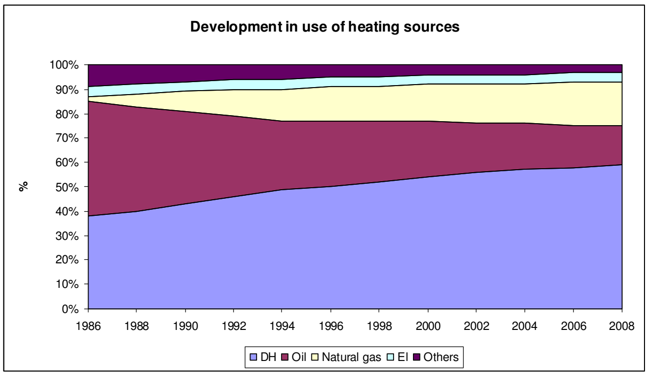
District heating consumption and environmental impact

The development in consumption, use of fossil fuels and CO_2 emission per m^2 heated area is shown in the figure below:



Sources for heating

The development in use of heating sources is shown in the figure below:



Since 1981 the use of district heating has increased from 34% to 60% while the use of oil has dropped from 53% to 16%.

Natural gas, introduced in Denmark in the beginning of the 1980'ties is now covering 14% of the demand.

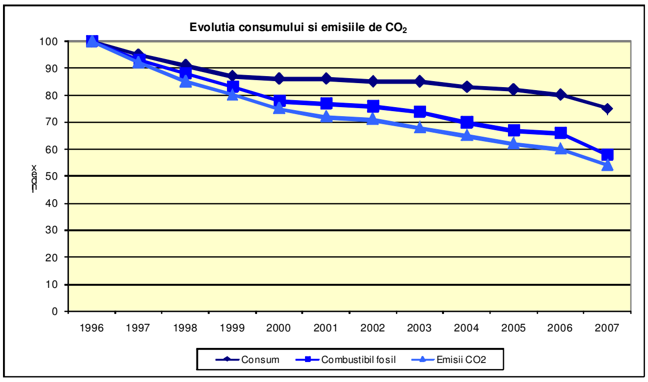
District heating is the most common used source of

Combustibilul folosit pentru producerea de energie termica in anul 2007 a fost:

Tipul combustibilului	TJ	%
Carbune	9.100	27
Gaz natural	9.664	29
Pacura	1.299	4
Surplus de energie industriala	922	3
Deseuri	6.892	20
Biomasa	5.470	16
Biogaz	274	1
Altele	117	0
Total	33.739	100

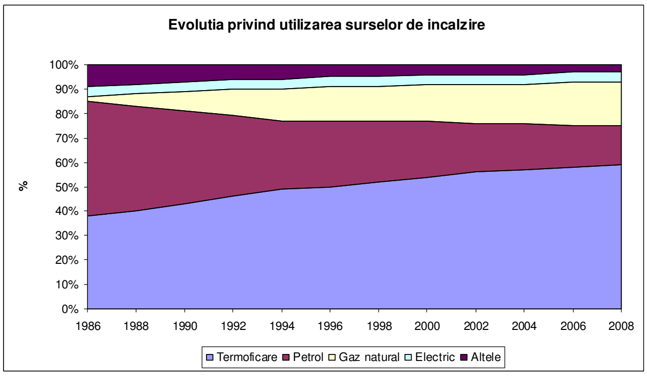
Consumul de energie termica si impactul asupra mediului

Evolutia consumului, folosirea combustibilului fosil si emisiile de CO_2 per m^2 de zona incalzita sunt prezentate in graficul de mai jos:



Surse pentru incalzire

Dezvoltarea privind folosirea surselor de incalzire este prezentata in figura de mai jos:



Din anul 1981 folosirea energiei termice a crescut de la 34% la 60% in timp ce folosirea pacurii a scazut de la 53% la 16%.

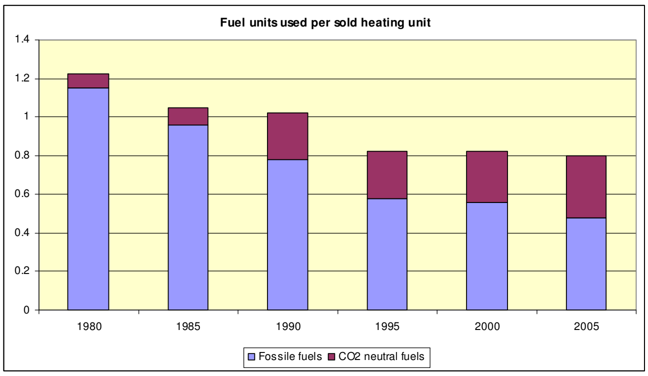
Gazul natural, introdus in Danemarca la inceputul anilor '80 acopera in prezent 14% din cerere.

Sistemul de incalzire centralizat este sursa de heating for one-family houses as well as for apartment blocks with 41% and 87%, respectively.

incalzire cea mai des intalnita in casele pentru o sigura familie si pentru blocuri, in proportie de 41%, respectiv 87%.

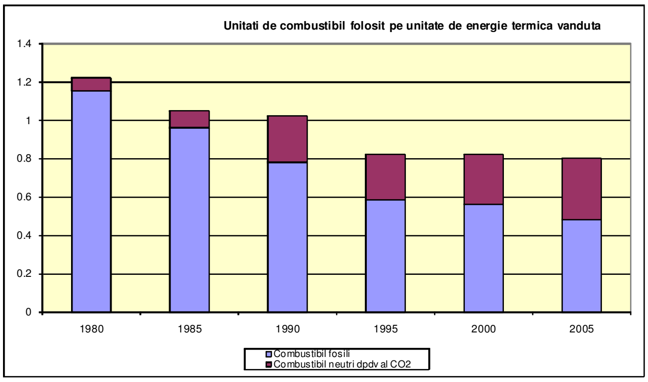
District heating efficiency

The efficiency expressed as used fuel unit per sold heating unit is shown in the figure below:



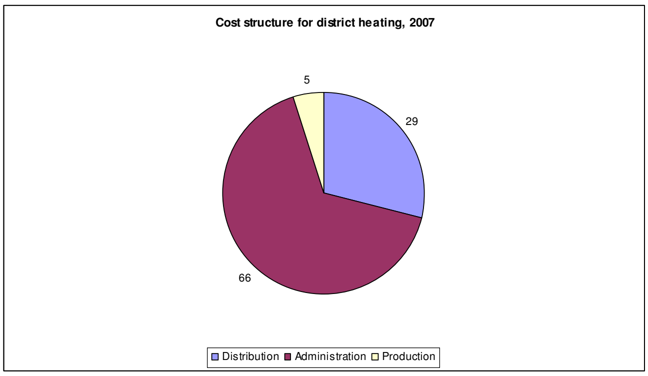
Eficienta incalzirii centralizate

Eficienta exprimata in unitati de combustibil folosit pe unitati de energie termica vanduta este prezentata in tabelul de mai jos:



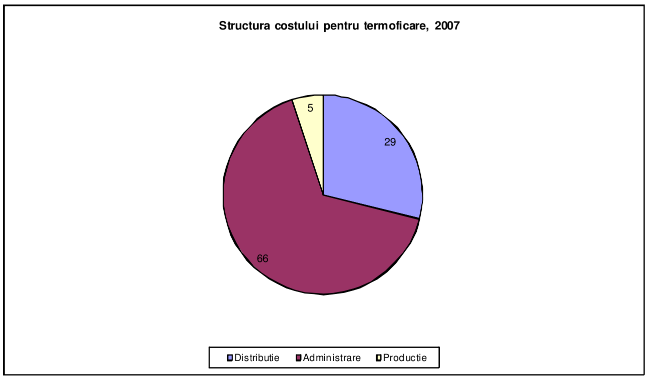
District heating cost structure

The cost structure for Danish district heating in 2007 is shown in the figure below:



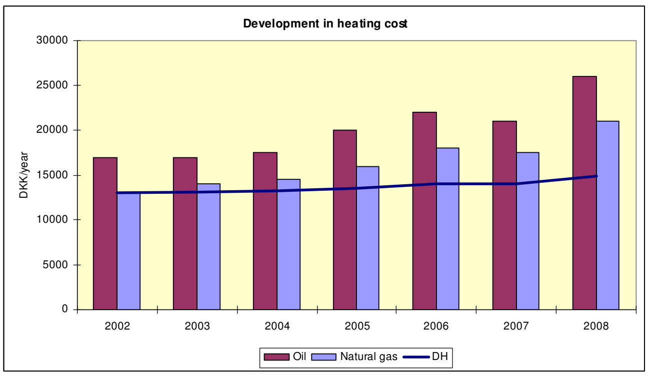
Structura costului energiei termice

Structura costului energiei termice in Danemarca in anul 2007 este prezentata in graficul de mai jos:



Heating costs

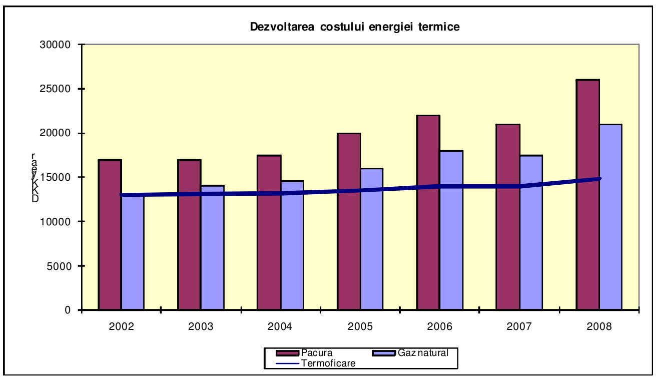
The development in cost of heating a so-called Danish standard house including energy and environmental taxes and VAT is shown in the figure below:



More than 50% of the costs are taxes and VAT.

Costurile de incalzire

Dezvoltarea costului incalzirii pentru o casa standard in Danemarca, incluzand taxe de mediu si energie si TVA este prezentata in figura de mai jos:



Mai mult de 50% din costuri reprezinta taxe si TVA.

Specific information (benchmarking values)

The benchmarking is reported in four tables:

- Table 1: General data
- Table 2: Data for production
- Table 3: Data for operation, maintenance and administration
- Table 4: Economical data

These tables are shown on the following pages:

Informatii specifice (valori de referinta)

Analiza comparativa este raportata in patru tabele:

- Tabelul 1: Date generale
- Tabelul 2: Date pentru producere
- Tabelul 3: Date pentru exploatare, inretinere si administrare
- Tabelul 4: Date economice

Aceste tabele sunt prezentate in paginile urmatoare:

Distribution companies, General data

Name	Meters	Supplied energy	Max consump-tion	Utilisation	System length		Connected capacity		Flow temperature		Return temperature		Cooling
					Main	Branches			Winter	Summer	Winter	Summer	
		GWh	MW	h	km	km	MW	MW/km	^0C	^0C	^0C	^0C	^0C
Denumire	Contori	Energia furnizata	Consum max tion	Utilizare	Lungimea sistemului		Capacitatea conectata		Temperatura tur		Temperatura Return		Racirea
					Mag	Ramuri			Iarna	Vara	Iarna	Vara	
		GWh	MW	h	km	km	MW	MW/km	^0C	^0C	^0C	^0C	^0C
Aabenraa	7,690	273	68	4,020	220	114	301	1.37	75	71	36	42	38
Aalborg	31,541	1,723	485	3,552	800	540	1,545	1.93	82	75	39	40	40
Klejtrup													
Allerød, Engholm													
Allerød, Lillerød													
Ansager	634	15			9	8	11	1.15	76	76	34	38	42
Århus	48,415	2,334	898	2,599	1,107	717	2,602	2.35	85	75	45	50	
Aars	3,755	92	24	3,847	94	94	83	0.88	80	80	35	40	
Ferritslev	258	6			5	3	6	1.17	73	73	30	32	
Assens	2,694	75	22	3,364	52	38	75	1.44	95	75	35	41	37
Augustenborg	1,307	26	6	4,007	23	20	30	1.30	72	72	34	44	36
Auning	921		6		20	19			73	73	44	55	28
Avedøre Holme, steam	128	103	31	3,321	13	8			165	165	75	100	
Bjerringbro	2,108	89	29	3,054	53	41	82	1.54	76	71	35	40	51
Bogense	1,294	33	12	2,789	18	19	28	1.58	72	72	36	39	34
Bramming	2,397	68	20	3,416	51	36	67	1.32	80	80	33	36	46
Bredebro													
Hindsholm	379	12	3	4,634	17	12	9	0.53	80	65	35	40	40
Bredsten-Balle	623	16	4	3,919	14	14	12	0.84	76	75	40	43	33
Broager	1,007	23	6	3,706	17	18	28	1.60	78	76	34	38	41
Brovst													
more													

Distribution companies, Data for production/Companii de distributie, Date pentru productie																
Name	**Heat-only boilers**								**CHP**							
	Oil	Natural gas	Wood pilets	Straw	Chips	Waste	Industry surplus	Others	Coal	Oil	Natural gas	Wood pilets	Straw	Chips	Waste	Industry surplus
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Denumire	**CAF-uri**								**Centrala de cogenerare**							
	Pacura	Gaz natural	Peleti de lemn	Paie	Cipsuri	Deseuri	Surplus industrial	Altele	Carbune	Pacura	Gaz natural	Peleti de lemn	Paie	Cipsuri	Deseuri	Surplus industrial
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Aabenraa	1							0	163				109			
Aalborg	1	32					490	0	828						371	
Klejtrup																
Allerød, Engholm																
Allerød, Lillerød																
Ansager	0		14		1											
Århus	6			82			13		1,745						494	
Aars		2	2												89	
Ferritslev											6					
Assens					2									74		
Augustenborg		17									8					
Auning																
Avedøre Holme, steam	20	18	8	5				17							31	
Bjerringbro		43									46					
Bogense		11						19			4					
Bramming											68					0
Bredebro																
Hindsholm											12					
Bredsten-Balle		7									10					
Broager		12									14					
Brovst																
altele																

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Distribution companies, Data for operation and maintenance/Companii de distributie, Date pentru exploatare si intretinere

Name	Circulated water		Power consump-tion	Make-up Water		Heat losses	Operation and maintenance costs							
							Energy procured	Energy sold	Staff	Mainte-nance	Other O&M	Admini-stration	Deprecia-tion	Reserve fund
	1000 m^3	m^3/MWh	kWh/MWh	m^3/GWh	m^3/km	MWh/km	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh
Denumire	Apa circulata		Consum energie electrica	Apa de adaos		Pierderi de caldura	Costuri de exploatare si intretinere							
							Energie cumparata	Energie vanduta	Personal	Intre tinere	Altele	Admini-stratie	Amorti zare	Fond de rezerva
	1000 m^3	m^3/MWh	kWh/MWh	m^3/GWh	m^3/km	MWh/km	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh
Aabenraa	6,230	23	3	75	68	199								
Aalborg	36,734	21	9	65	72	299								
Klejtrup														
Allerød, Engholm														
Allerød, Lillerød														
Ansager	309	21	12	32	40	212	39.64	52.49	8.61	1.56	4.69	2.26		
Århus			3	44	39	309	37.91	49.96	3.07	6.53	3.48	0.07	0.84	0.37
Aars			52	100	111	147								
Ferritslev			13	178	145	180	47.70	107.35	12.50	0.12	12.81	0.73	20.96	
Assens	1,740	23	33	95	93	151								
Augustenborg	617	24	5	17	14	159								
Auning	642													
Avedøre Holme, steam			6	29		1,062	44.25	56.10	6.37	1.99	3.83	0.19	2.40	
Bjerringbro	1,508	17	7	36	38	153								
Bogense	846	25	9	62	69	180								
Bramming	1,272	19	8	47	47	192								
Bredebro														
Hindsholm	257	21	10	15	19	157								
Bredsten-Balle	425	26	8	91	116	172								
Broager	486	21	8	41	32	156	52.95	100.82	13.77	5.05	8.42	2.64	18.76	4.28
Brovst														
altele														

Distribution companies, Economical Data				
Companii de distributie, Date economice				
Name	Energy Procured	Total distribution costs	Administration costs	
	EUR/MWh	EUR/MWh	EUR/MWh	EUR/meter
Denumire	Energie cumparata	Total costuri distributie	Costuri de administrare	
	EUR/MWh	EUR/MWh	EUR/MWh	EUR/meter
Aabenraa	38.86	21.59	4.17	112.23
Aalborg	27.65	17.36	2.90	121.53
Klejtrup				
Allerød, Engholm				
Allerød, Lillerød				
Ansager				
Århus				
Aars	43.03	25.35	7.74	133.47
Ferritslev				
Assens	71.98	15.25	5.91	134.17
Augustenborg	88.20	38.23	7.26	104.25
Auning				
Avedøre Holme, steam				
Bjerringbro	98.15	14.03	4.25	149.42
Bogense	67.98	25.73	3.70	76.67
Bramming	86.43	20.82	4.17	89.93
Bredebro				
Hindsholm	38.41	48.30	9.06	179.12
Bredsten-Balle	98.86	46.22	5.75	103.80
Broager				
Brovst				
	55.54	32.65	4.88	76.86
altele				

Transmission companies, General data

Name	Meters	Supplied energy	Max consump-tion	Utilisation	System length	Flow temperature		Return temperature		Cooling
						Winter	Summer	Winter	Summer	
		GWh	MW		km	^0C	^0C	^0C	^0C	^0C
Denumire	Contori	Energia furnizata	Consum max	Utilizare	Lungimea sistemului	Temperatura tur		Temperatura Return		Racirea
						Iarna	Vara	Iarna	Vara	
		GWh	MW		km	^0C	^0C	^0C	^0C	^0C
CTR	60	4,685	1,337	3,504	54	107	97	51	50	56
TVIS	8	1,324			80	110	95	43	46	67
VEKS	19	2,304			104	115	95	50	50	65

Transmission companies, Data for production/Companii de transport, Date pentru productie

Name	Heat-only boilers								CHP								
	Oil	Natural gas	Wood pilets	Straw	Chips	Waste	Industry surplus	Others	Coal	Oil	Natural gas	Wood pilets	Straw	Chips	Waste	Industry surplus	Others
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
Denumire	Heat-only boilers								CHP								
	Pacura	Gaz natural	Peleti de lemn	Paie	Cipsuri	Deseuri	Surplus industrial	Altele	Carbune	Pacura	Gaz natural	Peleti de lemn	Paie	Cipsuri	Deseuri	Surplus industrial	Altele
	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh
CTR	420	935	678					1,375							1,276		
TVIS							477	8		106	734						
VEKS	19	2,304	236	454	195	127				428							788

Transmission companies, Data for operation and maintenance/Companii de transport, Date pentru exploatare si intretinere

Name	Circulated water		Power consumption	Make-up Water		Heat losses	Operation and maintenance costs: Energy procured	Energy sold	Staff	Maintenance	Other O&M	Administration	Depreciation	Reserve fund
	1000 m^3	m^3/MWh	kWh/MWh	m^3/GWh	m^3/km	MWh/km	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh
Denumire	Apa circulata		Consum energie electrica	Apa de adaos		Pierderi de caldura	Costuri de exploatare si intretinere: Energie cumparata	Energie vanduta	Personal	Intretinere	Altele	Administratie	Amortizare	Fond de rezerva
	1000 m^3	m^3/MWh	kWh/MWh	m^3/GWh	m^3/km	MWh/km	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh	EUR/MWh
CTR	76,047	16	11	9		864	36.38	36.75	0.39		3.35	0.26	2.19	
TVIS						476								
VEKS						661	37.10	38.24	1.27		5.86	0.82	15.29	

Transmission companies, Economical Data
Companii de transport, Date economice

Name	Energy Procured	Total distribution costs	Administration costs	
	EUR/MWh	EUR/MWh	EUR/MWh	EUR/meter
Denumire	Energie cumparata	Total costuri distributie	Costuri de administrare	
	EUR/MWh	EUR/MWh	EUR/MWh	EUR/meter
CTR				
TVIS	30.30	2.43	0.63	101337
VEKS				

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Part C: Technical Note 26.08.2009

Impact of delayed implementation

Contract 4144 / 31.12.07

Strategia Energetica a Municipiului Bucuresti

Etapa a III-a: Strategia

Partea C: Nota tehnica din data de 26.08.2009

Impactul intarzierii implementarii

4				
3				
2				
1	30.08.2009	First edition	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

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Cuprins

1 INTRODUCTION

The Consultant is requested to analyse the impact of delaying the implementation of the Energy Strategy with 5 respectively 10 years. This means that the goals established for 2020 will only be reached in 2025 or 2030.

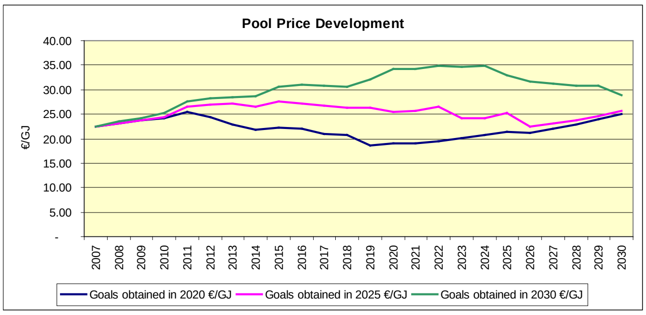
1 INTRODUCERE

Consultantul a primit solicitarea de a analiza impactul intarzierii implementarii Strategiei Energetice a Municipiului Bucuresti cu 5, respectiv 10 ani. Aceasta inseamna ca obiectivele stabilite pentru anul 2020 vor fi atinse in 2025 sau 2030.

2 CONCLUSION

2.1 Heat price, EUR/GJ

Delaying the implementation will impact the pool price[1] of heat:



In the baseline scenario, blue curve – Goals obtained by 2020, it will be possible to reduce the tariff from 2012 when the first local peak-load boilers are installed and the first solar panels starts production. After 2020 the heat price will increase following the general price increases in the society.

In the 5-year delayed scenario, pink curve – Goals obtained by 2025, the heat price will continue to increase until after 2015 where the proposed measures take effect. After 2015 we'll see a decreasing heat price until 2025.

In the 10-year delayed scenario, green curve – Goals obtained by 2030, the heat price will continue to increase until about 2020 where it is stabilised. After 2025 we'll se a decrease in the heat price.

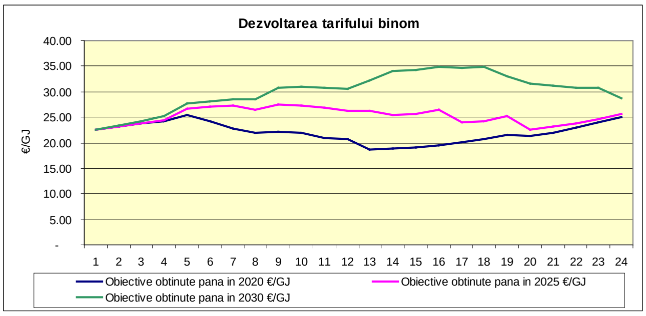
2.2 Production costs, EUR/y

Due to delay in commissioning of the proposed cheaper production facilities, especially waste-to-energy and solar heating systems, the annual production costs will be much higher in the delayed scenarios than in the baseline scenario.

2 CONCLUZIE

2.1 Pretul energiei termice, EUR/GJ

Intarzierea implementarii va avea un impact asupra pretului binom[1] al energiei termice:



In scenariul de baza, curba albastra - Obiective obtinute pana in 2020, va fi posibila reducerea tarifelor incepand cu 2012, cand vor fi instalate primele cazane locale pentru acoperirea varfului de sarcina si cand vor incepe sa produca primele panouri solare. Dupa 2020, pretul energiei termice va creste ca urmare a cresterii generala a preturilor in societate.

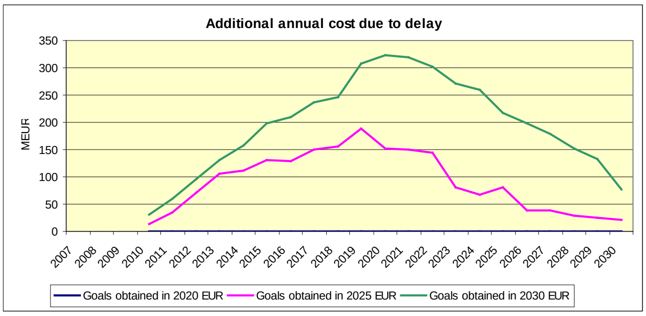
In scenariul cu o intarziere de 5 ani, curba de roz - Obiective obtinute pana in 2025, pretul energiei termice va continua sa creasca, pana cand, dupa anul 2015, masurile propuse vor avea efect. Dupa 2015 vom vedea o scadere a pretului pana in 2025.

In scenariul cu o intarziere de 10 ani, curba verde - Obiective obtinute pana in 2030, pretul energiei termice va continua sa creasca pana in 2020, cu aproximatie, cand se va stabiliza. Dupa 2025 vom vedea o scadere a pretului energiei termice.

2.2 Costurile de productie, EUR/an

Din cauza intarzieri in punerea in functiune a instalatiilor propuse, care pot produce energie ieftina, in special a sistemele de incinerare a deseurilor cu recuperarea caldurii si sistemele de incalzire solara, costurile anuale de productie vor fi mult mai mari in scenariile cu intarzierii decat in scenariul de baza.

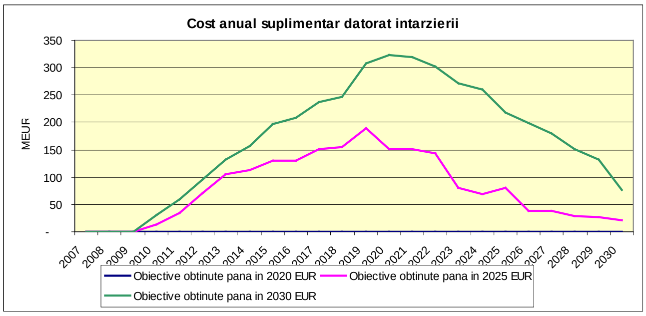
[1] The pool price of heat is the price the distribution companies pay for heat supplied by the Transmission Company/Pretul binom al energiei termice este pretul pe care il platesc companiile de distributie pentru energia termica furnizata de compania de transport.



The baseline scenario, blue curve – Goals obtained by 2020, is as reference set to zero.

The addition production costs is in the 5-year delayed scenario, pink curve – Goals obtained by 2025, show additional production costs of up to about 180,000,000 EUR/y. The total extra production costs for the period 2010 to 2030 will be about 2,000,000,000 EUR.

The additional production costs is in the 10-year delayed scenario, green curve – Goals obtained by 2030, show additional costs of up to more than 300,000,000 EUR/year. The total extra production costs for the period 2010 to 2030 will be about 4,000,000,000 EUR or about 1,000,000,000 more than to be invested for obtaining the baseline scenario.



Scenariul de baza, curba albastra – Obiective obtinute pana in 2020, este setat ca referinta la zero.

Costurile de productie suplimentare in scenariul cu o intarziere de 5 ani, curba roz – Obiective obtinute pana in 2025, arata o cresterea de pana la circa 180.000.000 EUR/an. Costurile suplimentare totale de productie pentru perioada 2010-2030 vor fi de circa 2.000.000.000 EUR.

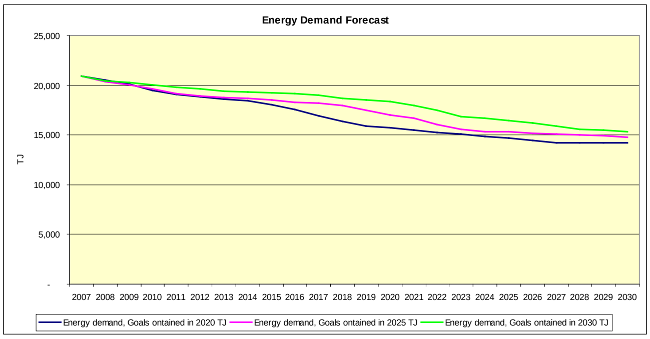
Costurile de productie suplimentare in scenariul cu o intarziere de 10 ani, curba verde – Obiective obtinute pana in 2030, arata o cresterea de peste 300.000.000 EUR/an. Costurile suplimentare totale de productie pentru perioada 2010-2030 vor fi de circa 4.000.000.000 EUR sau cu aprox. 1.000.000.000 mai mult decat ar trebui investit pentru a obtine scenariul de baza.

3 DETAILED ANALYSE

3.1 Energy conservation

Consumer level

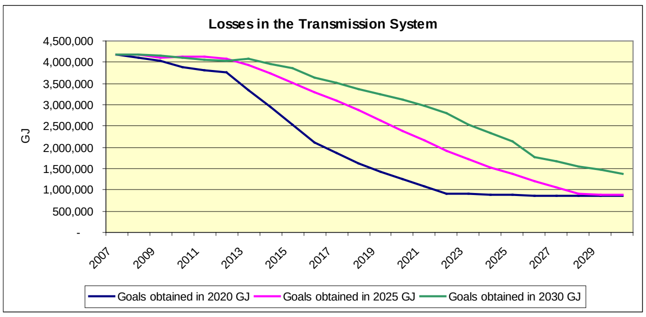
The impact of delaying the energy conservation at the consumers will delay the reduction in demand:



Denying the consumers the energy conservation means a higher heat bill making it even more difficult/painful to remove the general subsidises and also for the local budget (social welfare).

Network losses

A higher demand as show in previous section together with delay in moving the production from the centralised level to the decentralised/local levels means that the reduction in diameters and lengths of the transmission system will be delayed correspondingly. This impact the heat loses as shown:



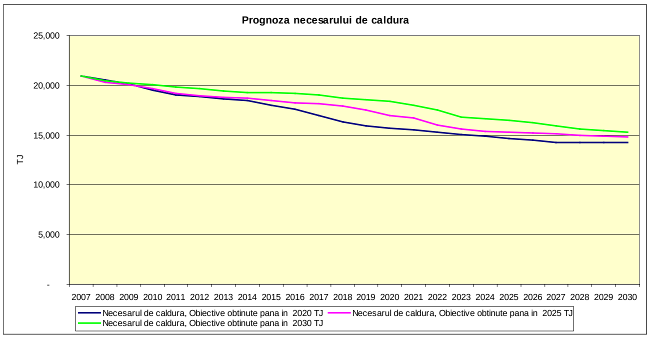
The impact in terms of costs are for the period 2010-2030 about 500,000,000 EUR (5 years delay) and 1,000,000,000 EUR(10 years delay), respectively:

3 ANALIZA DETALIATA

3.1 Conservarea energiei

La nivel de consumator

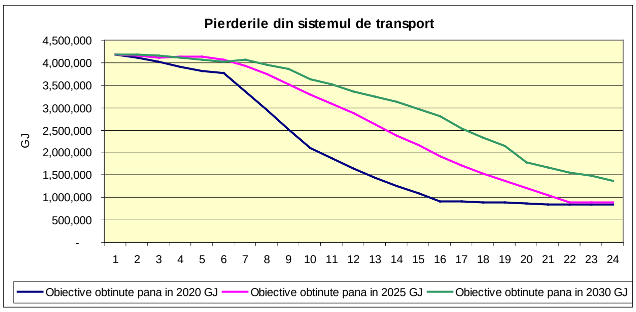
Impactul intarzierii conservarii energiei la nivel de consumator va intarzia reducerea cererii:



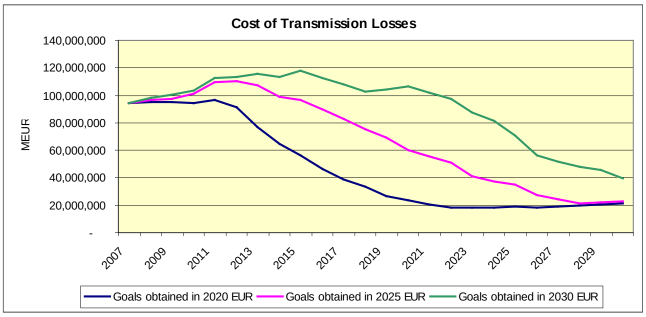
Refuzarea masurilor de conservarea a energiei consumatorilor inseamna o factura de energie termica mai mare, facand ca eliminerea subventiilor generale sa fie pentru consumatori mult mai greu de suportat dar si pentru bugetul local (ajutorul social).

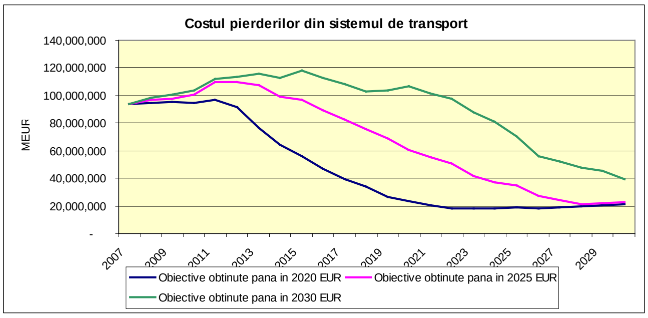
Pierderile de pe retea

O cerere mai mare dupa cum se arata in sectiunea anterioara, impreuna cu intarziere mutarii productiei de la nivel centralizat la nivel descentralizat/local inseamna intarzierea corespunzatoare a reducerii diametrelor si lungimilor sistemului de transport. Impactul asupra pierderilor de caldura este urmatorul:



Impactul in ceea ce priveste costurile pentru perioada 2010-2030 reprezinta 500.000.000 EUR(5 ani intarziere) si respectiv 1.000.000.000 EUR(10 ani intarziere):





3.2 Production Option

Existing CHP

Most of the existing CHP capacity has passed its useful lifetime long ago and is today operated downgraded and with low efficiency.

The base-line scenario (Goals obtained by 2020) assumes some of the capacity life extended to be in operation after 2020. However, it cannot be considered technical possible to life extent the lifetime additionally.

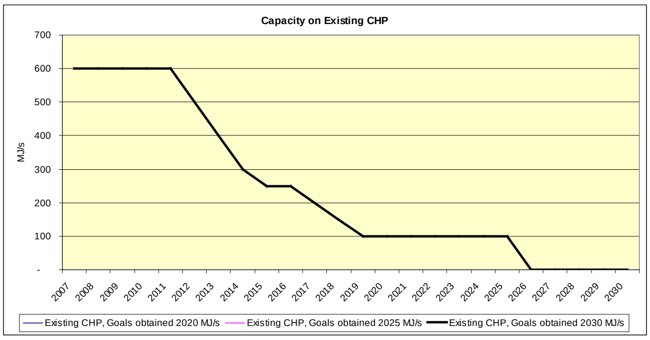
Thus the capacity is the same in all scenarios:

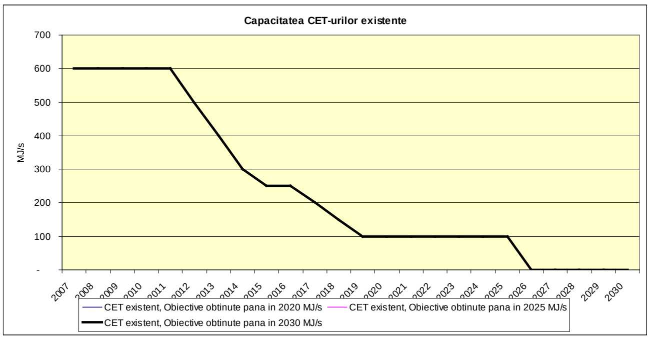
3.2 Optiunea privind producere

CET existent

Majoritatea capacitatilor de cogenerare si-au depasit durata de viata utila in urma cu mult timp si astazi functioneaza si echipamente invechite si cu eficienta scazuta.

In scenariul de baza (Obiective obtinute pana in 2020) se presupune ca durata de viata a unora dintre capacitatii sa fie extinsa pana dupa 2020. Totusi, din punct de vedere tehnic nu putem considera posibila extinderea duratei de viata suplimentar.





Existing Heat-only Boilers

Production from the existing heat-only boilers is the most expensive production in the system considering that the production must also carry the high transmission costs. The goal is thus to replace the centralised heat-only boiler production by energy conservation and construction of cheaper production sources enable reduction of the diameters and length on the transmission system.

Some of the existing heat-only boilers are assumed rehabilitated and used as local heat-only boilers in the future (this means connected to the distribution network and disconnected from the transmission network).

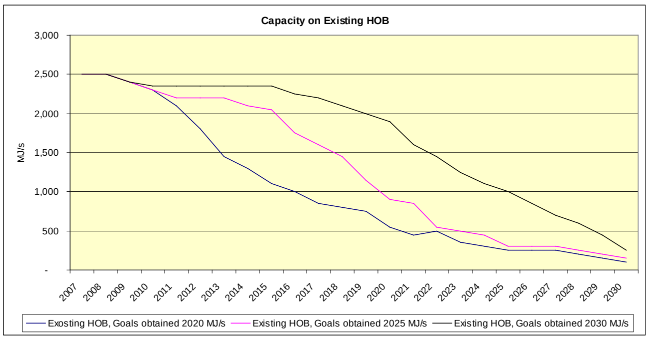
Delay in construction of new production capacity lead to delay in decommissioning of the existing heat-only boilers:

CAF-urile existente

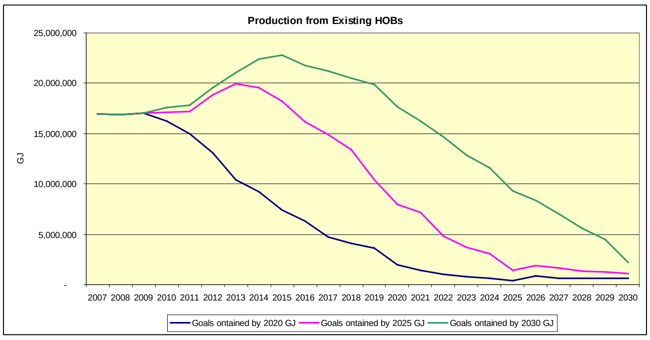
Productia de la CAF-urile existente este cea mai costisitoare din intreg sistemul avand in vedere faptul ca productia trebuie sa suporte si costurile mari de transport. Obiectivul este de a inlocui productia centralizata prin introducerea masurilor de conservare a energiei si construirea unor surse de producere mai ieftine care vor permite reducerea diametrelor si lungimilor sistemului de transport.

Se presupune ca unele dintre CAF-urile existente vor fi reabilitate si vor fi folosite ca CAF-uri locale in viitor (aceasta inseamna ca vor fi conectate la reteaua de distributie si vor fi deconectate de la reteaua de transport).

Intarzierea construirii noilor capacitati de producere va conduce la intarzierea dezafectarii CAF-urilor existente:



In terms of energy production the production from existing heat-only boilers will be increased:



Over the period 2010 to 2030 the existing heat-only boilers will produce additionally about 100,000,000 GJ in the 5-year delayed scenario and about additionally 200,000,000 GJ in the 10-year delayed scenario.

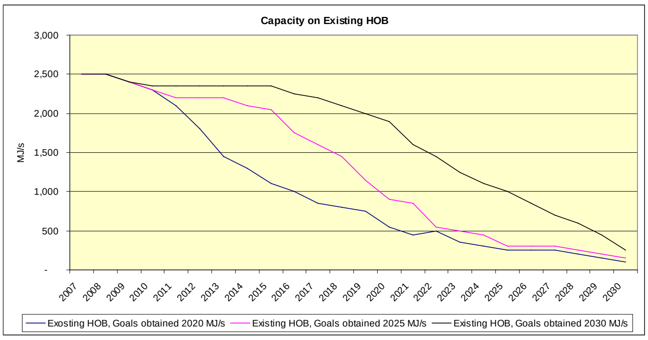
The tariff for existing HOBs increases over the 20-year period from about 12 EUR/GJ to about 40 EUR/GJ. In contrast the prise of production replacing the existing heat-only boilers, solar energy and waste-to-energy, increases far les; From about 5 EUR/GJ to about 6 EUR/GJ and from about 10 EUR/GJ to about 25 EUR/GJ, respectively.

Solar Heating Systems

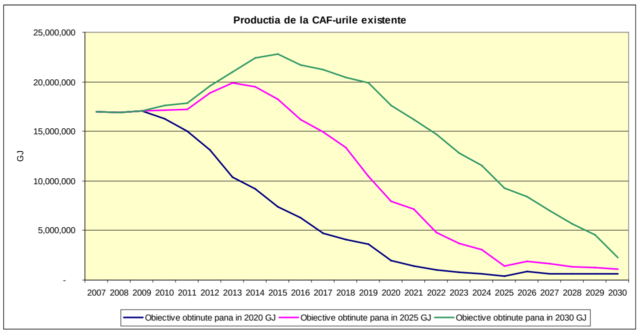
Installation of solar panels aims to reduce the heat tariff as this option is only second to waste-to-energy in terms of low production costs.

If supported by the Romanian government as currently discussed solar heating will be the cheapest production source in the system and will significant reduce the heat bills.

Delay in implementation will reduce the production from solar heating systems:



In ceea ce priveste productia de energie de la CAF-urile existente, aceasta va creste:



In perioada 2010 – 2030 CAF-urile existente vor produce suplimentar aproximativ 100.000.000 GJ in scenariul cu o intarziere de 5 ani si circa 200.000.000 GJ in scenariul cu o intarziere de 10 ani.

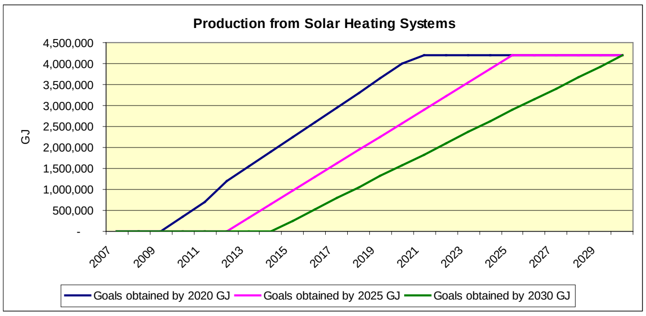
Tariful pentru CAF-urile existente va creste in urmatorii 20 de ani de la cca 12 EUR/GJ la aprox. 40 EUR/GJ. In contrast pretul productiei care va inlocui CT-urile existente, energia solara si incinerarea deseurilor va creste mult mai putin, de la aprox. 5 EUR/GJ la aprox. 6 EUR/GJ si respectiv de la cca 10 EUR/GJ la cca 25 EUR/GJ.

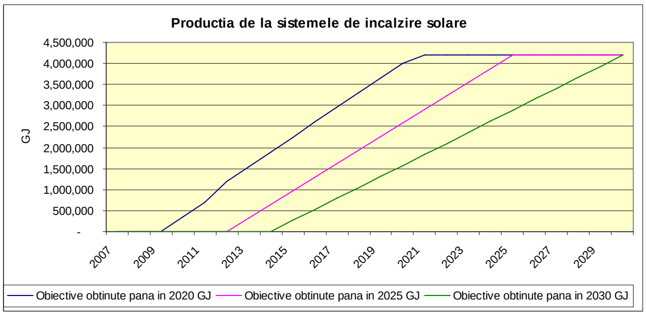
Sistemele de incalzire solara

Instalarea de panouri solare are drept scop reducerea tarifului de caldura intrucat aceasta optiune este a doua, dupa statiile de incinerare a deseurilor din punct de vedere al costurilor de productie reduse.

Daca este sustinuta de catre guvernul roman, dupa cum se discuta in present, energia solara va fi cea mai ieftina sursa de productie din sistem si va reduce semnificativ facturile de caldura.

Intarzierea implementarii, va reduce productia de la sistemele de incalzire solara:





The production will decrease over the 20-year period from about 66,000,000 GJ the baseline scenario (blue curve – Goals obtained by 2020) to about 50,000,000 GJ in the 5-year delay scenario (pink curve – Goals obtained by 2025) and to about 35,000,000 GJ in the 10-year scenario (green curve – Goals obtained by 2030).

Productia va scadea in urmatorii 20 de ani de la aproximativ 66.000.000 GJ in scenariul de baza (curba albastra – Obiective obtinute pana in 2020) pana la cca 50.000.000 GJ in scenariul cu o intarziere de 5 ani (curba roz – Obiective obtinute pana in 2025) si la aproximativ 35.000.000 GJ in scenariul cu o intarziere de 10 ani (curba verde – Obiective obtinute pana in 2030).

Local Heat-only Biolers

Moving the peak-load production from the centralised level (the current large plants) aim to reduce the size of the transmission system and the huge related heat losses.

Delay in construction of the heat-only boiler production (peak-load production) means that the centralised heat-only boilers must remain in operation for more years. Reducing the diameters of the transmission system must be delayed correspondingly and the high heat losses will remain.

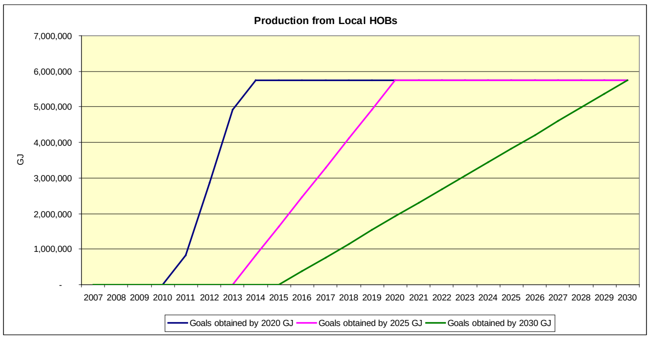
Delay in construction of the local heat-only boilers will reduce the local production:

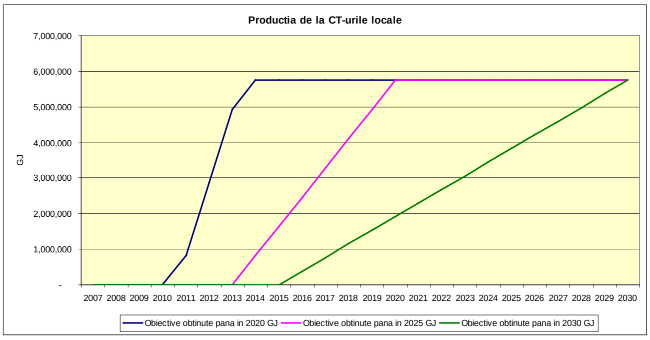
CT-uri locale

Mutarea productiei pentru acoperirea varfului de sarcina de la nivel centralizat (CAF-urile de la centralele mari existente) are drept scop reducerea dimensiunii sistemului de transport si a pierderilor imense de caldura aferente.

Intarzierea realizarii productiei de la CT-urilor locale (productie pentru acoperirea varfului de sarcina) inseamna ca se vor mentine in functiune CAF-urile centralizate pentru mai multi ani. In consecinta, reducerea diametrelor sistemului de transport va fi intarziata si pierderile mari de caldura vor ramane.

Intarzierea construiii CT-urilor locale vor reduce productia locala astfel:





Decentralised CHP

Construction of decentralised CHP aim to reduce the centralised production to waste-to-energy production and thus reducing the sizing of the transmission system and reduce the current huge heat losses.

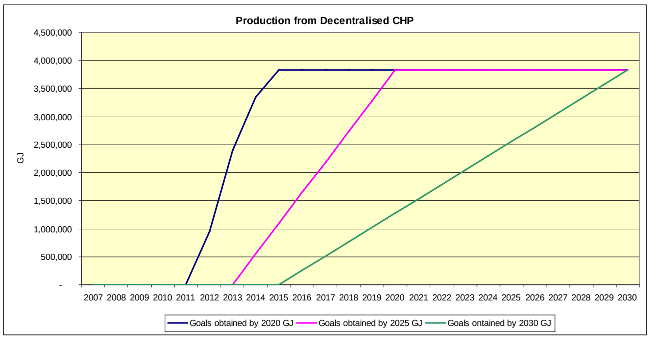
Thus, delay in construction of the decentralised CHP

CET descentralizat

Construirea unei centrale de cogenerare descentralizate vizeaza reducerea productiei centralizate doar la nivelul productiei de la statiile de incinerare a deseurilor si in consecinta, reducerea dimensiunii sistemului de transport corespunzator cu reducerea pierderilor imense de caldura actuale.

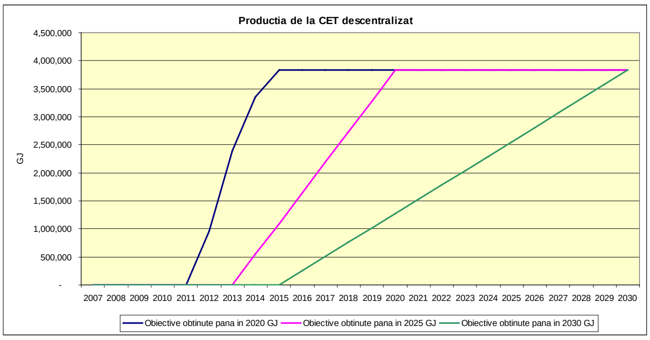
units will delay the reduction of the transmission system and require the expensive production on existing facilities maintained for a longer period.

Delay in construction of the decentralised CHP units will reduce the decentralised production:



Astfel, intarzierea construirii unitatilor de cogenerare descentralizate va intarzia reducerea dimensiunii sistemului de transport si va mentine productia costisitoare de la instaltiile existente pentru o perioada mai lunga.

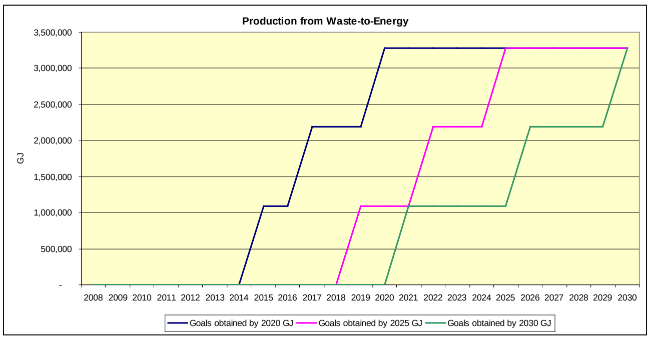
Intarzierea construirii unitatilor de cogenerare descentralizate va reduce productia descentralizata:



Waste-to-Energy Facilities

Heat recovering from waste incineration is the backbone in cheap district heating supply in most district heating countries.

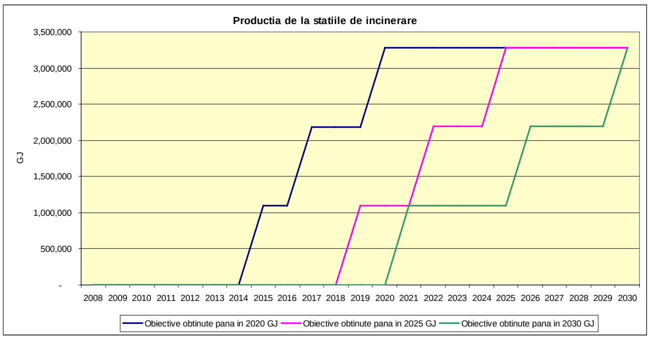
Delay in construction of these facilities will not only delay the access to cheap energy for the district heating system but also delay solving the waste problem in Bucharest. Delay will reduce the cheap production:



Statiile de incinerare a deseurilor cu recuperare caldurii

Caldura recuperata de la statiile de incinerare a deseurilor reprezinta coloana vertebrala in furnizarea de energie termica ieftina in majoritatea tarilor cu termoficare.

Intarzierea construirii acestor facilitati nu numai ca va intarzia accesul la energie ieftina pentru sistemul de termoficare dar, va intarzia si rezolvarea problemei deseurilor in Bucuresti. Intarzierea va reduce productia ieftina astfel:



Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Technical Note 21.10.2009

Nota Tehnica 21.10.2009

Observation from General Counsellor Ioan Gaf Deac

Observatii din partea Consilierului General Ioan Gaf Deac

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1	21.09.2009	First edition	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

ATH energ | Grontmij | Carl Bro

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Cuprins

1 INTRODUCTION

The Consultant has submitted the Draft Final Report for the Energy Strategy. The Strategy was presented for the Technical Committee on 20.08.2009.

RADET has submitted a number of observations the meeting respectively on 09th of October 2009. This Technical Note repeats the observations and provides the answers from the Consultant.

The above mentioned answers were submitted to all members of Municipal Energetic Committee. As a reply Mr. General Counsellor Ioan Gaf Deac submitted his opinion as bellow.

The current technical note replay to Mr Gaf Deac.

1 INTRODUCERE

Consultantul a transmis varianta initiala a Raportului Final pentru Strategia Energetica. Strategia a fost prezentata Comitetului Energetic Municipal in data de 20.08.2009.

RADET a formulat o serie de observatii si a transmis note scrise ulterior intalnirii, in data de 09.10.2009. Consultantul a raspuns la notele scrise care s-au regasit si in observatiile formulate.

Raspunsurile consultantului de mai sus, au fost transmise tuturor membrilor Comitetului Energetic Municipal. Fata de acestea domnul Consilier General Ioan Gaf Deac a transmis urmatoarele comentarii.

Prezenta nota tehnica raspunde domnului Gaf Deac

2 OBSERVATIONS AND ANSWERS

2.1 Mr. General counsellor Ioan Gaf Deac:

Observation 2.1.1:

Please submit to the consultant my clear intention to co-opt his next summer for the festival "Bucharest summer neighborhood", being a cultural festival, for the section COMEDY!!!!. They have some delicious answers:). The only sad aspect is related to the fact that we will pay with hard money the effort and comradely work performed for reaching the highest level of multilateral development of the energetic system in Bucharest!

Somewhere on the beginning of RADET document is asking

"Report 3" not offers solution for Energetic Strategy of Bucharest Municipality, because only 1.2 million people from 2.5 million being the total number of people in Bucharest are connected to the district heating system. Over 220,000 apartments are heated by other means natural gas, liquid fuel, wood, etc.

THE CONSULTANT IS REPLYING:

The Heat Demand Forecast presented in the Strategy Report establish 90-95% of the heat demand in 2020 supplied by district heating and about 5-10% supplied by means of other renewables.

On the end of the document RADET ia asking:

Replacement of the inside heating installation of the blocks considering separate supply of the apartments and tri-generation.

THE CONSULTANT IS REPLAYING:

RADET must understand that the internal heat (and cooling) distribution in private owned buildings is not a concern for a public utility.

2 OBSERVATII SI RASPUNSURI

2.1 Dl. Consilier General Ioan Gaf Deac:

Observatia 2.1.1

Transmiteti va rog catre consultant intentia mea clara de a-i coopta pentru anul care vine in festivalul Bucuresti Cartier de Vara, festival de cultura, la sectiunea COMEDIE !!! Au unele raspunsuri delicioase:). Singurul aspect **trist** este acela ca vom plati cu bani grei efortul si munca tovaraseasca despuse pentru ducerea pe cele mai inalte culmi ale dezvoltarii multilaterale a sistemului energetic bucurestean!

Undeva pe la inceputul documentului RADET intreaba

Raportul 3" nu prezinta solutii pentru Strategia Energetica a Municipiului Bucuresti, deoarece din cei 2,5 milioane locuitori doar 1,2 milioane locuitori sunt racordati la sistemul centralizat administrat de RADET. Un numar de peste 220.000 apartamente isi asigura necesarul de incalzire prin gaze, combustibil lichid, lemn, etc.

CONSULTANTUL RASPUNDE:

Raportul privind Strategia, considera ca aproximativ **90-95%** din cererea de caldura va fi asigurata din sistemul de incalzire centralizata si restul de 5-10%, din alte surse de energie regenerabila.

Mai spre finalul documentului RADET intreaba:

Inlocuirea instalatiilor interioare din blocuri concomitent cu asigurarea alimentarii separate a apartamentelor, inclusiv trigenerarea.

CONSULTANTUL RASPUNDE:

RADET trebuie sa inteleaga ca distributia caldurii (si a racirii) in interiorul unor cladiri private nu este o responsabilitate pentru un operator~~ii~~ de utilitati

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What is supposed to understand, dear STRATEGISTS … that you consider in your calculation something and then said that RADET shall understand that hi has no responsibility to reach the certain percentage!

I ASKED YOU PERSONALY, FORGET ABOU JOKE, THAT YOU SHALL COME WITH A STRATEGY ANCHORED IN THE REALITY !!!

publice.[1]

Pai ce sa mai intelegem stimati STRATEGI... ca luati in calcul ceva, apoi spuneti ca radetul sa inteleaga ca nu are o responsabilitate ca sa se ajunga la procentul respectiv!

DOMNILOR SI DOAMNELOR CONSULTANTI!!!

VA SOLICIT PERSONAL, LASAND GLUMA, CA AR TREBUI SA VENITI CU O STRATEGIE ANCORATA IN REALITATE !!!

Answer 2.1.1:

Dear Mr. General Counsellor, sincerely, we are expecting when you are reading the observation formulated by the RADET representative, to become sad. The main reason for this situation is due to the fact that the persons responsible for supply heat to a very relevant number of consumers in Romania, is violating, by his observations, in each sentence the EU Directives and national in force legislation which transpose EU Directives. The money that was supposed to be sorry (and are incredible many) shall be the one invested by RADET considering their skills and unhopefully afterwards any small benefit can be seen only damages. Please trust us, because we have proves and we are knowing this realities from inside organisation.

In case you wish a strategy anchored “in the reality” (NB: what means reality? The one RADET is living, far from what is happening in Europe of 2009 or in other civilised places in Romania) you should have it formulated in the Terms of References for the consultant. Unfortunately for the persons against reform /or fortunately for the people of Bucharest you and nor RADET representatives didn’t participate in the preparation of those. The Terms of References for the elaboration of the strategy leaves to the tax payers the perspective of solving their problems and shows them the way to a civilised life which is interested also about the tax payers problems (reduction of the heat bill, comfort, quality of public services, sustainability of heating means and not the last the climate).

Raspuns 2.1.1

Stimate domnule Consilier General, ne asteptam ca atunci cand veti fi citit observatiile formulate de catre reprezentantul RADET sa va intristati, principalul motiv fiind acela ca persoane responsabile pentru furnizarea acestui serviciu catre un numar relevant de consumatori din Romania, prin observatiile pe care le-au formulat si semnat, violeaza in fiecare fraza, directivele europene si legislatia din Romania in vigoare care transpune aceste directive. Banii de care ar fi trebuit sa va para rau (si sunt incredibil de numerosi) sunt aceia care au fost investiti de RADET, si din nefericire in urma acestor investitii nu se pot identifica beneficiile proiecate, ci doar pagube. Va rog sa ne credeti ca avem si dovezi in acest sens si cunoastem bine aceste realitati.

In eventualitatea in care dumneavoastra doriti o strategie ancorata “in realitate” (NB: care realitate? cea in care traieste RADET, departe de tot ceea ce se intampla in Europa anului 2009 si chiar in anumite colturi civilizate din Romania), ar fi trebuit ca in termenii de referinta pentru consultant sa includeti aceste cerinte. Din nefericire pentru cei care se opun reformelor/sau fericire, pentru populatia Bucurestiului nu ati intocmit dvs. termenii de referinta si nici reprezentatii RADET. Termenii de referinta ai elaborarii strategiei ofera insa acestor contribuabili o perspectiva de rezolvare a problemelor cu care se confrunta, si o cale de a inainta catre o lume civilizata care se preocupa si de problemele platitorilor de taxe (reducerea facturii la energia temica, confort, calitatea serviciilor publice, sustenabilitatea solutiilor de incalzire si nu in ultimul rand chestiunile climatice).

[1] Nota Consultantului - ~~De acord, d~~Distributia de caldura si frig in interiorul unei cladiri este responsabilitatea proprietarilor unui condominiu. ~~Daca insa o~~Observatia ~~ar fi dorit sa~~ se ~~refere~~ refera ~~la~~ mai mult ~~decat~~ la instalatiile interioare din blocuri~~, ar fi trebuit sa raspundem mai nuantat, intrucat cred ca~~si nu la faptul ca cererea de frig, ca si cea de caldura, poate fi obiectul intereselor publice vizate de strategia energetica. Asa cum este prezentat in Partea B a Raportului final, Consultantul a explicat ca producerea centralizata de frig nu este tehnic fezabila, intrucat nu este tehnic posibil ca pe intreaga perioada a anului, temperatura agentului termic primar sa fie peste 100^0C/ [1] *Note of Consultant – the Owners of the buildings shall be responsible about distribution of heating and cooling inside the building. The observation focus on inside installation of the building and not to the fact that heat and cooling demands shall be part in the Strategy as public interest. As it is presented in Part B of Final Report, the consultant has explained that district cooling is not technical feasible due to the fact that is not technical possible to ensure for the entire year the flow temperature over 100^0C.* ~~As respinge doar cu argumente serioase oportunitatea producerii centralizate de frig, alaturi de incalzirea centralizata. Nu cunosc aceste argumente. Ar trebui expuse.~~

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~~It seems that we were wrong, you either still live in playful world, without responsabilities, or refuse to see the reality of 2009 for different reasons.~~

~~Dar se pare ca ne-am inselat, dumneavoastra ori continuati sa traiti intr-o lume ludica, fara responsabilitati, , sau refuzati sa recunoasteti realitatea anului 2009, din diferite motive.~~

We are sad to find how easy is to detour a serious debate, based on competent opinions (and I would like to mention the previous relevant contribution of the member of the Municipal Energetic Committee), given by a political person who by definition must be the most interested in the welfare of their electors.

Suntem intristati sa constatam cat de usor se poate deturna o dezbatere serioasa, bazata pe opinii pertinente (si aici am dori sa mentionam aportul extraordinar de pana acum al Membrilor Comitetului Energetic Municipal) de catre o persoana politica care prin definitie ar trebui sa fie cea mai interesata de binele locuitorilor, care i-au oferit votul.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Technical Note 31.10.2009

Observation from General Counsellor Ioan Gaf Deac

Contract 4144 / 31.12.07

Strategia Energetica a Municipilui Bucuresti

Etapa a III-a: Strategia

Nota Tehnica 31.10.2009

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The Consultant has submitted the Draft Final Report for the Energy Strategy. The Strategy was presented for the Technical Committee on 20.08.2009.

RADET has submitted a number of observations the meeting respectively on 09th of October 2009. This Technical Note repeats the observations and provides the answers from the Consultant.

The above mentioned answers were submitted to all members of Municipal Energetic Committee. As a reply Mr. General Counsellor Ioan Gaf Deac re-submitted his opinion as bellow.

The current technical note replay to Mr Gaf Deac.

1 INTRODUCERE

Consultantul a transmis varianta initiala a Raportului Final pentru Strategia Energetica. Strategia a fost prezentata Comitetului Energetic Municipal in data de 20.08.2009.

RADET a formulat o serie de observatii si a transmis note scrise ulterior intalnirii, in data de 09.10.2009. Consultantul a raspuns la notele scrise care s-au regasit si in observatiile formulate.

Raspunsurile consultantului de mai sus, au fost transmise tuturor membrilor Comitetului Energetic Municipal. Fata de acestea domnul Consilier General Ioan Gaf Deac a retransmis urmatoarele comentarii.

Prezenta nota tehnica raspunde domnului Gaf Deac

2 OBSERVATIONS AND ANSWERS

2.1 Mr. General counsellor Ioan Gaf Deac:

Observation 2.1.1:

- I am more sad due to the fact that you are working in so called “strategy” with old date without being updated. I have checked on RADET and I can confirm that is no recent request submitted by your company for collection of updated data regarding district heating, investements, current situation of RADET. You are using your intuition . There is not normally.
- I am sad about the costs encountered by this pseodo - strategy
- I sad about doubtfully competency and activities from the past, related to the “Consultant” (and there are not considered the foreign ones)
- You have no documents proving that the structure of the building can bear the weight of the solar panel (please consider Baneasa example where Ceausescu has installed the frameworks for solar panel installation and later the calculation has demonstrated to stop the process – please contact Mr Ciumara former ministry, General Manager of I.N.C.E – Romanian Academy)!
- I am sad due to the fact that you consider that I am naive or far away from the subject (namely stupid)
- I am also sad about hundered problems of Bucharest people, which cannot be solved in real time because some responsible persons from Municipality are travelling in Denmark in “study tour”
- I am sad because RADET was a victime of incompetency and thieves and now you (you are aware… as I am understood) criticize the company, considered all investments as losses and are unable to see the project. Please invite an engineer or an economist to explain its!
- I am sad because it considered that the Energetic Committee will be formed by naives City Coucellors, eventually retarded, ready to vote a crap, just because are used presentation in powerpoint! Nothing false!
- Until you will not fill in the strategy all domains which are considered in relation with energetic system for Bucharest, I assure you that no strategy will be voted!!! (I will guarantee with political support of my organisation which is able to get the majority in the City Council)

2 OBSERVATII SI RASPUNSURI

2.1 Dl. Consilier General Ioan Gaf Deac:

Observatia 2.1.1

- EU SUNT SI MAI INTRISTAT DE FAPTUL CA LUCRATI IN ASA-ZISA STRATEGIE CU DATE VECHI... FARA SA LE FI ACTUALIZAT... AM VERIFICAT LA RADET SI VA POT CONFIRMA CA NU EXISTA O CERERE RECENTA DIN PARTEA SOCIETATII DVS DE A COLECTA DATE ACTUALIZATE DESPRE SISTEMUL DE TERMOFICARE, INVESTITII, SITUATIA RADET... MERGETI PE INTUITIE... NU ESTE NORMAL !!!
- SUNT INTRISTAT DE COSTURILE ACESTEI PSEUDOSTRATEGII...
- SUNT INTRISTAT DE COMPETENTELE SI ACTIVITATILE DIN TRECUT, INDOIELNICE ALE UNORA DINTRE ”CONSULTANTI” (SI NU MA REFER LA CEI STRAINI)
- NU AVETI NICIUN DOCUMENT CARE SA ATESTE CA STRUCTURILE DE REZISTENTA ALE BLOCURILOR VOR REZISTA LA PANOURI SOLARE (VEZI CAZUL BANEASA UNDE CEAUSESCU A MONTAT CADRELE METALICE PENTRU PANOURI SOLARE IAR APOI CALCULELE DE REZISTENTA ALE STRUCTURII I-AU DETERMINAT SA NU MAI FACA NIMIC - A se lua legatura pentru verificare date Dl. CIUMARA, fost Ministru, DIRECTOR GENERAL I.N.C.E. - Academia Romana)!
- SUNT INTRISTAT DE FAPTUL CA AVETI IMPRESIA CA SUNT NAIV, CA SA NU SPUN PARALEL CU UNIVERSUL (ADICA PROST)!
- MAI SUNT INTRISTAT DE SUTELE DE PROBLEME PE CARE LE AU BUCURESTENII, CARE NU POT FI REZOLVATE IN TIMP REAL, PENTRU CA DE MULTE ORI RESPONSABILII PMB SUNT PRIN DANEMARCA IN ”VIZITE DE LUCRU”
- SUNT INTRISTAT DE FAPTUL CA RADET-UL A SUFERIT DATORITA UNOR INCOMPETENTI SI HOTI SI ACUM DVS. (CARE SUNTETI IN TEMA...DIN CATE AM INTELES) CRITICATI REGIA, CATALOGATI TOATE INVESTITIILE DREPT PIERDERE SI NU VEDETI PROIECTELE ... CHEMATI UN INGINER SAU UN ECONOMIST

- And finally, if you have melancholy moods….sad, or more depression, please renounce to work in this committee, or if the company (Could be a breaking news for World Psychology) has sad and depression please think on the huge amount of money which you hope to get it and you it will pass
- Regarding the violation made by RADET, mentioned in your answer, I insist to mention that you proposal is violating in this moment the safety of enegetic supply in Bucharest, you are violating the right of citizens for normality , further you are violating the common sense, in order to clarify the meaning of the word "violation" in official comunications.

SA VI LE EXPLICE !

- SUNT INTRISTAT DE FAPTUL CA S-A CREZUT, CA IN ACEST COMITET O SA VINA NISTE CONSILIERI GENERALI NAIVI, EVENTUAL RETARDATI, CARE SA VOTEZE O PORCARIE, DOAR PENTRU CA SE PROIECTEAZA NISTE PREZENTARI IN POWER POINT PE PERETE... NIMIC MAI FALS !!!
- PANA NU VETI COMPLETA STRATEGIA CU ABSOLUT TOATE DOMENIILE CARE AU LEGATURA CU SISTEMUL ENERGETIC PENTRU BUCURESTI VA ASIGUR CA NU SE VA VOTA NICIO STRATEGIE !!! (GARANTIA V-O DAU DIN PUNCTUL DE VEDERE AL GRUPULUI POLITIC DIN CARE FAC PARTE SI CARE ASIGURA MAJORITATEA IN CGMB)
- SI IN FINAL ..DACA AVETI STARI MELANCOLICE... INTRISTARE... SAU CHIAR DEPRESIE VA ROG SA RENUNTATI IN A MAI LUCRA IN ACEST COMITET, SAU DACA FIRMA (AR FI O NOUTATE IN PSIHOLOGIA MONDIALA) SUFERA DE INTRISTARE SI DEPRESII GANDITI-VA LA SACII DE BANI PE CARE SPERATI SA-I OBTINETI ... SI O SA VA TREACA !!!
- CAT DESPRE VIOLUL PE CARE IL EXECUTA RADET, MENTIONAT IN RASPUNSUL DVS., TIN SA VA SPUN CA DVS PRIN CEEA CE PROPUNETI IN ACEST MOMENT VIOLATI SIGURANTA ENERGETICA A BUCURESTIULUI, VIOLATI DREPTUL BUCURESTENILOR LA NORMALITATE, AS PUTEA SPUNE VIOLATI BUNUL SIMT...ASTA CA SA NE LAMURIM ASUPRA UTILIZARII TERMENULUI DE "VIOL" PRIN COMUNICARILE OFICIALE...

Answer 2.1.1:

As a consultant we cannot and will not comment on your political statements.

From a technical point of view we have assumed that the buildings in Romania and in Bucharest can carry the 60 PJ (10^{15} J) heat producing solar panels and the 1.2 TWh electricity producing solar panels assumed in the National Energy Strategy by ICEMENERG, as potential of renewable resources. Solar panels produced in 2009 cannot be compared with solar panels produced 20 years ago. Today's solar panels are produced using lightweight materials and the water content in the panels is on a few litres (kg) per m^2. But of cause you are right: Each building must be assessed in terms of capability of carrying solar panels before these are installed as they should, in principle, be assessed before air condition units and/or insulation is mounted.

Regarding safety of supply of heat and electricity in Bucharest the strategy will improve the safety:

Raspuns 2.1.1

Ca si consultant noi nu putem si nici nu vom comenta declaratiile dumneavoastra politice.

Din punct de vedere tehnic am considerat ca atat in Romania cat si in Bucuresti, cladirile pot suporta instalarea unor panouri solare care sa produca 60 PJ (10^{15} J) energiei termice si 1.2 TWh energie electrica, in conformitate in prevederile Strategiei Energetice Nationale, potentialul national al surselor regenerabile evaluat de ICEMENERG. Panourile solare produse la nivelul anului 2009 nu se pot compara cu panourile solare produse acum 20 de ani. Astazi panourile solare sunt produse utilizand materiale usoare, iar continutul de apa din aceste panouri este de cativa litri(kg) pe m^2. Dar aveti dreptate: fiecare cladire trebuie evaluata din punct de vedere al capacitatii portante, inainte ca acestea sa fie instalate, asa cum de altfel ar trebui sa se intample si inainte de instalarea spliterelor de aer conditional si/sau a izolatiei termice.

- The heat production will mainly be based on solar energy, domestic waste and bio fuels and distributed on a large number of local, decentralised and centralised plants. Today's production is based on only one fuel, natural gas.
- The production system will be new. Most of the present production system has passed its useful lifetime and the reliability is thus low.
- The heat related electricity generated during peak load in the summer period will be increased as the waste-to-energy facilities will generate power when the solar panels can cover the heat demand. However, the heat related generation will be far from sufficient to cover the demand and the Electricity Authorities will thus have to decide if present generation capacity shall be maintained, new plants constructed or new transmission lines shall be constructed – this is not the responsibility of the Municipality of Bucharest.

Regarding Data Collection, we would like to inform you, that the first phase of this contract was data collection. The period allocated in the contract, for data collection in order to be able to elaborate the strategy, was February 2008- November 2008 and responsible for this task was the declared subcontractor ATHEnerg. This stage is considered completed as was endorsed by Energetic Committee from November 2008.

~~It seems that we were wrong, you either still live in playful world, without responsabilities, or refuse to see the reality of 2009 for different reasons.~~

Referitor la siguranta furnizarii energiei termice si a electricitatii in Bucuresti, strategia va imbunatati aceasta siguranta:

- Producerea de energie termica se va baza in principal pe energie solara, deseuri menagere si bio combustibil, distribuita unui numar mare de centrale de producere locale, descentralizate si centralizate. Astazi, producerea se bazeaza doar un tip de combustibil, gazele naturale.
- Sistemul de producere va fi nou. Marea majoritate a capacitatilor instalate in prezent si-au desita durata normata de viata si eficienta in consecinta este scazuta.
- Producerea de caldura in corelare cu producerea de electricitate, in perioadele de varf de consum, in perioada de vara, se va imbunatati, in conditiile in care facilitatile de incinerare a deseurilor vor produce electricitate atunci cand panourile solare vor acoperi cererea de caldura. In orice caz, producerea caldurii in corelare cu producerea de electricitate va acoperi cererea de departe, astfel Autoritatile responsabile in domeniul electricitatii vor trebui sa decida daca unitatile existente vor trebui mentinute, se vor construi altele noi, sau se vor construi noi linii de transport – dar acest lucru nu se afla in limita de competente ale Primariei Municipiului Bucuresti.

Referitor la colectarea datelor, va informam ca in derularea acestui contract etapa initiala a fost reprezentata de colectarea de date. Perioada de colectare a informatiilor necesare elaborarii SEM a fost cuprinsa intre februarie 2008 – noiembrie 2008 si a reprezentat responsabilitatea, printre altele a subcontractantului declarat in contract firma ATHEnerg. Aceasta etapa s-a considerat incheiata, fiind deja avizata de Comitetul Energetic Municipal inca din noiembrie 2008.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Technical Note 16.03.2010

Observation from General Counsellor Ioan Gaf Deac

Contract 4144 / 31.12.07

Strategia Energetica a Municipilui Bucuresti

Etapa a III-a: Strategia

Nota Tehnica 16.03.2010

Observatii din partea Consilierului General Ioan Gaf Deac

4				
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1	23.03.2010	First edition	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

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1 INTRODUCTION

The Consultant has submitted the Final Report for the Energy Strategy.

On 16.03.2010 was held the meeting for the endorsement of the report by the Technical Committee and later to be submitted to the General Council for final approval.

With the occasion of this meeting, Mr. Gaf Deac has submitted to the members of Committee the document: "cConsiderations on the proposal included in the Energy Strategy for Bucharest".

The current technical note replay to Mr Gaf Deac.

1 INTRODUCERE

Consultantul a transmis varianta finala a Raportului Final pentru Strategia Energetica.

In data de 16.03.2010 a avut loc sedinta pentru avizarea studiului de catre Comitetul Energetic Municipal pentru a fi ulterior inaintat spre aprobare Consiliului General.

Cu ocazia acestei intalniri, domnul Gaf Deac a inaintat documentul "Consideratii asupra propunerilor din Strategia Energetica a Municipiului Bucuresti" membrilor Comitetului Municipal al Energiei.

Prezenta nota tehnica raspunde domnului Gaf Deac

2 CONSIDERATIONS

1. The Strategy elaborated by the Danish consultancy company Grontmij Carl Bro, in the form presented, does not respond to the "Terms of Reference" as is not treating the energetic problems of the city as a whole and as requested initially, but only the energy services in which the Bucharest Municipality if partially involved, respectively the district heating supply service, operated by RADET and global aspects of public transport in Bucharest.

Reply to 1.

The strategy addresses all areas of energy consumption for which the municipality is responsible and able to influence. It is clear according to the Romanian legislation that the municipality is responsible for heat supply, public lighting, water supply and sewers and transport.

However, we are aware that in the same period of tender procedure for award of services for Energetic Strategy, was organized an other procedure for award services for a Master Plan for Transport in Bucharest, contract financed from PHARE funds. This Master Plan was elaborated and approved in 2008, including also public transport. Hence, there is no reasonable arguments for double the tasks in two different contracts .

2. With regard to the issue of providing district heating to the consumers in Bucharest “the Strategy” didn’t consider also the natural gas supply of the city leaving without strategic solution two serious issues namely:

- the existence in the same apartments block of several heating supply systems although is prohibited by the national strategy

- adoption for new real estate building complexes exclusively of heating solutions based on heating units in the block or individual heating although the national strategy makes mandatory to consider also the co-generation solutions.

Reply to 2.

The Energy Strategy recommends mandatory connection to the district heating system or establishment heating from renewable sources to be mandatory. The deadline for disconnection from the natural gas network should be when district heating is establish in the area, which in turn should be before 2020.

2 CONSIDERATII

1. Strategia elaborata de firmele de consultanta daneze Grontmij Carl Bro, in forma prezentata, nu raspunde “Termenilor de referinta” intrucat nu trateaza ansamblul problemelor energetice ale orasului asa cum s-a cerut prin tematica initial, ci numai Serviciul energetic in care este implicate partial Primaria Municipiului Bucuresti, respective Serviciul privind asigurarea energiei termice prin sistemele centralizate exploatate de RADET si aspectele globale privind transportul urban in municipiul Bucuresti.

Raspuns la punctul 1

Strategia abordeaza consumul energiei in toate domeniile energetice pentru care municipalitatea este responsabila si pe care poate sa le influenteze. In conformitate cu legislatia romaneasca municipalitatea este responsabila pentru furnizarea energiei termice, iluminat public, alimentarea cu apa si canalizare si transport.

Este cunoscut faptul ca in aceeasi perioada in care s-a derulat procedura de achizitie a serviciilor de elaborare a strategiei energetice, a fost in derulare o procedura de achizitie pentru realizarea unui Master Plan pentru transport in Bucuresti, finantat din fonduri PHARE. Acest Master Plan a fost finalizat si aprobat in 2008, incluzand is transportul in comun. Este evident ca nu exista nici un argument pentru a se suprapune aceeasi responsabiltate in doua contracte.

2. In problema asigurarii cu energie termica a consumatorilor din municipiul Bucuresti “Strategia” nu a tratat si alimentarea cu gaze naturale a orasului lasand fara rezolvari strategice doua aspecte grave si anume:

- existenta in acelasi condominiu a mai multor sisteme de incalzire desi strategia nationala interzice acest lucru

- adoptarea pentru ansamblurile de noi constructii imobiliare in exclusivitate a solutiilor de incalzire cu centrale termice de bloc sau de apartament desi strategia nationala impune obligativitatea luarii in considerare si a solutiilor de cogenerare.

Raspuns la punctul 2

Strategia Energetica recomanda racordarea obligatorie la sistemul de incalzire centralizata sau infiintarea unui sistem de incalzire bazat pe surse de energie regenerabila. Termenul limita pentru deconectarea de la sistemul de gaze naturale este determinat de data la care sistemul de incalzire centralizata este disponibil in zona respectiva, dar nu mai tarziu de anul 2020.

3. Determination of the heat demand and demand forecast for Bucharest district heating system, two essential elements for the fundament of the strategy have been treated superficially and without any scientific base.

Thus the input values used for analysis are:

- Specific annual heat demand is considered, without any explanations, to be 180 kWh/m^2/y (150 kWh/m^2/ y for the existent building and 200 kWh/m^2/y for the new buildings).

These values, as presented in the strategy, will be reduced according to EU objectives up to:

- 90-100 kWh/m^2/y for existing buildings
- 50 kWh/m^2/y for new buildings

- The registered and invoiced consumptions of district heating (without HOB) in 2007 was 20,580 TJ
- The proposed heat demand decrease in the year 2030 is 45% compared to 2007.

All three values taken into consideration for the determination of the heat demand and demand forecasts are insufficiently substantiated. A correction of these values can be made if the real values of consumption from the past 5 years will be taken into account.

Specific annual heat demand for buildings connected to the district heating system of RADET (without HOB) recorded and billed in the last 3 years was:

Consumul de caldura facturat in sistemul de termoficare (fara CT)

Anul	Total		Locuinte		Agenti Economici	
	Gcal	TJ	Gcal	TJ	Gcal	TJ
2004	5.741.724	24.040	5.065.420	21.209	676.304	2.831
2005	5.859.085	24.532	5.161.047	21.609	698.038	2.923
2006	5.348.638	22.395	4.684.909	19.616	663.729	2.779
2007	4.863.163	20.362	4.286.341	17.947	576.923	2.415
2008	4.695.006	19.507	4.071.337	17.047	587.669	2.460

The dwellings from Bucharest supplied with district heating represents 570,000 physical apartments and about 600,000 of conventional apartments with a surface of 75 m^2/ap.

Specific heat consumption registered in 2007 of 17,947 TJ (4,985,278 MWh) is therefore:

The average heat consumption over the last 3 years was 1818,203 TJ / year (5,056,481 MWh / year) and annual specific heat consumption was:

Both values are far below the 180 kWh/m^2/y and even below the value for old buildings of 150 kWh/m^2/y.

The heat consumption registered and billed in 2007 (reference year considered in the strategy) for buildings connected to district heating system is not 20,580 TJ but 17,947 TJ, the difference coming from the heat billed to the companies connected to the district heating.

3. Determinarea necesarului de caldura si prognoza cererii pentru sistemul de termoficare al municipiului Bucuresti doua elemente esentiale pentru fundamentarea strategiei au fost tratate superficial si fara o baza stiintifica.

Astfel valorile de plecare folosite in cadrul analizei sunt:

- necesarul de caldura anual specific este considerat fara nici o explicatie de 180 kWh/m^2/an (150 kWh/m^2/an la cladirile existente si 200 kWh/m^2/an la cladirile noi).

Aceste valori, se arata in strategie, vor trebui reduse, potrivit obiectivelor UE pana la:

- 90-100 kWh/m^2/an la cladirile existente
- 50 kWh/m^2/an la cladirile noi

- consumul de caldura inregistrat si facturat in anul 2007 in sistemul de termoficare (fara CT) a fost de 20.580 TJ.
- Reducerea necesarului de caldura propusa, la nivelul anului 2030 este de 45% fata de anul 2007.

Toate aceste trei valori care stau la baza determinarii necesarului de caldura si a prognozei cererii sunt insuficient fundamentate.

O corectie a acestor valori se poate face daca se iau in considerare valorile reale ale consumurilor inregistrate in ultimii 5 ani.

Necesarul de caldura anual specific pentru cladirile racordate la sistemul de termoficare al RADET (fara CT) inregistrat si facturat in ultimii 3 ani a fost:

Consumul de caldura facturat in sistemul de termoficare (fara CT)

Anul	Total		Locuinte		Agenti Economici	
	Gcal	TJ	Gcal	TJ	Gcal	TJ
2004	5.741.724	24.040	5.065.420	21.209	676.304	2.831
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2007	4.863.163	20.362	4.286.341	17.947	576.923	2.415
2008	4.695.006	19.507	4.071.337	17.047	587.669	2.460

Locuintele din Bucuresti alimentate cu caldura din sistemul de termoficare reprezinta 570.000 apartamente fizice respectiv cca. 600.000 de apartamente conventionale cu suprafata de 75 m2/ap.

Consumul de caldura specific inregistrat in anul 2007 de 17.947 TJ (4.985.278 MWh) este deci de:

Consumul de caldura mediu pe ultimii 3 ani a fost de 1818.203 TJ/an (5.056.481 MWh/an), iar consumul de caldura anual specific a fost:

Ambele valori sunt cu mult sub valorile de 180 kWh/m^2/an si chiar sub cea referitoare la cladirile vechi de 150 kWh/m^2/an.

Consumul de caldura inregistrat si facturat in anul 2007 (an de referinta luat in considerare in cadrul strategiei) pentru cladirile racordate la sistemul de termoficare nu este de 20.580 TJ ci de 17.947 TJ diferenta fiind caldura facturata pentru agentii economici racordati la sistemul centralizat.

Reducerea necesarului de caldura de 45% la nivelul

The decrease of the heat demand of 45% in the year 2030 compared to 2007 established in order to cope with the national strategy and EU objectives (100 kWh/m^2/y) is not justified and technically unrealistic. This decrease can be 15-17% if we take into consideration the registrations regarding consumption over the last 3 years and 22% if the analyses is reported to the last 5 years.

Heat consumption forecast for year 2020 is 14,040 TJ which represents a reduction of 21.8% of the consumption from residential buildings in 2007. Considering the necessary measures be taken to achieve the strategy objectives we should not have a decrease of consumption with 45% compared with 2007 but a reduction of 22% meaning that a re-evaluation of the proposed measures and their priority should be performed.

The proposed measures to be re-evaluated should be within the PIR analyses (Integrated Resource Planning).

Reply to 3.

Directives 2006/32/EC the European Parliament and the Council of 5 April 2006 on energy end-use efficiency and energy services and directive 2002/91/CE of the European Parliament and the Council of December 16, 2002 on the energy performance of the buildings were partially transposed in Romanian legislation by Government Ordinance 22/2008 and Emergency Government Ordinance 18 /04.03.2009, regarding increasing energetic performance of dwelling houses together with his methodology for implementation, regulate the thermal rehabilitation of the dwelling houses enforcing as maximum value of 100 kWh/m^{2,} as specific annual consumption for heating (utile area).

In the stage 1 of the contract for the elaboration of Energetic Strategy – Final Report 1 have been included a chapter for assessment of buildings separate as buildings connected to district heating, buildings with individual boiler and individual dwelling houses with own old boiler.

There is attached as appendix 1, example of Energetic Certificate, issued according with Mc 0001/2006, available during the data collection stage and a centralized table, as extract from Final Report 1

They all show a heat demand as stipulated in the demand forecast (or even higher).

The 21.8% reduction is in sales for the district heating in the period 2007 and 2020, considering connection of new consumers and current natural gas consumers. Energy conservation both for the new consumers and existing consumers to the district heating is about 45%.

anului 2030 fata de anul 2007 stabilita pentru incadrarea in cifrele din strategia nationala si din obiectivele UE (100 kWh/m^2/an) este o valoare nejustificata si tehnic nerealista. Aceasta reducere poate fi de 15-17% daca se iau in considerare inregistrarile de consum pe ultimii 3 ani si de 22% daca analiza se raporteaza la ultimii 5 ani.

Consumul de caldura prognozat pentru anul 2020 este de 14.040 TJ ceea ce reprezinta o reducere de 21,8% a consumului caldirilor de locuit din anul 2007.

Ca urmare a masurilor necesare a fi luate prin strategie pentru a atinge obiectivele propuse nu trebuie sa corespunda unei reduceri de 45% a consumului din anul 2007 ci o reducere de 22% ceea ce impune reevaluarea masurilor propuse si a ordinei de prioritate a acestora in cadrul strategiei.

Prin aceasta masurile propuse trebuie sa fie reevaluate in cadrul analizei PIR (Planificare Integrata a Resurselor).

Raspuns la punctul 3

Directivele 2006/32/CE a Parlamentului European si al Consiliului din 5 aprilie 2006, privind eficienta energetica la consumatorii finali si serviciile energetice si 2002/91/CE privind performanta energetica a cladirilor au fost partial transpuse in legislatatia romaneasca prin OG 22/2008 si OUG 18 din 4 martie 2009, privind cresterea performantei energetice a blocurilor de locuinte, impreuna cu normele de aplicare ale acestei ordonante, prin care este reglementata reabilitarea termica a cladirilor impunandu-se astfel scaderea consumul anual specific de energie calculat pentru incalzirea, sub valoarea de 100 kWh/m^2 arie utila.

In etapa 1 - Raportul final 1, a contractului de servicii pentru elaborarea Strategiei Energetice a fost inclusa o analiza detaliata a starii energetice a cladirilor din Bucuresti, tratandu-se separat cladirile racordate la termoficare, cladiri cu centrala termica proprie si cladiri individuale ale carori instalatii termice sunt racordate la centrala termica proprie – cazan vechi. Am atasat ca anexa 1, exemple ale Certificatelor de Performanta energetica a cladirilor, emise in conformitate cu Mc 0001/2006, disponibile la data colectarii datelor si un tabel centralizator, ca extras din Raportul Final 1.

Ceea ce rezulta din aceste certificate este ca necesarul de caldura existent este cel stipulat in prognoza cererii (sau chiar mai mare).

21.8% reprezinta reducerea vanzarilor de caldura de caldura in sistemul de termoficare intre 2007 si 2020, considerand si racordarea noilor consumatori care in prezent sunt racordati la sistemul de gaze naturale. Conservarea energiei atat pentru noii consumatori cat si pentru cei existenti racordati la termoficare este aproximativ 45%.

4. One of the most important problems of the Energy Strategy of Bucharest is the issue regarding heat production and energy sources in general.

Currently the Bucharest district heating system is based on production from CHP plants except CT Casa Presei owned by RADET.

Surprisingly though the proposed strategy takes into consideration in the PIR report the solution of centralized cogeneration sources that is easily removed both in the first screening and second screening although in the both screenings this proved to be the most advantageous.

In connection to this background subject - the conception of the Bucharest energy strategy – the following needed to be mentioned:

- Elements of investments that ELCEN, the current owner of the main existing CHP plants and that covers 90% of the heat demand of the city performed or on going were not thorough. These investments cocnerns CET Bucuresti Vest, CET Bucuresti Sud, CET Grozavesti, CET Titan and CET Progresu and exceed 400 million euros. These investments will transform the existing plants into high efficiency CHP plants and will cope with the environmental requirements stipulated by EU.
- The issues regarding the implication of renouncing to the main transmission pipelines among the first modernized from external loans and which are the basic structure of the transmission system from the plants to the consumption areas were not sufficiently assessed.
- There was not consideration regarding the installed power from the centralized co-generation sources of 1,124 MW (equivalent with CTE Rovinari 4x300 MW) and the fact that these are assuring the electricity to Bucharest in island operation conditions, in case of failure or natural disasters.
- It was not taken into consideration that if they are located outside the central area of the city and provided superior solutions in terms of environmental protection are far more advantageous compared to the boilers or even small co-generation units located in the area of consumption.
- It was not taken into account that that the cancellation of summer consumption by proposing to include installation of solar panels into the building insulation projects will negatively influence the negative efficiency of the investments into both large CHP plant and decentralized CHP plants and that the positive effects regarding their operation with long duration might cancel the efficiency of the solar panels and related accumulation installation.
- It was not taken into account the huge investment in gas networks and regulation stations in case the heating sources (CHP plant and boilers for peak

4. Una dintre problemele cele mai importante ale Strategiei Energetice a Municipiului Bucuresti este problema producerii energiei termice respectiv a surselor de energie in general.

In prezent sistemul de termoficare al municipiului Bucuresti are la baza sub aspectul producerii numai centralele de cogenerare cu exceptia CT Casa Presei care apartine RADET.

In mod suprinzator Strategia propusa desi ia in considerare in cadrul analizei PIR si solutia surselor centralizate de cogenerare aceasta este eliminata facil atat la prima evaluare cat si la cea de a doua evaluare desi in ambele etape aceasta se dovedea cea mai avantajoasa.

In legatura cu acest subiect de fond conceptia strategiei energetice a municipiului Bucuresti se mentioneaza urmatoarele:

- Nu au fost aprofundate elementele privind investitiile pe care ELCEN, actualul detinator al principalelor centrale de cogenerare existente si care acopera 90% din necesarul de caldura al orasului le-a realizat sau le are in curs de promovare. Aceste investitii vizeaza CET Bucuresti Vest, CET Bucuresti Sud, CET Grozavesti, CET Progresu si CET Titan depasesc 400 milioane de EURO. Prin aceste inverstitii centralele existente se vor transforma in centrale de cogenerare de inalta eficienta si se vor incadra in cerintele de mediu prevazute de UE.
- Nu au fost analizate in suficienta masura implicatiile renuntarii la cele mai importante magistrale de transport care au fost modernizate printre primele prin credite externe si care alcatuiesc structura de baza a sistemului de transport de la aceste centrale catre zonele de consum.
- Nu s-a tinut seama ca puterea instalata in sursele de cogenerare centralizate este de 1124 MW (echivalent cu CTE Rovinari 4x300 MW) si ca acestea asigura necesarului de energie electrica al municipiului Bucuresti in conditii de functionare insulara in situatii de avarii sau de calamitati naturale.
- Nu s-a tinut seama ca prin amplasarea lor in afara zonei centrale a orasului prin solutiile superioare privind protejarea mediului sunt incomparabili mai avantajoase fata de amplasarea de cazane sau chiar centrale de cogenerare mici situate in zonele de consum.
- Nu s-a tinut seama de faptul ca anularea consumului de vara prin propunerea de includere in proiectele de izolare termica a blocurilor a panourilor solare va influenta negativ eficienta negativa a investitiilor in centralele de cogenerare atat cele mari, cat si cele descentralizate si ca efectele pozitive privind functionarea acestora la durata mare ar putea anula eficienta panourilor solare si a instalatiilor de acumulare aferente.
- Nu s-a tinut seama de investitiile uriase in retelele

load) are to be located in the areas of consumption which may make impossible to adopt the solution proposed in the strategy report even from technical point of view without making a analysis of this issue together with Distrigaz.

- It was not taken into account the implications of locating the sources in the areas of consumption in terms of land ownership and acceptability of the people from the respective area.

de gaze si in statiile de reglare necesare in cazul amplasarii surselor de caldura (centrale de cogenerare si cazanele de varf) in zonele de consum care ar putea face imposibila adoptarea solutiei propuse prin strategie chiar si din punct de vedere tehnic fara o analiza a acestei probleme impreuna cu Distrigaz.

- Nu s-a tinut seama de implicatiile amplasarii surselor in zonele de consum sub aspectul proprietatii terenurilor si al acceptabilitatii cetatenilor din zona.

Reply to 4

None of the existing CHP plants comply with the EU definition of CHP plants in terms of efficiencies and power/heat ratio. Rehabilitation of the plants will not change this situation. Hence, the plants belong to the category “power plants with heat supply” and such plants should be replaced with CHP plants.

The Energy Strategy foresee a capacity of about 100-200 MJ/sec on newly constructed/rehabilitated units in operation until 2023 at what time they are at the end of their useful lifetime and it must be decided to life extent the units of establish replacement capacity.

Most of the capacity on the plants are heat-only-boilers and the Energy Strategy recommends the best of these converted to local peak load boilers of which a total capacity of about 700 MJ/sec will be needed in the future.

Reduction of the transmission system needs no other argumentation that the real transmission cost (not the cost included in the tariff as this is without loan service and depreciation etc) is above 8 EUR/GJ – almost the same as the production costs. Such a value is unheard in modern district heating system and on top of this we can add the high heat and water losses as arguments.

The transmission system is designed for about 4,000 TJ/y (about 10,000,000 Gcal) and it should be clear for everybody that when the current demand is only about 2,000 TJ/y the transmission system ought to be reduced correspondingly.

The reason for excluding future production based on natural gas (from existing or new plants) is that it will be too expensive. The international forecast for price of natural gas (3-5% above the general inflation yearly price escalation) and introduction of environmental and energy taxes as in other EU countries will more than double the natural gas price until 2020. As an alternative to new natural gas fired CHP units the Energy Strategy recommends waste-to-energy facilities – they will be able to produce heat at about ½ the cost of today from existing plants.

However, if the power side decides to construct new plants in the Bucharest area and sell heat at a price lower than the price from waste-to-energy facilities the Energy Strategy should be changed accordingly.

Raspuns la punctul 4

Nici una din centralele de cogenerare existenta nu se incadreaza in definitia UE pentru centralele de cogenerare de inalta eficienta si a raportului energie electrica/energie termica. Reabilitarea acestor centrale nu va putea schimba aceasta situatie. In consecinta, aceste centrale se incadreaza in categoria ”centrale electrice care produc si energie termica”, iar aceasta categorie trebuie inlocuita cu centrale de cogenerare.

Strategia Energetica prognozeaza ca in anul 2023 va fi pusa in functiune o capacitate instalata in noile unitati construite/reabilitate de aproximativ 100-200 MJ/s, moment in care capacitatile existente se gasesc la sfarsitul duratei de viata normate si trebuie decis ce ce va intampla cu ele, durata de viata va fi extinsa sau se vor inlocui aceste capacitati de productie.

Cea mai mare parte a funizarii de la aceste centrale se face din CAF-uri, iar Strategia Energetica recomanda ca cel mai eficient este transformarea acestor cazane in cazane de acoperire a varfului de consum, cu o capacitate de aproximativ 700 MJ/s, cat va fi necesar in viitor.

Reducerea sistemului de transport nu are nevoie de alte argumente, decat acela prin care costul real de transport (si nu acele costuri care in prezent nu includ cheltuielile aferente creditelor si nici amortizarea, etc) este de 8 Euro/GJ, mai mult sau mai putin egal cu costul de producere. Asemenea valori nu se intalnesc sub nici o forma in sisteme moderne de termoficare, fara a se mai adauga argumentele legate de pierderile mari de energie termica si de agent termic.

Sistemul de transport este proiectat pentru aproximativ 4000 TJ/an (aproximativ 10,000,000 Gcal/an) si este foarte clar pentru oricine ca in conditiile in care necesarul este de doar de 2000TJ/an, sistemul de transport ar trebui redus corespunzator.

Motivul pentru care a fost exclusa viitoare productie pe baza de gaze naturale (de la centralele existente sau centrale noi) este acela ca va fi foarte scumpa. La nivel international se prognozeaza ca pretul(cresterea de 3-5%, anual va fi doar din inflatie) pentru gazele naturale si introducerea taxelor de mediu si energie(ca in toate tarile UE) se va dubla sau chiar mai mult pana in 2020. Ca si o alternativa la unitatile de cogenerare

The impact of locating new plants outside the central part of the city is high transmission costs. We have calculated the price of heat as (Production + transmission + distribution):

- *Centralized production as today: 11 + 8 + 9 = 28 EUR/GJ*
- *Decentralized CHP production: 13 + 0 + 9 = 22 EUR/GJ*
- *Centralized Waste-to-energy: 5 + 5* + 9 = 19 EUR/GJ. (* Reduced transmission system)*

The decentralized CHP and local peak load boilers are assumed using biofuels after 2020. Natural gas cannot in a longer perspective be considered available for peak load use in December - February.

Decentralized CHP and local boiler are assumed located at decommissioned substations. The number of residential substations will be reduced to about 100 leaving about 500 possible locations for CHP and/or boilers.

care functioneaza pe baza de gaze naturale, Strategia Energetica recomanda facilitatile de incinerare a deseurilor cu recuperarea caldurii, care astazi sunt in masura sa produca energie termica la ½ din pretul la care produc astazi unitatile existente.

Totusi, daca pe partea de producere electricitate se decide contruirea unor noi centrale, in zona Bucurestiului, care pot fi in masura sa vanda energie termica la un pret mai mic decat cel al energiei termice produsa de facilitatile de incinerare a deseurilor, atunci Strategia Energetica trebuie modificata.

Impactul amplasarii noilor centrale in afara zonei centrale a orasului il reprezinta consturile mari de transport. Noi am calculat pretul energiei termice in structura :Producere+Transport+Distributie, dupa cum urmeaza:

- *Producere centralizata cum este in prezent: 11+8+9 = 28 Euro/GJ*
- *Producere in cogenerare descetralizata: 13+0+9=22 Euro/GJ*
- *Producere centralizata din incinerartoare de deseuri: 5+5*+9=19 Euro/GJ; (* cu sistem redus de transport)*

Unitatile de cogenerare si cazanele de acoperire a varfului de consum sunt prevazute a utiliza biocombustibil dupa anul 2020. Gazul natural nu poate fi considerat ca o perspectiva pe termen lung, pentru perioadele de iarna (decembrie –februarie).

Unitatile de cogenerare descentralizate si cazanele de acoperire a varfului de consum sunt preconizate a se amplasa in locatiile din care se vor dezafecta puncte termice. Numarul de puncte termice urbane se va reduce la 100, lasand circa 500 de posibile locatii pentru unitati de cogenerare si /sau cazane.

5. The strategy proposes to replace the centralized production system by redesigning and reconstruction and reconfiguration of Bucharest district heating system layout with waste to energy facilities, decentralized co-generation units, peak load boilers installed in the area of consumptions and solar energy systems. The works proposed assume in the same time both redesign and reconstruction of the transmission and distribution systems, and the total investments have been evaluated to 6.8 billion Eur for period 2009-2020.

It should be stressed that the strategy does not take into account the fact that the proposed solutions and technologies were known also in 1994 when in the PHARE programme also a Danish consulting company - Danish Power Consult - prepared the study for Rehabilitation of the Bucharest district heating system where other strategic technologies were proposed and evaluated to 934 million USD.

Many of these solutions have been completed or are almost completed and consisted of reconstruction of transmission and distribution pipelines using only pre-insulated pipes, installation of plate heat exchangers on the heating and hot tap water system from substations, metering of primary and secondary systems, installation of water treatment systems, expansion systems and balancing in the substation.

It is incomprehensible how the same authors have proposed several years ago the works mentioned for which were subsequently spent hundreds of million of dollars and now present us a new strategy that restructures completely the district heating system without taking into account the amounts spent up to now.

All the proposed technologies in the new strategy proposed by the Danish consultants are known and were included in many strategic studies for supply of heat to the cities from the Country, elaborated by Romanian designers, some of them adapted to the specificity of each city were already applied.

Obviously the technologies proposed in the strategy respectively resizing of the heat demand for productions capacitates and transmission and distribution networks, installation of heat modules close to consumers and replacement of 4 pipes systems with 2 pipe-systems, introduction of heat supply control based on both concept (variable temperature and variable flow) are applicable and even applied in the Bucharest district heating system but not by a complete restructuring of the system, they should be integrated into the general process of modernization and upgrading of the system.

5. Strategia propune inlocuirea sistemului centralizat de producere prin reproiectarea si reconstructia acestuia si reconfigurarea schemei generale de termoficare a municipiului Bucuresti prin centrale de incinerare a deseurilor, unitati de cogenerare descentralizate, cazane pentru acoperirea varfului instalate in zonele de consum si sisteme de incalzire solara. Lucrarile propuse presupun in acelasi timp si reproiectarea si reconstructia sistemului de transport si al celui de distributie iar investitiile totale au fost evaluate la 6,8 mld. Euro pentru perioada 2009-2020.

Trebuie subliniat ca strategia nu tine seama de faptul ca solutiile si tehnologiile propuse au fost cunoscute si in anul 1994 in care prin programul PHARE tot o firma de consultanta daneza – danish Power Consult – a elaborat Studiul de Reabilitare a Sistemului de Termoficare al Municipiului Bucuresti prin care s-au propus alte strategii tehnologice la cca 934 mil USD.

Multe dintre aceste solutii au fost finalizate sau se afla in curs de finalizare si au constat in reconstructii de retele de transport si distributie utilizand numai conducte preizolate, montarea de schimbatoare de caldura cu placi pe circuitele de incalzire si de apa calda de consum din punctele termice, contorizarea circuitelor primare si secundare, instalarea de module de tratarea a apei, de expansiune si de echilibrare in punctele termice.

Este de neinteles cum aceeasi autori care au propus in urma cu cativa ani lucrarile mentionate pentru care ulterior s-au cheltuit sute de milioane de USD ne prezinta acum o noua Strategie care restructureaza total sistemul de termoficare fara a lua in considerare sumele cheltuite pana in prezent.

Toate tehnologiile propuse in noua Strategie propusa de consultantii danezi sunt cunoscute, au fost incluse in multe studii Strategice de alimentare cu caldura a localitatilor din tara, elaborate de proiectanti romani, unele dintre ele adaptate la specificul fiecarei localitati fiind deja aplicate.

Evident ca tehnologiile propuse prin Strategie respectiv redimensionarea cererii de consum a capacitatilor surselor si a retelelor de transport si distributie, instalarea de module termice la consumatori insotita de schimbarea sistemului cu 4 tevi in sistemul cu 2 tevi, introducerea reglajului mixt de livrare a caldurii etc. sunt aplicabile si chiar aplicate si in sistemul de termoficare al municipiului Bucuresti dar nu printr-o restructurare totala a acestuia si prin integrarea lor in cadrul procesului de modernizare generala si retehnologizare a sistemului.

Reply to 5.

The strategy prepared by Danish Power Consult recommended rehabilitation and life extension of some of the existing units for 15-20 years – this period

Raspuns la punctul 5

Strategia intocmita de Danish Power Consult a recomandat reabilitarea si extinderea duratei de viata a unor unitati existente pentru 15-20 de ani- aceasta *expires these years.*

The strategy further recommended construction of high efficient dual fuel CHP units. These units were never constructed.

There were no international targets and commitments for reduction of CO_2 and other greenhouse gasses in 1994 – at that time everybody talked about high efficient CHP, which is not the case in 2010 where everybody talks about renewable energy. Hence, you should not be surprised to find that the strategy is different today from 1994.

The main problem in this respect is that nobody has updated the strategy for 15 years. Please, don't let that happen for the new Energy Strategy.

The strategy for Copenhagen elaborated in the 1980'ties and implemented up to the turn of the century was to construct large centralized CHP units and waste-to-energy facilities. These CHP units, build for power generation, are today 10-15 years old and the power utilities has guaranteed the units in operation until at least 2025. Hence, this influence the heat planning as there will be no use for replacement capacity for the next 15-20 years.

It shall be mentioned that the units are dual fuel units (coal, natural gas and biomass) and all equipped with desulphurization, de-NOx, high efficient electrostatic precipitators and advanced waste water treatment facilities. The plant operates with 93% efficiency in CHP mode and above 50% when generating power, only.

When emitting CO_2 above the limit value accepted according to the Danish quota system the plant have to procure Green Certificates or pay $C0_2$ taxes. I both situations the money will be used for renewable energy in terms of investment contribution or feed-in tariffs (a value paid to renewable energy sources in addition to the normal grid tariff).

perioada va expira in curand.

Strategia a mai recomandat construirea unor unitati de cogenerare cu inalta eficienta functionand pe baza de doua tipuri de combustibili. Aceste unitati nu au fost niciodata construite.

La acel moment, in 1994, nu existau obiective si obligatii internationale pentru reducerea emisiilor de CO_2 si alte gaze cu efect de sera, ci doar se discuta de cogenerare eficienta. Astfel, nu ar trebui sa fiti suprins ca strategia de astazi este diferita de cea din 1994.

Marea problema consta in faptul ca de 15 ani nimeni nu a actualizat acea strategie, ceea ce va rugam sa nu permiteti sa se intample si cu aceasta, acelasi lucru.

Strategia pentru Copenhaga, elaborata in 1980 si implementata pana la sfarsitul secolului trecut, a constat in a construi unitati mari de cogenerare si facilitati de incinerare a deseurilor. Aceste unitati de cogenerare, construite pentru producerea de electricitate, au in prezent 10- 15 de ani vechime, iar unitatile de producere sunt garantate sa functioneze cel putin pana in 2025. Totusi, aceasta situatie infuenteaza planificarea pentru energia termica, in conditiile in care nu va fi necesara inlocuirea capacitatilor pentru urmatorii-15-20 de ani.

Trebuie de asemenea mentionat ca unitatile de cogenerare sunt duale si functioneaza atat pe baza de carbune, gaze naturale si biomasa, fiind toate echipate cu sisteme de desulfurare, de curartare NOx, filtre electrostatice cu inalta eficienta si facilitati de tratatre a a apelor uzate avansate. Centralele opereaza cu o eficenta de 93% in sistem de cogenerare si peste 50% doar la generarea energiei electrice.

Daca aceste centrale emit CO_2 peste valorile limita acceptate, in conformitate cu sistemul de cote danez, centralele trebuie sa achizitioneze certificate verzi sau sa plateasca taxe pe emisiile de CO_2. In ambele situatii, sumele colectate in acest sens se reintorc ca investitii in energie regenerabila in sistem "feed-in tariff"(o valoare suplimentara platita pentru producerea din surse de energie regenerabila, peste tarifele oferite de retea)

6. In order for the proposals to be more convincing the strategy is abundant in comparison with the DH system of the Danish capital Copenhagen.

But recently was released HOT/COOL magazine issue no. 3 of 2009 edited by DBDH a prestigious association in the field,of district heating, where is published the article "Heat Plan for the capital area of Danmark" in which Mr. Lars Gulev former president of DBDH makes a presentation of the strategy for the district heating system from Copenhagen with issues similar to the strategy for Bucharest.

In order to compare the two approaches and options

6. Pentru a fi cat mai convingatoare propunerile facute, Strategia abunda in comparatii cu sistemul de termoficare al capitalei daneze Copenhaga.

Dar iata ca recent a aparut nr. 3 din 2009 al revistei HOT/COOL editata de DBDH o prestigioasa Asociatie in domeniul termoficarii, in care este publicat articolul "Heat Plan for the capital area of Danmark" in care dl. Lars Gulev a fost presedinte al BDDH face o prezentare a strategiei sistemului de termoficare din Copenhaga cu problematica similara strategiei municipiului Bucuresti.

Pentru compararea modului de abordare si a included in both strategies we present below the conclusions of the strategy for Copenhagen.

It should be said from the very beginning that the Copenhagen district heating system is a centralized heat supply system with high performance which has three large CHP plants based on coal, gas and heavy oil, and has a degree of integration of renewable resources of about 35% meaning the existence of large waste to energy facilities (based on waste and biomass) and geothermal energy use.

The consultancy company "Ea Enegianalyse" has performed the analysis based on following objectives:

- to ensure an overview of the district heating perspective from Copenhagen
- to clarify the role of DH in the entire energy system of the city
- to examine which heat sources would be of economic and environmental interest in the future.
- To examine and create the preconditions for the development of a RE-based DH system including analyses of the socio-economics consequences arising from this change.

There have been developed 4 scenarios for year 2025 and one scenario for the perspective of 2050 that ensures the conformity with the rates of CO_2 emission reduction of 50-80%.

In all scenarios for 2025 was doubled that current use of renewable resources in order to achieve 70% by this year.

From the conclusions of the report the following memorised:

- The efficiency of DH increases along with the increase of fuel prices and CO_2 compared to separate production of power and heat.
- Correct rehabilitated DH system offer a wide flexibility and good opportunity to incorporate renewable energy sources for energy productions in conditions significantly cheaper opposite to individual propuction
- Converssion of CHP plants based on classical fuel to biomass can be made by the redesigning in the next 4-5 years. The biggest challenges is to make the logistic regarding biomass procurement, transportation and storage work.
- Geothermal energy reduces the dependence on biomass but is a very expensive solution. In addition the heat pumps do not reduce CO_2 emissions as long as marginal electricity production still relies on coal for a long perspective.
- Solar energy included in the centralised heat supply systems trough large collective plants is a relatively cheap form of supply with heat, but heat is produced during the summer period when the waste to energy facilities covers most of the heat need, and heat produced in the new collective solar plants is more expensive compared to the biomass

propunerilor celor doua strategii va redau mai jos concluziile strategiei orasului Copenhaga.

Trebuie spus de la bun inceput ca sistemul de termoficare al orasului Copenhaga este un sistem centralizat de alimentare cu caldura/performant care dispune de trei centrale mari de cogenerare pe carbune, gaze si pacura, si are un grad de integrare a resurselor regenerabile de cca 35% prin existenta unor centrale mari de deseuri si biomasa si folosirea energiei geotermala.

Compania de consultanta “Ea Enegianalyse” a efectuat analiza in baza urmatoarelor obiective:

- sa asigure o viziune asupra prespectivelor termoficarii din Copenhaga
- sa clarifice care este rolul termoficarii in energetica de ansamblu a orasului
- sa examineze care surse ale sistemului de termoficare prezinta interes in viitor sub aspect economic si de mediu
- sa examineze si sa creeze preconditii pentru dezvoltarea unui sistem de termoficare bazat pe resurse energetice regenerabile si care ar putea fi consecintele social-economice ale acestei schimbari.

Au fost dezvoltate 4 scenarii pentru anul 2025 si un scenariu pentru perspectiva anului 2050 care sa asigure incadrarea in ratele angajate de reducere a emisiilor de CO_2 de 50-80%.

In toate scenariile pentru anul 2025 a fost dublata utilizarea actuala a resurselor regenerabile respectiv sa se atinga pana in acest an pana la 70%.

Din concluziile lucrarii se retin urmatoarele:

- eficienta termoficarii creste odata cu cresterea preturilor combustibililor si a CO_2 fata de producerea separata a energiei electrice si termice.
- Sistemele de termoficare reabilitate coerent ofera o larga flexibilitate si o buna oportunitate pentru includerea resurselor regenerabile in producerea de energie in conditii semnificativ mai ieftine decat cele obtinute in cazul solutiilor individuale
- Conversia CET-urilor de pe combustibil clasici pe biomasa se poate face prin reproiectarea in 4-5 ani. Cele mai mari provocari contau in elaborarea logictisii privitoare la procurarea biomasei, transportul si depozitarea acesteia.
- Energia biotermala poate reduce dependenta de biomasa dar in prezent este o solutie foarte scumpa. In plus pompele de caldura nu reduc emisiile de CO_2 atata timp cat productia marginala de electricitate se bazeaza inca mult timp pe carbune.
- Energia solara indusa in sistemele centralizate de alimentare cu caldura prin centrale solare mari este o forma relativ ieftina de alimentare cu caldura, dar caldura este produsa pe perioada de vara cand centralele pe deseuri acopera cea mai mare parte a necesarului de caldura, iar caldura obtinuta din centralele noi solare este mai scumpa comparativ cu cogenerarea pe biomasa. Costurile

cogeneration. The costs of solar collective plants for DH systems, represents half of the amount of corresponding plants for storey buildings or only 25% of corresponding systems on one-family houses.

centralelor colective solare pentru sistemele centralizate de alimentare cu caldura reprezinta jumatate din valoarea centralelor solare de bloc sau numai un sfert din valoarea centralelor solare pentru cladiri unifamiliare.

Reply to 6.

Members of the Energy Committee participated in presentation by Mr. Lars Gullev of the Heat Plan for the greater Copenhagen area in the autumn 2009. I'm sure they fully understand the difference between the situation in Copenhagen and in Bucharest.

Please see our "Reply to 5" for additional comments.

Raspuns la punctul 6

Membri ai Comitetului Energetic Municipal au participat la prezentarea domnului Lars Gullev referitor la Planul energetic pentru zona largita a Copenhagai, in toamna anului 2009. Sunt sigur ca acestia au inteles perfect diferenta dintre situatia din Copenhaga si cea din Bucuresti.

Pentru lamuriri suplimentare va rog sa vedeti "Raspunsul de pa punctul 5".

7. The conclusions of the study elaborated by the consultancy company "Ea Enegianalyse" for Copenhagen highlight that analysis considers to a much greater extent the existing state of the DH system and approached in a more scientific manner how the renewable resources can be efficiently implemented within the existing district heating systems.

7. Concluziile studiului intocmit de compania de consultanta "Ea Enegianalyse" pentru Copenhaga scot in evidenta faptul ca analiza efectuata a tinut seama intr-o masura mult mai mare de situatia existenta a sistemului de termoficare si a abordat intr-o maniera mult mai motivata stiintific modul in care pot fi implementate eficient resursele regenerabile in cadrul sistemelor de termoficare existente.

Reply to 7.

We have carefully analyzed the existing state of the district heating system in Bucharest and our findings are that the real socio-economic tariff in Bucharest is probably the highest in the world for the following main reasons:

- *High production costs due to low efficiencies, worn-out plants and plants operated downgraded.*
- *Heat losses in the transmission system unheard of for modern systems. The losses in Bucharest exceed 20% while in Copenhagen they are in the level of 1%.*
- *Water losses in the system unheard of for modern district heating systems. The water losses in Bucharest is about 7 million m^3 per year while in Copenhagen the water losses are measured in single digits thousands m^3 per year.*
- *The water quality in Bucharest, especially in the secondary system, is poor and will result in a reduced lifetime of pipes and other components (10-15 years). The water quality in Copenhagen is boiler water as used at the CHP plant giving a lifetime of 50+ years.*

Please read the SWOT analyze found in Volume 2 – Part C , Appendix, chapter 8, to the strategy for additional information.

Hence, the strategy for Copenhagen and Bucharest will of cause be very different.

Raspuns la punctul 7

Noi am analizat cu mare atentia starea existenta a sistemului de termoficare din municipiul Bucuresti si rezultatele analizei au evidentiat faptul ca tariful socio-economic real, in Bucuresti, este probabil cel mai mare din lume, din urmatoarele motive principale:

- *Costuri de productie mari, datorita eficientei scazute; centralelor uzate fizic si moral si exploatarea lor sub standarde.*
- *Pierderi de caldura in sistemul de transport cu valori de neconceput pentru un sistem modern. Pierderile din Bucuresti depasesc 20%, in timp ce in Copenhaga sunt in jur de 1%.*
- *Pierderi de agent termic in sistem cu valori de neconceput pentru un sistem modern de termoficare. Pierderile de agent termic din Bucuresti sunt in jur de 7 milioane de m3/an, in timp ce in Copenhaga sunt de ordinul a cateva mii de m3/an.*
- *Calitatea apei in Bucuresti, in special in sistemul de distributie este foarte scazuta, ceea ce conduce la scaderea duratei de viata a conductelor si a altor echipament la 10-15 ani. Calitatea apei, in Copengaha este considerata apa de cazan, asa cum este utilizata in centralele de cogenerare, ceea ce ofera sistemului o durata de viata de peate 50 de ani.*

Va rugam sa cititi analiza SWOT, din Strategie, aflata in Volumul 2 – Partea C, Anexe capitolul 8, pentru informatii suplimentare.

Totusi, strategia pentru Copenfhaga si Bucuresti, desigur vor fi foarte diferite.

8. Even if the general objectives of the energy strategy of Bucharest are close to those of the Danish capital Copenhagen, the proposed technological solutions and their implementation in the specific situation of the Bucharest district heating system are not supported sufficiently neither from technical point of view nor in terms of energy efficiency which leads to the conclusion that they are inapplicable.

8. Chiar daca obiectivele generale urmarite prin strategia energetica a municipiului Bucuresti sunt apropiate de cele ale capitalei daneze Copenhaga, solutiile tehnologice propuse si incadrarea acestora in situatia specifica a sistemului de termoficare al municipiului Bucuresti nu sunt sustinute suficient nici sub aspect tehnic nici sub aspectul eficientei energetice ceea ce conduce la concluzia ca sunt inaplicabile.

Reply to 8.

The recommended technical solutions regarding production are all fully in compliance with the solutions outlined in the National Energy Strategy. The selected options are all well-know and implemented in other parts of the world and even to some extent in Romania.

The technical solutions for transmission and distribution are all solutions implemented in modern district heating systems, also in Romania.

Raspuns la punctul 8

Solutiile tehnice recomandate referitor la producere sunt in deplina concordanta cu cele specificate in Strategia Energetica Nationala. Optiunile selectate, sunt pe deplin cunoscute si implementate in alte parti ale lumii si chiar si in anume locuri din Romania.

Solutiile tehnice pentru transport si distributie sunt numai solutii implementate in sisteme moderne de termoficare, chiar si in Romania.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipilui Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Technical Note 16.03.2010

Nota Tehnica 16.03.2010

Observation from Mrs. Marinela Ivan and Mr. Prof.Dr.Ing. Serban Raicu

Observatii din partea D-nei Marinela Ivan si a D-lui Prof.Dr.Ing. Serban Raicu

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1 INTRODUCTION

The Consultant has submitted the Final Report for the Energy Strategy.

On 16.03.2010 was held the meeting for the endorsement of the report by the Technical Committee and later to be submitted to the General Council for final approval.

With the occasion of this meeting, the members of Technical Committee voted the endorsement of Report 3 –Strategy. From the total 5 negative votes, there are below submitted the justification of negative votes expressed by Mrs. Marinela Ivan and Mr. Prof.dr.ing.Serban Raicu.

The current technical note replay to Mrs. Ivan and Mr Raicu.

1 INTRODUCERE

Consultantul a transmis varianta finala a Raportului Final pentru Strategia Energetica.

In data de 16.03.2010 a avut loc sedinta pentru avizarea studiului de catre Comitetul Municipal al Energiei pentru a fi ulterior inaintat spre aprobare Consiliului General.

Cu ocazia acestei intalniri, membrii Comitetului Municipal al Energiei au votat avizarea Raportului 3 – Strategia. Dintre cele 5 voturi negative exprimate sunt prezentate justificarile voturilor negative acordate de catre d-na Marinela Ivan si domnul Prof.dr.ing. Serban Raicu.

Prezenta nota tehnica raspunde doamnei Ivan si domnului Raicu

2 CONSIDERATIONS OF MR. RAICU

As defined during the meeting from 16. 03. 2010 and following your renewed request regarding the necessity agreed to argument my vote, the arguments are here:

1. The Energetic Strategy had to contain a relevant analysis of transport matters, due to the importance and weight this problems, considering the significant implications of energy consumption and the negative external impact on surface generated by public transport (affected by the major congestion of road network) and of the underground transport. Even more, the responsibility of Bucharest Municipality, by directing the transport municipal operator, is major in providing population movements in accordance with the requirements of sustainable development. Individual and public transport, as traffic to, directly influences the quality of the inhabitant's life.
2. Unfortunately, for energy issues, including those relating to adverse external effects, are reserved only a few rows (page 6, 7 and 23 in Phase III of the Strategy) which only prove the lack of competence in the field (references are almost entirely related to individual trips with cars, parking, congestion charges, tolls, etc. and not as it was necessary to increase the attractively of public transport, with high efficiency and reduced external negative effects). The energy issues to public transport and urban traffic are so shallow presented that, without restraint, I say that this can not be assimilated with a strategy as exists in the field.
3. With the observation that my assessment only refers to the strategy (which I think is far to meet minimum requirements!) for public transport and urban traffic - area where I claim my competency - I voted negatively.

2 CONSIDERATII DL RAICU

Conform celor stabilite in sedinta din 16. 03. 2010 si la solicitarea reinnoita de catre dumneavoastra privitoare la necesitatea convenita de argumentare a votului iata argumentele:

1. Strategia energetica a Municipiului Bucuresti, date fiind implicatiile semnificative ale consumurilor energetice si ale efectelor negative externe ale transportului public de suprafata (afectat de congestia majora a retelei stradale) si ale celui subteran, trebuia sa contina cu importanta si ponderea cuvenita aceasta problematica. Cu atat mai mult cu cat responsabilitatea Primariei, prin regia din subordine, este majora in asigurarea mobilitatii populatiei in conformitate cu cerintele dezvoltarii durabile. Transportul individual si cel public, ca si traficul aferent, influenteaza direct calitatea vietii locuitorilor municipiului si ai zonelor limitrofe.
2. Din nefericire, problemelor energetice, inclusiv celor care privesc efectele externe negative, le sunt rezervate numai cateva randuri (pagina 6, 7 respectiv 23 din etapa III-a a Strategiei) care nu fac decat sa dovedeasca lipsa de competenta in domeniu (referirile sunt in cvasitotalitate legate de deplasarile individuale cu autoturismele, locuri de parcare, taxe de congestie, taxe de drum, etc si nu cum ar fi fost necesar la cresterea atractivitatii transportului public, cu eficienta energetica ridicata si cu efecte externe negative reduse). Este atat de superficial prezentata problematica energetica a transportului public si a traficului urban incat, fara retinere, afirm ca nu poate fi asimilata cu o strategie vag consonanta cu ceea ce exista in domeniu.
3. Cu observatia ca aprecierile mele se refera numai la strategia (pe care o consider departe de a raspunde unor minime exigente!) in domeniul transportului public si al traficului urban – domeniu in care imi revendic competente- am votat negativ.

Reply to Mr.Raicu

As mentioned in the ToR, the elaboration of the Energetic Strategy was considered necessary being considered one from 5 external negative factors, identified by an other independent consultant, employed By Municipality to elaborate a study regarding establishment of PPP and transform RADET

Raspuns la consideratiile domnului Raicu

Asa cum se mentioneaza si in Termenii de Referinta, elaborarea Strategiei Energetice a aparut ca o necesitate, inexistenta acesteia fiind considerata unul din cei 5 factori negativi externi, identificati de catre un alt consultant independent, angajat de catre Primaria Municipiului Bucuresti pentru a intocmi un studiu *into commercial entity, project financed by EBRD and Swiss Government.*

Nowhere in the ToR is mentioned as a requirement for the consultant to prepare a detailed Strategy for Urban Transport in Bucharest. Furthermore, financed by PHARE funds, there was elaborated and approved a General Master Plan for Urban Transport in Bucharest with EU project code: EuropeAid/123579/D/SER/RO. The contract for the elaboration of General Master Plan was completed in the same time when Municipality has sign the contract for elaboration of Energy Strategy, so there is no reason for Municipality to pay in addition for an already completed task. The consultant for Energy Strategy has obtained a copy of this final report and considered that is no reason to reload and investigate aspects which already are considered and treated by the above mentioned General Master Plan.

The requirement from ToR are specifying directly on the elaboration of Energy Strategy focusing on the energetic services provided by Municipality, namely supply of heat in Bucharest.

privind stabilirea unui PPP si transformarea RADET Bucuresti intr-o societate comerciala, in cadrul unui program finantat de catre BERD si Guvernul Elvetian. Nu este nicaieri mentionat in Termenii de referinta vreo cerinta de a elabora o strategie pentru transportul in Bucuresti. Cu atat mai mult cu cat a fost elaborat si aprobat un Master Plan General pt Transport Urban in Bucuresti, proiect cu finantare PHARE: EuropeAid/123579/D/SER/RO. Contractul pentru elaborarea Master Planului a fost finalizat la data la care s-a incheiat contractul privind elaborarea Strategiei Energetice. Nu exista nici un motiv pentru care Primaria Municipiului Bucuresti sa fi dorit sa plateasca suplimentar pentru o activitate care deja era finalizata. Consultantul a avut acces la acest raport final si a considerat ca nu este necesara reluarea unor aspecte deja investigate si clarificate de Master Planul mai sus mentionat.

Cerinta din Termenii de Referinta se refera in mod direct la elaborarea unei strategii energetice care sa se concentreze pe serviciile energetice aflate in responsabilitatea Municipalitatii si anume serviciile de incalzire centralizata din Municipiul Bucuresti.

3 CONSIDERATIONS OF MRS.IVAN

As is known I have voted "NO" (although as I said, I would have liked very much to vote yes) but in my opinion we should remain consistent and coherent in expression of an option in accordance with the standards, needs and realities to which a document of such importance to Bucharest must respond. As mentioned during the meeting, those members of Energetic Committee who voted "No" must submit their written arguments for the negative vote on the meeting from last week. Therefore, I voted "No" because according to "Terms of Reference Chapter B / Report 3 – finally" I believe that are not fully achieved these important issues:

1. "shall elaborate a **realistic forecast of the evolution of energy consumption**" - (this would have meant the introduction of realistic in deep approach of public transport, public lighting, etc.)
2. "shall justify **General Council decisions on investments for development and efficiency the energy services**" - (on this issue are very relevant the comments and votes of the general counsellors, but I can't trust in reaching of the requirements mentioned in the ToR)

In addition I mention these:

- The investments made so far in district heating system (EIB, EBRD, donors) and the results of these investments are ignored, neglected, or denied (?!). I deny these comments / conclusions in any form and in any context should be made. There are responsibilities to be assumed and it can not be treated easily.
- The strategy should contain a detailed and equally laborious vision of the sectors of public transport, public lighting, water and sewerage services, who consumed energy and direct or indirect the manager is the Bucharest Municipality.
- ELCEN role - as energy producer with significant impact on the tariff system and on the relationship RADET-PMB –end users is irrelevant treaty
- The proposed investments (there are more digits from 3.5 billion to 6 billion) seem to be disconnected from reality and unable to be completed in the next 10 years (the intended SEM period), with a period for the recovery of investment resulted after some calculations between 50 - 100 years. What kind of investments can be considered efficient and also attractive with this period of recovery and where in the world?
- Another example is the proposal for introduction of

4 CONSIDERATII DNA IVAN

Dupa cum este cunoscut am votat "NU" (desi asa cum am mentionat mi-as fi dorit foarte mult sa votez DA) dar dupa parerea mea trebuie sa ramanem consistenti si coerenti in exprimarea unei optiuni in acord cu standardele, exigentele si realitatile caruia un document de o asemenea importanta pentru Bucuresti trebuie sa ii raspunda. Cum a fost mentionat in timpul intalnirii, acei membri ei CEM care au votat "Nu" trebuie sa-si argumenteze si in scris votul exprimat in adunarea CEM de saptamana trecuta. Prin urmare am votat "Nu" pentru ca in acord cu "Termenii de Referinta cap.B/ Raport 3 – final" consider ca nu sunt pe deplin realizate urmatoarele aspecte mai importante:

1. "va elabora o prognoza **realista privind evolutia consumurilor de energie**"-(aceasta ar fi insemnat inclusiv aprofundari realiste ale transportului public, iluminatului public, samd)
2. "va fundamenta **deciziile Consiliului General privind investitiile pentru dezvoltarea si eficientizarea serviciilor energetice"** –(asupra acestui aspect foarte relevante sunt comentariile si votul d-lor consilieri generali, dar am rezerve asupra realizarii acestei cerinte din ToR)

In plus si deosebit de cele de mai sus mentionez urmatoarele:

- Investitiile facute pana acum in sistemul de incalzire urban (BEI, BERD, donatori) si rezultatele acestor investitii sunt ignorate, neglijate, sau mai mult negate(?!). Personal resping categoric aceste comentarii/concluzii sub orice forma si in orice context ar fi formulate. Exista responsabilitati care trebuie asumate si care nu pot fi tratate superflu.
- Strategia ar fi trebuit sa cuprinda intr-o masura egal detaliata si laborioasa si sectoarele transportului public, iluminatului public, serviciilor de apa si canalizare, in care se consuma energie si al caror gestionar direct sau indirect este PMB.
- Rolul ELCEN – ca producator de energie cu impact major asupra sistemului de tarife, asupra relatiei RADET-PMB- consumatori finali este nerelevant tratat
- Investitiile propuse (se vehiculeaza mai multe cifre de la 3.5 Miliarde la 6 Miliarde) par rupte de realitate si imposibil a fi realizate in urmatorii 10 ani (perioada vizata de SEM) , cu o durata de recuperare a investitiilor cuprinsa dupa unele calcule intre 50 – 100 ani. Ce investitii pot fi considerate eficiente si atractive cu asemenea

renewable energy (solar panels), for which there is no space and no location, and I came back to the "reality" as requested by ToR

There are also other aspects to be considered, but I would like to stop here. I want to emphasize that using the renewable energy is not only a goal for each of us (the environmental component and efficient use of conventional energy resources which they have) and national policies in this respect, but still the using of renewable proposals must be feasible, realistic and adapted to local conditions. Also I want to highlight by this message that I have nothing against privatization, by contrary, in all our projects we tried to promote effective mechanisms and management of PPP as the main goal reaching the satisfaction the end users. But this implies certain conditions which shall be satisfied rigorous, professional, transparent and by any situation, the implementation could not be in any situation and in any form. Otherwise, we build sand castles that are falling under the spectre of improvisation, ad-hoc decisions, as are many examples, unfortunately.

So, my vote stays NO. I emphasize that my vote is not directed against the consultant, whose professionalism is indubitable, but against the document, which in my opinion cannot reach expectations of the ToR. Further evidence to this effect would be the fact that even those CME members who voted YES, mentioned targets and suggest improvements to the SME chapters.

Of course, whatever will be the decision of the General Council this must be respected, because General Council represents law-makers.

indicator de recuperare si unde in lume?

- Un alt exemplu ar fi propunerea de regenerabile (panouri solare), pentru care nu exista nici spatiile si nici conditiile de amplasare la volumul propus prin SEM si revenim la "realismul" mentionat prin ToR

Ar fi si alte aspecte dar ma opresc la acestea. Doresc sa subliniez ca utilizarea energiilor regenerabile este nu numai un deziderat al fiecaruia dintre noi (prin componenta de mediu si de utilizare eficienta a resurselor energetice clasice pe care le are) si al politicilor nationale in acest sens, dar totusi realizarea propunerilor privind utilizarea regenerabilelor trebuie sa fie fezabila, realista si adaptata conditiilor locale existente.

Deasemenea reafirm si prin acest mesaj ca nu am nimic impotriva privatizarii, dimpotriva, prin toate proiectele noastre incercam sa promovam mecanisme ale PPP si eficientizare a managementului cu scopul final al satisfacerii cerintelor consumatorilor finali cele mai inalte standarde. Dar asta implica anumite conditii indeplinite riguros, profesional, transparent si in nici un caz implementare in orice situatie si sub orice forma. Altfel construim castele de nisip care se prabusesc sub spectrul improvizatiei, deciziilor ad-hoc, asa cum sunt exemple relevante din pacate.

Prin urmare votul meu ramane NU. Subliniez ca votul meu nu este indreptat impotriva consultantului, al carui profesionalism este de necontestat ci impotriva documentului elaborat al SEM si care in opinia mea nu raspunde asteptarilor formulate prin ToR. O dovada in plus in acest sens ar fi si faptul ca, chiar si acei membri ai CME care au votat DA au mentionat obiectiuni si au sugerat imbunatatirea unor capitole ale SEM.

Bineinteles ca oricare ar fi decizia Cosiliului General al Municipiului Bucuresti, aceasta trebuie respectata pentru ca CGMB reprezinta legislativul.

Reply to Mrs. Ivan

Regarding 1:

Please see the replay above, to observations from Mr. Serban Raicu

Regarding 2:

We have assumed that all decisions of the General Council so far has, and in the future will, comply with provisions of relevant EU-directive as these are implemented in Romanian legislation and comprehensively outlined in the national strategy.

In preparation of the Energy Strategy it is assumed that

Raspuns la consideratiile doamnei Ivan

Privitor la punctul 1:

Va rugam sa vedeti raspunsul de mai sus, la observatiile domnului Serba Raicu

Privitor la punctul 2:

Am luat in considerare că toate deciziile Consiliului General au fost până în prezent şi vor fi în viitor, în conformitate cu prevederile relevante ale Directivei UE, asa cum acestea sunt puse în aplicare în legislaţia românească şi mentionate cuprinzător în Strategia Naţională.

În pregătirea Strategiei Energetice s-a considerat că the implementation of the National Strategy will take place without further delay and be completed as agreed between the Romanian Government and the EU.

Regarding investment in DH

The benefit of investments in terms of obtaining satisfactory supply (priority 1) is not neglected. The investments ensured by the municipality in the 1990'ties aimed to increase the supply of DH from then about 70% of the demand to close to 100%. Satisfactory supply was obtained from the late 1990'ties.

During the last decade investments have aimed to continue satisfactory supply conditions and at the same time obtain improved energy efficiency. However, improved energy efficiency has been very difficult to obtain due to the requirements of following existing STAS-norm and Romanian design guidelines etc. This is detailed discussed in the Project Completion Report for the EIB, CEB financed project: "Programme START" and discussed with other donors by EIB.

In consequence of the observations in the Project Completion Project there were meetings between EIB and Romanian authorities resulting in a JASPER project recommending new standards and norms etc. The findings and recommendations of the JASPER project was fully in-line with the observations discussed in the Project Completion Report. However, these recommendations have never been implemented and the design for new investment projects is still based on norms, standards and guidelines.

Regarding ELCEN role

ELCEN's role will in the future be to ensure electricity supply in Romania including Bucharest. Possible supply of heat will be decided based on commercial, security and environmental considerations. As long as the plans are rehabilitation of existing plants having a production price above 10 EUR/GJ (plus 8 EUR transmission costs) heat supply for ELCEN will not be feasible in competition with waste-to-energy, solar energy and decentralised CHP.

If ELCEN come with an offer that can compete with other possible sources the Energy Strategy should be updated. However, we found this possibility impossible as it will require cross subsidises from the electricity side to the heat side, which shall not be approved in calculation of the tariffs.

Recovery of investments

All calculations regarding investments are based on 10-20 year financial lifetime while maintaining the current tariff level.

If the tariffs will be allowed to follow increase in natural gas tariff (price escalation 4% pa) and added environmental taxes (introduced from 2012 reaching

implementarea Strategiei Naţionale va avea loc fără întârziere şi va fi implementata după cum s-a convenit între Guvernul României şi UE.

Privitor l a investiţiile în incalzirea cen tralizata

Beneficiul investiţiilor în ceea ce priveşte obţinerea unei furnizari satisfăcătoare (prioritatea 1) nu a fost negat. Investiţiile asigurate de municipalitate, la nivelul aniilor 1990, au permis atunci cresterea nivelului de furnizare a incalzirii centralizate de la aproximativ 70% din cerere, la aproape 100%, astfel la sfarsitul anilor '90 a fost obţinuta o furnizare satisfăcătoare.

Pe parcursul ultimului deceniu, investiţiile au avut drept scop o continuare in condiţii satisfăcătoare a furnizarii şi în acelaşi timp, obtinerea unei eficienţe energetice ridicate. Cu toate acestea, îmbunătăţirea eficienţei energetice a fost foarte dificil de obtinut din cauza cerinţelor din STAS-urile existente, normele de proiectare, liniile directoare din proiectarea românească, etc. Acest lucru a fost discutat in detaliu în Raportul de finalizare a Proiectului pentru proiectul finanţat de BEI, BDCE: "Programul START"; şi discutat si cu alţi donatori de catre BEI.

Ca urmare a observaţiilor, în Raportul de Finalizare au existat întâlniri între BEI şi autorităţile române ce s-au finalizat cu un proiect Jasper ce recomanda noi standarde şi norme. Constatările şi recomandările proiectului Jasper au fost pe deplin în conformitate cu observaţiile discutate în cadrul Raportului de completare a Proiectului. Cu toate acestea, aceste recomandări nu au fost niciodată puse în aplicare iar noile proiecte de investiţii se bazeaza încă pe vechile norme, standarde şi regulamente.

Privitor la rolul ELCEN

Rolul ELCEN va fi, în viitor, de a asigura furnizarea energiei electrice din România, inclusiv in Bucureşti. Posibila furnizare de căldură va fi decisa pe baza consideraţiilor comerciale, de securitate şi de mediu. Atâta timp cât planurile sunt de reabilitare a instalaţiilor existente, care au un preţ de producţie de peste 10 euro / GJ (plus 8 euro costurile de transmitere) pentru furnizarea agentului termic de catre ELCEN, aceasta furnizare nu va fi fezabila în competitie cu energia provenita din deseuri, energia solară şi unitatile in cogenerare descentralizate.

În cazul în care ELCEN a veni cu o oferta care poate concura cu alte surse posibile de energie, Strategia Energetică ar trebui să fie actualizata. Cu toate acestea, am noi consideram acest lucru imposibil, cata vreme acest lucru necesita o subvenţionare incrucisata dinspre energia electrică catre partea de căldură, subventionare care nu va fi aprobata în calculul tarifelor.

Recuperarea investiţiilor

Toate calculele în ceea ce priveşte investiţiile se bazează pe durata de viaţă financiara de 10-20 ani, menţinând nivelul actual al tarifelor.

20% of the fuel costs in 2020) the recovery time will be much shorter. On the other hand, if the production tariffs will be deceased as compensation for removal of subsidises the recovery time will be longer.

In appendixes to the Strategy Report you can find calculations for the different production options.

Installation of solar panels

We don't believe that Bucharest should be the only EU city where solar panels cannot be installed.

În cazul în care tarifele vor urma cresterea tarifului gazelor naturale (creşterea preţurilor cu 4%/an) şi adaugarea taxelor de mediu (introduse începând din 2012, si ajungând la 20% din costurile combustibilului în 2020) timpul de recuperare va fi mult mai scurt. Pe de altă parte, în cazul în care tarifele de producţie vor creste ca o compensaţie pentru eliminarea subvenţiilor, timpul de recuperare va fi mai mare. În anexele la Raportul Strategiei puteţi găsi calcule pentru diferite opţiuni de producţie.

Instalarea de panouri solare

Noi nu putem crede că Bucureştiul ar trebui să fie singurul oraş din UE, în care panourile solare nu pot fi instalate.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipiului Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Technical Note 15.10.2009

Nota Tehnica 15.10.2009

Observation from RADET

Observatii din partea RADET

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Cuprins

1 INTRODUCTION

The Consultant has submitted the Draft Final Report for the Energy Strategy. The Strategy was presented for the Technical Committee on 20.08.2009.

RADET has submitted a number of observations the meeting respectively on 09th of October 2009. This Technical Note repeats the observations and provides the answers from the Consultant.

1 INTRODUCERE

Consultantul a transmis varianta initiala a Raportului Final pentru Strategia Energetica. Strategia a fost prezentata Comitetului Energetic Municipal in data de 20.08.2009.

RADET a formulat o serie de observatii si a transmis note scrise ulterior intalnirii, in data de 09.10.2009. Consultantul a raspuns la notele scrise care s-au regasit si in observatiile formulate.

2 OBSERVATIONS AND ANSWERS

2.1 RADET

Regarding "Report 3" - Energetic Strategy of Bucharest Municipality, we submit the followings:

Observation 2.1.1:

"Report 3" has nothing to do with "Report 2": Results of the analysis of district heating system transmission and distribution and the study regarding rehabilitation of districtrict heating system prepared by Danish power consult related to PHARE programme, rehabilitation programme financed by EIB, etc.

Answer 2.1.1:

The Strategy Report (Report 3) submitted in 2009 has nothing to do with the PHARE Study (Study on Bucharest district heating system) submitted in 1995 apart from some data and references taken from the PHARE Study when elaborating the Strategy Report.

Since 1995 a number of new developments have taken place. Most important are the EU membership and the subsequent implementation of EU directives and approval of a National Energy Strategy(approved by GD 1069/2007) having among others the following impact:

- Future financing shall be based on private investments (privatisation).
- Energy conservation shall bring the consumption in existing buildings down from more than 180 kWh/m^2/y to about 100 kWh/m^2/y.
- Solar energy shall play an important role in the heat production.
- About 20 waste-to-heat facilities shall be constructed in Romania in cities with above 150,000 inhabitants.

It should be obviously clear that implementing these and other measures will result in a very different RADET organisation, production pattern, transmission structure and distribution structure than the present.

Observation 2.1.2:

"Report 3" not offers solution for Energetic Strategy of Bucharest Municipality, because only 1.2 million people from 2.5 million being the total number of people in Bucharest are connected to the district heating system. Over 220,000 apartments are heated by other means:

2 OBSERVATII SI RASPUNSURI

2.1 RADET

In ceea ce priveste "Raportul 3" – Strategia Energetica a Municipiului Bucuresti, va transmitem:

Observatia 2.1.1

"Raportul 3" nu are nici o legatura cu "Raportul 2": Rezultatele analizei sistemului centralizat de transport si distributie a energiei termice si studiul de reabilitare a Sistemului de Termoficare intocmit de Danish Power consult in cadrul programului PHARE, programe de reabilitare cu credite BEI, etc.

Raspuns 2.1.1

Raportul privind Strategia (Raportul 3) transmis in 2009, nu are nici o legatura cu Studiul PHARE (Studiu asupra sistemului de termoficare din Bucuresti) transmis in 1995, cu exceptia unor date si referinte incluse in Studiul PHARE, care au fost utilizate la elaborarea Raportului privind Strategia.

Incepand cu anul 1995, in Romania, au fost inregistrate o serie de evolutii pozitive. Cea mai importanta fiind aderarea Romaniei la EU, avand ca implicatie directa implementarea Directivelor Europene si aprobarea Strategiei Energetice Nationala (aprobata prin HG 1069/2007), avand printre altele urmatorul impact:

- Finantarea viitoare se va baza pe investitii private (concesiune cu aport de capital);
- Conservarea energie trebuie sa conduca la reducerea consumului din cladirile existente de la peste 180 kWh/m^2/an ajungandu-se sub 100 kWh/m^2/an;
- Energia solara va juca un rol important in producerea de energie termica;
- Aproximativ 20 de facilitati de incinerare a deseurilor vor fi construite in Romania, in orase cu o populatie mai mare de 150,000 locuitori.

Este absolut evident ca implementarea celor de mai sus si a altor masuri vor implica: o organizatie complet diferita de cea prezenta a RADET, modele de producere, transport si distributie foarte diferite de structurile aflate in prezent.

Observatia 2.1.2:

"Raportul 3" nu prezinta solutii pentru Strategia Energetica a Municipiului Bucuresti, deoarece din cei 2,5 milioane locuitori doar 1,2 milioane locuitori sunt racordati la sistemul centralizat administrat de RADET. Un numar de peste 220.000 apartamente isi natural gas, liquid fuel, wood, etc.

asigura necesarul de incalzire prin gaze, combustibil lichid, lemn, etc.

Answer 2.1.2:

The Strategy Report consider the total heat demand of Bucharest and in order to obtain CO_2 neutrality in 2020 the present individual heated buildings are assumed converted to district heating or other renewable sources. The Heat Demand Forecast presented in the Strategy Report establish 90-95% of the heat demand in 2020 supplied by district heating and about 5-10% supplied by means of other renewables.

Raspuns 2.1.2:

Raportul privind strategia ia in considerare faptul ca intregul necesar de incalzire, in Bucuresti, va deveni, la nivelul anului 2020, neutru din punct de vedere al emisiilor de CO_2, cu luarea in considerare si a cladirilor care sunt in prezent incalzite individual, ca vor fi racordate la sistemul de incalzire centralizata sau vor utiliza surse individuale de incalzire be baza de energie regenerabila. Prognoza cererii privind incalzirea, la nivelul anului 2020, inclusa in Raportul privind Strategia, considera ca aproximativ 90-95% din cererea de caldura va fi asigurata din sistemul de incalzire centralizata si restul de 5-10%, din alte surse de energie regenerabila.

Observation 2.1.3:

A strategy which asked 8-10 billions Euro for investments, cannot be taken into consideration if is not included in the National Strategy, endorsed by the body empowered as: Ministry of Administration, Ministry of Environmental, National Regulatory Agency for Energy, Bucharest Polytechnic University, Bucharest Construction University, National Institute for Research and Development in Construction and in Construction Economy, etc

Observatia 2.1.3:

O strategie municipala ce implica investitii de peste 8-10 miliarde Euro nu poate fi luata in considerare daca nu este inclusa in strategia nationala, avizata de organele abilitate: MAI, Ministerul Mediului, ANRE, Institutiile UPB, UCB, INCERC,etc.

Answer 2.1.3:

The author must have read a different Strategy Report that the one submitted by the Consultants and must have completely misunderstood or misread Romanian legislation in force regarding district heating, the National Energy Strategy, relevant EU-directives and International Treaties endorsed by the Romanian parliament.

The Strategy Report establish a value necessary for implementing the strategies in the level of 3 – 3.5 billion EUR over the next 10-12 years (the 8-10 billion mentioned in the observation cannot be found in the report).

The Strategy Report is elaborated fully in respect of the National Energy Strategy, relevant EU-directives (most important in this respect the energy conservation and energy improvement directives, the CHP directive, the waste directive and the coming district heating directive) and international treaties (must importantly in this respect the Kyoto treaty). The Consultant would be very surprised if the author of the observations specifically can mention strategy aspects included in the Strategy Report out of line with the above mentioned preconditions.

Raspuns 2.1.3:

Autorul pare ca a citit un alt Raport privind Strategia decat cel care a fost transmis de catre Consultant si se pare ca are o intelegere gresita sau chiar nu a citit legislatia Romanesca in vigoare privind sistemul de incalzire centralizata, Strategia Energetica Nationala, Directivele Europene relevante in domeniu si Tratatele Internationale, ratificate de catre Parlamentul Romaniei.

Raportul privind Strategia stabileste ca valoarea investitiilor necesare pentru implementarea strategiilor este la un nivel de 3-3.5 miliarde Euro in urmatorii 10-12 ani(cele 8 -10 miliarde, mentionate in observatii nu se regasesc in Raportul privind Strategia).

Raportul privind Strategia este elaborat in deplina concordanta cu Strategia Energetica Nationala, Directivele EU relevante (cele mai importante in acest sens fiind cele referitoare la: conservarea energiei si eficienta energetica, cogenerare de inalta eficienta, gestionarea deseurile precum si directiva care este pregatire referitoare la incalzirea centralizata) tratatele internationale (cel mai important dintre acestea fiind Protocolul de la Kyoto). Consultantul ar fi foarte surprins daca autorul acestor observatii ar putea sa identifice in Raportul privind Strategia aspecte care sunt in contradictie cu oricare dintre preconditiile mentionate mai sus.

Observation 2.1.4:
"Report 3" under evaluates or not evaluates the necessary investments for the new 100 heat exchangers stations and 50 new local HoB in term of the related premises, connection to the utilities and specifically insurance of deposits for the bio fuels and extension of the natural gas network, etc.

Observatia 2.1.4:
"Raportul 3" subevalueaza sau nu evalueaza investitiile necesare in asigurarea locatiilor propuse, a utilitatilor la cele 100 noi substatii si 50 noi centrale locale, si in mod deosebit asigurarea depozitelor de "biocombustibil" si extinderea retelelor de gaze naturale, etc.

Answer 2.1.4:
The cost estimates are elaborated based on known prices from similar private financed projects and not from prices from similar projects implemented by RADET. For reasons detailed explained in the Project Completion Report for Programme START the prices obtained by RADET are in general 20-40% higher than private financed projects.

Redesign and reconstruction of the transmission system will decommission about 400 of 500 substations (the future number of substations in the future system will be below 100). Some of the decommissioned substations are assumed selected for installation of heat-only-boilers and/or CHP units

Raspuns 2.1.4:
Estimarea costurilor s-a facut in baza preturilor cunoscute din proiecte similare finantate din fonduri private si nu pe baza preturilor din proiecte similare implemenatate de RADET. Preturile obtinute de RADET sunt in general cu 20-40% mai ridicare decat cele din proiecte finantate din fonduri private, iar explicatiile pentru aceasta situatie sunt prezentate detaliat in Raportul de Finalizare al Programului START.

Reproiectarea si reconstructia sistemului de transport va conduce la dezafectarea a 400-500 de puncte termice (viitorul numar de puncte termice va fi sub 100). O parte din aceste locatii, aferente punctelor termice dezafectate, se presupune ca vor fi selectate pentru instalarea cazanelor de acoperirea varfului de consum si/sau a unitatilor de cogenerare descentralizate.

Observation 2.1.5:
"Report 3", could be considered as a catastrophe for Bucharest Municipality, from the point of view of energetic safety, in case of temporary crisis of natural gas market or a bio fuel.

Observatia 2.1.5:
Din punct de vedere al sigurantei energetice, "Raportul 3" poate reprezenta o catastrofa pentru Municipiul Bucuresti, in cazul unor crize temporare a pietei gazului sau a biocombustibililor.

Answer 2.1.5:
Again, the author of the questions must have read a different Strategy Report and the author demonstrate a complete lack of knowledge of the current supply conditions.

The district heating and most other heating in Bucharest is today based on natural gas and thus very vulnerable. The Strategy Report establishes a strategy for obtaining independency of imported fuels, fully in-line with the goals of the National Energy Strategy. When the Municipality Energy Strategy is fully implemented the heat sources will be almost equal amounts of solar energy, waste-to-energy and assumingly domestic produced bio fuels and thus provide:

- A very high security of supply;
- High cost independency of oil and natural gas prices;
- Low environmental impact

Raspuns 2.1.5:
Din nou, autorul acestor observatii se pare ca a citit un Raport privind Strategia diferit de cel transmis de consultant si demonstraza o totala lipsa de cunostinte privind conditiile de furnizare.

Sistemul de incalzire centralizata si celelalte sisteme de incalzire, in Bucuresti se bazeaza pe gaze naturale si in consecinta sunt foarte vulnerabile. Raportul stabileste strategia pentru obtinerea independentei fata de combustibilul importat, in deplina corelare cu prevederile Strategiei Energetice Nationale. Cand Strategia Energetica Municipala va fi pe deplin implementata, sursele de incalzire vor fi in cantitati aproximativ egale, constand din energie solara, facilitati de incinerare si biocombustibil,considerat a fi produs in RO, asigurand:

- O foarte mare siguranta in furnizare;
- O independenta fata de costurile foarte ridicate pentru gaze naturale si petrol;
- Impact scazut asupra mediului.

Observation 2.1.6:
"Report 3" cannot be considered the Energetic Strategy of Bucharest Municipality if is not considering, in different type of the ownership, the existing producing sources and their related locations, specifically their capacity for fuel storage, able to ensure energetic safety, including the development of renewable sources on bio fuel, waste, etc

Observatia 2.1.6:
"Raportul 3" nu poate fi Strategia Energetica Municipala daca nu ia in considerare, indiferent proprietarul, sursele si locatiile energetice existente si in mod deosebit capacitatile de stocare ale combustibililor care pot asigura siguranta energetica inclusiv dezvoltarea unor capacitati alternative pe baza de biocombustibili, deseuri, etc.

Answer 2.1.6:
The ownership of the district heating system must follow the money. Attempts in Romania of obtaining private investment without transfer of ownership has so far failed as it has failed in all other countries. Thus, to maintain the district heating under public ownership will require that the necessary funds are provided as public funds which are by the Consultants considered impossible in a situation where the municipality cannot even provide toiler paper and hand soap to out school children in the middle of a flue epidemic and a huge number of social problems are unsolved.

The Strategy Report recommends a minimum storage at the plants and a larger storage at the existing production facilities.

A typically 5 MJ/sec boiler will use about 8 t/day of fuel when running full load. It should not be a problem establishing a logistic with 1 truckload per 2 days.

Raspuns 2.1.6:
Proprietatea asupra sistemului de incalzire centralizata trebuie sa urmareasca banii. Tentativele, in Romania de a obtine investitii private fara transferul proprietatii, va esua asa cum a esuat si in alte tari. In consecinta, pentru a mentine sistemul de incalzire centralizata in proprietate publica, vor fi necesare investitii publice, pe care Consultantul le considera ca fiind imposibil de asigurat de catre Primarie, in conditiile in care aceasta nu poate asigura hartie igienica si sapun copiilor la scoala in perioade de epidemii de gripa si nici rezolvarea unor diferite alte probleme sociale.

Raportul privind Strategia recomanda o capacitate minima de stocare la centrale si un sistem de stocare mai mare la nivelul facilitatilor de producere existente.

Un cazan tipic de 5MJ/s va folosi aproximativ 8 t/zi combustibil cand va functiona la intrega capacitate. Nu va fi o problema sa se stabileasca o logistica cu un camion care alimenteaza o data la 2 zile.

Observation 2.1.7:
Until the connection of the new erected buildings (on the location of the former industrial area), to the municipal district heating network, the big capacity of transmission pipes (cca 200,000 m^3) between CHP and Substations could be used as storage capacity for the thermal energy produced by the renewable sources (solar, waste-to-energy, small CHP units, etc)

Observatia 2.1.7:
Pana la racordarea la reteaua municipala de termoficare a ansamblurilor de cladiri construite pe locul fostelor platforme industriale, volumul mare al conductelor de transport a energiei termice de la CET-uri la PT de cartier(cca 200,000 mc) poate fi folosit pentru acumularea energiei termice produse in surse alternative: panouri solare, statii de incinerare, cogenerare de mica putere, etc.

Answer 2.1.7:
This is an interesting observation in relation to the necessity of having heat storages together with solar energy. This should be considered in the redesign of the transmission system.

Raspuns 2.1.7:
Aceasta este o observatie foarte interesanta in corelare cu necesitatea de a avea capacitati de acumulare a caldurii impreuna cu energia solara. Acest lucru ar putea fi luat in considerare in reproiectarea sistemului de transport.

Observation 2.1.8:
A part of solutions proposed by "Report 3" could be implemented in the new residential area ANL, third parties, block of flats disconnected from the district heating, historical area, new residential area under erecting, considering "British model": municipality will offer concession accord regarding waste incineration, solar systems, production of thermal energy, which will be erected and operated by the private companies.

Observatia 2.1.8:
O parte din solutiile prezentate in "Raportul 3" se pot implementa in ansamblurile noi ANL, terti, blocuri decuplate de la termoficare, centru istoric, noile ansambluri aflate in constructie, dupa "modelul britanic": municipalitatea ofera acord de concesiune privind incinerarea deseurilor, panouri solare, producerea de energie termica, care vor fi construite si exploatate de companii private.

Answer 2.1.8:

The proposal will result in huge differences in tariff from area to area.

In current areas continuously supplied from natural gas sources the baseline tariff will be about 30 EUR/GJ in 2009 increasing to above 50 EUR/GJ in 2020 as the natural gas price increases and energy/environmental taxes are introduced.

In areas supplied from waste-to-energy facilities the baseline tariff will be about 10 EUR/GJ in 2009 and this tariff can be maintained in 2020.

We recommend in the Strategy Report that the benefit of waste-to-energy and solar energy shall be for everybody.

Raspuns 2.1.8:

Propunerea va genera diferente de tarif imense de la o zona la zona.

In ariile in care, in prezent, furnizarea caldurii se bazeaza pe surse cu gaze naturale, tariful de baza va creste de la aproximativ 30 Euro/GJ cat este in 2009. la aproape 50 Euro/GJ, in 2020, ca urmare a cresterii pretului la gazele naturale si introducerii taxelor pe mediu/energie.

In ariile in care furnizarea se va sigura din facilitatile de incinerare, tariful de baza este estimat in preturi la nivelul anului 2009 de 10 Euro/GJ, acest tarif putandu-se mentine constant chiar si in 2020.

Beneficiile din facilitatile de incinerare a deseurilor si din energia solara ar trebuie sa fie disponibile pentru fiecare, aceasta recomandare se regaseste in Raportul privind Strategia.

Observation 2.1.9:

The price of the electricity produced by Electrocentrale Bucuresti is 20-30% less than the national average price, due to the fact that RADET ensure proper condition for an efficient cogeneration mode. Also, the price for electricity local produced could be taken by Bucharest Municipality from distribution and may be lower due to the savings on transmission lines.

Observatia 2.1.9:

Energia electrica produsa de SEB are pretul cu 20-30% mai mic decat pretul mediu pe tara si datorita faptului ca RADET asigura conditii energetice corespuzatoare functionarii eficiente in cogenerare. De asemenea, pretul energiei electrice produse local si preluata de Municipiul Bucuresti ar fi mai mic deoarece nu mai intervin pierderile de transport a energiei electrice.

Answer 2.1.9:

The overall goal of the EU-directives regarding opening of the electricity market is that the price, in an ideal situation, should be the same from Lapland in north to Sicily in South and from Ireland in West to Romania in East. This is obtained by ensuring that electricity will flow from areas with low production costs to areas with high production costs levelling the differences in tariffs.

National, regional and municipal borders are not relevant in this respect.

Raspuns 2.1.9:

Obiectivul general al Directivelor Europene, in ceea ce priveste deschiderea pietei de energie electrica, in conditii ideale, este acela ca pretul electricitatii ar trebui sa fie acelasi in toata Europe din Laponia, in nord, pana in Sicilia, in sud si din Irlanda, in vest, pana in Romania, in est. Acest lucru poate fi posibil ca urmare a faptului ca electricitatea se poate transporta din zonele, in care costurile de producere sunt mici, catre zone in care costul de producere este ridicat, niveland astfel diferintele din tarif.

Observation 2.1.10:

Regarding the considerations on RADET organisation included in “Report 3”, we mention the followings:

a) Where proper location in terms of enough space, RADET has implemented heating modules at level of blocks (over 250 pieces), including new connected buildings.
b) The RADET tariff included in his structure the losses of thermal energy between production sources and thermal substations, being unique in Romania in this respect.
c) During the period when the technical condition are favourable, the big and small CHP are pooled operated (SUD + Titan + Pipera, Grozavesti +

Observatia 2.1.10:

In ceea ce priveste observatiile referitoare la RADET din “Raportul 3”, mentionam urmatoarele:

a) Acolo unde exista spatii corespunzatoare, RADET a implementat module termice(peste 250 bucati), inclusiv la imobilele noi racordate.
b) Tariful energiei termice livrat de RADET Bucuresti este singurul din tara care include pierderile de energiei termica de la surse la PT de cartier.
c) In perioadele in care conditiile tehnice permit, CET-urile mari functioneaza in “inel” cu CET-urile mici, (SUD + Titan + Pipera, Grozavesti + Grivita + CTZ CPL)
d) Exista preocupari, studii, proiecte pentru: cogenerare de mica putere, transformarea CT in

Grivita + CTZ CPL)

d) There are concerns, studies, projects for: small cogeneration, conversion of Local HoB into small CHP (Bucurestii Noi area, Barbu Vacarescu, Floreasca, Ferentari area, etc)

e) Following the City Council approval of financing , RADET has performed the followings main projects:
   - Integral replacing of heat exchangers for heating and htw
   - Installation in all substations softening plants for treatment of additional heat carrier
   - For the very first time the quality of water in the primary and secondary systems reached the level requested by norms
   - Until the end of the year, in the 459 substations will be installed pumps with variable speed (currently in 304 substation are already installed)
   - In 229 substation is installed the control system and in the last quarter of 2009 in other 138 substation will be installed the control system
   - The thermal isolation is replaced on 102 km primary system and 339 km secondary system, with modern solution with λ≤ 0.027 W/mpK

PT (zona Bucurestii Noi, Barbu Vacarescu, Floreasca, zona Ferentari, etc)

e) Pe baza aprobarii si a finantarii CGMB, la RADET Bucuresti s-au realizat urmatoarele lucrari principale:
   - Inlocuirea integrala a schimbatoarelor de incalzire si apa calda de consum
   - Dotarea PT cu module de tratare a apei de adaos
   - Pentru prima data dupa 1990, calitatea apei din circuitele primare si secundare este conform normativelor
   - Pana la sfarsitul anului, 459 PT vor avea pompe cu turatie variabila(la 304 PT pompele sunt in functiune)
   - 229 PT sunt automatizate, iar la 138 PT automatizarile vor fi puse in functiune in trim IV 2009.
   - 102 km conducte retea primara si 339 km retea secundara sunt inlocuite cu izolatii moderne λ≤ 0.027 W/mpK

Answer 2.1.10:

a) We understand that only 250 blocks of 8.658 blocks has “hot tap water and heating on demand”.

b) The tariff is unique not only in Romania but worldwide. No other district heating system in the EU has so high transmission costs, pumping costs and water losses etc as RADET.

c) Changing the supply area between summer load and winter load is not the technical-economical load dispatch with pooled operation we talk about.

d) With projects already prepared it should easy the implementation of the decentralised production programme proposed in the Energy Strategy.

e) No norms allow the black water seen in the distribution systems when they were filled at the start of the heating season 2009/2010.

   The list of progress is impressive. What the consumers are waiting for is a reduction in tariffs (reflection to the savings obtained) and improved supply conditions (heat and hot tap water on demand).

   The main problem in this respect is that no savings and other benefits are obtained. RADET is not even able to repay EIB/CEB and EBRD loan but must depend on the Municipality to perform the loan services.

Raspuns 2.1.10:

a) Noi intelegem ca numai 250 de blocuri din cele 8,658 existente, au “caldura si apa calda de consum la cerere”.

b) Structura de tarif este aceeasi, nu numai in Romania, ci in intreaga lume. Nici un alt sistem de incalzire centralizata din UE nu are costuri de transport, costuri de pompare si pierderi de agent termic, etc. atat de mari ca cele ale RADET.

c) Schimbarea zonelor de furnizare in situatia de vara, fata de cea de iarna nu reprezinta descrierea functionarii unui dispecer tehnico-economic, cu sursele “injectand in inel”, asa cum a fost inclusa in Strategia Energetica.

d) Nici un normativ nu permite o asemenea calitate a apei pentru agentul termic, asa cum este aceasta “apa neagra” din sistemul de distributie, folosita pentru incarcarea sistemului la inceputul sezonului de incalzire 2009/2010.

   Lista progreselor este impresionanta. Ceea ce asteapta consumatorii de fapt sunt: o reducere a tarifului (reflectarea economiilor ca urmare a investiilor facute) si imbunatatirea conditiilor de furnizare (caldura si apa calda la cerere).

   Cea mai mare problema in acest sens este faptul ca nu se obtin nici economii nici alte beneficii din investitiile facute. RADET nu este capabil financiar sa returneze creditele BEI/BDCE si BERD si trebuie sa depinda de Primarie pentru asigurarea cheltuielilor pentru returnarea creditelor.

Observation 2.1.11:

The priorities of Bucharest Municipality regarding district heating with cogeneration are:

- Rehabilitation of the existing producing CHP, under different type of ownership

  This excludes solar energy and waste-to-energy and will increase the production costs without obtaining significant efficiency improvements and reduction in transmission costs.

  To bring the existing CHP plants in compliance with the EU definition of CHP will be extremely costly if technical possible.

- Reconnection of CHP Pipera and Grivita to the system, rehabilitation of those by private partnership, including taking over by PMB – RADET.

  There is currently no lack of production in the system so why reconnect two inefficient plants to the system? By the way, Pipera is not a CHP plant.

- Erection of CHP in Colentina-Fundeni area, where the pipe system is sized accordingly.

  For sure a decentralised production system should include CHP production in the Colentina-Fundeni area. However, what to decommission as there is no need of additional production capacity in the system?

- Closing of the second ring in the district heating system (Pantelimon – Fundeni - Colentina, Colentina - Dna Ghica - Dimitrie Pompei - Aviatiei, Aviatiei – Baiculesti - Pajura, Drumul Taberei - Alexandriei, Alexandriei – Rahova - Ferentari);

  With decreasing demand and change from centralised to decentralised and local production there will be need of less pipes – not more pipes.

- Total replacing during maximum 5 years of the pipes with over 30 year old operation period, or pipes with low quality thermal isolation, with two times measured heat losses (reducing of heat losses with over 12-15% will allow reimbursement of the loans without any financial problems);

  The proposal is in-line with the measures outline in the Energy Strategy but lacks the aspect of reducing the heat losses by reducing the diameters and length of pipes (as a consequence of the decrease in demand).

- Replacement of the pipes and thermal isolation in the technical basements of the blocks of flats,

Observatia 2.1.11:

Prioritatile privind incalzirea prin termoficare “COGENERARE” a Municipiului Bucuresti sint:

- Retehnologizarea surselor existente, indiferent de proprietar

  Aceasta exclude energia solara si facilitatile de incinerare si va conduce la cresterea costurilor de producere, fara a se obtine o imbunatatire semnificativa a eficientei si nici o reducere a costurilor de transport.

  Pentru a se aduce CET-urile existe la cerintele definite de Directivele Europene pentru acestea, va fi extrem de scump si nu intotdeauna va fi posibil si tehnic

- Recuplarea la sistem a CET Pipera si CET Grivita, retehnologizarea si parteneriat public privat, inclusiv preluarea de catre PMB-RADET.

  In prezent, in sistem nu se inregistraza o lipsa a necesarului de producere, asadar de ce este necesara reconectarea in sistem a doua surse ineficiente? Si mai mult Pipera nu este o centrala in cogenerare.

- Construirea unui CET in zona Colentina - Fundeni unde exista si conducte dimensionate corespunzator.

  Desigur, sistemul de producere descentralizat trebuie sa includa si producerea in cogenerare in zona Colentina-Fundeni. Totusi, avand in vedere faptul ca nu este necesara o capacitate suplimentare de productie in sistem, ce se va dezafecta din capacitatea existenta odata cu construirea celei noi?

- Incheierea celui de-al doilea inel de termoficare (Pantelimon-Fundeni-Colentina, Colentina-Dna Ghica-Dimitrie Pompei-Aviatiei, Aviatiei-Baiculesti-Pajura, Drumul Taberei-Alexandriei, Alexandriei-Rahova-Ferentari);

  In conditiile in care cererea de caldura este in scadere, iar producerea centralizata se va inlocui cu cea descentralizata, este evident ca va fi nevoie de mai putine tevi si in nici un caz de mai multe.

- Inlocuirea integrala in maxim 5 ani a conductelor ce sunt in functiune de peste 30 ani sau la care pierderea masurata de energie termica prin izolatie este dubla (reducerea pierderilor cu peste 12-15% va permite rambursarea fara probleme a creditelor);

  Propunerea este in corelare cu masurile specificate in Strategia Energetica, dar nu ia in considerare aspectul legat de necesitatea reducerii pierderilor de caldura prin reducerea diametrelor si a lungimii conductelor (ca si o consecinta a scaderii cererii de caldura).

no matter the owner.

RADET must understand that maintaining pipes in private buildings is not a public obligation. A support scheme for energy rehabilitation of buildings is already under implementation and the private owners can obtain financial support for insulation of heating pipes under this scheme.

- Connection to the district heating of all local HoB in the vicinity of transmission pipes, and its conversion into thermal substation or small CHP unit.

  The proposal is in-line with the measures outline in the Energy Strategy. The existing boilers should than be operated as local peak-load boilers in the future.

- Special condition (favourable) for connection of the new consumers to the district heating (insurance of the internal resources for RADET – PMB to perform the works in the public area, including metering).

  Connection to the district heating system should be motivated as in other countries by:

  - *Tariffs significant below other means of heating.*
  - *High service level (heat and hot tap water on demand).*

  Until RADET can offer this we can forget all about connection of new consumers.

- Separation and metering of public consumers (industrial) inside commercial complex or from the ground floor of the blocks

  Metering of public consumers (industrial) should be completed long time ago, so no comments on this observation.

- Replacement of the inside heating installation of the blocks considering separate supply of the apartments and tri-generation.

  RADET must understand that the internal heat (and cooling) distribution in private owned buildings is not a concern for a public utility.

- Insurance of financing for building of the intermediary station (to limit the pressure temperature) in order to be able to implement heating modules in all buildings placed in the adjacent are to the transmission pipes (in this solution the heating modules and related two supply pipes will more cheap than the direct connection)

  RADET must understand that the internal heat (and cooling) distribution in private owned buildings is not a concern for a public utility.

- Inlocuirea conductelor si izolatiilor termice din subsolurile tehnice indiferent de proprietar;
  RADET ar trebui sa inteleaga ca intretinerea tevilor in interiorul cladirilor private nu reprezinta o obligatie publica. RADET ar trebui sa cunoasca faptul ca in prezent exista in vigoare o schema de sprijin financiar pentru reabilitarea termica a cladirilor care permite proprietarilor sa obtina finantare pentru lucrari de interventie la instalatia de distributie a agentului termic aferenta partilor comune ale blocurilor de locuinte.
- Racordarea la termoficare a tuturor CT aflate in zone limitrofe conductelor de circuit primar, concomitent cu transformarea in PT sau CET de mica putere;
  Propunerea este in linie cu masurile incluse in Strategia Energetica. Cazanele existente ar trebui exploatate in viitor ca si cazane pentru acoperirea varfului de consum.
- Facilitati pentru racordarea noilor consumatori (asigurarea resurselor interne pentru ca RADET – PMB sa execute lucrarile din domeniul public, inclusiv contorizarea).
  Conectarea la sistemul de incalzire centralizata ar trebui motivata , asa cum se intampla in alte tari prin:
  - *Tarife semnificativ mai mici decat cele din alte moduri de incalzire*
  - *Nivel ridicat de servicii (caldura si apa calda de consum menajer la cerere)*

  Pana cand RADET nu va putea oferi acestea conditii, trebuie uitat de conectarea noilor consumatori.
- Separarea si contorizarea agentilor economici din complexele comerciale sau parter de bloc;
  Contorizarea agentilor economici este o activitate care trebuia a fi finalizata cu mult timp in urma, din acest motiv nu avem comentarii.
- Inlocuirea instalatiilor interioare din blocuri concomitent cu asigurarea alimentarii separate a apartamentelor, inclusiv trigenerarea.
  RADET trebuie sa inteleaga ca distributia caldurii (si a racirii) in interiorul unor cladiri private nu este o responsabilitate pentru un operatorii de utilitati publice.
- Asigurarea finantarilor pentru realizarea de statii intermediare de limitate a presiunilor temperaturilor in vederea implementarii modulelor la toate cladirile amplasate in zonele limitrofe retelelor de transport a caldurii (in acest fel, atat modulele cat si cele doua conducte aferente vor fi mult mai ieftine ca la racordarea directa).
  RADET trebuie sa inteleaga ca distributia caldurii (si a racirii) in interiorul unor cladiri private nu este o responsabilitate pentru un operatorii de utilitati publice.

Answer 2.1.11:
Reply is included above with *Italic writing*

Raspuns 2.1.11:
Raspunsurile la acest punct sunt incluse mai sus *in italic*

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipilui Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Technical Note 26.10.2009

Nota Tehnica 26.10.2009

Observation from RADET

Observatii din partea RADET

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2				
1	03.11.2009	First edition	GMCB	haa
Edition	Date	Changes	Prepared by:	Approved by:

Grontmij | Carl Bro

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Cuprins

1 INTRODUCTION

The Consultant has submitted the Draft Final Report for the Energy Strategy. The Strategy was presented for the Technical Committee on 20.08.2009.

RADET has submitted a number of observations the meeting respectively on 09th of October 2009. This Technical Note repeats the observations and provides the answers from the Consultant.

RADET has sent a replay to the technical note formulated by the Consultant on 26th of October 2009.

The Consultant has replayed to RADET as bellow:

1 INTRODUCERE

Consultantul a transmis varianta initiala a Raportului Final pentru Strategia Energetica. Strategia a fost prezentata Comitetului Energetic Municipal in data de 20.08.2009.

RADET a formulat o serie de observatii si a transmis note scrise ulterior intalnirii, in data de 09.10.2009. Consultantul a raspuns la notele scrise care s-au regasit si in observatiile formulate.

RADET a revenit, in data de 26.10.2009 cu un raspuns la nota consultantului:

Consultantul a raspuns dupa cum urmeaza:

2 OBSERVATIONS AND ANSWERS

2.1 RADET

We have the following observations on the documentation prepared by Grontmij | Carl Bro as result of the services contract signed in 2007 with Bucharest Municipality.

Observation 2.1.1:

The above mentioned contract was concluded without previous acceptance of RADET.

Answer 2.1.1:

It was the solo decision of Bucharest Municipality.

Observation 2.1.2:

All RADET investments implemented or during implementation under City Council coordination, based on the feasibility study prepared by Danish Power Consult named “Strategy for public services for heating supply 1999-2015” and financial approval of City Council, apart being under supervision of Danish Consultant team (in 1994, under PHARE programme was allocated 1 million ECU for the elaboration of “Study for rehabilitation of district heating in Bucharest”)

All projects to be implemented in order to achieve the goals of this strategy was estimated to approx 934 million USD(1999) as follows:

A. Modernisation of primary network, secondary network and new components – valves – compensators
B. Modernisation of thermal substations
   - Control system
   - Heat exchangers
   - Electrical installations and pumps
C. New transmission networks
D. Metering
E. Dispach system
F. Modernisation of htw network
G. Connection to local HoB

The goal of this strategy was to obtain at least 50% reducing of heat losses, increasing the comfort, safety supply, safety operation, connection of new heating sources and new consumers.

Answer 2.1.2:

The amount of 934 MUSD/ECU is correct. The significant higher amount estimated today, about 1,600

2 OBSERVATII SI RASPUNSURI

2.1 RADET

Avand in vedere materialele prezentate – in baza contractului in anul 2007 intre PMB si firma internationala de consultanta Grontmij | Carl Bro, facem cunoscut urmatoarele:

Observatia 2.1.1

Contractul a fost incheiat fara consultarea RADET.

Raspuns 2.1.1

A fost decizia unilaterala a Primariei Municipiului Bucuresti.

Observatia 2.1.2:

Toate investitiile RADET au fost si sunt desfasurate sub coordonarea CGMB, pe baza studiului de reabilitare a sistemului de termoficare intocmit de Danish Power Consult, a “Strategiei Serviciilor de alimentare cu energie termica prin sistemul de termoficare 1999-2015” si a angajamentelor financiare aprobate de CGMB, unele avizate – coordinate si de consultanti danezi (in anul 1994, prin programul PHARE s-a alocat 1 milion ECU pe baza caruia Danish Power a intocmit “Studiul de Reabilitare a Municipiului Bucuresti”)

Investitiile totale necesare implementarii acestei strategii au fost estimate la cca 934 mil USD(1999) reprezentand:

A. Modernizare retele primare, secundare si componente noi – vane – compensatori
B. Modernizare puncte termice:
   - Automatizare
   - Schimbatoare caldura
   - Instalatii electrice si pompare
C. Retele noi de transport
D. Contorizare
E. Dispecerizare sistem
F. Modernizare retele acm
G. Racordare centrale cartier

Rezultatul aplicarii acestei strategii ar fi permis reducerea cu cel putin 50% a pierderilor de energie termica, cresterea confortului, a sigurantei in exploatare, racordarea de noi surse de caldura si noi consumatori

Raspuns 2.1.2:

Suma de 934 milioane USD/ECU este corecta. Cea mai mare dintre sumele estimate in prezent si anume

MEUR, is mainly related to extension of the distribution system to the about 40% of the population currently supplied by natural gas or other means of heating.

1,600 milioane Euro, se refera la extinderea sistemului de distributie pentru racordarea a aproximativ 40% din populatie, care astazi se incalzeste cu gaze naturale, sau alte solutii de incalzire, diferite de termoficare.

Observation 2.1.3:
The data included in Report 2 "Analysis of the centralized transmission and distribution network" are not corresponding with current situation on 1st of August 2009, due to the fact that a certain projects were implemented or close to be implemented (replacing of the transmission/distribution pipes, heat exchangers for hot tap water and heating, metering of primary system, pumps with variable speed, softening plant, balancing valves, expansion systems, etc).
Unfortunately, the limited financial resources didn't allow continuing the implementation of the projects, in line with the provision of strategy and needs, for the replacing of pipes for the transmission system.

Observatia 2.1.3:
Datele prezentate in Raport 2 Analiza sistemului centralizat de transport si distributie a caldurii" nu corespund cu situatia existenta la 1 august 2009, datorita lucrarilor de investitii municipale finalizate sau in curs de finalizare (inlocuire conducte de transport/distributie, schimbatoare de incalzire si apa calda de consum, contorizare circuit primar si consumatori, pompe cu turatie variabila, module de tratare a apei, vane de echilibrare, module de expansiune, etc).

Din pacate, resursele financiare alocate incepand cu 2002, nu au permis continuarea investitiilor, conform strategiei si a necesitatilor, pentru inlocuirea conductelor de transport a energiei termice

Answer 2.1.3:
The data used for our analyses is based on the information provided by RADET in the data collection phase. The data collection report and analyses included in this report is approved by the Energy Committee.

The Consultant assume that the savings obtained from previous investments provided by the Municipality of Bucharest can carry loan services and provide financing for additional rehabilitation/modernisation works. Hence, it is not understood why financial resources are not available.

Raspuns 2.1.3:
Datele utilizate in analizele intocmite au la baza informatiile furnizate de RADET in etapa de colectare de date. Colectarea de date precum si analizele incluse in acest raport, au primit avizarea Comitetului Energetic Municipal.

Consultantul considera ca din economiile obtinute ca urmare a implementarii proiectelor anterioare, finantate de PMB, ar fi trebuit sa fie posibila acoperirea cheltuielile aferente creditelor si de asemenea sa se asigure finantare pentru lucrari suplimentare de reabilitare /modernizare. De altfel, nu este clar de ce nu sunt disponibile aceste resurse financiare.

Observation 2.1.4:
Report no 3 "Energetic Strategy of Bucharest Municipality" could be presented as a possible solution to be applied in the area where is not developed yet the district heating, later the surplus of cheap energy (without hidden subsidiaries or bonus) to be taken over by the municipal district heating system.

Observatia 2.1.4:
Raportul 3 "Strategia energetica a Municipiului Bucuresti" poate fi prezentata ca o solutie posibila de aplicat in zonele in care nu exista incalzire centralizata, urmand ca eventualul excedent de energie termica ieftina (fara subventii mascate sau bonificatii) sa fie preluat de instalatiile municipale de termoficare.

Answer 2.1.4:
The Energy Strategy is not a possible solution but a necessary solution if RADET and the Municipality intent to comply with relevant EU-Directives, the National Energy Strategy (which implement most of the relevant EU-Directives) and relevant Romanian laws and legislation.

Raspuns 2.1.4:
Strategia Energetica nu este o solutie posibila, ci este o solutie necesara, daca RADET si PMB intentioneaza sa se conformeze prevederilor Directivelor Europene, Strategiei Energetice Nationale(care implementeaza directivele UE relevante) si legislatiei aferente acestui domeniu.

Observation 2.1.5:

In case of private investors available to invest in new technical solution, shall be applied British principle (presented also by the consultants): municipality sign a full concession for waste incineration, solar panels, co-generation, inclusive operation of the systems, loan services, recovering the services from the consumers, direct/indirect subsidiaries or bonus.

Accordingly, we consider that the 220,000 apartments, not connected today to district heating (including the disconnected blocks of apartments) could be a serious place for the implementation of the proposal from Grontmij | Carl Bro.

It is necessary to inform the consultants that the municipality "ensure toilet paper and soap for the schools during the epidemic period and is able to solve themselves the social problems".

The main problem of the municipality is to ensure equal conditions for all citizens and to attract private investor willing to invest in the new technical solution, to operate its and full and direct recover from the consumers (without interference of local authority) of the costs for loan reimbursement, maintenance, etc.

Observatia 2.1.5:

Daca pentru solutiile noi propuse exista investitori privati dispusi sa le implementeze, trebuie aplicat principiul britanic (prezentat si de consultanti): municipalitatea ofera acord de concesiune totala privind incinerarea deseurilor, panourile solare, producerea de energie termica-electrica, inclusiv exploatarea instalatiilor, contractarea-returnarea creditelor, recuperarea de la consumatori a serviciilor, subventiilor- bonificatiilor directe sau indirecte.

In acest sens consideram ca cele 220 000 apartamente – locuinte care nu sunt racordate la sistemul de termoficare (inclusiv blocurile debransate) pot constitui o oferta serioasa pentru aplicarea propunerilor Grontmij Carl Bro.

Pentru consultanti trebuie precizat ca PMB "asigura hartie igienica si sapun la scoala in perioadele de epidemii si isi rezolva singura problemele sociale".

Problema de baza a municipalitatii este de a asigura conditii egale pentru toti locuitorii si atragerea investitorilor privati dispusi ca prin aplicarea Strategiei energetice sa asigure implementarea solutiilor noi, exploatarea acestora si recuperarea totala si directa de la consumatori (fara interventii ale administratiei locale) a costurilor necesare rambursarii creditelor, mentenantei etc

Answer 2.1.5:

Our recommendations are not taking privatisation so far as we propose the "British solution" with 100% private ownership. Some areas, for example the heat transmission, are proposed remaining the property of the municipality as it will be impossible to establish competition.

Try to look search the WEB for "social problems Romania" and you'll find different statements, for example try:

http://www.eu-digest.com/2007/11/hotnews-romania-romania-acting-like.html

If we talk about equal conditions regarding heat supply we are not aware that the municipality support the natural gas consumers – they will have to pay a connection fee, pay for boiler installation and a non-subsidised gas tariff. If the proposed Energy Strategy is implemented an equal situation will, over some years, be obtained as the tariff structure for district heating will be cost related and general subsidises including investment subsidises removed.

Raspuns 2.1.5:

Recomandarile noastre nu iau in considerare privatizarea conform "modelului britanic", cu 100% proprietate privata. Anumite zone, ca de exemplu sistemul de transport este propus a ramane in proprietatea primariei, in conditiile in care va fi imposibil sa se obtina competitie.

Daca incercati sa cautati pe internet "probleme sociale in Romania" veti gasi diferite declaratii, ca de exemplu:

http://www.eu-digest.com/2007/11/hotnews-romania-romania-acting-like.html

Daca discutam despre conditii egale, privind furnizarea caldurii, nu avem informatii, cum ca primaria subventioneaza si consumatorii care se incalzesc cu gaze naturale – ei trebui sa plateasca o taxa de conectare, sa plateasca pentru instalarea unui cazan si sa plateasca un tarif de gaze naturale nesubventionat. Dace se va implementa Strategia Energetica, peste cativa ani, se va putea vorbi de conditii egale, astfel tariful energiei termice din termoficare se va baza de costuri reale si subventiile generale vor fi eliminate, ca de altfel si cele acordate pentru investitii.

Observation 2.1.6:

Regarding proposed suggestions for the current district heating system, we consider that all these are not correlated with the current situation, specific for installation operated by RADET and also related to the legal aspects of public and private property where these installations are placed.

The solutions regarding solar panel, bio fuel, heating module, etc are known in Romania and also by Danish Consultants who worked for the project under PHARE programme, but were not included in the study for the rehabilitation.

Even the administrative situation could allow the reconfiguration of the new networks, the placing of the CHP – HoB (including the deposit for the bio fuel with the requested protection area), the proposed “strategy” cannot be promoted without the approval of City Council, of the governmental organisations (Ministry of Administration and Internals, Ministry of Environmental, Ministry of Agriculture, National Regulatory Authority for Electricity) and of competent non governmental organisations (Universities Design Institute and Research institutes, etc)

Observatia 2.1.6:

In ceea ce priveste sugestiile pentru actualul sistem de incalzire prin termoficare, consideram ca acestea nu sunt corelate cu situatia existenta, atat in ceea ce priveste instalatiile exploatate de RADET cat si cu realitatea juridica a proprietatilor publice si private pe care sunt amplasate.

Solutiile privind panourile solare, biocombustibili, module, etc se cunosteau atat in Romania cat si de catre consultantii danezi, care au lucrat in cadrul programului PHARE, dar nu au fost incluse in studiul de reabilitare.

Chiar daca situatia administrativa ar permite reconfigurarea retelelor noi, amplasarea de substatii sau CET-CT (inclusiv depozitele de biocombustibili cu zonele de protectie aferente), ”stategia” propusa nu poate fi promovata decat cu aprobarea CGMB, a organizatiilor guvernamentale (Ministerul Administratiei si Internelor, Ministerul Mediului, Ministerul Agriculturii, ANRE) si a organizatiilor nonguvernamentale abilitate (UPB, UCB, INCERC, IPB, ISPE, etc)

Answer 2.1.6:

The proposed solutions are fully in-line with Romanian legislation implementing relevant EU-Directive. However, it is true that not all secondary legislation is in place yet but for the porpose of the Energy Strategy we have assumed that this is just a matter of time.

How can you propose that ISPE, a private design institute elaborating startegies in competition with Grontmij | Carl Bro, Ramboll, MVV and other international consulting companies, shall approve the Energy Strategy????

Raspuns 2.1.6:

Solutiile propuse sunt in deplina concordanta cu legislatia din Romania, care implementeaza directivele europene relevante. Totusi, este adevarat ca nu toata legislatia secundara este elaborata in corelare cu legislatia primara, dar pentru scopul Strategiei Energetice, noi am considerat ca aceasta este doar o chestiune de timp.

Cum puteti sa lansati ideea ca ISPE, care este un institut privat de proiectare si care la randul sau elaboreaza strategii in competitie cu Grontmij | Carl Bro, Ramboll, MVV si alte companii de consultanta internationale, trebuie sa aprobe Strategia Energetica????

Observation 2.1.7:

We consider that the fully implementation of the proposed solutions will not reduce the financial effort to be made by the municipality (reimbursement of loans, direct or indirect subsidiaries). Whether the operator is state owned or private, the loan services shall be paid not depending on evolution on prices for bio fuel, meteorological condition, thermal rehabilitation of the client, payment of the subsidiaries/bonus regarding domestic waste incineration so production of bio fuel.

Considering all above, we consider that the implementation of this strategy imply obtaining the approval from City Council and also from other governmental organisations (Ministry of Administration and Internals, Ministry of Environmental, Ministry of Agriculture, National Regulatory Authority for Electricity)

Observatia 2.1.7:

Consideram ca implementarea integrala a solutiior propuse nu va diminua efortul financiar al municipalitatii (rambursare credite, subventii directe si indirecte). <u>Indiferent daca administratorul este de stat sau privat, creditele vor trebui platite la timp,</u> indiferent de evolutia preturilor biocombustibililor, conditii meteo, reabilitarea termica a clientilor, asigurarea subventiilor – bonusurilor privind arderea deseurilor menajere sau producerea biocombustibililor.

In acest sens consideram ca aplicarea unor elemente din aceasta strategie implica aprobarea atat a CGMB cat si a organizatiilor guvernamentale (Ministerul Administratiei si Internelor, Ministerul Mediului, Ministerul Agriculturii, ANRE), care timp de 15-20 ani trebuie sa asigure resursele financiare si legale which shall ensure financial resources for a period of 15-20 years necessary for the implementation period and later for the operation of these new installation no matter the level of money collection and operator(private or state)

necesare implementarii si exploatarii noilor instalatii indiferent de gradul de incasare si operator (de stat sau privat)

Answer 2.1.7:

There is only one reasonable way to reimburse loans and that is to include the loan services in the tariff.

When change of ownership (if this method of privatisation is selected) the future owner and concessionaire will have to pay the municipality the value of the system taken over minus the debt in the system.

It is completely out-of-line to assume that several ministries and authorities shall provide financial resources for the district heating system. The National Energy Strategy is clear in this respect: "Financial resources for must be obtained from privatisation and private sources".

Raspuns 2.1.7:

Exista doar o singura cale rezonabila pentru a putea rambursa creditele si anume aceea prin care cheltuielile aferente creditului se regasesc in structura de tarif.

La schimbarea formei de proprietare (daca se alege metoda privatizarii) viitorul proprietar si concesionar va trebui sa plateasca primariei valoarea sistemului preluat, minus datoriile din sistem.

Este complet neadecvat sa se considere ca anumite ministere si autoritati trebuie sa asigure finantare pentru sistemul de termoficare. Strategia Energetica Nationala este foarte clara in acest sens " efortul investitional va fi sustinut in principal prin privatizare si investitii private".

Observation 2.1.8:

We consider also that is necessary a re-evaluation of the costs, because the 5 billions Euro cannot cover the cost for the proposed location, mainly the utilities for the new 100 thermal substations and 50 new HoB and specifically for the deposits for fuel, 15-20,000 braches for water, electricity, etc.

Also, there is necessary to be considered the real costs for the intermediary stations for sorting the waste, units for necessary to ensure raw material and production of bio fuel, maintenance costs, <u>bonus to be paid by somebody to the supply of raw material.</u>

We consider that the initial estimation could be overcome with 3-5 billion and <u>failure to implement it could compromise the goal of the programme to eliminate the direct and indirect subsidiaries</u>.

Observatia 2.1.8:

Consideram ca de asemenea este necesara reevaluarea costurilor, deoarece cei cca 5 miliarde de euro nu pot asigura locatiile propuse, utilitatile la cele 100 noi substatii si 50 noi centrale locale si in mod deosebit asigurarea depozitelor de biocombustibil, 15-20 000 bransamente de apa, electricitate, etc

De asemenea trebuiesc luate in considerare costurile reale pentru statiile de sortare deseuri, unitatile de asigurare a materiilor prime si de producere a biocombustibililor, cheltuielile de mentenanta, <u>bonificatii pe care cineva trebuie sa le plateasca furnizorilor de materii prime.</u>

Apreciem ca evaluarile initiale pot fi depasite cu 3-5 miliarde, iar nerealizarea acestora poate compromite <u>un program care isi propune ca dupa implementare sa elimine complet subventiile directe sau indirecte.</u>

Answer 2.1.8:

The total estimated cost is about 3.200 billion EUR covering the cost mentioned in the appendixes to the Strategy Report.

Cost of waste handling including sorting shall have no influence on the district heating tariff (this will be illegal cross-subsidises). It is assumed that a gate fee at the same level as at new landfills shall be paid. This, together with sale of heat, electricity and green certificates will generate a huge profit for the waste-to-energy facility. It will then be a political decision how this profit shall be used: as royalty to the municipality, to reduce the gate-fee, to reduce the heat tariff or to be reinvested.

Raspuns 2.1.8:

Costul total estimat este de aproximativ 3,2 miliarde Euro acoperind costurile mentionate in anexele la Raportul privind Strategia.

Costul manipularii deseurilor, inclusiv sortarea nu trebuie sa aiba influenta asupra tarifului energiei din termoficare (va fi ilegal, fiind considerate subventii incrucisate). Se considera ca trebuie platita o "taxa la poarta" incineratorului, la acelasi nivel cu taxa de depozitate intr-o groapa ecologica noua. Aceasta taxa, impreuna cu vanzarea de energie termica, electricitate si certificate verzi, vor aduce un profit imens facilitatilor de incinerare a deseurilor. Va fi atunci necesar, luarea unei decizii politice asupra modului in care acest profit poate fi utilizat: ca o redeventa platita primariei, We have assumed market prices as forecasted by the International Energy Agency and used by World Bank and EBRD for fuels. These forecasts are in EUR/GJ and the cost of raw materials is of cause included in the whole-sale prices.

reducerea “taxei la poarta”, pentru reducerea tarifului la energia termica sau ca acest profit sa fie reinvestit.

In calculele noastre am considerat evolutia preturilor la combustibili, asa cum este prognozata de catre Agentia Internationala de Energie si utilizata de catre Banca Mondiala si BERD. Aceste prognoze sunt exprimate in Euro/GJ, iar costul materiilor prime sunt desigur incluse in pretul total de vanzare.

Observation 2.1.9:

Regarding the direct administration of district heating by Municipality through RADET we specify:

In case, there is desired the implementation of high efficient co-generation (as described by EU Directives) the strategy shall include “in the same package” the rehabilitation of the old and new CHP (no matter the owner) of the installations owned by municipality of the installations owner by the consumers.

Operation and rehabilitation of the existing locations will allow reducing of the total losses with 10%, connection of new consumers, including taking over of the renewable energy. (the current volume of 200,000 m3 of the primary system could replace the future heat accumulation to be placed underground or over ground).

Currently, the primary system is oversized, but these pipes ensure permanent supply even it appear a failure of the sources or in case of disconnection from the system (CHP Pipera, Griro).

In the same time the primary system is acting as a accumulator, accumulating the momentary excess of heat and allowing to take over new consumers or new heat sources.

Observatia 2.1.9:

In ceea ce priveste sistemul de incalzire administrat de PMB prin RADET precizam urmatoarele:

Daca se doreste implementarea cogenerarii de inalta eficienta (asa cum sunt directivele UE) strategia energetica a Municipiului Bucuresti trebuie sa includa ”la pachet” retehnologizarea surselor vechi si noi (indiferent de proprietar) a instalatiilor administrate de municipalitate si a instalatiilor proprietate a clientilor.

Folosirea si retehnologizarea locatiilor existente, va permite scaderea pierderilor totale sub 10%, preluarea de noi consumatori, inclusiv preluarea energiei termice produse din sursele neconventionale. (Amplasarea supraterana sau subterana de acumulatoare de energie termica poate fi suplinita de volumul apei din retelele primare, cca 200 000 m3)

Momentan, retelele magistrale de agent termic primar sunt supradimensionate, dar prin ele se asigura furnizarea permanenta a energiei termice, chiar si in situatii de avarii a unei surse, sau in situatii de decuplare de la sistem (CET Pipera, Griro)

In acelasi timp prin retelele magistrale se acumuleaza excedentele momentane de energie termica de la surse si permit si preluarea noilor consumatori sau furnizori de energie termica.

Answer 2.1.9:

Renewable energy has priority over cogeneration based on CO_2 emitting fuels. Thus, construction of new or rehabilitation of existing units cogeneration is only relevant to the extent the renewable resources are exhausted.

Any argument for maintaining a transmission system designed for more than 5,000 MJ/s when the future requirement will be about 400 MJ/s cannot be considered seriously.

Raspuns 2.1.9:

Energia regenerabila are prioritate chiar si in fata cogenerarii, care utilizeaza combustibil cu emisii de CO2. In acest sens, construirea de noi capacitati sau reabilitarea celor existente este relevanta doar in contextul in care, potentialul de surse regenerabile este epuizat.

Orice argument in favoarea mentinerii unui sistem de transport proiectat pentru mai mult de 5,000 MJ/s, in conditiile in care cerintele viitorului vor fi de circa 400 MJ/s, nu poate fi considerat serios.

Observation 2.1.10:

The priorities of Bucharest Municipality regarding district heating with cogeneration are:

- Rehabilitation of the existing producing CHP, under different type of ownership

  This excludes solar energy and waste-to-

Observatia 2.1.10:

Prioritatile privind incalzirea prin termoficare “COGENERARE” a Municipiului Bucuresti sint:

- Retehnologizarea surselor existente, indiferent de proprietar
  Aceasta exclude energia solara si facilitatile de incinerare si va conduce la cresterea costurilor

energy and will increase the production costs without obtaining significant efficiency improvements and reduction in transmission costs.

To bring the existing CHP plants in compliance with the EU definition of CHP will be extremely costly if technical possible.

- Reconnection of CHP Pipera and Grivita to the system, rehabilitation of those by private partnership, including taking over by PMB – RADET.

  There is currently no lack of production in the system so why reconnect two inefficient plants to the system? By the way, Pipera is not a CHP plant.

- Erection of CHP in Colentina-Fundeni area, where the pipe system is sized accordingly.

  For sure a decentralised production system should include CHP production in the Colentina-Fundeni area. However, what to decommission as there is no need of additional production capacity in the system?

- Closing of the second ring in the district heating system (Pantelimon – Fundeni - Colentina, Colentina - Dna Ghica - Dimitrie Pompei - Aviatiei, Aviatiei – Baiculesti - Pajura, Drumul Taberei - Alexandriei, Alexandriei – Rahova - Ferentari);

  With decreasing demand and change from centralised to decentralised and local production there will be need of less pipes – not more pipes.

- Total replacing during maximum 5 years of the pipes with over 30 year old operation period, or pipes with low quality thermal isolation, with two times measured heat losses (reducing of heat losses with over 12-15% will allow reimbursement of the loans without any financial problems);

  The proposal is in-line with the measures outline in the Energy Strategy but lacks the aspect of reducing the heat losses by reducing the diameters and length of pipes (as a consequence of the decrease in demand).

- Replacement of the pipes and thermal isolation in the technical basements of the blocks of flats, no matter the owner.

  RADET must understand that maintaining pipes in private buildings is not a public obligation. A support scheme for energy rehabilitation of buildings is already under implementation and the private owners can obtain financial support for insulation of heating pipes under this scheme.

- Connection to the district heating of all local HoB in the vicinity of transmission pipes, and its

de producere, fara a se obtine o imbunatatire semnificativa a eficientei si nici o reducere a costurilor de transport.
Pentru a se aduce CET-urile existe la cerintele definite de Directivele Europene pentru acestea, va fi extrem de scump si nu intotdeauna va fi posibil si tehnic

- Recuplarea la sistem a CET Pipera si CET Grivita, retehnologizarea si parteneriat public privat, inclusiv preluarea de catre PMB-RADET.
  In prezent, in sistem nu se inregistraza o lipsa a necesarului de producere, asadar de ce este necesara reconectarea in sistem a doua surse ineficiente? Si mai mult Pipera nu este o centrala in cogenerare.
- Construirea unui CET in zona Colentina - Fundeni unde exista si conducte dimensionate corespunzator.
  Desigur, sistemul de producere descentralizat trebuie sa includa si producerea in cogenerare in zona Colentina-Fundeni. Totusi, avand in vedere faptul ca nu este necesara o capacitate suplimentare de productie in sistem, ce se va dezafecta din capacitatea existenta odata cu construirea celei noi?
- Incheierea celui de-al doilea inel de termoficare (Pantelimon-Fundeni-Colentina, Colentina-Dna Ghica-Dimitrie Pompei-Aviatiei, Aviatiei-Baiculesti-Pajura, Drumul Taberei-Alexandriei, Alexandriei-Rahova-Ferentari);
  In conditiile in care cererea de caldura este in scadere, iar producerea centralizata se va inlocui cu cea descentralizata, este evident ca va fi nevoie de mai putine tevi si in nici un caz de mai multe.
- Inlocuirea integrala in maxim 5 ani a conductelor ce sunt in functiune de peste 30 ani sau la care pierderea masurata de energie termica prin izolatie este dubla (reducerea pierderilor de la 20-25% la 8-10-12% va permite rambursarea fara probleme a creditelor);
  Propunerea este in corelare cu masurile specificate in Strategia Energetica, dar nu ia in considerare aspectul legat de necesitatea reducerii pierderilor de caldura prin reducerea diametrelor si a lungimii conductelor (ca si o consecinta a scaderii cererii de caldura).
- Inlocuirea conductelor si izolatiilor termice din subsolurile tehnice indiferent de proprietar;
  RADET ar trebui sa inteleaga ca intretinerea tevilor in interiorul cladirilor private nu reprezinta o obligatie publica. RADET ar trebui sa cunoasca faptul ca in prezent exista in vigoare o schema de sprijin financiar pentru reabilitarea termica a cladirilor care permite proprietarilor sa obtina finantare pentru lucrari de interventie la instalatia de distributie a

conversion into thermal substation or small CHP unit.

The proposal is in-line with the measures outline in the Energy Strategy. The existing boilers should than be operated as local peak-load boilers in the future.

- Special condition (favourable) for connection of the new consumers to the district heating (insurance of the internal resources for RADET – PMB to perform the works in the public area, including metering).

  Connection to the district heating system should be motivated as in other countries by:

  - *Tariffs significant below other means of heating.*
  - *High service level (heat and hot tap water on demand).*

  Until RADET can offer this we can forget all about connection of new consumers.

- Separation and metering of public consumers (industrial) inside commercial complex or from the ground floor of the blocks

  Metering of public consumers (industrial) should be completed long time ago, so no comments on this observation.

- Replacement of the inside heating installation of the blocks considering separate supply of the apartments and tri-generation.

  RADET must understand that the internal heat (and cooling) distribution in private owned buildings is not a concern for a public utility.

- Insurance of financing for building of the intermediary station (to limit the pressure temperature) in order to be able to implement heating modules in all buildings placed in the adjacent are to the transmission pipes (in this solution the heating modules and related two supply pipes will more cheap than the direct connection)

  RADET must understand that the internal heat (and cooling) distribution in private owned buildings is not a concern for a public utility.

agentului termic aferenta partilor comune ale blocurilor de locuinte.

- Racordarea la termoficare a tuturor CT aflate in zone limitrofe conductelor de circuit primar, concomitent cu transformarea in PT sau CET de mica putere;

  Propunerea este in linie cu masurile incluse in Strategia Energetica. Cazanele existente ar trebui exploatate in viitor ca si cazane pentru acoperirea varfului de consum.

- Facilitati pentru racordarea noilor consumatori (asigurarea resurselor interne pentru ca RADET – PMB sa execute lucrarile din domeniul public, inclusiv contorizarea).

  Conectarea la sistemul de incalzire centralizata ar trebui motivata , asa cum se intampla in alte tari prin:

  - *Tarife semnificativ mai mici decat cele din alte moduri de incalzire*
  - *Nivel ridicat de servicii (caldura si apa calda de consum menajer la cerere)*

  Pana cand RADET nu va putea oferi acestea conditii, trebuie uitat de conectarea noilor consumatori.

- Separarea si contorizarea agentilor economici din complexele comerciale sau parter de bloc;

  Contorizarea agentilor economici este o activitate care trebuia a fi finalizata cu mult timp in urma, din acest motiv nu avem comentarii.

- Inlocuirea instalatiilor interioare din blocuri concomitent cu asigurarea alimentarii separate a apartamentelor, inclusiv trigenerarea.

  RADET trebuie sa inteleaga ca distributia caldurii (si a racirii) in interiorul unor cladiri private nu este o responsabilitate pentru un operatorii de utilitati publice.

- Asigurarea finantarilor pentru realizarea de statii intermediare de limitate a presiunilor temperaturilor in vederea implementarii modulelor la toate cladirile amplasate in zonele limitrofe retelelor de transport a caldurii (in acest fel, atat modulele cat si cele doua conducte aferente vor fi mult mai ieftine ca la racordarea directa).

  RADET trebuie sa inteleaga ca distributia caldurii (si a racirii) in interiorul unor cladiri private nu este o responsabilitate pentru un operatorii de utilitati publice.

Answer 2.1.10:

Answers are included with *Italic* in the text above and we maintain the same replay on the same comments as last time.

Raspuns 2.1.10:

Raspunsurile sunt aceleasi, la aceleasi observatii ca si data trecuta si sunt incluse cu caractere *italic*

Observation 2.1.11:

Maybe, could be relevant to be done an analysis of the heating in Bucharest applying the principle "value of the electricity": that means that the heat consumers should pay the costs related the production in the CHP minus "value of electricity" produced in the condensation mode.

"Value of electricity" means the cost of electricity produced in other power plant from the national energetic system in the condensation mode.

In terms of marginal cost on long terms, this is the value of electricity produced in the coal power plant in the condensation mode.

Observatia 2.1.11:

Poate ar fi interesant de facut o analiza a incalzirii Municipiului Bucuresti aplicand principiul "valoarea energiei electrice" : consumatorul de caldura plateste toate costurile legate de productia din centrale electrice de termoficare, care livreaza caldura in sistemul de incalzire al orasului, minus "valoarea energiei electrice" generate de aceeasi sursa in regim de condensatie.

"Valoarea energiei electrice" este data de costul energiei electrice generata in centrale cu condensatie din sistemul energetic national.

In termenii costului marginal pe termen lung, aceasta este valoarea energiei electrice generata in centrale cu condensatie pe carbune.

Answer 2.1.11:

Before we can discuss "value of electricity" method we must agree that there are three operation conditions for cogeneration plants:

1. The plant is in operation requested by the heat side to cover a heat demand.
2. The plant is in operation requested by the power side to cover a power demand.
3. The plant is in operation requested both by the heat side and the power side to cover both a heat demand and a power demand.

In situation 1) the plant must sell the power at the pool price of the national grid. The heat price should thus be: Total variable costs minus income from sale of power (spot price of power).

In situation 2) a sale of heat will reduce the sale of power with the power/heat ratio for the plant. The cost of heat should thus be: The costs of reduced sale of power. This cost can be calculated as: (Production in condense mode – loss of power due to heat production) x spot price of power.

In situation 3) the heat price should be calculated as in situation 2) but the benefit of cogeneration (difference between alternative heat production price and actual heat production price should be share between the power and the heat side.

Other methods are seen and a very complicated method and non-transparent calculation method is currently used in Romania. Independent of the method to be used it must ensure that there is no cross-subsidises between the sectors.

Power produced from renewable sources shall have priority to the national electricity grid and the EU member states are obliged to ensure a feasible tariff. In Romania, as in many other countries, the feasibility of renewable energy will be obtained by introduction of Green Certificates. These certificates will be sold by the renewable energy producers to producers emitting CO_2. Thus, in this scheme RADET will have to procure

Raspuns 2.1.11:

Inainte de a discuta principiul "valoarea energiei electrice" trebuie acceptat ca exista 3 conditii pentru exploatarea centralelor de cogenerare:

1. Centrala este exploatata pe baza cererii de caldura si sa acopere aceasta cerere.
2. Centrala este exploatata pe baza cererii de electricitate si sa acopere aceasta cerere.
3. Centrala este exploatata atat pe baza cererii de electricitate cat si de caldura si sa acopere amandoua cereri.

In prima situatie, centrala trebuie sa vanda electricitate la pretul binom al retelei nationale. Pretul energiei termice poate fi in acest caz: total costuri variabile minus venituri din vanzarea de electricitate (pretul spot la electricitate).

In a doua situatie, vanzarea de caldura va reduce vanzarea de electricitate cu ponderea electricitate/caldura a centralei. Costul caldurii in acest caz, ar putea fi: Costurile generate de reducerea vanzarii de electricitate. Acest cost se poate calcula dupa cum urmeaza: (producere in condensatie – pierderi de putere datorita producerii de caldura) X pretul spot de vanzare al electricitatii.

In a treia situatie, pretul energiei ar putea fi calculat ca si in situatia a doua, dar beneficiul cogenerarii (diferenta dintre pretul de producerea alternativa a caldurii si pretul actual de producere a caldurii trebuie impartit intre electricitate si caldura.

Alte metode sunt disponibile si de asemenea o metoda complicata si netrasparenta de calcul este utilizata in prezent in Romania. Indiferent ce metoda va fi folosita, trebuie sa existe asigurare ca nu vor fi subventii incrucisate intre sectoare.

Electricitatea produsa din surse regenerabile trebuie sa aiba prioritate in reteaua energetica national si statele membre sunt obligate sa asigure un tarif fezabil. In Romania, ca si in multe alte tari, fezabilitatea energiei din surse regenerabile va fi

Green Certificates corresponding to the CO_2 emission related to the production of heat from existing plants.

Introduction of Green Certificates and introduction of other energy and environmental taxes is the economical background for recommendation of renewable sources in the National Energy Strategy and subsequent in the recommended Energy Strategy for Bucharest Municipality.

The main problem with the method proposed in the observation is that the marginal cost of power generated from coal is significant cheaper than power generated from natural gas. Hence, the heat side will have to compensate this difference.

obtinuta prin introducerea certificatelor verzi. Aceste certificate for fi vandute de catre producatorii de electricitate din surse regenerabile, producatorilor care emit CO2. In acesta schema RADET, va trebui sa cumpere certificate verzi, corespunzator cu cantitatea de CO2 emisa de catre centralele existente, care produc caldura.

Introducerea certificatelor verzi si a altor taxe pe energie si mediu constituie baza economica pentru recomandarile incluse in Strategia Energetica Nationala si in consecinta si in recomandarile Strategiei Energetice a Municipiului Bucuresti.

Principala problema legata de metoda propuse in observatiile RADET, este aceea ca pretul marginal al producerii de electricitate pe baza de carbune este mai mic decat cel pentru electricitatea pe baza de gaze naturale. In consecinta, componenta caldura va trebui sa compenseze aceasta diferenta.

Observation 2.1.12:

We mention, also that before the implementation of a municipal strategy, it is necessary to establish public private partnership with the bio fuel suppliers, electricity suppliers, gas supplier, energetic waste supplier, in terms of prices and quantities during summer-winter.

Also there is necessary an update of the real structure of costs, tariffs for each proposed solutions: value of direct investment, interest, price of fuel, renewable energy, hidden value of subsidiaries – bonus for the thermal energy produced by the waste incineration, bio fuel (subsidiaries from agriculture), maintenance expenditures.

If in the tariff structure is not included the cost for the reimbursement of the loan and remove of subsidiaries, there is necessary to be ensured the financial resources in order to be able to fulfil the financial obligation.

In case the real costs are not covered by tariffs, the owner shall ensure the financial resources, or to decide what are the activities to be renounced on it.

At administrative and politic level there is necessary to be analysed the possibilities to not include in the tariff, until the rehabilitation of the pipes, the difference between real heat losses and the EU theoretical value of these losses. The owner shall ensure the related financial resources and these one shall not be considered as subsidiaries.

There is not normal that the consumers and special new consumers to pay for the heat losses in the installation with commissioned 20-30-40 years ago

(the thermal insulation cannot be replaced before the pipes are replaced).

Taking into consideration that the heat losses in the primary and secondary system are in range of 22-25%, annual investments for rehabilitation shall be 15-20% of

Observatia 2.1.12:

Mentionam de asemenea ca, anterior implementarii unei strategii municipale, este necesara stabilirea unor parteneriate pe 15-20 ani cu furnizorii de biocombustibili, gaze, electricitate, deseuri energetice, atat in privinta preturilor cat si in privinta cantitatilor vara-iarna.

Deasemenea ar trebui reactualizata structura reala a costurilor, tarifelor pentru fiecare din solutiile propuse: valoare investitii directe, valoare dobanzi, pret combustibil, energie neconventionala, valoarea mascata a subventiilor- bonificatiilor pentru energia termica rezultata din arderea deseurilor menajere, biocombustibil (subventii in agricultura), cheltuieli de mentenanta.

Daca prin tarife nu se asigura rambursarea creditelor si eliminarea subventiilor, trebuiesc asigurate resursele pentru respectarea angajamentelor financiare.

In situatia in care costurile reale nu sunt acoperite de tarife, proprietarul trebuie sa asigure resursele financiare, sau sa decida care sunt activitatile la care se renunta.

La nivel administrativ si politic ar trebui analizata posibilitatea ca, pana la retehnologizarea conductelor, diferenta dintre pierderile reale prin izolatiile termice si pierderile teoretice UE sa nu fie incluse in tarif. Proprietarul sa asigure resursele financiare fara ca acest lucru sa fie considerat subventie.

Nu este normal ca abonatii si in mod deosebit noii consumatori sa plateasca pierderile prin izolatiile termice ale instalatiilor aflate in functiunede peste 20-30-40 ani (izolatiile termice nu pot fi inlocuite decat dupa decopertarea si inlocuirea conductelor)

Avand in vedere ca pierderile prin izolatiile termice ale conductelor primare si secundare sunt de cca 22-25%, investitiile anuale pentru retehnologizare (inlocuire the value for bought thermal energy /around 2500 billion lei).

Answer 2.1.12:

It is correct that before privatisation it is necessary to establish the real cost structure for the existing system. It will not be possible to establish the negotiation goals without.

In appendixes to the Energy Strategy we have establish a comprehensive cost structure and we have to our best capability established a cost related tariff with a breakdown in administrative costs, fees to be paid by the consumers, capacity costs and energy costs.

As the current approved tariff only include administrative and operation costs and the bookkeeping performed by RADET lack transparency the established costs must of cause be corrected when more accurate values become available. The first step in this process is that RADET establish a bookkeeping where the mentioned cost components can be identified and benchmarking values to demonstrate where improvement in performance is most feasible.

Heat losses must be included in transmission tariffs and distribution tariffs and in the end there will be no other to pay these losses than the consumers (unless of cause RADET succeed by obtaining municipality subsidises to which also the natural gas consumers participate when paying there taxes).

We have never before heard about a tariff system based on the time you connected to the system. Of cause this will be possible but is not realistic to the opinion of the consultant.

conducte si izolatii) ar trebui sa fie 15- 20% din contravaloarea energiei termice cumparate (cca 2500 miliarde lei)

Raspuns 2.1.12:

Este corect ca inainte de privatizare sa se stabileasca structura reala a costurilor in sistemul actual. Nu va fi posibila negocierea obiectivelor fara ca aceste costuri sa fie cunoscute.

In anexele Strategiei Energetice am stabilit o structura comprehensiva a costurilor iar in baza celor mai bune cunostinte am stabilit o structura de tarif bazata de costuri, formata din: costuri administrative, taxe care trebuie platite de consumatori, costuri de capacitate si costul energiei consumate.

In conditiile in care tariful aprobat include doar costuri administrative si de exploatare, in contabilitatea RADET, costurile stabilite cu lipsa de transparenta, trebuie de asemenea corectate atunci cand vor fi disponibile valori mai precise. Prima etapa in acest proces este aceea prin care RADET va stabi modul in care va fi posibila identificarea in contabilitate a componentelor de cost, permitand calcularea in consecinta a valorilor de benchmarking. Valorile de benchmarking vor putea demonstra ce imbunatatiri ale performantelor sunt cele mai fezabile.

Pierderile de caldura trebuie incluse in tariful de transport si in tariful de distributie, iar in final cel care le va plati va fi consumatorul (cu exceptia situatiei in care RADET, va obtine subventii din partea primariei, iar aceste subventii provin si de la platitorii de taxe care se incalzesc cu gaze naturale).

Nu am mai auzit pana acum de un sistem de tarifare diferit, bazat pe momentul in care consumatorul se racordeaza la sistem. Bineinteles ca acest lucru este posibil, insa in opinia Consultantului nu este realist.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Phase III: Strategy Report

Technical Note 24.09.2009

Observation from the Municipal Energetic Committee

Contract 4144 / 31.12.07

Strategia Energetica a Municipilui Bucuresti

Etapa a III-a: Strategia

Nota Tehnica 24.09.2009

Observatii din partea Comitetului Energetic Municipal

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Grontmij | Carl Bro

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1 INTRODUCTION

The Consultant has submitted the Draft Final Report for the Energy Strategy. The Strategy was presented for the Technical Committee on 20.08.2009.

The Technical Committee has submitted a number of observations during the meeting and in notes after the meeting. This Technical Note repeats the observations and provides the answers from the Consultant.

1 INTRODUCERE

Consultantul a transmis varianta initiala a Raportului Final pentru Strategia Energetica. Strategia a fost prezentata Comitetului Energetic Municipal in data de 20.08.2009.

Comitetul Energetic Municipal in timpul intalnirii a formulat o serie de observatii sau a transmis note scrise ulterior intalnirii. Consultantul a raspuns la notele scrise care s-au regasit si in observatiile formulate.

2 OBSERVATIONS AND ANSWERS

2.1 Ioan Gaf-Deac City councellor

Observation 2.1.1:

I wish to receive from the consultants:

EXTENDED CALCULATION related to the losses generated by delay in implementation of the strategy

Answer 2.1.1:

The Excel (sheet – Transmission pool price) file where the cost of delay is calculated is attached on CD

Observation 2.1.2:

I wish to receive from the consultants:

The strategy regarding energy consumption for the public transport.

Answer 2.1.2:

The energy consumption for public transport is included in the demand forecast Part C Appendix 4b Demand Forecast 2' edition, which will be included in the Strategy Report. The Demand Forecast is attached on the CD.

Observation 2.1.3:

I wish to receive from the consultants:
ALL technical and economical details which prove the viability of the solution for solar energy!

Answer 2.1.3:

The technical and economical evaluation of solar energy is found in Part C Appendix 7a.

The evaluation is performed for:

- One-family house – about 150 m^2
- Large houses – about 500 m^2
- Small apartment blocks – about 2,000 m^2
- Large apartment blocks – about 6,000 m^2

The evaluation is based on standard solar heating systems as sold on the WEB from many suppliers. These systems are sized for a one family house:

- About 6 m^2 solar panel.
- About 300 l heat storage

The cost of such a system is 6.031 EUR including all components and installation by contractor certified by

2 OBSERVATII SI RASPUNSURI

2.1 Consilier general Ioan Gaf-Deac

Observatia 2.1.1

Vreau sa-mi parvina de la consultant:

CALCULUL EXTINS al pierderilor generate de intarzierea aplicarii strategiei

Raspuns 2.1.1

Fisierul excel (sheet – Transmission pool price), in care sunt calculate costurile generate de intarzierile in implementare este atasat pe CD

Observatia 2.1.2:

Vreau sa-mi parvina de la consultant:

Strategia privind consumul de energie al transportului in comun.

Raspuns 2.1.2:

Consumul de energie pentru transportul in comun este inclus in prognoza cererii Partea C Anexa 4b – Prognoza Cererii editia a 2-a, care va fi inclusa in Raportul final al Strategiei. Prognoza cerii este atasata pe CD

Observatia 2.1.3:

Vreau sa-mi parvina de la consultant:

TOATE detaliile tehnice si economice care sa dovedeasca solutia energiei solare ca fiind fiabila!

Raspuns 2.1.3:

Evaluarea tehnico-economica a energiei solare se gaseste in Partea C Anexa 7a.

Evaluarea s-a facut pentru:

- O casa pentru o familie – aproximativ 150 m^2
- O casa mare – aproximativ 500 m^2
- Un bloc mic de apartamente – aproximativ 2000 m^2
- Un bloc mare de apartamente – aproximativ 6000 m^2

Evaluarea se bazeaza pe sisteme de incalzire solara standard, care pot fi comandate pe internet de la diferiti furnizori.

Aceste sisteme sunt dimensionate pentru o casa pentru o familie:

the supplier.

(Please find the values for other buildings/system sizes in the report).

The feasibility is evaluated in different scenarios: A scenario based on socio-economic costs and a scenario based on subsidised prices and tariffs.

In addition the feasibility is evaluated for buildings currently connected to the district heating system and for building which must have new installations.

CONCLUSION

Solar heating is not feasible under the current subsidise scheme. Production costs for solar heating will be between 17 and 30 EUR/GJ while the subsidised district heating tariff is about 8.60 EUR/GJ.

Solar heating is feasible if current general subsidises are removed and a true cost related tariff is introduced. Production cost for solar heating will still be between 17 and 30 EUR/GJ while the cost of district heating supply will be about 31 EUR/GJ.

- Aproximativ 6m^2 suprafata de panou solar
- Aproximativ 300 l capacitatea acumulatorului de caldura

Costul unui astfel de sistem este de 6.031 euro incluzand toate componentele precum si lucrarile de instalare realizate de catre un contractant acreditat de catre furnizor.(Celelalte valori, pentru alte tipuri de cladiri/marimi ale sistemelor, se gasesc in raport)

Fezabilitatea este evaluata in diferite scenarii: scenariul A stabilit pe baza costurilor socio-economice si un scenariu B bazat pe preturi si tarife subventionate.

In plus, fezabilitatea este evaluata: pentru cladiri care sunt deja conectate la sistemul de incalzire centralizata si pentru cladiri la care trebuie realizate instalatii noi.

Incalzirea din energie solara nu este fezabila in conditiile schemei actuale de subventii. Costurile de producere pentru incalzirea cu energie solara vor fi intre 17-30 Euro/GJ, in timp ce tariful subventionat al energiei termice din sistemul de termoficare este aproximativ 8.6 Euro/GJ.

Energia solara este fezabila in conditiile in care se va elimina subventia generala si se va introduce un tarif stabilit pe baza costurilor reale.

Costul de producere pentru incalzirea din energie solara se va situa intre 17-30 Euro/GJ, in timp ce costul incalzirii prin sistemul centralizat va fi de aproximativ 31 Euro/GJ.

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Grontmij | Carl Bro

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1 INTRODUCTION

The Consultant has submitted the Draft Final Report for the Energy Strategy. The Strategy was presented for the Technical Committee on 20.08.2009.

The Technical Committee has submitted a number of observations during the meeting and in notes after the meeting. This Technical Note repeats the observations and provides the answers from the Consultant.

1 INTRODUCERE

Consultantul a transmis varianta initiala a Raportului Final pentru Strategia Energetica. Strategia a fost prezentata Comitetului Energetic Municipal in data de 20.08.2009.

Comitetul Energetic Municipal in timpul intalnirii a formulat o serie de observatii sau a transmis note scrise ulterior intalnirii. Consultantul a raspuns la notele scrise care s-au regasit si in observatiile formulate.

2 OBSERVATIONS AND ANSWERS

2.1 Prof. Dr. George Darie

Observation 2.1.1:

I still consider that the necessary volume of construction works can not be covered in a so short period (11 years).

Answer 2.1.1:

Working in East Germany in the early 1990'ties and seeing how contractors was coming from all over Europe as soon as the funding for reconstruction become available I'm not afraid of lack of work force.

However, foreign workers will not come for a salary of 1,000 EUR/month.

Observation 2.1.2:

Consultant proves a brief knowledge of issues related to production and transmission of electricity. Replacing the current centralized sources (electricity production) with a relatively high number of small power sources, decentralized, involves major changes in transport and distribution of electricity. Who will bear the costs? There is somebody asked for a point of view in front of distribution companies in the Bucharest? The answers received prove that strategy has been developed considered only supply heat, which is totally wrong. Same answer mentions the possibility of the actual power sources in Bucharest to continue to supply heat and after 2020. There is a contradiction to the hypothesis "CO_2 neutral".

Answer 2.1.2:

Construction of decentralised power generation at the level of the thermal substations where also 10 /0.4 kV, or 20/0.4kV transformer capacity is available will reduce the losses in the distribution system and require no significant changes to the distribution system.

Most of the existing CHP plant does not comply with definition of cogeneration which is that the power/heat ration should be at least 0.85 (0.85 MW generated when producing 1 MJ/s). Thus, these plants will not have priority in sale to the national power grid as generation from renewable sources and "real" cogeneration.

The main reason for not maintaining the existing units and for not building new is the low electricity price in Romania. At a tariff between 40 and 90 EUR/MWh for sale to the national grid there is no basic for investment

2 OBSERVATII SI RASPUNSURI

2.1 Prof. Dr. George Darie

Observatia 2.1.1

Raman la parerea ca volumul necesar de activitati de constructie-montaj nu poate fi acoperit intr-un interval asa de scurt (11 ani).

Raspuns 2.1.1

Din experienta acumulata in estul Germaniei, in anii 1990, in momentul in care fondurile pentru reconstructie au devenit disponibile, imediat ontractantii au venit din toata Europa ce, in acest sens nu imi e frica de o lipsa a fortei de munca. In orice caz, muncitorii straini nu vor lucra pentru un salariu de 1000 euro/luna.

Observatia 2.1.2:

Consultantul dovedeste o cunoastere sumara a problemelor legate de producerea si transportul energiei electrice. Inlocuirea actualelor surse centralizate (de producere a energiei electrice) cu un numar relativ ridicat de surse de mica putere, descentralizate, implica schimbari majore in reteaua de transport si distributie de energie electrica. Cine suporta costurile ? A fost solicitat un punct de vedere al societatilor de distributie din zona Bucuresti ? Raspunsul dovedeste ca strategia elaborata nu a avut in vedere decat alimentarea cu caldura, ceea ce este total eronat. Acelasi raspuns mentioneaza posibilitatea ca actualele centrale electrice din Bucuresti sa continue furnizarea de caldura si dupa anul 2020. Apare o contradictie cu ipoteza "zero emisii de CO_2".

Raspuns 2.1.2:

Construirea unor unitati de producere a energiei electrice descentralizate, la nivelul punctelor termice unde sunt disponibile transformatoare electrice 10 /0.4 kV, sau mai rar 20/0.4 kV, vor conduce la reducerea pierderilor in sistemul de distributie si nu necesita modificari semnificative ale sistemului de distributie.

Cele mai multe centrale de cogenerare nu corespund definitiei cogenerarii pentru care raportul electricitate/energie termica trebuie sa fie cel putin 0.85 (sunt generati 0.85 MW electricitate la producerea 1 MJ/s energie termica). Astfel, aceste centrale nu vor avea prioritate la vanzarea electricitatii in reteaua electrica nationala, inaintea electricitatii produsa din surse regenerabile sau "adevarata cogenerare" in new production or maintaining the existing. If more electricity is requested produced in Bucharest the electricity tariff should be increased and, if increased high enough, the selection of production options would have been different.

The electricity consumption is forecasted to almost double until 2030. Thus, the transmission and distribution systems must be developed to meet this demand and this must of cause be paid for by the electricity consumers.

In the future we'll probably see the maximum electricity load in the summer period due to air conditioning and as the heat production in the same period is close to zero the electrical transmission and distribution systems must anyhow be developed to cover the peak demand. In fact, constructing waste-to-energy facilities generating electricity when the heat demand is low will increase the power generation in the Bucharest area in the summer period.

This indicate, that a optimal solution for supplying Bucharest with electricity will be a combination of extension of the grids and construction of power-only sources for reserve and peak-load purposes.

Pretul scazut pentru electricitate in Romania reprezinta motivul principal pentru care nu vor fi mentinute unitatile existente sau pentru a nu fi construite altele noi. La un tarif de vanzare catre reteaua nationala intre 40 si 90 Euro/MWh nu se poate justifica fezabilitatea investitiilor in noi unitati de producere sau mentinerea celor existente. In conditiile in care, se solicita ca in Bucuresti sa se produca mai multa energie electrica, ar trebui ca tariful sa creasca, iar daca acesta creste suficient de mult, selectarea opriunilor privind producerea ar putea fi diferita.

Consumul de electricitate in 2030 este prognozat a se dubla. Totusi, sistemele de transport si distributie trebuie dezvoltate astfel incat sa se poata conforma acestui consum si evident costurile pentru aceste investitii vor trebui a fi platite tot de catre consumatorii de electricitate.

In viitor, se va realiza ca incarcarea maxima pentru electricitate se va inregistra in perioada de vara, datorita aerului conditionat, in timp ce consumul de energie termica este aproape zero, sistemele electrice de transport si distributie trebuie extinse pentru a acoperi necesarul la varf. In fapt, construirea facilitatilor de incinerarea a deseurilor, capabile sa produca electricitate cand necesarul de caldura este scazut va conduce la generarea energiei electrice, in Bucuresti, in perioada verii.

Acesta indica faptul ca solutia optima pentru furnizarea de electricitate in Bucuresti va fi reprezentata de o combinatie intre extinderea retelelor si construirea unor surse de producere numai a energiei electrice, ca rezerva si pentru acoperirea varfurilor de consum.

Observation 2.1.3:

Solar panels will be mounted on blocks which are private property. How can this problem be solved legally? Those owners will receive a "rent" for these panels?

Observatia 2.1.3:

Panourile solare vor fi montate pe blocuri care constituie proprietate privata. Cum poate fi rezolvata legal aceasta problema ? Acei proprietari vor primi o "chirie" pentru aceste panouri ?

Answer 2.1.3:

This is a political problem.

In Malmö Sweden, where a new developed city area "Ecostaden" is CO_2 neutral, installation of solar heating panels is included in the heat plan. Thus, the building permits request installation of solar panels supplying heat to the district heating network and connection of the building to the district heating system.

There is no obstacle for doing the same in Bucharest for new buildings. The problem is the existing building:

- It could be a condition for obtaining financial support for energy rehabilitation that solar panels are integrated in the insulation envelope.
- A discount in heat tariff could be offered.

Raspuns 2.1.3:

Aceasta e o problema politica.

In Suedia, la Malmö, unde intr-o noua zona de dezvoltare a orasului, Ecostaden, este neutra din punct de vedere al emisiilor de CO2, instalarea panourilor solare fiind incluse in planul de incalzire. Astfel cladirile care corespund conditiilor de instalare a panourilor solare, aprovizioneaza cu caldura sistemul de termoficare, cladirea fiind conectata la sistemul de termoficare.

Nu exista nici un obstacol ca acest lucru sa se intample si in Bucuresti pentru noile cladiri. Problema o reprezinta cladirile existente, pentru care pot fi gasite solutii de genul :

- Poate fi o conditie pentru obtinerea de fonduri

- A rental agreement could be offered
- More

pentru reabilitarea termica, panourile solare facand parte din anvelopa cladirii.

- Poate fi oferita o reducere a tarifului la incalzire
- Poate fi oferita o schema de inchiriere
- Alte solutii

Observation 2.1.4:

I believe that the proposed strategy can not be accepted in the current version for the following reasons:

1. There are recent investments (transmission pipe system, new units on CET VEST) which should be abandoned
2. Power supply issue is treated superficially. It should be considered that existing CHP are still part of current energy system of the city, even if not subordinated to the Municipality.
3. Under the conditions of the consultant, in the above mentioned power supply heat may continue after 2020 (response 2.1.4), changes in the transmission system should not take this into account? Normally they should have free access to transmission system.
4. Strategy is subject to appropriate regulations aimed at placing solar panels on private properties (response 2.1.6). Who guarantees that such legislation will be issued?

Observatia 2.1.4:

Consider ca strategia propusa de consultant nu poate fi acceptata in actuala varianta din urmatoarele motive**:**

- Exista investitii recente (ex. magistrale de apa calda, noul grup de la CET Vest) la care ar trebui sa se renunte
- Problema alimentarii cu energie electrica este tratata in mod superficial. Trebuie avut in vedere ca actualele CET fac totusi parte din sistemul energetic al orasului, chiar daca nu sunt in subordinea primariei.
- In conditiile mentionate de consultant, in care centralele mentionate mai sus pot continua livrarea de energie termica si dupa anul 2020 (raspunsul 2.1.4), modificarile in sistemul de transport nu ar trebui sa tina seama de acest lucru ? In mod normal ele ar trebui sa aiba acces liber la reteaua de transport.
- Strategia este conditionata de existenta unor reglementari care sa vizeze plasarea de panouri solare pe proprietati private (raspunsul 2.1.6). Cine garanteaza emiterea unei astfel de legislatii ?

Answer 2.1.4:

1. The new unit at CET Vest is maintained in operation units from 2006/2007. The strategy does not address what should happen with the unit at that time. Rehabilitated? Decommissioned?
2. (Please see 2.1.3). You cannot expect a centralised planning approach in a liberalised energy market based on commercial contracts between the parties.
3. Yes
4. Nobody can give such guarantee but as far as implementation is related to EU legislation Romania will have to comply. It is difficult for the Consultant to foresee a situation where the National Energy Strategy's goal cannot be reached due to lack of secondary legislation – we are in an EU country not in Zimbabwe.

Raspuns 2.1.4:

1. Noua unitate de la CET Vest a inceput sa functioneze din 2006/2007. Strategia nu se refera la ce se va intampla cu aceasta unitate in acel moment. Reabilitare? Dezafectare?
2. (Vă rugăm a se vedea 2.1.3). Nu va puteti aştepta la o abordare planificata centralizat, într-o piaţă liberalizată a energiei bazata pe contracte comerciale între părţi.
3. Da
4. Nimeni nu poate oferi o asemenea garantie, dar atata vreme cat implementarea actiunii este in corelare cu legislatia europeana, Romania va trebui sa se conformeze. Este dificil pentru Consultant sa prevada ca obiectivele incluse in Strategia Energetica Nationala nu pot fi atinse din cauza lipsei legislatiei secundare, totusi ne aflam intr-o tara a Uniunii Europene si nu intr-o tara din lumea a 3-a.

2.2 Prof. Dr. Virgil Musatescu

Observation 2.2.1:

I believe that both the consultant, and Bucharest Municipality should be aware that though some of the conditions for achieving the targets - and especially the rehabilitation of housing blocks - are not even now and probably will not find in the future in scope of decision of the Bucharest Municipality, which increases the risk of implementing the proposed study

Answer 2.2.1:

The Consultant agrees that this is a main risk.

In some of the countries where energy audits on buildings are implemented and certification issued the so called Red Spot buildings (buildings with an energy consumption of 150 kWh/m2/year or more) are practically impossible to sell as financing from the official financial institutions shall be conditions by implementation of the energy conservation measures outlined in the energy audit report – measures to which the building owner by the way can obtain support from the governments.

Observation 2.2.2:

I want to draw attention to an aspect unaccredited in study: the use of urban waste incineration means, especially if Bucharest, the existence of a support fuel. The study says nothing about it nor about the value of using this fuel related emissions.

Answer 2.2.2:

At arrival at the plant the waste is mixed aiming to obtain a uniform heating value and the crane operator always aim to have some wood waste or similar stored in a corner of the waste dump for mixing if the heating value of the received waste is very low.

In this way support fuel is almost never used. However, for start-up and back-up oil burners are installed.

At a typical 14 t/h waste-to-energy energy facility at Nordforbrænding in Denmark about 100,000 t waste with a heat content of about 850,000 GJ is incinerated annually using less that 5 t of oil with a heat content of about 210 GJ.

2.2 Prof. Dr. Virgil Musatescu

Observatia 2.2.1:

Consider ca atat consultantul, cat si Primaria trebuie sa fie constienti de faptul ca totusi unele din conditiile de atingere a tintelor propuse - si in mod special reabilitarea blocurilor de locuinte - nu se afla nici acum si probabil nu se va afla nici in viitor in sfera de decizie a Primariei, ceea ce mareste riscul de implementare a propunerilor studiului

Raspuns 2.2.1:

Consultantul este de acord ca acesta este un risc major.

În unele dintre ţările în care se realizeaza auditurile energetice ale clădirilor şi este emis aşa-numitul "Red Spot Buildings" (clădiri cu un consum de energie de 150 kWh/m2/an sau mai mult) este practic imposibil să vinzi, finanţarea de la instituţiile financiare putandu-se face doar in condiţiile punerii în aplicare a măsurilor de conservare a energiei, evidenţiate în raportul de audit energetic - măsuri pentru care, de altfel, proprietarul clădirii poate obţine sprijin din partea guvernelor.

Observatia 2.2.2:

Vreau sa trag atentia asupra unui aspect nementionat de studiu: folosirea incinerarii deseurilor urbane presupune, mai ales pentru cazul Bucurestiului, existenta unui combustibil suport. Studiul nu spune nimic in aceasta privinta si nici despre valoarea emisiilor aferente folosirii acestui combustibil.

Raspuns 2.2.2:

De la inceput deşeurile sunt amestecate cu scopul de a obţine o valoare unitară de încălzire. Operatorul tinde sa aiba întotdeauna unele deşeuri de lemn sau similare stocate într-un colţ al depozitului pentru a le amesteca în cazul în care valoarea de încălzire a deşeurilor primite este foarte scăzuta. În acest fel combustibilul suport nu este folosit aproape niciodată. Cu toate acestea sunt instalate arzătoare cu petrol pentru aprindere si pentru rezerva. Pentru facilitatea de incinerare deşeurilor cu o incarcare normala de 14 t/h, ca cea de la Nordforbrænding, Danemarca, unde se incinereaza aproximativ 100.000 t de deşeuri cu un conţinut de energie termică de aproximativ 850000 GJ se utilizeaza anual mai puţin de 5 tone de petrol cu un conţinut de căldură de aproximativ 210 GJ.

2.3 Prof.Dr.Ing.Nicolae Golovanov

Observation 2.3.1:
I appreciate that will be useful not to removed the solution of using electricity at night for peak boilers. Even in case of existence of power plant with 1000 MW with accumulation by pumping, still is considered an important back-up that could be used for peak load heating systems. Romania has experience in this area.

Answer 2.3.1:

Accumulating heating is technical possible but not feasible at the current conditions.

The international development trend is to establish night consumption of electricity by charging electrical vehicles.

2.3 Prof.Dr.Ing.Nicolae Golovanov

Observatia 2.3.1:
Apreciez că nu trebuie înlăturată soluţia cu utilizarea energiei electrice pe timp de noapte pentru cazanele de vârf. Chiar în condiţiile existenţei centralei cu acumulare prin pompare de 1000 MW, rămâne o importantă rezervă care ar putea fi utilizată şi pentru alimentarea sistemelor de încălzire de vârf. În România există experienţă în acest sens.

Raspuns 2.3.1:

Acumularea de caldura este tehnic posibila, dar nu poate fi fezabila în condiţiile actuale. Tendinţa internaţională de dezvoltare este de a stabili consumul de energie electrică pe timp de noapte prin incarcarea bateriilor vehiculelor electrice

2.4 Director General DGISP Madalin Dumitru

Observation 2.4.1:

The modernization of RATB's tram fleet needs some technical solutions for electric traction system to improve their performance, especially in terms of energy consumption? What are the costs related to this measure?

Answer 2.4.1:

To answer your question in a qualified manned will require a detailed feasibility study. Such a study is not the scope of the Energy Strategy.

Observation 2.4.2:

From the total number of 38 transformer stations which are under RATB' operation necessary for supply of electrical transport, a total of 19 stations were rehabilate until now. Considering this information there is necessary that the Consultant shall express his opinion regarding the modernization of the remaining 19 stations or opportunity for building new station in order to reach the balance of the energetic system. What technical solutions, and what costs would involve the action?

Answer 2.4.2:

To answer your question in a qualified manned will require a detailed feasibility study. Such a study is not the scope of the Energy Strategy.

Observations 2.4.3:

Considering that the Municipality has purchased in the last 3 years a total of 1000 buses Mercedes Ataro and a total of 200 trolleybuses Irisbus, which would be the measures it sees the consultant helpful in future for further modernization of the fleet RATB both by light decrease CO_2 emissions and the reduction of consumption of material resources?

Answer 2.4.3:

More cities have already or will in the near future introduce busses operated on natural gas (or other forms of gas), electrical battery busses with charting when breaking or as hybrids. However, this is all on experimental basis and today more expensive than traditional diesel busses.

The Consultant believes that the short-term development in Bucharest should be based on low polluting, high efficient diesel busses as the Mercedes

2.4 Director General DGISP Madalin Dumitru

Observatia 2.4.1:

La modernizarea parcului de tramvaie al RATB sunt necesare anumite solutii tehnice pentru sistemul electric de tractiune care sa imbunatateasca performantele acestora, mai ales sub aspectul consumulului de energie? Ce costuri implica aceasta masura?

Raspuns 2.4.1:

Pentru un raspuns calificat la intrebarea dumneavoastra este necesar un studiu detaliat de fezabilitate. Un astfel de studiu nu este telul strategiei energetice

Observatia 2.4.2:

Din totalul de 38 de statii de transformare pe care le are in exploatare RATB pentru alimentarea transportului electric, un numar de 19 statii au fost modernizate pana in prezent. Prin prisma acestui aspect cred ca este util ca firma de consultanta sa se pronunte asupra modernizarii restului de 19 substatii sau oportunitatea construirii de substatii noi pentru echilibrarea sistemului energetic. Ce solutii tehnice si ce costuri ar implica aceasta masura?

Raspuns 2.4.2:

Pentru un raspuns calificat la intrebarea dumneavoastra este necesar un studiu detaliat de fezabilitate. Un astfel de studiu nu este telul strategiei energetice

Observatia 2.4.3:

Tinand seama de faptul ca municipalitatea a achizitionat in ultimii 3 ani un numar de 1000 autobuze Mercedes Ataro si un numar de 200 troleibuze Irisbus, care ar fi masurile pe care le vede consultantul, utile in viitor, pentru continuarea modernizarii parcului de autovehicule RATB atat prin prisma scaderii emisiilor de CO2 cat si pentru scaderea consumului de resurse materiale?

Raspuns 2.4.3:

Mai multe orase au deja sau vor introduce in viitorul apropiat autobuze care funcţionează pe gaz natural (sau alte forme de gaz), autobuze cu acumulatori electrici sau hibrizi. Cu toate acestea, acestea reprezinta o baza experimentala astazi si sunt mult mai scumpe decât autobuzele diesel tradiţionale. Consultantul este de părere că dezvoltarea pe termen scurt in Bucuresti ar trebui să se bazeze pe o poluare scazuta, autobuze diesel foarte eficiente precum type already in operation. However, this should not exclude that RATB on experimental basis try one or more of the new technologies.

Technology development and competitive prices of the new technologies together with strengthen air quality regulations will result in implementation of these technologies in Bucharest in a long-term perspective.

The above outlined strategies are not developed by the Consultant but obtained from literature about the subject available.

autobuzele Mercedes, deja în funcţiune. Oricum, acest lucru nu ar trebui să excludă ca RATB pe bază experimentală sa incerce una sau mai multe dintre noile tehnologii.
Dezvoltarea tehnologica şi preţuri competitive ale noilor tehnologii, împreună cu consolidarea reglementărilor privind calitatea aerului vor conduce la punerea în aplicare a acestor tehnologii în Bucureşti într-o perspectivă pe termen lung.
Strategiile prezentate mai sus nu sunt dezvoltate de către Consultant, dar au fost obţinute din literatura de specialitate cu privire la acest subiect

Observation 2.4.4:
What measures are needed to transform public lighting system in an eligible consumer of electricity, so that it becomes possible to get energy from the free market and what estimated costs would involve this transformation?

Observatia 2.4.4:
Ce masuri sunt necesare pentru transformarea sistemului de iluminat public intr-un consumator eligibil de energie electrica, astfel incat sa devina posibila achizitionarea energiei de pe piata libera si ce costuri estimative ar implica aceasta transformare?

Answer 2.4.4:

A consumption of about 57 GWh is hardly enough to obtain significant savings by shopping on a free electricity market considering the administrative costs and the risks involved. In an open market you have winners and looser's.

In the Nordic open electricity market a consumption of 500 GWh or more is considered the break-even level for private shopping.

Raspuns 2.4.4:

La un consum de aproximativ 57 GWh este destul de greu sa obtii economii importante cumparand de pe o piaţă liberă de energie electrică, având în vedere costurile administrative şi riscurile implicate. Intr-o piaţă deschisă sunt câştigători şi perdanti.
Pe piaţa nordică de energie electrică, un consum de 500 GWh sau mai mult este considerat pragul de rentabilitate pentru a cumpara de pe piata libera.

Bucharest Municipality

Primaria Municipiului Bucuresti

Contract 4144 / 31.12.07

Contract 4144 / 31.12.07

Energy Strategy for Bucharest Municipality

Strategia Energetica a Municipilui Bucuresti

Phase III: Strategy Report

Etapa a III-a: Strategia

Technical Note 28.08.2009

Nota Tehnica 28.08.2009

Observation from the Municipal Energetic Committee

Observatii din partea Comitetului Energetic Municipal

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1 INTRODUCTION

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2 OBSERVATIONS AND ANSWERS

2.1 Prof. Dr. George Darie

Observation 2.1.1:

The strategy is based on the assumption that in 2020 the production of thermal energy should neutral from CO_2 emissions. This assumption has led inevitably to establish technical solutions to produce thermal energy. I believe that this assumption is too demanding, especially for a city as size of Bucharest

Answer 2.1.1:

The overall goals, including the goal of obtaining CO_2 neutrality for heating by 2020, for the Energy Strategy was proposed by the Consultant in Phase II and presented in the Report “Clarification of Goals”. The goals are formulated as recommendations in the “Recommendation Report” completing Phase II.

The goal of CO_2 neutrality by 2020 is established because it is feasible and the measures selected for obtaining the goal are fully in-line with EU-directives as implemented in Romania in the National Energy Strategy. Delay of 5 or 10 years in construction of solar heating systems, waste-to-energy, local peak-load production and modernisation of the transmission system will result in addition production costs in the level of 2 BEUR and 4 BEUR, respectively (See technical note regarding impact of delayed implementation).

Observation 2.1.2:

The strategy involves a radical change in terms of heat supply, assuming an extremely high volume of investments and construction activity and assembly. It is hard to believe that this will be achieved only in 11 years. I consider that one of the main obstacles will be the acceptance by the population of the new technologies.

Answer 2.1.2:

The consultant agrees that providing the necessary investments (more than 3,000 MEUR) seems difficult and out-of-reach for the Municipality of Bucharest.

To overcome this problem we propose private investment based on production and operation concessions.

2 OBSERVATII SI RASPUNSURI

2.1 Prof. Dr. George Darie

Observatia 2.1.1

Strategia are la baza ipoteza ca in anul 2020 emisiile de CO_2 rezultate din producerea energiei termice trebuie sa fie nule. Aceasta ipoteza a condus in mod inevitabil la stabilirea solutiilor tehnice de producere a energiei termice. Consider ca aceasta ipoteza este mult prea pretentioasa indeosebi pentru un oras de talia Bucurestiului.

Raspuns 2.1.1

Obiectivele generale ale Strategiei Energetice, inclusiv obiectivul pentru atingerea neutralitatii dpdv al emisiilor de CO_2 in 2020, au fost propuse de Consultant in Etapa a II a si este prezentat in raportul “Clarificarea Obiectivelor”. Obiectivele au fost formulate ca si recomandari in raportul “Recomandari”, care completeaza Etapa aII-a.

Obiectivul privind obtinerea neutralitatii dpdv al emisiilor de CO_2 in 2020 a fost stabilit ca urmare a faptului ca este fezabil, iar masurile selectate pentru atingerea acestuia sunt in completa conformitate cu Directivele UE, asa cum sunt implementate in Romania prin Strategia Energetica Nationala. Intarzieri de 5 sau 10 ani in construirea sistemelor de incalzire solara, facilitati de incinerare, cazane pt acoperirea varfului de consum si modernizarea sistemului de transport vor genera costuri de producere la nivelul a 2 miliarde Euro, respectiv 4 miliarde Euro(a se vedea nota tehnica referitoare la impactul generat de intarzierea implementarii).

Observatia 2.1.2:

Strategia implica o schimbare radicala a modului de acoperire a cererii de caldura, presupunand un volum extrem de ridicat de activitati de constructie si montaj. Este greu de crezut ca acest lucru va fi realizat in doar 11 ani. Una dintre principalele piedici o consider acceptarea de catre populatie a noilor tehnologii.

Raspuns 2.1.2:

Consultantul este de aceeasi parere ca asigurarea necesarului de investitii(mai mult de 3 miliarde Euro) este dificila si complet peste posibilitatile PMB.

In vederea rezolvarii acestei situatii noi propunem investitiile private pe baza concesiunilor pentru producere si distributie.

Observation 2.1.3:

The strategy involves removing the current super-centralized system of heat supply. Adopting the strategy will influence the investments in the transmission system.

Answer 2.1.3:

Yes. The transmission system will over time be reduced from the current capacity of about 5,000 MJ/sec to about 400 MJ/sec as the only centralised production in the future will be the waste-to-energy facilities with the decentralised CHP units as back-up.

The proposed strategy for changing the transmission system: decommission unnecessary pipes and replace other when worn-out. Fully changing the transmission system is not expected completed before 2025 or even later.

Observatia 2.1.3:

Strategia presupune eliminarea actualului sistem super-centralizat de alimentare cu caldura. Adoptarea strategiei va influenta in mod hotarator investitiile in magistralele de transport a apei fierbinti.

Raspuns 2.1.3:

Da. Sistemul de transport se va reduce in timp, de la capacitatea actuala de 5,000 MJ/sec la aproximativ 400 MJ/sec, in conditiile in care producerea centralizata se va baza doar pe facilitatile de incinerare cu unitatile de cogenerare centralizate ca si rezerva.

Strategia propusa pentru modificarea sistemului de transport consta in: dezafectarea conductelor care nu se vor mai utiliza si inlocuirea altora cand sunt depreciate. Nu se asteapta ca reconstructia completa a sistemului de transport sa aiba loc inainte de anul 2025.

Observation 2.1.4:

The strategy involves the withdrawal of operating and decommissioning in 2020 of all CHP functioning on the basis of fossil fuels. Also it is proposed to achieve decentralized cogeneration units, small capacity. These measures will influence the balance of electricity production in the area of Bucharest. Strategy should consider how is influenced the system of transmission and distribution of electricity, including the security of the supply of electricity to the city of Bucharest. Similar problems could arise in case of transmission networks and distribution of natural gas.

Answer 2.1.4:

Yes and No. The electricity generation from cogeneration will be increased. (Decentralised CHP in the heating period and waste-to-energy in the off-heating period). If the electricity side decides to maintain the condense production is not the problem of the Municipality of Bucharest.

The electricity side can continue operation in condense mode of the necessary electricity or find a cheaper solution in terms of addition power lines to the Bucharest area or others. The power sector shall be welcome to supply heat to the district heating system in competition with solar energy and waste-to-energy. What the electricity side decides to do is not the responsibility of Bucharest Municipality.

Observatia 2.1.4:

Strategia implica retragerea din exploatare si dezafectarea pana in 2020 a tuturor CET care functioneaza pe baza de combustibili fosili. Deasemeni se propune realizarea unor unitati de cogenerare descentralizate, de mica capacitate. Aceste masuri vor influenta balanta producerii de energie electrica in zona Bucuresti. Strategia ar trebui sa analizeze modul in care este influentat sistemul de transport si distributie a energiei electrice, inclusiv securitatea in alimentarea cu energie electrica a orasului Bucuresti . Probleme similare ar putea aparea si in cazul retelelor de transport si distributie a gazului natural

Raspuns 2.1.4:

Da si nu. Producerea de electricitate prin cogenerare va creste. (Unitati de cogenerare descentralizate in perioada de incalzire si facilitati de incinerare a deseurilor in afara perioadei de incalzire. Daca pe partea de producere a electricitatii se decide sa se mentina unitatile in condensare, nu este problema Primariei Municipiului Bucuresti.

Partea de producere a electricitatii poate sa continue sa opereze in condensatie pentru producerea cantitatii de electricitate necesara sau sa gaseasca solutii ieftine ca de exemplu construirea unor linii suplimentare de alimentare a zonei Bucurestiului sau alte solutii. Sectorul de producere al electricitatii este binevenit sa furnizeze energie termica in sistemul de incalzire centralizat in competitie cu energia solara si facilitatile de incinerare a deseurilor.

Primaria Municipilui Bucuresti nu este responsabila pentru deciziile luate de catre sectorul de producere al electricitatii.

Observation 2.1.5:

Covering the heat requirement is based mainly on use of solar energy. In terms of days without sun and low temperatures outside, the other sources of heat will be sufficient to cover heat demand? A solution could be to maintain current capacity based on fossil fuels?

Observatia 2.1.5:

Acoperirea necesarului de caldura se bazeaza in mare masura pe utilizarea energiei solare. In conditiile unor zile neinsorite si a unor temperaturi exterioare scazute, celelalte surse de caldura vor fi suficiente pentru acoperirea cererii de caldura? O solutie ar putea fi mentinerea unor capacitati actuale bazate pe combustibili fosili?

Answer 2.1.5:

Solar energy is assumed covering the demand near to 100% in the summer period while the production will be insignificant in the coldest periods of the winter. Thus a production on fossil fuels on heat-only is expected also after 2020.

However, after 2020 we assume that bio-fuel will be cheaper than natural gas or heating oil when energy/environmental taxes as requested by the EU are fully implemented in Romania and when take-or-pay conditions for natural gas are introduced.

Raspuns 2.1.5:

Se presupune ca energia solara va putea sa acopere aproape in intregime necesarul de energie termica in perioada de vara, in timp ce productia va fi nesemnificativa in cele mai reci perioade iarna. Totusi se asteapta si dupa anul 2020 sa existe productie de energie termica utilizand combustibili fosili.

Astfel, dupa 2020 se preconizeaza ca bio-combustibilul va deveni mai ieftin decat gazele naturale sau produsele petroliere, datorita introducerii taxelor pe energie/mediu ca urmare a conformarii Romaniei cu cerintele UE, in acesr caz, utilizarea gazelor naturale va fi taxata suplimentar.

Observation 2.1.6:

The concept "Solar Energy for all” is difficult to put into practice in the buildings owned by private owners. Acceptance of installing solar panels on these buildings cannot be a condition for connection to the heating system.

Observatia 2.1.6:

Conceptul “Energie solara pentru fiecare” este dificil de pus in practica in cazul cladirilor detinute de proprietari privati. Acceptarea montarii de panouri solare pe aceste cladiri nu poate reprezenta o conditie de conectare la sistemul de termoficare.

Answer 2.1.6:

It is a political problem.

Can it be accepted that the Government of Romania only support the population living on the “south-side” with public funding?

It should not be difficult to understand that if public funding is involved in construction of solar heating system the benefit of the systems must be for everybody.

Raspuns 2.1.6:

Aceasta este o problema politica.

Este acceptat ca Guvernul Romaniei sa subventioneze din fonduri publice doar acea parte a populatiei care are apartamente cu “vedere spre sud”?

Nu este foarte greu de inteles ca atunci cand fondurile publice sunt utilizate pentru construirea de sisteme de incalzire solara, beneficiile rezultate trebuie sa fie pentru fiecare.

2.2 Prof. Dr. Virgil Musatescu

Observation 2.2.1:

The strategy is addressed only to restricted areas: supply of heat and hot tap water and energy used for public transport in the city. Are excluded the urban problems - energy and environment, as well as other services with impact on energy consumption: water - sewage, household waste collection, public lighting (let's not forget the mandatory replacement of sources with incandescent lighting up to 2012)

2.2 Prof. Dr. Virgil Musatescu

Observatia 2.2.1:

Domeniul abordat este restrans doar la alimentarea cu caldura si apa calda menajera si energia utilizata pentru transportul public in interiorul orasului. Sunt excluse problemele legate de urbanism – energie si mediu, ca si alte servicii cu impact asupra consumului energetic : apa - canal , colectare deseuri menajere, iluminatul stradal (sa nu uitam obligativitatea de inlocuire a surselor de iluminat cu incandescenta pana in 2012)

Answer 2.2.1:

The Energy Strategy focuses on the areas of energy consumption and production where the Municipality of Bucharest is responsible.

The Consultant agrees that electricity consumption in areas such as public transport public lightning is missing. This will be corrected in the final version.

Raspuns 2.2.1:

Strategia Energetica se concentraza pe domenii ale consumului si producerii de energie care intra in sfera de competenta legala a Primariei Municipiului Bucuresti.

Consultantul este de acord ca lipsesc sectiunile referitor la consumul de electricitate pentru transportul in comun ca si pentru iluminatul public.

Observation 2.2.2:

I agree with the vision to reduce consumption in Bucharest but I have big doubts about the way in which - primarily from a legal point of view - may be imposed with administrative resources the centralized heating system, as a single supply means.

Observatia 2.2.2:

Sunt de acord cu viziunea de reducere a consumului la nivelul orasului dar am mari indoieli in legatura cu modalitatea in care – in primul rand din punct de vedere legal – se va putea impune prin mijloace administrative sistemul de producere si distributie centralizata a caldurii drept unic sistem de alimentare cu caldura

Answer 2.2.2:

The Consultant has assumed about 5-10% of the heat supply covered from individual CO_2 neutral sources. The legislation is in place for mandatory connection to the district heating system but some conditions must be fulfilled before mandatory connection can be political acceptable, we assume:

- District heating must have competitive tariffs (lower price) than individual heating.
- The comfort level must be at least as for individual natural gas heating (heat and hot tap water on demand).
- Security of supply must be at least at the same level as gas supply.

Raspuns 2.2.2:

Consultantul a luat in considerare ca intre 5-10% din energia termica furnizata va fi acoperita de producerea in surse individuale, neutre din punct de vedere al emisiilor de CO_2. Legislatia in vigoare include prevederi pentru obligativitatea conectarii la sistemul de incalzire centralizat, dar inainte ca aceasta obligativitate sa poata fi acceptabila din punct de vedere politic, consideram ca trebuie indeplinite anumite conditii:

- Incalzirea centralizata trebuie sa aiba tarife competitive (preturi mai scazute) decat incalzirea din surse individuale.
- Nivelul de confort trebuie sa fie cel putin egal cu cel cu cel asigurat de surse individuale pe gaz natural (caldura si acc la cerere)
- Siguranta furnizarii trebuie sa fie cel putin la acelasi nivel ca cel realizat prin sursele utilizand gaze naturale.

2.3 Prof. Dr. Ing. Aureliu Leca

2.3 Prof. Dr. Ing. Aureliu Leca

Observation 2.3.1:

According to the provisions of the strategy will be reduced the heat demand by 45% from a specific consumption 180 kWh/mp/year) (figures are known for Romania is 290 kWh/mp/year) Under the rules of EU ,100 kWh/m^2/year for existing buildings and 50 kWh / m^2/year for new buildings, will be necessary a considerable financing. The strategy doesn't give a way to finance the thermal rehabilitation of buildings.

Observatia 2.3.1:

Conform strategiei se va realiza reducerea cererii de caldura cu 45% de la un consum specific de 180kWh / m^2/an (cifrele care se cunosc pentru Romania sunt de 290 kWh/m^2/an) La normele UE de 100 kWh/mp/an pentru cladirile existente si 50 kWh/mp/an pentru cladirile noi este necesara o finantare considerabila. Nu rezulta modul de finantare a reabilitarii termice a cladirilor.

Answer 2.3.1:

The specific consumption of 180 kWh/m2/year assumes that the already mandatory energy conservation measures as energy metering and

Raspuns 2.3.1:

Consumul specific de 180 kWh/m^2/an ia considerare faptul ca masurile de conservarea energiei obligatorii, precum contorizarea si instalarea vanelor termostatate installation of thermostatic valves on the radiators are implemented.

As the buildings are private owned, it is not the problem of Bucharest Municipality to provide financing. However, a energy rehabilitation scheme supported by Romanian Government, Sectors Municipalities (in case of Bucharest) and owners association is in force but the Consultant finds in appropriate to allocate at least some of the income from energy/environmental taxation (must be introduced in Romania from 2011 according to Treaty with the EU) for energy conservation projects as it is seen in most other EU countries.

la radiatoare au fost implementate.

In conditiile in care cladirile sunt proprietate privata, finantarea nu este o problema a Primariei Municipiului Bucuresti. In prezent este in vigoare o schema de finantare suportata de catre Guvern si Primariile de Sector(in cazul Municipiului Bucuresti), dar avand in vedere ca incepand cu anul 2011, in conformitate cu Tratatul de Aderare, Romania va trebui sa introduca un sistem de taxare pe energie/mediu, Consultantul considera ca macar o parte din aceste fonduri se vor aloca pentru proiecte in domeniul conservarii energiei, asa cum se intampla in cele mai multe tari din UE.

Observation 2.3.2:

Measures proposed in the strategy are correctly designed from the technical point of view, environmental impact, economic and social, but applicable in an ideal context, for a developed country of the EU.

In Romania (in the last 20 years), the energy has not been a national priority, where the reduction of the energy losses were done only by the closure of economic activity and there are not identified financial resources for the thermal rehabilitation of buildings (including administrative buildings!), ANRE regulations discourages efficient cogeneration etc.

Observatia 2.3.2:

Masurile propuse in strategie sunt elaborate corect din punct de vedere tehnic, impact de mediu, economic si social, dar intr-un context ideal, al unei tari dezvoltate a UE. In Romania (in ultimii 20 ani), energia nu a reprezentat o prioritate nationala, nu s-au redus pierderile de energie decat prin inchideri de activitati economice, nu s-a reusit finantarea reabilitarii energetice a cladirilor (inclusiv a cladirilor administrative!), reglementarile produse de ANRE descurajeaza cogenerarea eficienta etc.

Answer 2.3.2:

The measures proposed in the strategy are not issued just because are enforced by EU Directives, Romanian legislation in force, Treaties and Conventions where Romanian is party. These measures are mainly selected due to the fact that all these lead to the lowest heating price for the population.

Raspuns 2.3.2:

Masurile propuse in strategia nu au aparut doar datorita faptului ca sunt impuse de Directivele Europene, legislatia Romaneasca in vigoare si tratatele si convetiile la care Romania este parte ci mai ales pentru faptul ca aceste masuri conduc la obtinerea celui mai scazut pret al energiei termice pentru populatie.

2.4 Prof. Dr. Jean Constantinescu

2.4 Prof. Dr. Jean Constantinescu

Observation 2.4.1:

In the provisions of the strategy the wording relating to functions of the privatization are contradicted by the specific proposed solutions, which are keeping the public authority as main investor. For example RADET should be removed from the situation of bankruptcy before privatization, the Municipality would rebuild the system applying for the loans (67%) and supply credit (30%), and concessionaires would take over ready rebuilt rewarding Municipality because " the current tendency is investment from public funds." Personally I can see this tendency only in a declarative way.

Observatia 2.4.1:

In strategie asertiunile privind functiile privatizarii sunt contrazise de solutiile concrete propuse, care mentin autoritatea publica in rolul de principal finantator. De exemplu, RADET ar fi scos din situatia de faliment inainte de privatizare, primaria ar reconstrui sistemele prin imprumuturi (67%) si credite furnizor (30%) iar concesionarii le-ar prelua gata reconstruite recompensand Primaria, deoarece “curentul actual se indreapta catre investitia publica”. Personal nu vad acest curent decat declarativ.

Answer 2.4.1:

We do not propose keeping the public authority as the

Raspuns 2.4.1:

Noi nu propunem mentinerea autoritatii publice ca main investor. We propose the main investments to come from private investors (concessionaires).

Public investment is in our proposal limited to investments in the transmission system.

investitor principal. Noi propunem ca investitiile principale sa vina din partea investitorilor privati (concesionari).

Investitiile publice, in cadrul propunerii noastre sunt limitate doar la investitii in sistemul de transport.

Observation 2.4.2:

There are some inconsistencies regarding financing matters, there some chapters where is mentioned that the financing is supported by private investors and others where the Municipality shall invest initially afterwards these investments will be handover to the private operators with money recovered.

The scope of privatization is mainly to ensure the sources of financing, which is impossible for the Municipality to bear it. This scope shall be accomplished from the early stage (of reconstruction).

Observatia 2.4.2:

Sunt ambiguitati referitor la finantare, sunt capitole in care este clar ca finantarea trebuie sustinuta de catre mediul privat si sunt alte capitole in care se mentioneaza ca finantarea trebuie asigurata initial de catre Consiliul General si se vor da sistemele acestea gata facute privatilor si sa recupereze cumva banii.

Rolul privatizarii este in primul rand asigurarea finantarii pe care Primaria nu o mai poate sustine. Daca acest rol nu este clar cineva se poate intreba ce nevoie avem de privatizare. Acest rol trebuie indeplinit inca din fazele incipiente (ale reconstructiei).

Answer 2.4.2:

To avoid delay in moving the heat only boiler production to the local level we have proposed that the Municipality initially finance the construction. However, when the concessionaire is appointed, assumingly in 2012, we expect that he take over the boilers and reimburse the Municipality

Raspuns 2.4.2:

Pentru a se evita intarzierile in mutarea producerii caldurii in cazane la nivel local, noi am propus ca Primaria sa finanteze initial constructia acestora. Asadar, cand concesionarul va fi stabilit, presupunand ca acest lucru va avea loc in 2012 si ne asteptam ca acesta va prelua cazanele cu recuperarea investitiei.

Observations 2.4.3:

Instead of a competitive heat market, it is proposed a system of monopoly in the camouflage, like "Single Buyer", based on benchmarking and the transmission operator in this role. For the role of "Market Design" was delivered an "Organization".

In the Organization chapter shall be included some description regarding “Market Design”, the word “market” is not used as “market for the services”

In EU, the meaning of PSO had different approach. In the latest there is used a other wording: Systems of General Interest, sometime using PSO wording could lead to a conflict of interest due to the fact that it is maintained a framework of public service instead of real open market. I consider to be realistic the description of PSO made by the consultant.

Observatia 2.4.3:

In loc de o piata competitiva a caldurii, se propune un sistem de monopol deghizat, de tipul “Cumparator Unic”, bazat pe benchmaking si cu operatorul de transport in acest rol. In rol de “Proiect al pietei” se livreaza o “Organizare”.

In capitolul privind Organizarea trebuie incluse descrieri referitor la “Proiect al pietei”, de altfel cuvantul “piata” nu este utilizat ca de altfel “piata a serviciilor”.

In UE, PSO este premeditata si diferit inteleasa. In ultimul timp se utilizeaza SIG – servicii de interes general, uneori utilizand expresia PSO s-ar putea ajunge si la conflicte de interes pentru ca se mentine un cadru de serviciu public si nu unul de piata reala. Descrierea facuta de consultant pentru PSO mi se pare realista.

Answer 2.4.3:

There will not be a sufficient number of actors on the market and the necessary surplus of capacity to establish competitive market conditions for heat supply. Thus, the market must be regulated and controlled and this is the responsibility of the Municipality in a decentralised concept as outlined in the EU Service Directive.

Competition by comparison (Benchmarking) is successfully implemented in more countries and used

Raspuns 2.4.3:

Nu va fi un numar suficient de actori pe piata dar surplusul necesar de capacitate va stabili conditii de piata competitiva pentru furnizarea energiei termice. Totusi, piata trebuie reglementata si controlata, iar aceasta este responsabilitatea Municipalitatii asa cum este definit conceptul descentralizarii in Directiva Europeana a Serviciilor. Iar in Cartea verde si Cartea alba a serviciilor de interes general, lansate de Comisia Europeana in 2003 si 2004, conceptul as a tool for the regulating and controlling body in implementation of corrective measures where necessary.

We can call it PSO or something else. The important matter is that the City Council, who has the competency to concession the services and related assets must institutionalise the regulatory and controlling body as independent entity from Municipality, to ensure both parties fulfil the conditions of future concessions.

Observation 2.4.4:

Arguments are not convincing (not enough competitors!), and examples of "Single Buyer" comes from the past and is no longer found in EU legislation. Moreover, in Central and Eastern Europe all the "Single Buyer" systems had ended in failure and litigations.

How will be the private investor interested?

There is possible by a guarantee of stability , by affordable customers on the market prices.

The privatization shall start from the distribution side, after the distribution is privatized on the chain of supply will be created the stability and guarantee.

Answer 2.4.4:

We are not sure what “Single Buyer” refers to. If it refers to the technical-economical load dispatch and the pool pricing of production costs it is not something from the past but the principle of operation is one of the most efficient transmission systems in the world.

Private investors will only be attracted is they see a business opportunities - a profit must be generated. Thus, in order to benefit the consumers (lower tariff etc) and generate a profit at the same time the private investor must demonstrate that he can obtain the necessary cost reduction. This is a difficult balance, but not impossible! The interest of the investors is generated also by the continuity of these services on long terms, allowing(by guarantee) the recovering of the investment.

Privatisation of the production (construction of new facilities) is far the easiest privatisation to handle as experience is obtainable from almost all EU countries. Privatisation of the distribution is more difficult and requires more preparation.

promovat in domeniu este de liberalizare controlata, autoritatile publice competente pentru utilitatile publice avand importante responsabilitati si puteri de a reglementa respectarea de catre operatori a regulilor pietei si a obligatiilor specifice ale acestor servicii.

Competitia prin comparatie(Benchmarking) a fost cu succes implementata in mai multe tari si este utilizata ca un instrument de catre orgamismele de reglementare si control in implementarea masurilor corective, atunci cand este necesar.

Acest organism poate fi numit PSO sau in oricare alt fel. Cel mai important aspect este ca CGMB , care are competenta de a concesiona serviciile si bunurile aferente acestora trebuie sa institutionalizeze acest organism de reglementare si control, ca entitate independenta, separata de PMB, pentru a se asigura ca ambele parti indeplinesc conditiile viitoarelor concesiuni.

Observatia 2.4.4:

Argumentele invocate nu sunt concludente (nu ar fi suficienti operatori!), iar exemplele citate de “ Cumparator Unic” vin din trecut si nu se mai regasesc in legislatia UE. De altfel, in Europa Centrala si de Est toate sistemele de “Cumparator Unic”au sfarsit in esec si litigii.

Cum vor putea fi interesati investitorii privati?

Acest lucru este posibil prin garantarea stabilitatii, prin clienti solvabili la preturile pietei.

Privatizarea ar trebui sa inceapa cu distributia, dupa ce aceasta va fi privatizata pe lantul furnizarii se va putea crea stabilitate si garantie.

Raspuns 2.4.4:

Nu suntem foarte siguri ca am inteles la ce va referiti cand spuneti “Cumparator Unic”. Daca va referiti la dispeceratul tehnico-economic si la stabilirea preturilor binome pe baza costurilor de productie nu este ceva ce vine din trecut si principiul de operare este unul dintre cele mai eficiente pentru sistemele de transport din lume.

Investitorii privati vor fi atrasi numai daca vor vedea o oportunitate de afacere si anume generarea unui profit. Totusi, pentru ca si consumatorii sa beneficieze si in acelasi timp sa poata genera profit, investitorul privat trebuie sa poata obtine reducerile necesare de cost. Este un echilibru greu de stabilit, dar nu imposibil! Apoi interesul investitorilor este atras de continuitatea pietei acestor servicii, cererea mentinandu-se pe termen lung, ceea ce garanteaza recuperarea investitiilor facute.

Privatizarea producerii(construirea unor noi facilitati) este de departea privatizarea cea mai usor de gestionat, considerand experienta obtinuta in alte tari ale UE.

Privatizarea distributiei este mai complexa si necesita o pregatire speciala.

2.5 Irina Duica – SC Electrocentrale Bucuresti SA

Observation 2.5.1:

Privatization of services by concession does not solve the problem of competition. It is not allowed, at least at the level of energy production, do not exist competition. As it is presented in the strategy, there is no place for competition, there will be built new "monopolies".

Answer 2.5.1:

Free competition will not exist in the area of public services. Mainly, due to the fact that the strategies for these services are established by the competent public authorities. Then, these services shall comply with specific obligations as according to legal provisions in Romania the infrastructure for these services is considered public asset and is not subject for selling just for concession. Usually, in this sector is function only the competition for occupying the market and not inside the market. Inside the market, the competition can run only by analysis and comparing of the indicators.

The technical-economical load dispatch must consider periodically agreed production costs (fuel costs), hourly operation costs (other variable costs) and start/stop costs, based on which the cheapest possible production can be obtained and payments performed.

Observation 2.5.2:

Not sure how to give "back-up" for solar resources. There is impossible to be ensured a safety heat supply using sources other than ones based of fossil fuels (natural gas). With a production of 40% in solar systems there is not ensured the safety in the heat supply for the city. Also the strategy does not analyze and presents in details how is to be ensured safety in the heat supply to the city.

Answer 2.5.2:

Solar energy system includes heat storage for back-up on daily/weekly basic.

The heat storage gives the load dispatcher sufficient time for decision taking of what to do if the sun is not shining for a long period:

- If the waste-to-energy facilities generate power this generation can be reduced obtaining additional heat production.
- Decentralised CHP can be started.
- Local peak-load boilers can be started.

Solar heating systems are not considered having any capacity value. Thus, the capacity on other sources is

2.5 Irina Duica – SC Electrocentrale Bucuresti SA

Observatia 2.5.1:

Privatizarea serviciilor prin concesiune nu rezolva problema concurentei. Nu este permis ca, cel putin la nivelul producerii de energie, sa nu existe concurenta. Asa cum este prezentat in strategie, nici nu va fi vorba de concurenta ci de realizarea unor “monopoluri”.

Raspuns 2.5.1:

Competitia libera nu exista in domeniul serviciilor de interes general. In primul rand ca strategiile acestor servicii se stabilesc de catre autoritatile publice competente. Apoi aceste servicii trebuie sa respecte niste obligatii specifice, iar conform prevederilor constitutionale si legale din Romania de regula infrastructura aferenta acestor servicii constituie bun public, care nu se poate vinde ci doar concesiona. De aceea in acest sector functioneaza de regula competitia pentru piata (pentru ocuparea pietei) si nu in cadrul pietei. In cadrul pietei, competitia poate functiona doar prin analiza comparativa de indicatori. Dispeceratul tehnico-economic trebuie sa evalueze periodic costurile de producere (costurile combustibilului), costurile de operare orare(alte costuri variabile) si costurile de pornire/oprire, pe baza carora se poate stabili si obtine cea mai ieftina producere si platile efectuate.

Observatia

Nu rezulta cum se asigura back-up pentru resursele solare. Este imposibil ca siguranta alimentarii cu caldura sa se poata asigura altfel decat din surse ce functioneaza pe baza de combustibili fosili (gaze naturale).Cu 40% din cantitatea produsa in instalatii solare nu exista siguranta in alimentarea cu caldura a orasului. De altfel, strategia nu face analiza si precizarile privind modul de asigurare a sigurantei.

Raspuns 2.5.2:

Sistemele de incalzire solara includ acumularea caldurii realizand o rezerva zilnica sau saptamanala.

Acumularea caldurii acorda dispeceratului suficient timp pentru luarea deciziilor si stabilirea actiunilor ce trebuie indeplinite in cazul in care exista o perioada mai lunga fara soare:

- Daca facilitatile de incinerare genereaza electricitate, aceasta productie poate fi redusa, astfel incat sa se poata obtine un supliment de energie termica.
- Unitatile de cogenerare descentralizate pot porni

designed for the maximal heat load.

- Cazanele pentru acoperirea varfului de consum pot porni.

Sistemele de incalzire solare nu sunt considerate a avea valoare pentru capacitatea instalata. In acest sens, capacitatea celorlalte surse este proiectata pentru acoperirea incarcarii maxime.

Observation 2.5.3:

There is clear that classical sources will not use technology from the year 1960 nor in the present neither in 2020. Today in Bucharest in West CET, can be produced 190 Gcal / h in a mixed group, using the latest technology. In South CET, in 2010, will start the construction of a group that will produce 100 Gcal /h.

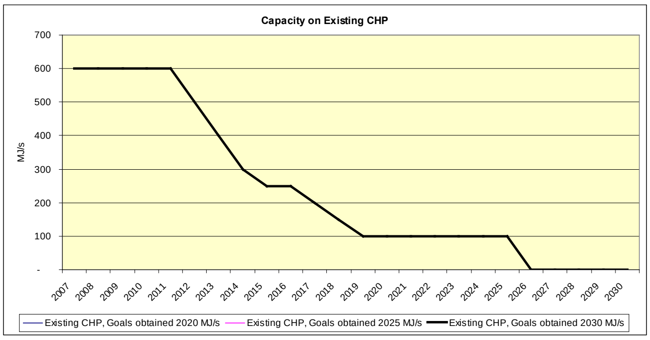
Observatia 2.5.3:

Sursele clasice, nici in prezent si cu atat mai mult la nivelul anului 2020, nu vor mai folosi tehnologia de la nivelul anului 1960. In prezent in Bucuresti, in CET Vest, se pot produce 190 Gcal/h dintr-un grup in centru mixt de ultima tehnologie iar in CET Sud va incepe in 2010 construirea unui grup care va produce 100 Gcal/h

Answer 2.5.3:

Information about the new facilities at CET SUD is new for us.

The facility on CET Vest is included in our forecast for existing CHP units and as you'll see on the curve below the unit is assumed in operation until 2027 at what time decision regarding rehabilitation or decommissioning must be taken.

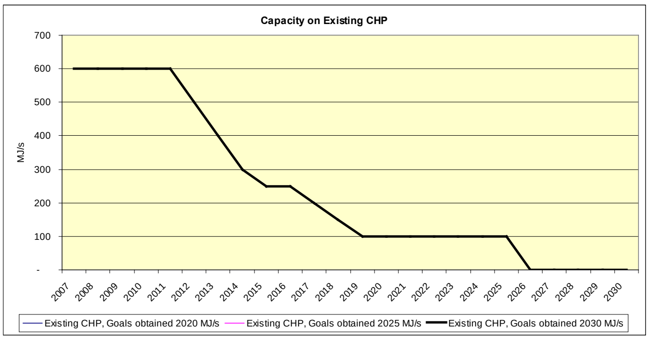


A part of the facility is considered decentralised CHP as the production is used in the area around CET VEST.

Raspuns 2.5.3:

Informatiile despre noile facilitati la CET SUD nu au fost cunoscute pana acum de catre noi.

Facilitatile de la CET VEST sunt incluse in prognoza noastra pentru unitatile de cogenerare existente si precum se observa in graficul de mai jos, s-a considerat ca unitatea va functiona pana in 2027 moment in care trebuie luata o decizie referitor la reabilitare sau dezafectare.



O parte a facilitatii este considerata a fi in categoria unitati de cogenerare descentralizate, intrucat productia este utilizata pentru furnizarea in zona CET VEST

Observation 2.5.4:

Before putting into operation of the other sources, also very expensive (solar, waste, etc.), it seems that the investments done in these classical sources shall be already amortized (credits reimbursed), which lead to the price to lower than the price mentioned in the strategy (72.7 Euro / Gcal).

Observatia 2.5.4:

Pana la punerea in functiune a altor surse, de altfel foarte scumpe (solare, deseuri, etc), aceste investitii in sursele clasice vor fi probabil deja amortizate (creditele returnate), ceea ce face ca pretul sa fie sub cel mentionat in strategie (72,7 Euro/Gcal).

Answer 2.5.4:

We have assumed, in-line with practise found in the best operated energy companies like e-on, Suez or Vattenfall, that after credit reimbursement the tariff is maintained enable increasing own financing.

Lowering the tariff will lead to dependency of external

Raspuns 2.5.4:

Am considerat, in conformitate cu practica regasita in companiile care opereaza cel mai bine in domeniul energiei ca E-ON, Suez sau Vattenfall, ca dupa returnarea creditelor tariful este mentinut permitand cresterea capacitatii proprii de finantare.

financing and thus limit the investment possibilities.

There is obviously, the reducing of the tariffs will happened only in the condition of competition with solar energy and waste-to-energy facilities.

Scaderea tarifului va conduce la dependenta de finantarea externa, limitand astfel posibilitatile de finantare.

Este evident ca tarifele nu se vor reduce decat daca se va intra in competitie cu energie solara si facilicitatile de incinerare.

2.6 Dna Marinela Ivan

Observation 2.6.1:

As I have mentioned during the meeting, my main comments are related to the compliance with the provision of Terms of References, chapter B.) Final Report (3) as follows:

a. Shall be elaborated a realist forecast regarding energy consumption (Ms.Ivan's note: there shall cover all type of municipal services: public transport, lighting, heating, etc)
b. Shall determine the real situation of the technologies inside the municipal services (Ms.Ivan's note: public transport, lighting, heating, etc)
c. Shall highlight an unitary and coherent plan for the reduction of energy consumption (Ms.Ivan's note: public transport, lighting, heating, etc)
d. Shall underline the decisions of City Council regarding investments for development and increasing the efficiency of the energetic services.
e. Shall highlight the optimal sequences of actions: depending on priorities, capacity of financing and economical effects (Ms.Ivan's note: I'm sorry, but I didn't remark verry clear in the submitted report/documentation this prioritization and I consider this one being very necessary!).
f. Shall contribute to the improvement of local mentality regarding efficient utilization of the energy". (Ms.Ivan's note:I didn't remark in th Final report relevant conclusion/proposal in relation with this requirement from ToR)

Answer 2.6.1:

General: The area of public transport and public light will be addressed in the final version (we are working on it now).

a. The forecast for heat demand is based on about 45% energy conservation fully in-line with the National Energy Strategy and EU-directives/policies (From currently about 180 kW/m^2/y to about 100 kW/m^2/y). We consider this realistic in light of energy conservation obtained in other EU countries.

   The forecast for heat demand further consider connection of current individual heating to the district heating system. After 2020 about 90-95% of the heat demand is covered by district heating. We consider this realistic in light of the development

2.6 Dna Marinela Ivan

Observatia 2.6.1:

Cum am mentionat in timpul intalnirii voi face comentariile in primul rand, in raport cu *"Termenii de Referinta (ToR) cap. B.). Raportul (3) final",* dupa cum urmeaza:

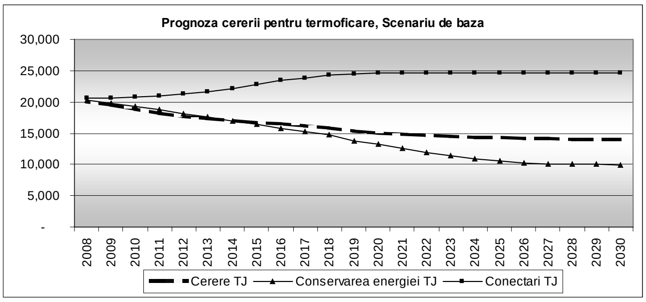
a. *va elabora o prognoza realista privind evoiutia consumurilor de energie;* (Nota Ivan Marinela/IM: trebuie sa acopere toata paleta serviciilor muncipale: transport public, iluminat, incalzire, etc)
b. va determina situatia reala a tehnologiilor din cadrui serviciilor municipale : (IM: transport public, iluminat, incalzire, etc)
c. va evidentia un plan unitar si coerent de masuri de reducere a consumurilor de energie; (IM: transport public, iluminat, incalzire, etc)
d. va fundamenta deciziiie Consiliului general privind investitiile pentru dezvoltarea si eficientizarea serviciilor energetice;
e. va evidentia esalonarea optima a actiunilor: in functie de prioritati, de capacitatea de finantare si de efectele economice; (Nota IM: imi pare rau dar, nu am remarcat in raportul/documentul prezentat aceasta prioritizare foarte clar solicitat si care se impune !)
f. *va contribui la imbunatatirea mentalitatii locale privind utilizarea eficienta a energiei".* (Nota IM: nu am remarcat semnificative concluzii/propuneri in legatura cu aceasta solicitare din ToR pentru Raportul final).

Raspuns 2.6.1:

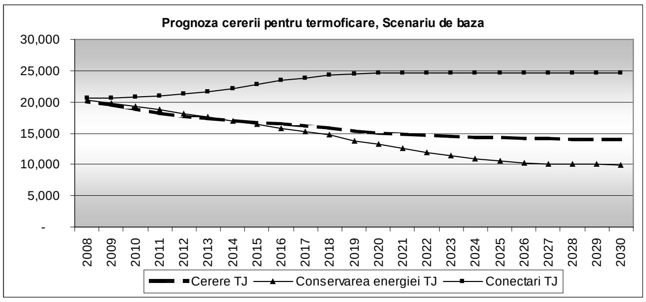
In general: Domeniul transportului public si cel al iluminatului public vor fi incluse in varianta finala (acestea sunt in lucru in acest moment).

a. Prognoza cererii de energie termica se bazeaza pe aproximativ 45% conservarea energiei, fiind in deplina conformitate cu Strategia Energetica Nationala si Politicile si Directivele UE (de la consumul de energie prezent de 180 kW/m^2/an la aproximativ 100 kW/m^2/an). Am considerat acest aspect realistic avand in vedere conservarea energiei obtinuta in alte tari ale UE. Prognoza cererii de energie termica a luat de asemenea in considerare conectari la sistemul de termoficare ale consumatorilor care in prezent au instalate seen in other EU countries where this value is already obtained in many large cities.

surse individuale de producere. Dupa anul 2020 circa 90-95% din cererea de caldura va fi acoperita din sistemul de incalzire centralizata. Am considerat-o si pe aceasta realista in lumina evolutiei vazuta in alte tari ale UE, de altfel acete valori sunt deja obtinute in multe orase mari.



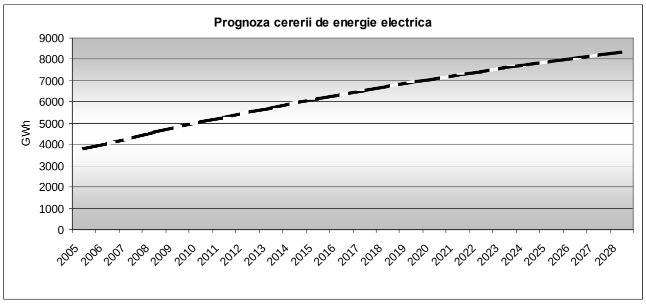
(Figure from Part C Demand Forecast)



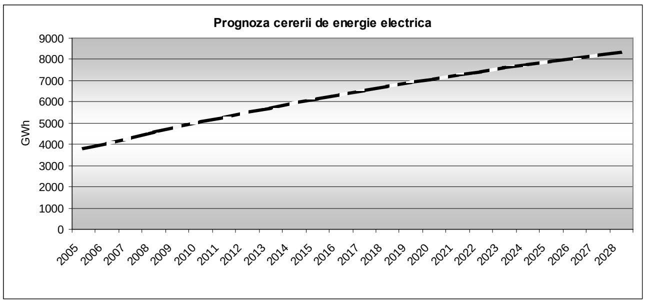
(Grafic inclus in Partea C Prognoza Cererii)

The forecast for electricity demand in Bucharest is submitted to us by SC Electrocentrale Bucuresti SA. It shows that the demand will be about double of today's in about 15 years. We assume this forecast is elaborated in compliance with the goals of the National Energy Strategy. However, as the electricity demand is not the responsibility of Bucharest Municipality we have not analysed this further.

Prognoza pentru cererea de electricitate in Bucuresti a fost transmisa catre noi de catre SC Electrocentrale Bucuresti SA. Din aceasta rezulta ca in urmatorii 15 ani cererea de energie electrica se va dubla. Am considerat ca aceasta prognoza este elaborata in conformitate cu obiectivele din Strategia Energetica Nationala. Avand in vedere faptul ca asigurarea cererii de electricitate nu este responsabilitatea Primariei Municipiului Bucuresti nu am analizat mai mult acest aspect.



(Figure from Part C Demand Forecast)



(Grafic din Partea C Prognoza Cererii)

b. Yes

c. Yes

d. It is difficult to see that investments have been driven by goals of energy efficiency. Most of the investments have been used for replacement of worn-out components and make-up for lack of maintenance. The concept of district heating today is as it was designed in the 1950 - 1960'ties and the system is operated with the same concept as established when the system was commissioned.

   Of course changing 25-year old pumps, heat exchangers and other vital components lead to improved efficiency due to the technical development of the components. However, improved efficiency by utilising the facilities of the modern control systems is not seen in the EIB project – hopefully it is seen in the EBRD project, but we drought.

e. The priority of the proposed actions should be visible from the time frame included in Part B.

b. Da

c. Da

d. Este greu de vazut ca investitiile derulate pana acum au fost ca si obiectiv eficienta energetica. In cea mai mare parte investitiile au avut ca si obiectiv inlocuirea componentelor uzate moral si reparatii ca urmare a lipsei de intretinere. Conceptul actual al sistemului de termoficare este acelasi cu cel pe baza caruia s-a facut proiectarea in anii 1950-1960, iar exploatarea acestuia se face dupa acelasi concept ca cel folosit la punerea in functiune a sistemului.

   Desigur inlocuirea pompelor vechi de 25 de ani, a schimbatoarelor de caldura si a altor componente vitale conduce la imbunatatirea eficientei, ca urmare a dezvoltarii tehnologice a acestor componente. Totusi, imbunatatirea eficientei prin utilizarea facilitatilor oferite de sistemele de automatizare nu au fost vizibile ca urmare a implementarii proiectului finantat de BEI – speram

However, we will highlight the priorities more clearly in the final report.

f. Our technical proposal includes a 3months period for public information after approval of the Strategy Report. We intent to implement these services as promised.

ca vor fi vizibile in proiectul BERD, dar avem dubii in acest sens.

e. Prioritatile pentru actiunile propusear fi trebuit sa fie vizibile in graficele de realizare a actiunilor incluse in Partea B. In consecinta, vom evidentia prioritatile mult mai clar in raportul final.

f. Propunerea noastra tehnica include o perioada de informare publica de 3 luni dupa aprobarea Raportului Final. Noi intentionam sa implementam aceste servicii asa cum au fost promise.

Observation 2.6.2:

I support in explicit manner to keep the already made investments for the rehabilitation and modernization of district heating in Bucharest financed by EIB and EBRD. All investments in relation with increasing the efficiency shall be integrated with responsibility into new proposed technical solutions. Spending of 105 millions Euro for rehabilitation and modernization of district heating imply also responsibility. Denying the necessity and opportunity of these expenditures made means also responsibility to be taken. Therefore, I fully support to be continued the current investments and all those before done, in line with increasing of the efficiency of the system and I am against total reconstruction of the system *(the wheel is not supposed to be invented all the time when a new report is issued).*

Observatia

Sustin in mod explicit mentinerea a ceea ce s-a investit prin programele de finantare derulate (BEI; BERD) pentru modernizarea sistemului de incalzire urban al Bucuresti-ului. Tot ceea ce este investit si realizat in sensul eficientizarii sistemului trebuie integrat in mod responsabil in solutiile noi propuse. Utilizare a cca 105 Mio Euro pentru reabilitarea si modernizarea sistemului de incalzire a insemnat si inseamna resposabilitate. Negarea utilitatii si oportunitatii acestor sume investite deja inseamna tot responsabilitate care trebuie asumata. Prin urmare, sustin continuarea si integrarea a tot ceea ce deja s-a investit material si uman prin programele mentionate si solutii pe linia eficientizarii sistemului si nu a reconstructiei totale. (*roata nu se inventeaza in fiecare an si cu fiecare raport care se elaboreaza*).

Answer 2.6.2:

As previously explained it is the finding of the Consultant that the investments more have been used for replacing worn-out equipment than to obtain improved efficiency.

A continuation of the investments should to the opinion of the Consultant depend on an independent evaluation of what is obtained until now in terms of improved efficiencies. We consider that cannot be accepted that the investment is used for replacing worn-out equipment, in case of lack of efficiency.

Raspuns 2.6.2:

Asa cum s-a explicat anterior este descoperirea Consultantului faptul ca au fost facute investitii mai mult pentru inlocuirea echipamentelor uzate decat pentru a se imbunatati eficienta.

In opinia Consultantului, continuarea investitiilor ar trebui sa depinda de concluziile unei evaluari independente, asupra rezultatul obtinut pana acum in ceea ce priveste imbunatatirea eficientei. Nu trebuie acceptat ca investitiile sunt folosite pentru inlocuirea echipamentelor uzate, daca acestea sunt ineficiente.

Observation 2.6.3:

I think that the report shall include in a dedicate chapter named “Action Plan for short and long terms” as it is requested in ToR for the Final report (3). My opinion is that by the introduction of those aspects in each subchapter, these lead to the dilution of one of the most important instrument which Municipality shall use in the implementation action.

Observatia

Cred ca Raportul ar trebui sa contina in mod explicit un capitol numit "*Planul de Actiuni pe termen scurt si mediu "* asa cum este cerut in ToR pentru Raportul (3) final. Dupa parerea mea prin includerea acestor aspecte in fiecare subcapitol al raportului, se dilueaza unul dintre cele mai importante instrumente pe care muncipalitatea ar trebui sa le utilizeze in actiunea de implementare.

Answer 2.6.3:

We understand your concern and will highlight the priorities and the related actions in the final version of the Strategy Report.

Raspuns 2.6.3:

Am inteles ingrijorarea dumneavoastra si vom sublinia prioritatile si actiunile corespunzatoare in varianta final a Raportului.

Observation 2.6.4:

RADET – as urban public service company could be considered as a municipal company, to be prepared for the future PPP or to inter into restructuring process so far his activities to become efficient from economical and quality of services !?

The current experiences show that the only the privatization cannot be considered all the time as "a magic wand" able to solve all aspect inside the company. The solution shall be adapted, interpreted and applied in an intelligent manner to the context, based on very clear projections in future considering economical, social, investment and environmental protection aspects and results that could be achieved.

Answer 2.6.4:

Our proposal for privatisation of production and distribution (not transmission) is fully in-line with the National Energy Strategy and the EU Service Directive and based on the findings that the Management of RADET is not ready to implement modern high efficient solution but keep talking about fixed flow, by-pass in the thermal substations and bigger pipes.

Observatia 2.6.4:

RADET - ca, companie de servicii publice incalziri urbana poate fi conceputa si ca o companie municipala care sa intre intr-un PPP sau intr-un proces de restructurare astfel incat activitatea sa sa devina performanta economic si al calitatii serviciilor oferite¨!? Experiente aflate in derulare arata ca privatizarea exclusiva nu este intotdeauna o *bagheta magica* care rezolva toate aspectele unei si intr-o companie. Solutiile trebuie adaptate, interpretate si aplicate inteligent in context, pe baza unor foarte clare proiectii in viitor din punct de vedere economic, social, investitional, al protectiei mediului si al rezultatelor ce pot fi obtinute.

Raspuns 2.6.4:

Propunerea noastra de privatizare a producerii si distributiei (nu si a sistemului de transport) este in deplina concordanta cu Strategia Energetica Nationala si Directiva Europeana a Serviciilor bazandu-se si pe descoperirea ca managementul RADET nu este pregatit sa implementeze solutii moderne cu eficienta ridicata, continuand sa discute despre conceptul de operare cu debit fix, by-pass intre tur si retur in PT si tevi cu dimensiuni mari.

2.7 Prof.dr.ing.Nicolae Golovanov

Observation 2.7.1:

The strategy is referring to an interval until 2020, the objectives proposed for the strategy are very ambitious and there is hard to imagine that those will be implemented, in the conditions of missing of major investments and I am fully convinced , that those investment for beyond the possibilities of Municipality.

Answer 2.7.1:

An analysis of the impact of delay in implementation of the proposed measures is prepared and attached. Delaying the implementation will cost about 2,000 MEUR for every 5 year.

Observation 2.7.2:

The strategy is considering the thermal rehabilitation of all old blocks of apartments from Bucharest. There is very few possible to be fully accomplished before 2020.

Answer 2.7.2:

Introduction of energy and environmental taxes from 2011 and removal of the general subsidises from 2012 combined with a support scheme for thermal rehabilitation introduced at the same time will to our

2.7 Prof.dr.ing.Nicolae Golovanov

Observatia

Strategia se refera practic la intervalul pana in anul 2020, iar obiectivele propuse in cadrul strategiei sunt foarte ambitioase si greu de imaginat ca vor putea fi puse in aplicare, in lipsa unor investitii masive care, sunt convins, depasesc cu mult posibilitatile Primariei Municipiului Bucuresti.

Raspuns 2.7.1:

A fost intocmita o analiza a impactului generat de intarzierea in implementarea masurilor propuse care este atasat. Intarzierea in implementare va costa aproximativ 2,000 MEuro la fiecare 5 ani.

Observatia 2.7.2:

Strategia ia in considerare reabilitarea termica a tuturor blocurilor vechi din Municipiul Bucuresti, ceea ce este putin probabil sa se realizeze integral pana in anul 2020.

Raspuns 2.7.2:

Introducerea taxelor pe energie si de mediu incepand cu anul 2011 precum si eliminarea subventiilor generale din 2012 combinate cu o schema de suport pentru reabilitarea termica a cladirilor introdusa in opinion motivate the population have the works performed.

However, we agree that this is an ambitious goal of the National Energy Strategy.

acelasi timp, in opinia noastra, va motiva populatia sa doreasca executarea lucrarilor.

In orice caz, suntem de acord ca acesta este un obiectiv ambitios al Strategiei Energetice Nationale.

Observation 2.7.3:

There is considered that 40 % from the heat demand will be covered by solar energy. Reaching this objective is requesting huge investments, large studies regarding layout of solar panels on the surface of actual blocks and complete replacing of the heat distribution inside blocks. I consider that this is an objective hard to be accomplished.

Observatia 2.7.3:

Se considerara ca necesarul de caldura va fi acoperit in proportie de 40% din energia solara. Realizarea acestui obiectiv necesita investitii imense, ample studii privind amplasarea panourilor termice pe suprafata cladirilor actuale si modificarea intregii structuri de incalzire a blocurilor. Apreciez ca este un obiectiv greu de realizat

Answer 2.7.3:

Standard solutions are available and a large number of private companies perform the necessary design work and installation. Some companies are already established in Romania and we feel confident that many more will come when the support scheme for solar energy is approved.

Raspuns 2.7.3:

Sunt disponibile solutii standard si un numar mare de companii private care pot realiza servicii specializate de proiectare si lucrari de executie. O parte din aceste firme au deschis sedii in Romania si sunt siguri vor aparea si mai multe de indata ce va fi aprobata schema de sprijin financiar pentru energia solara.

Observation 2.7.4:

The mandatory connection of all buildings to the moderns district heating system requests first of all the initiation of adequate legal framework which is not yet done. Neither a legal framework is in force for imposing for new building erected to consider the concept of modern system for heat supply.

Observatia 2.7.4:

Obligativitatea conectarii tuturor cladirilor la sistemul modern de incalzire necesita, mai intai initierea unui cadrul legislativ adecvat, care inca nu este elaborat. Nu exista cadru legislativ ca cel putin noile cladiri sa fie realizate astfel incat sa corespunda unui sistem modern

Answer 2.7.4:

Several EU-directives implemented in the Romania legislation legalise mandatory connection.

An example is the so-called CHP directive on utilisation of a heat demand for cogeneration. According to this directive the member states shall introduce measures to ensure heat supply from CHP or renewable sources in these areas.

There are different legal provisions in Romania stimulating the connection to district heating in specific defined areas. The National Governmental Program for support of district heating for public District heating 2009-2016 heat and comfort, approved by Government Decision 462/2006, establish as an eligibility criteria for financing of the rehabilitation projects, the selection of the heating unitary areas(inside municipality) where will be promoted only one heating solution, respectively district heating.

Furthermore, according to the provision of Law 325/2006 (the law of public service for heating supply), at articles 8 and 9 is specified the obligation of public authorities to establish the heating unitary areas being subject for approval by the city council based on feasibility studies.

Raspuns 2.7.4:

Mai multe Directive Europene implementate si in legislatia din Romania legalizeaza conectarea obligatorie la sistemul de incalzire centralizata.

Un exemplu este asa numita Directiva a cogenerarii care se bazeaza pe cererea utilă de căldură. In conformitate cu aceasta directiva, statele membre trebuie sa introduca masuri care sa asigure furnizarea energiei termice rezultate din cogenerare catre populaţia racordate la sistemele centralizate sau din surse de energie regenerabila in aceste zone.

Exista prevederi legale in Romania prin care este stimulata stabilirea unor zone unitare de incalzire si conectarea acestora la sistemul de incalzire centralizate. In acest sens, programul guvernamental de sustinere financiara a sistemului de incalzire centralizat Termoficare 2006-2015 – caldura si confort aprobat prin HG 462/2006, include ca si conditie de eligibilitate pentru finantare a proiectelor obligativitate stabilirii zonelor unitare de încălzire, reprezentând arealul geografic (zona unei localităţi) aparţinând unei unităţi administrativ teritoriale în interiorul căreia se poate promova o singură soluţie de încălzire, respectiv soluţia adoptată pentru reabilitarea şi eficientizarea

SACET

Mai mult, in conformitate cu Legea 325/2006 (Legea serviciului public de alimentare cu energie termica), la articolele 8 si 9 se vorbeste de obligativitatea autoritatilor de stabilire a zonelor unitare de incalzire, pe care consiliile locale trebuie sa le aprobe in baza unor studii de fezabilitate.

Observation 2.7.5:

Covering 20% of the heat demand from waste to energy facilities requests a detailed analysis of the structure of the waste. The before done analysis highlighted that the waste produced in Bucharest has different characteristics than other cities in Western Europe.

Observatia 2.7.5:

Asigurarea necesarului de energie primara, in proportie de 20% din deseuri, necesita o analiza de detaliu a caracteristicilor acestor deseuri. Analizele facute au aratat ca deseurile din Municipiul Bucuresti au caracteristice energetice diferite de cele ale reziduurilor din orasele din vestul Europei.

Answer 2.7.5:

A sorting of the waste is necessary if efficient incineration shall be obtained. Sorting of plastic bottles and paper in Bucharest is started last year and more will be introduced continuously. Thus, in a longer perspective we believe that the waste composition for incineration will be the same in Bucharest as in other large cities in Europe.

Raspuns 2.7.5:

Pentru o eficienta ridicata a incinerarii este necesara sortarea deseurilor. Sortarea sticlelor din plastic si a hartiei a inceput in Bucuresti in ultimii ani si mai mult acest lucru va continua. Astfel, intr-o perspectiva mai lunga, consideram ca in Bucuresti, compozitia deseurilor va fi aceeasi ca si in alte orase mari din Europa.

Observation 2.7.6:

Installation of capacities based on bio fuels covering 20% from heat demand has few chances to be realized due to the fact that the land properties surrounded Bucharest have high value, there is possible to be more efficient to use its for other purposes.

Observatia 2.7.6:

Realizarea unei ponderi de 20% a energiei pe seama biocombustibililor este putin probabila avand in vedere proprietatile superioare ale terenurilor din jurul municipiului Bucuresti, utilizabile mai eficient pentru alte scopuri

Answer 2.7.6:

Romania is today exporter of biomass for bio fuel production and the first domestic processing plant is in operation. The market for bio fuel will be driven by increasing prices in natural gas and oil and by introduction of energy and environmental taxes.

During the period where the oil price reached 140 USD/barrel in 2007/2008 is was feasible to import bio fuel from Brazil to mix in gasoline and diesel oil.

Raspuns 2.7.6:

In prezent, Romania este exportator de biomasa pentru producerea biocombustibilului chiar prima fabrica de procesare este in functiune. Piata pentru biocombustibil va fi dirijata de cresterea pretului la gaze naturale si petrol precum si de introducerea taxelor pe energie si de mediu.

In perioada 2007/2008, in care pretul petrolului a atins 140 USD/baril era fezabil importul de biocombustibil din Brazilia pentru amestec cu benzina si motorina.

Observation 2.7.7:

I consider that in the strategy before 2020, shall be better to exploit the existing heat production units (CET) in the condition of heat demand (disconnection from the power dispatch of the units which are directly used for heat supply in Bucharest).

Observatia 2.7.7:

Apreciez ca in strategia pana in anul 2020 este necesar sa fie mai bine folosite sursele actuale de caldura(CET), prin realizarea, a unor regimuri conduse de necesarul de energie termica (exceptarea de la dispecerizare a grupurilor care furnizeaza energie termica pentru incalzirea municipiului)

Answer 2.7.7:

Most of the existing units has passed their useful lifetime and must be rehabilitated it the operation shall

Raspuns 2.7.7:

Cele mai multe dintre unitatile existente si-au depasit durata normata de viata si ar trebui reabilitate daca se continue after 2015-2020.

From 2015 the units will have to comply with EU directive regarding emissions from large combustion plants if they shall stay in operation.

CHP is in the EU legislation defined as units with a power/heat ration of 0.85 or above (for each MJ/sec heat 0.84 MW is generated). Perhaps the new unit a CET Sud comply with this but that will be the only one.

The impact of not replacing existing worn-out unit with facilities with low production costs (waste-to-energy and solar energy) is about 2 billion EUR per 5 year.

doreste continuarea functionarii dupa 2015-2020.

Din 2015, pentru a putea functiona, unitatile trebuie sa se conformeze cu Directivele Europene privind emisiile Instalatiilor Mari de Ardere.

Cogenerarea in legislatia UE este definita ca fiind produsa de unitati cu un raport electricitate/caldura de 0.85 sau superior(pentru fiecare MJ/s cadura sunt generati 0.84 MW electricitate. Este posibil ca noua unitate care se va construi la CET SUD se va conforma cu aceste cerinte, dar va fi doar o singura unitate.

Impactul neinlocuirii unitatilor uzate cu facilitati cu costuri de producere scazute(facilitati de incinerare si energie solara) este de aproximativ 2 miliarde Euro pe 5 ani.

Observation 2.7.8:

I consider that the proposed organization for the heat supply in Bucharest formed by a monopole (transmission system) and privatized part (distribution system) could have benefit effects for the energy in Bucharest. There is urgent mandatory to initiate an adequate legal framework.

Observatia 2.7.8:

Consider ca organizarea sistemului de incalzire a municipiului in partea de transport (monopol) si partea de distributie (privatizata) poate avea efecte benefice pentru energetica municipiului. Este necesara intierea de urgenta a cadrului legislativ adecvat.

Answer 2.7.8:

Today the legal framework for organization of concession process is in force. The Government Ordinances 34/2006 and 54/2006 with later changes and modifications and guidelines for concession procedure approved by Government Decision no 717/2008 contain the main legal provisions to do this. Furthermore, from 2010, Bolkenstein Directive will stimulate the process for the opening of the market and privatisation(in the concessions way).

Raspuns 2.7.8:

In prezent exista cadrul legal pentru stabilirea concesiunilor. OUG 34/2006, OUG 54/2006 cu modificarile si completarile ulterioare si normele metodologice de aplicare aprobate prin HG 717/2008 contin prevederile legale principale pentru acestea. De asemenea, aplicarea Directivei Bolkenstein incepand din 2010 va dinamiza procesul de deschidere a pietei si privatizare (in sensul de concesionare).

Observation 2.7.9:

Initiation of the legal framework for the introduction of pooled tariff is correct and logical. Taking into consideration that the distribution system will be privatized, the structure of the tariff shall be analyzed based on strategy proposed by the private operators.

Observatia 2.7.9:

Initierea legislatiei pentru plata energiei termice pe baza tarifului binar este corecta si logica. Avand in vedere faptul ca partea de distributie urmeaza a fi privatizata, modul de plata a energiei termice poate fi analizat in functie de strategia operatorilor privati.

Answer 2.7.9:

No answer considered necessary. We agree.

Raspuns 2.7.9:

Nu consideram necesar un raspuns. Suntem de acord cu observatia.

Observation 2.7.10:

Considering that in Romania, the power production is based on renewable sources (hydro, nuclear, wind)there is necessary to be analyzed the introduction of electrical heating, used during night time, being a solution used these days and this one could be efficient also for the heating system in Bucharest and also for the electro-energetic system

Observatia 2.7.10

Avand in vedere faptul ca, in Romania, energia electrica este obtinuta in mare masura din surse nepoluante (hidro, nuclear, instalatii eoliene), este necesar a fi analizata utilizarea solutiilor electrice, utilizabile pe durata noptii este o solutie care este practicata si poate fi eficienta atat pentru sistemul local de incalzire, dar si pentru sistemul electroenergetic.

Answer 2.7.10:

Several coal fired power plants are currently in the process of rehabilitation. We assume that these plants will be used when rehabilitated.

Thus, the marginal production of electricity in the heating season will be coal fired plants.

Accumulating heat from electricity in the night time is seen in countries with the same production patters as in Romania, for example in Sweden. However, such heating is not competing with district heating but used in small towns and country side building.

Surplus electricity in the night time could more feasible, like in some hydro-power countries, be used for pumping water to water storages for peak load power generation.

Raspuns 2.7.10:

Mai multe centrale pe carbune sunt in prezent in proces de reabilitare. Consideram ca aceste instalatii vor fi utilizate dupa ce vor fi reabilitate.

Astfel, productia marginala de electricitate in sezonul de incalzire se va baza pe centrale pe carbune.

Acumularea caldurii ca urmare a producerii de electricitate este o model obisnuit in tari care utilizeaza aceleasi modele de producere ca si Romania, de exemplu Suedia. Totusi, caldura produsa in acest fel nu se afla in competitie cu sistemul de incalzire centralizat dar este utilizata in orase mici si cladiri din zona rurala.

Surplusul de electricitate in perioada noptii ar putea fi mai fezabil daca ar fi utilizat, ca de exemplu in anumite tari cu potential hidro ridicat, pentru pomparea apei in lacurile de acumulare pentru generarea electricitatii in perioadele de varf.

Observation 2.7.12:

The strategy for the reduction of the energy consumption in transport system brings few concrete aspects, that impose in the future, to be developed a specific strategy for redefinition of the public transport system (by increasing the share of electrical public transport) with establishment of special routes also a private transport by encouraging the public transport but also by elaboration of an efficient transport scheme in Bucharest

Observatia 2.7.12:

Strategia pentru reducerea consumurilor de energie in sistemul de transport aduce putine aspecte concrete, ceea ce impune ca necesara dezvoltarea unei strategii specifice pentru redefinirea atat a sistemului public de transport (prin cresterea ponderii transportului electric) cu asigurarea unor trasee speciale, precum si a transportului privat atat prin incurajarea utilizarii transportului public, dar si prin elaborarea unei scheme eficiente de transport in municipiu.

Answer 2.7.12:

Your observation regarding improved/increased public transport is fully in-line with our proposals. The question is if there is the necessary political will to introduce congestion charges or road pricing and parking payment to provide the necessary funds for developing the public transport.

Raspuns 2.7.12:

Observatiile dumneavoastra referitor la imbunatatirea/cresterea transportului in comun este in totalitate in linie cu propunerile noastre. Intrebarea este daca exista vointa politica necesara pentru a se introduce taxa de aglomerare sau taxa de drum si plata parcarii pentru genera fondurile necesare pentru dezvoltarea transportului in comun.

Observation 2.7.13:

In order to reach the goals of the strategy is necessary to be elaborate a clear schedule regarding action to be taken in for new legislation initiatives, elaboration of these new laws necessary for implementation of the objectives. Each of necessary law shall be supported by related investments, in this way being highlighted the practical way for the implementation. Mainly the elaboration of the necessary legislation is subject for practical implementation of the objectives of the strategy.

Observatia 2.7.13:

Pentru realizarea obiectivelor strategiei apare necesara elaborarea unui program clar privind legislatia care trebuie sa fie initiata si elaborata pentru punerea in aplicare a obiectivelor acesteia. Fiecare dintre legile necesare trebuie insotite de efortul financiar necesar fiind puse in evidenta astfel posibilitatile practice de realizare. De fapt elaborarea legislatiei necesare conditioneaza posibilitatea practica de abordare a obiectivelor strategice.

Answer 2.7.13:

We find that the necessary legislation is in place for obtaining the goals of the strategy. There is necessary to be made a series of harmonisation and filling in for

Raspuns 2,7.13:

Noi consideram ca pentru atingerea obiectivelor generale din strategie legislatia necesara este in vigoare. Este adevarat ca mai sunt necesare unele the secondary legislation for public services and renewable sources(specially between district heating legislation, waste management and support scheme for the promotion of the renewable resources). All these action to be taken by Municipality will be include the Action plan in Final Strategy Report.

armonizari si completari ale legislatiei secundare a utilitatilor publice si ale resurselor regenerabile (in special intre legislatia incalzirii centralizate, a deseurilor si cea a sustinerii energiilor regenerabile, inclusiv cu privire la schemele de sprijin aferente).

Toate aceste actiuni se vor mentiona in Planul de actiuni din varianta finala a Strategiei.

Conclusion from Prof.dr.ing.Nicolae Golovanov:

The proposed objectives of the strategy are ambitious and in line with EU environmental requirements. The magnitude of the necessary investment leads to the impossibility or very few chances for the implementation of these objectives until 2020. I consider that the proposed strategy to could be less ambitious, but inside the forecasted limits of the funds which Municipality is able to attract its.

Concluzii din partea Prof.dr.ing.Nicolae Golovanov:

Obiectivele strategiei propuse sunt ambitioase si in concordanta cu cerintele de mediu ale UE. Amploarea investitiilor necesare face ca realizarea practica a acestor obiective, pana in 2020, sa fie putin probabila. Apreciez ca strategia propusa ar putea fi mai putin ambitioasa, dar in limitele previzibile ale fondurilor pe care Municipiul Bucuresti ar putea sa le atraga pentru realizarea obiectivelor acesteia.

2.8 City Councellor Dragos Florescu

2.8 Consilier General Dragos Florescu

Observation 2.8.1:

I will be very briefly and trenchant. I don’t believe in the privatization of RADET because I have a recent example Apa Nova. We have given under concession the services to Apa Nova and what we get ? We get a huge increasing of the tariff and maintained the same quality. I believe in the restructuring of RADET, in his transformation into a commercial company, outsourcing some services, but RADET shall be kept as a state company. Why RADET is today in this situation? For sure not due to the bad management or tariffs, but due to the many investments done, being not cover by the tariff.

My opinion is that RADET shall be a public company, a company held by the Municipality. There is to be decided if the Municipality will handover the production units or not. About my opinion these one shall be continuously held by Ministry of Economy, which is more powerful and viable. But to introduce a private company which will increase the tariff based on his wish, I fully disagree. Clearly, me as a member of City Council I disagree with this formula. I am interested in opinion of the general manger of RADET, and I cannot understand why RADET as a state company cannot be restructured and streamlined? Because RADET has 6000 employees, which have nothing to do there, I propose to outsourcing a art of services.

Observatia 2.8.1:

O sa fiu foarte scurt si transant. Nu cred in privatizarea RADET-ului pentru ca am un exemplu foarte apropiat Apa Nova. Am concesionat serviciile Apei Nova si ce am realizat? Am realizat o crestere de tarife enorma si calitate aceeasi. Cred intr-o restructurare a RADET, in transformarea lui intr-o societate comerciala, externalizarea unor servicii, dar RADET sa ramana o societate de stat. De ce pentru ca RADET a ajuns aici nu din cauza managementului, nu din cauza tarifelor ci din cauza investitiilor care s-au facut(si s-au facut destule si care nu au fost acoperite de tarif.

Parerea mea este ca RADET trebuie sa fie o societate publica, o societate a Primariei. Trebuie gandit clar daca luam si producatorul sau nu. Dupa parerea mea nu cred ca este bine pentru ca acolo trebuie foarte multi bani pentru investitii si l-as lasa in continuare pe producator la Ministerul Economiei, care are totusi alta forta si alta viabilitate. Dar sa fac o societate privata care sa mareasca tariful dupa cum vrea el nu sunt de acord. Clar in calitate de consilier general nu agreez aceasta formula. M-ar interesa si punctul de vedere al directorului general al RADET si nu stiu de ce RADET ca societate de stat de ce nu poate fi restructurat, de ce nu poate fi eficientizat? Pentru ca are 6000 de oameni care nu prea au ce face acolo, as externaliza o parte din servicii

Answer 2.8.1:

The strategy we have prepared is founded on EU-directive and policies, National Legislation and International Conventions.

Hence, it is not a matter if the Consultant agrees or

Raspuns 2.8.1:

Strategia care a fost intocmita are la baza Directivele si Politicile Europene, Legislatia Internationala si Conventiile internationale la care Romania este parte.

Din acest motiv, nu se pune problema daca disagree with Consilier General Mr. Dragos Florescu in his opinion regarding privatisation. It is found in EU and National Legislation that energy distribution and energy production shall be privatised and the Energy Strategy is elaborated accordingly. In addition, as above mentioned, privatisation (through concession) including private investments can lower the increasing of the heat tariff in Bucharest and release the local budget from the huge effort of investments, allowing the reallocation of the resources to the other needs of the city.

2.9 Consilier General Veronica Toma

Observation 2.9.1:

The same comments as Mrs. Ivan

Answer 2.9.1:

We consider the answers to Mrs. Ivan covering the observations.

2.10 General Counceillor Nicusor Stan

Observation 2.10.1:

NGO for owner's association made references to the necessity of political willing and we, the City Council, represents at least until 2012 the political willing.

In order to be able to express our political willing there is necessary to be formulated the ideas and this shall be done with support of specialist.

The strategy submitted has some shortcomings and also the approach is not the one expected.

Also the submitted energetic strategy is only one module, being the energetic strategy for heat supply. Municipality has also other problems: public transport, public lighting, heat supply and in the latest environment issues.

Answer 2.10.1:

We agree in your observation regarding public transport and public light and this will be included in the final version of the Energy Strategy.

The approach for elaborating the strategy is approved by the Energy Committee by approving the reports from Phase II: "Clarification of Goals" and "Recommendation Report".

For the preparation of the modules, the Consultant considered the development of the legal competency for public services for power supply and natural gas supply, which initially according to the provision of Law 326/2001, were under local authority competency and later by introducing of the new framework Law of public

Consultantul accepta sau nu opiniile d-lui Consilier General Dragos Florescu in ceea ce priveste privatizarea. Este mentionat atat in Legislatia Europeana cat si cea nationala ca distributia si producerea energiei trebuie privatizate, iar strategia energetica este elaborata in acest sens. In plus asa cum s-a aratat mai sus, privatizarea prin concesionare cu aport de capital pentru investitiile propuse poate determina o diminuare a cresterilor de tarif pentru bucuresteni si o degrevare majora a eforturilor bugetului local, care pot fi astfel disponibilizate pentru alte importante nevoi ale orasului.

2.9 Consilier General Veronica Toma

Observatia 2.9.1.

Aceleasi comentarii formulate ca si d-na Ivan

Raspuns 2.9.1:

Consideram ca raspunsurile la observatiile d-nei Ivan acopera si aceste observatii

2.10 Consilier General Nicusor Stan

Observatia 2.10.1:

Liga ligii asociatiei de proprietari a facut referire la necesitatea unei vointe politice ferme, pana in 2012, asta reprezentam noi, consilierii generali.

Pentru a ne exprima o vointa politica este necesara conturarea o gandiri si aceasta se poate realiza cu ajutorul specialistilor.

Strategia primita are anumite lipsuri si nici abordarea nu este cea asteptata.

Deasemenea Strategia energetica prezentata este doar un modul, fiind doar strategie energetica termica, municipalitatea are probleme cu transportul, iluminatul public, sistemul de incalzire, si mai nou cu poluarea mediului inconjurator.

Raspuns 2.10.1:

Suntem de acord cu dumneavoastra referitor la observatiile dumneavoastra cu privire la transportul in comun si iluminat public si acestea vor fi incluse in versiunea finala a Strategiei Energetice.

Abordarea pentru elaborarea strategiei a fost aprobata de catre Comitetul Energetic Municipal cu ocazia aprobarii Rapoartelor din Etapa a II-a: "Clarificarea Obiectivelor" si "Recomandari".

In dezvoltarea modulelor Consultantul a tinut insa seama de faptul ca serviciile de distributie a energiei electrice si de distributie a gazelor, aflate initial in Legea 326/2001 in competenta autoritatilor publice locale, au fost scoase din competenta acestor services no. 51/2006(with further modifications), these modules were released from the competency of local authorities.

Observation 2.10.2:

From a recent news about Germany, the German government in the next 10 years mobilizes to introduce more than one million electric cars.

We found out a figure and how much it will cost the development of entire heat distribution system, respectively 3 billion EUR by 2020. As the issue was not addressed as a unit, from where you can know that these 3 billions will be invested together with a consortium of companies to build an atomic-power plant, which can bring more benefit and have everything based on power, not polluting and then to sell these green certificates. I think the approach needs to be more complex.

Answer 2.10.2:

Germany and the Scandinavian countries has realised (energy planners have said that for years) that when wind power exceed 15-25% of the electricity production you must stop (pitch) the turbines in the night time and in the weekends, especially in the summer time. The idea of charging electrical cars and hybrid cars in the night time and in the weekends to increase the utilisation of the wind turbines is not new – the news is that it is now decided to have an implementation programme ready before 2012 and the necessary installation ready before 2015.

An investment of 3 billion EUR shall be seen in relation to the total cost of heat supply in Bucharest. The annual non-subsidised cost of district heating supply is today about 650 MEUR ~ more than 1 billion EUR for all of Bucharest. Is an investment of about 3 times the annual costs large?

By investing the 3 billion EUR we'll obtain a reduction from about 1 billion/year to about 0.5 billion per year and we have obtained a sustainable future independent from increased in natural gas prices, shortage of natural gas and oil and energy/environmental taxes. And we can tell our children than in out lifetime we took responsibility in respect of global warming.

Observation 2.10.3:

The strategy also focused more on RADET. My opinion is that RADET is not the cause, RADET is an effect and I would look more to encourage the production if we keep this option where we burn (fuel) and if we burn the resulting heat should be recovered and valued. But maybe we do not burn and then when we focus on the production of power and we will consume electricity also to heat. There are different options and I would have wanted to see such directions addressed. We

autoritati prin OUG 9/2002, aspect mentinut si in Legea cadru a utilitatilor publice, nr. 51/2006 cu completarile ulterioare.

Observatia 2.10.2:

Dintr-o stire recenta despre Germania, Guvernul german in urmatorii 10 ani se mobilizeaza sa introduca peste un milion de masini electrice.

Am aflat o cifra si anume cat ne-ar costa punerea la punct a intregului sistem de distributie a energiei termice respectiv 3 miliarde de Euro pana in 2020. Pentru ca nu a fost abordat unitar de unde se poate sti ca aceste 3 miliarde se investesc impreuna cu un consortiu de firme sa se construiasca o centrala atomo-electrica, care poate ar fi mai avantajos si sa mutam totul pe electric, care nu mai polueaza si ulterior sa vindem aceste certificate verzi. Cred ca abordarea trebuia sa fie mai complexa.

Raspuns 2.10.2:

Germania si tarile Scandinave au realizat (expertii in planificare energetica spun acest lucru de ani de zile) ca atunci cand electricitatea produsa de turbine eoliene depaseste 15-25% din productia de electricitate, turbinele trebuie orite in perioada de noapte si in week-end, mai ales in perioada de vara. Ideea de a incarca bateriile masinilor electrice si masinilor hibride pe perioada noptii si in week-end nu este noua – noutatea consta in aceea ca se hotaraste a avea un program de implementare gata inainte de 2012 si instalatiile gata inainte de 2015.

Investitia de 3 miliarde Euro trebuie vazuta ca si costul total pentru furnizarea energiei termice in Bucuresti. Costurile anuale nesubventionate pentru sistemul de termoficare sunt de 650 milioane ~ mai mult de 1 miliard pentru intreg Bucurestiul. Poate fi considerat mare un cost de investitii care este de aproximativ de 3 ori mai mare decat costurile anuale?

Prin investirea a 3 miliarde Euro se va obtine o reducere a costurilor anuale de la 1 miliard la 0.5 milarde si am obtinut o independenta sustenabila in viitor fata de cresterea pretului la gaze naturale, scaderea rezervelor de gaze naturale si pertrol si taxele pe energie si de mediu. Si putem sa le spunem copiilor nostri ca in vremea noastra ne-am asumat responsabilitatea in ceea ce priveste incalzirea globala.

Observatia 2.10.3:

De asemenea, strategia s-a concentrat mai mult pe RADET. Opinia mea este ca nu RADET este cauza, RADET este un efect si m-as uita mai mult la incurajarea productiei daca ramanem pe aceasta varianta in care ardem (combustibil) iar daca ardem rezulta energie termica sigur ca trebuie recuperata si valorificata. Dar poate nu mai ardem si atunci atunci ne concentram pe producerea de energie electrica si vom consuma energie electrica si pentru a ne incalzi.

appreciate your work but I think I does not help us enough to think about something sustainable for 2020 or 2030, and our grandchildren will punish us if we think a little less durable.

The direction is not complete and it can help me to make a decision

Sunt variante si as fi dorit sa vad astfel de directii abordate. Apreciem munca dumneavoastra dar cred ca nu ne ajuta suficient pentru a gandi ceva durabil pentru 2020 sau chiar 2030, iar nepotii nostri ne vor sanctiona daca am gandi ceva mai putin durabil.

Directia nu este cea completa si pe mine nu ma ajuta sa pot lua o decizie

Answer 2.10.3:

It is to our opinion necessary that the Municipality of Bucharest takes some actions to ensure a cheaper heat production than today. The cheapest alternative we can recommend is waste-to-energy and solar heating. Both these productions are expensive in construction but has no fuel costs. Systems based on a high percentage of waste-to-energy has experienced over a 20-year that the heat price based on natural gas has tripled while the heat price based on waste-to-energy has fallen 20% (all in fixed prices).

The question regarding electrical heating is discussed previously in 2.7.11 and 2.10.2.

RADET is a part of the problem. For too long RADET has not been willing to change the concept of heat transmission and heat distribution as it was established when the district heating network was expanded in the 1960-1979'ties. The result is the most expensive heat transmission and distribution systems we know of in Europe and RADET in spite of large investments in the last decades. It should be obvious that a district heating company, in spite of large investments, unable to improve the efficiency, increase the lifetime of main components and unable to control the water losses etc must be restructured – and it is the responsibility of the Municipality of Bucharest to take the necessary actions in this respect.

We hope the action plan, which we will include in the final version of the Strategy Report, will enable you and the Council of Bucharest Municipality to take the necessary decisions.

Raspuns 2.10.3:

In opinia noastra, consideram necesar ca Primaria Municipiului Bucuresti sa ia anumite masuri pentru a asigura o producere a energiei termice la un pret mai scazut decat este in prezent. Alternativa cea mai ieftina pe care o putem recomanda se bazeaza pe recuperarea energiei din deseuri si energia solara. Producerea in cele doua solutii este scumpa din punct de vedere al constructiei, dar in final costul combustibilului este zero. Sistemele de incalzire centralizata in care producerea energiei termice intr-un procent ridicat provine din recuperarea energiei din deseuri au experimentat intr-o perioada de peste 20 de ani faptul ca pretul energiei din gaze naturale s-a triplat, in timp ce pretul energiei produsa din recuperarea energiei din deseuri a inregistrat scaderi de 20%(toate in costuri fixe).

Observatia referitoare la incalzirea electrica este tratata anterior in 2.7.10 si 2.10.2.

RADET este parte in aceasta problema. De foarte mult timp RADET nu a dorit sa schimbe conceptul privind transportul si distributia caldurii, concept stabilit odata cu extinderea sistemului in perioada 1960-1979. Rezultatul acestei situatii este ca RADET opereaza cel mai scump transportul si distributia caldurii fata de ceea ce stim noi in Europa, in ciuda faptului ca au fost facute investitii foarte mari in ultimile decenii. Este absolut evident ca trebuie restructurata o companie de termoficare, care in ciuda investitiilor imense este incapabila sa imbunatateasca eficienta, sa creasca durata de viata a componentelor si incapabila sa controleze pierderile de agent termic etc – si este responsabilitatea Primariei Municipiului Bucuresti sa ia toate masurile in acet sens.

Noi speram ca planul de actiuni, pe care il vom include in varianta final a Strategiei va va permite dumneavoastra Consiliului General sa luati masurile necesare.

2.11 Municipality Public Utility Department

Observation 2.11.1:

The objective of EU policy provided by the Energy Strategy of Romania is increasing the share of renewable in total energy mix to 20% of total EU energy consumption by 2020. Ensuring 100% of thermal energy demand through renewable sources in the current strategy for 2020 is not too optimistic?

2.11 Directia Utilitati Publice - PMB

Observatia

In Strategia energetica a Romaniei este prevazuta, ca obiectiv al politicii UE, cresterea ponderii surselor regenerabile de energie in totalul mixului energetic la 20% din totalul consumului de energie al UE pana in 2020. Asigurarea unui procent de 100% din necesarul de energie termica prin surse regenerabile, prevazut in actuala strategie pentru anul 2020 nu este prea optimist?

Answer 2.11.1:

First of all, the 20% renewable energy is a minimum. And secondly, the 20% is an average for all EU countries and it is accepted that some countries cannot obtain the goal while other countries can obtain more. Think for example of countries with hydro power and of countries without this resource of renewable energy.

In almost all countries it is found that introducing renewable sources for heating purpose is the most feasible way to obtain the national targets. We see in many countries that the transport sector year by year is increasing the CO_2 emission due to more cars and people driving more – this must be compensated by additional reduction in other sectors.

Raspuns 2.11.1:

In primul rand 20% energie regenerabila este minim. In al doilea rand 20% este o medie pe toate tarile UE si este acceptat ca anumite tari nu pot atinge obiectivul, in timp ce altele pot obtine mai mult. Ganditi-va la tarile cu energie hidro si la tarile fara potential de energie regenerabila.

In marea majoritate a tarilor s-a identificat ca introducerea surselor regenerabile pentru incalzire este cea mai fezabila cale pentru atingerea tintelor nationale. Este vizibil in multe tari, ca in sectorul transport creste an de an cantitatea de emisii de CO2 datorita cresterii numarului de masini, iar oamenii conduc masinile din ce in ce mai mult – si aceasta situatie trebuie compensata prin reducerea emisiilor in alte sectoare.

Observation 2.11.2:

The study considers, in Part A, that approximately 40% of heat demand in 2020 will be covered by solar systems, in part C it is estimated that 30% of the demand related to 2020 and respectively the 20% of the 2008's. We request the submission of a calculation which was the basis of this value (to highlight the number of apartments blocks envisaged, areas available for the installation of solar panels, orientation, shading, operating hours, etc.. Also there is required to be submitted a scheme of the solar installation for one apartments block in order to be verified the possibility of applying to the rest of approximately 8,000 apartments blocks. It also will review proposed accumulation scheme (at level of block, on weekly basis, etc.) with the best recommended locations (basements, aerial, underground). We want to highlight that a relevant number of blocks have improper basements and there are private property of the owners associations. We estimate that 40% is overestimated by taking into account the problems of construction blocks, orientations, shading, etc.. The study explains the installation of solar panels shall not be included in the plan of reconstruction, being made before 2020, but also stated that they will fit together with the thermal rehabilitation of construction, which would actually be the first option, by providing the heat - input for all other options. So, instead there is a short term option, it should be achieved with thermal rehabilitation. Asked for clarification.

The value of investments in solar installations is estimated at 611 million euros or 550 million euros?

Observatia 2.11.2:

Studiul apreciaza, in partea A, ca aproximativ 40% din valoarea cererii de caldura din anul 2020 se va asigura prin sisteme solare, in partea C se apreciaza ca 30% din necesarul pe 2020 respectiv 20% din necesarul lui 2008. Solicitam prezentarea unui calcul care a stat la baza acestei valori (care sa evidentieze numarul de blocuri avute in vedere, suprafetele disponibile pentru amplasarea captatoarelor, orientari, umbriri, ore de functionare, etc. De asemenea se solicita prezentarea unei scheme aplicate de instalatie solara la un bloc, pentru a analiza posibilitatea de aplicare la cele aproximativ 8000 blocuri. De asemenea se va analiza schema de acumulare propusa (acumulatoare la bloc, acumulatoare saptamanale etc) cu recomandarile de amplasamente (subsoluri, aerian, ingropat). Precizam ca o mare parte din blocuri au subsoluri inadecvate constructiv iar acestea sunt proprietatea privata a asociatiilor de proprietari. Apreciem ca procentul de 40% este supraestimat luand in considerare problemele constructive ale blocurilor, orientarile, umbririle, etc.

Studiul precizeaza ca montarea panourilor solare nu trebuie obligatoriu inclusa in planul de reconstructie, nefiind realizabila inainte de 2020, dar totodata se precizeaza ca acestea se vor monta odata cu reabilitarea termica a constructiilor, care ar fi de fapt prima optiune, conditionand necesarul de caldura – input pentru toate celelalte optiuni.

Deci, desi nu este o optiune pe termen scurt, ea trebuie realizata odata cu reabilitarea termica. Solicitam clarificari.

Valoarea investitiilor in instalatiile solare este estimata la 611 milioane euro sau 550 milioane euro?

Answer 2.11.2:

It is not a task for the project to perform design drawings for how to install solar panels on the buildings. We have based our calculations on 6 m^2 solar panel and 300 l heat storage for a one-family house of about 200 m^2 (these are the values for the standard systems sold on the WEB). The conditions for our calculations and the calculations are shown in the Part C, Appendix 7C.

Raspuns: 2.11.2:

Nu intra in scopul proiectului executarea planurilor care sa arate cum vor fi instalate sistemele solare pe cladiri. Calculele noastre s-au bazat pe o suprafata de panouri solare de 6m^2 careia ii corespunde o capacitate de acumulare a caldurii de 300 l si acest sistem deserveste o casa pentru o familie avand o suprafata utila de 150 m^2 (acestea sunt valori disponibile pe internet pentru sisteme standard vandute). Conditiile in care au fost facute calculele sunt aratate in Partea C, Anexa 7C.

Question 2.11.3:

The total value of investments needed for reconstruction of district heating system is presented in chapter 8 as 6.8 billion Euros of investment and the values summarized in distribution, transportation and production are 4.917 billion Euros. Investment in production is evaluated in Part B, chapter A summary, from 3.3 billion Euros of which for solar installations (public) 550 million Euros and around 2750 million in private investment. In the Part C, the investment in production are valued at 1.7 billion Euros. Please clarify these values in a table summary of investment needs by category (consumer, distribution, transportation, production) and make proposals for financial solutions.

We asked for the assessment of the investment in thermal rehabilitation versions with and without thermal solar installations

Observatia 2.11.3:

Valoarea totala a investitiilor necesare pentru reconstructia sistemului de termoficare este prezentata in capitolul 8 ca fiind de 6,8 miliarde euro iar valorile de investitie insumate la distributie, transport si producere sunt de 4,917 miliarde euro. Investitia in sistemul de producere este evaluata in partea B, capitolul A rezumat, la 3,3 miliarde euro din care pentru instalatiile solare (publice) 550 milioane euro si aproximativ 2750 milioane euro in investitii private. In partea C investitiile in producere sunt evaluate la 1,7 miliarde euro. Va rugam sa ne clarificati aceste valori printr-un tabel centralizator al necesarului de investitii pe categorii (consumator, distributie, transport, producere) precum si sa faceti propuneri de solutii de finantare. Solicitam si o evaluare a investitiilor cu reabilitarea termica in variantele cu si fara instalatii solare.

Answer 2.11.3:

The investments are found in Chapter 10 (not on Chapter 8).

The estimated cost for the distribution systems is about 1.2 billion EUR. All investments are considered provided by the concessionaires. The estimate do not include cost of investments in thermal rehabilitation and heat installation inside the blocks as these are private owned and thus not a subject for public investment.

The estimated costs for the transmission system is about 0.42 billion EUR, mainly public investments.

Investment in production facilities are estimated to about 1.7 billion:

- Solar panels 611 million EUR of which about 407 million EUR is provided by the Government in terms of the support scheme for solar energy. The remaining is invested by the concessionaires.
- Local peak-load boilers 90 million EUR provided by the concessionaires.
- Decentralized CHP 400 million EUR provided by the Concessionaire for installing and operating the CHP units.
- Waste-to-energy facilities 600 million EUR provided by the concessionaires.

Raspuns 2.11.3:

Investitiile sunt descrise in Capitolul 10 (si nu in capitolul 8).

Costurile estimate pentru sistemele de distributie sunt de 1,2 miliarde Euro. Toate investitiile se asteapta sa fie facute de catre concesionari. Estimarea nu include costul investitiilor in reabilitarea termica si instalatiile de incalzire din interiorul blocurilor, atata vreme cat acestea sunt in proprietate privata si nu fac obiectul investitiilor din fonduri publice.

Costurile estimate pentru sistemul de transport este de aproximativ 0.42 miliarde Euro, in cea mai mare parte din fonduri publice.

Investitiile in facilitatile de producere sunt estimate la aproximativ 1.7 miliarde Euro:

- Panouri solare - 611 milioane Euro din care aproximativ 407 milioane Euro vor fi asigurati de Guvern in baza schemei de suport financiar pentru energia solara. Restul este investitia concesionarilor.
- Cazane pentru acoperirea varfului de consum – 90 milioane Euro investitie asigurata de concesionari.
- Unitatile de cogenerare descentralizate – 400 milioane Euro investitie asigurata de concesionari pentru instalarea si operarea

The calculations are presented in Part C Appendix 10a

unitatilor

- Facilitati de incinerare a deseurilor – 600 milioane investitie asigurata de concesionari.

Calculele sunt prezentate in Partea C Anexa 10a .

Observation 2.11.4:

The structure of production is: 40% solar energy, 20% waste, 20% decentralized CHP on bio-fuel, 10% HoB on bio-fuel, 10% other renewable sources. Please clarify what period these percentages refer. How will be the structure on winter, when a long period will be no sunny? It will increase percentages of bio-fuel sources or gas sources will be done?

Observatia 2.11.3

Structura de producere,pe surse, avuta in vedere este: 40% energie solara, 20% deseuri, 20% CET-uri descentralizate pe biocombustibil, 10% CAF-uri pe biocombustibil, 10% alte surse neconventionale. Va rugam sa clarificati la ce perioada se refera aceste procente. Care va fi structura iarna, cand o lunga perioada nu va fi soare? Se vor mari procentele la sursele pe biocombustibil sau se vor realiza surse pe gaz?

Answer 2.11.4:

The values mentioned are annual values.

The solar systems are considered having no or only a very little capacity value. Thus, the capacity balances for 2020 are outlined as (MJ/sec):

	Summer	Winter
Centralised production	0	300
Decentralised production	0	400
Solar energy (incl. Heat storage)	450	50
Heat-only-boilers	0	700
Other sources	50	50

We expect that the price of bio fuel will be attractive from 2020 when the energy taxes reaches the EU level of 30% or even more and when a take-or-pay clause is introduced for natural gas. Thus, decentralized CHP and heat only boilers will use bio fuels (not bio mass) after 2020.

Raspuns 2.11.4:

Valorile mentionate sunt valori anuale.

Sistemele solare sunt considerate a nu avea valoare de capacitate sau o capacitate foarte mica. Astfel echilibrul capacitatilor in 2020 este prezentat mai jos (MJ/s):

	Vara	Iarna
Producere centralizata	0	300
Producere descentralizata	0	400
Energie solara (incl. acumulare)	450	50
Cazane	0	700
Alte surse	50	50

Ne asteptam ca pretul pentru biocombustibili sa devina atractiv dupa anul 2020 atunci cand taxele pe energie nivelul din tarile UE de 30% sau mai mult si cand se va introduce o clauza pentru gazele naturale de asigurare a capacitatii. In acel moment, dupa anul 2020, unitaile de cogenerare descentralizate si cazanele vor utiliza biocombustibi (si nu biomasa).

Observation 2.11.5:

Indicate how the proposed solutions for the reconstruction of heating system take into consideration the configuration of basement blocks built in Bucharest, to be supplied by thermal modules connected to the new heating.

Observatia 2.11.5:

Solicitam sa se precizeze modul in care solutiile propuse pentru reconstructia sistemului de termoficare tin seama de configuratia subsolurilor blocurilor construite in Bucuresti, ce urmeaza a fi alimentate prin module termice racordate la noile retele termice

Answer 2.11.5:

We see no general problem in installing heating units in the basements of the apartment blocks.

Raspuns 2.11.5:

Nu consideram ca existe probleme generale la instalarea modulelor termice la subsolul blocurilor.

Observation 2.11.6:

We request clarification of aspects regarding the investments made to date and outstanding and ongoing investments financed from loans , from the municipality or local budget. The PHARE study

Observatia 2.11.6:

Solicitam clarificarea aspectelor privind investitiile facute pana in prezent si neamortizate, precum si investitiile aflate in curs de finantare din contractele de imprumut extern ale municipalitatii sau finantate de la recommended modernization of the heating system as current concept with an estimated investment volume of around 3 billion, including new CHP on current locations. It started a number of investment on the current concept (modernization and control system of thermal substations, new primary networks, new cogeneration units, etc.) that have a high payback period (approximately 20 years) and supply to a large area (the rehabilitated thermal substation are allover the city). We are asking for clarification on how will be integrated the new solutions into ongoing investments.

We are asking for clarification related the new investments from chapter B on the approved investment plan (attached).

The Plan for optimal staging of the actions, provided by the terms of reference should be detailed and clarified regarding the approach of investments (technical, stages), taking into account all above mentioned. The costs of rebuilding the heating system were taken into account the costs of decommissioning of the existing installations and road rehabilitation costs? Please clarify!

bugetul local. Prin studiul PHARE s-a recomandat modernizarea sistemului de termoficare pe actuala sa structura estimandu-se un volum investitional de circa 3 miliarde euro, inclusiv CET-uri noi pe actualele amplasamente. Este inceput un numar important de investitii pe actualul concept (modernizari si automatizari de puncte termice, retele primare noi, grupuri de cogenerare noi, etc) care au o perioada de amortizare mare (aproximativ 20 ani) si care deservesc o arie mare (punctele termice modernizate se refera la majoritatea suprafetei orasului). Solicitam clarificari privind modul de integrare a solutiilor noi pe lucrarile demarate

Solicitam clarificari privind realizarea investitiilor noi cuprinse la capitolul B in planul de investitii aprobat (anexat)

Planul de esalonare optima a actiunilor, prevazut prin termenii de referinta trebuie detaliat si clarificat cu privire la modul de abordare(tehnic, etapizare) a investitiilor, tinand seama de cele mai sus mentionate. In costurile privind reconstructia sistemului de termoficare au fost luate in calcul costurile cu dezafectarea instalatiilor existente precum si costurile cu reabilitarea drumurilor? Va solicitam clarificari

Answer 2.11.6:

The proposed concept for changes is the same as in the PHARE Study: “Change when worn-out”.

As long as RADET is not able to control the water losses, perform no preventive maintenance work and empty the heating distribution pipes the lifetime will not be longer than until 2020 for main components. For control valves and similar equipment the lifetime can at no circumstances be considered more than 10-15 years. Constantly improvement of pump efficiencies and changes in pumping requirements will in many situations make it feasible to change pumps after 10-12 years considering.

As far as the investments are used for oversized pipes and control valves etc the investments should be considered lost. However, to utilize that present installed capacities we propose to join more distribution areas in the future.

Raspuns 2.11.6:

Conceptul propus pentru inlocuire a ramas acelasi ca si in studiul PHARE: “inlocuire cand este uzat”

Atata vreme cat RADET nu este capabil sa controleze pierderile de agent termic, nu realizeaza lucrari de intretinere preventiva si goleste sistemul de distributie, durata de viata a celor mai importante componente nu va fi mai mare de 2020. Pentru vanele de reglaj si echipamente similare, durata de viata in nici un caz nu poate depasi 10-15 ani. Imbunatatirea constanta a eficientei pompelor si modificarea cerintelor pentru pompare face ca in anumite circumstante sa fie mai fezabil inlocuirea lor dupa 10-12 ani.

Atata vreme cat investitiile sunt utilizate pentru supradimensionarea conductelor si a vanelor de reglaj, etc., investitiile ar trebuie considerate ca si pierdute. Totusi, pentru a capacita instalatiile aflate in prezent, va propunem ca in viitor sa comasati mai multe arii pe distributie.

Observation 2.11.7:

Please review the implications (including costs) of the radical changes of the system in terms of electrical energy (balance production, existing networks, etc.) and gas networks, water networks to be modified (it is recommended that further to go on bio-fuels). The terms of reference required to be performed the cost-benefit analysis for the proposed solutions on the production systems, transmission and distribution of electricity. Also by the terms of reference is required considerations on effective system for water and sewer based on cost-benefit analysis. The costs of changing to other networks (electricity, gas, water) should be

Observatia 2.11.7:

Va rugam sa analizati implicatiile (inclusiv costurile) modificarii radicale a sistemului in ceea ce priveste energia electrica (balanta producerii, retele existente, etc) retelele de gaze si retelele de apa care ar trebui modificate (se recomanda ca ulterior sa se treaca pe biocombustibili). Prin termenii de referinta se solicita analiza cost-beneficiu a solutiilor propuse pentru sistemele de productie, transport si distributie a energiei electrice. De asemenea prin termenii de referinta se solicita consideratii privind solutii eficiente pentru sistemul de alimentare cu apa si canalizare pe baza analizei cost-beneficiu. Costurile modificarii considered when determining the total amount of investment.

So, please tell us how will influence the new decentralized CHP's and HoB's designed by new capabilities on the gas networks, electricity, etc. and their related costs

celorlalte retele (electrice, gaze, apa) ar trebui avute in vedere la stabilirea valorii totale a investitiei.

Astfel, va rugam sa ne precizati modul in care noile CET-uri descentralizate si CAF-uri prin noile capacitati proiectate, vor modifica retelele de gaze, electrice, etc si costurile aferente acestora

Answer 2.11.7:

The electricity tariff will be the same in Bucharest as it is in the rest of Romania or for that matter the same as in the Balkan region.

The purpose of opening the electricity market is that energy shall flow from areas with low costs to areas with high costs and thus leveling the prices in the system.

Changing the water supply for local preparation of hot tap water is in general no problem as the water consumption has been significantly reduced after introduction of metering leaving sufficient capacity in the local system.

The supply conditions for natural gas must be one of the parameters used for determine the locations of the peak-load boilers.

Raspuns 2.11.7:

Tariful pentru electricitate va fi acelasi in tot Bucurestiul, ca de altfel in restul tarii si mai mult acelasi pentru toata regiunea Balcanilor.

Motivul pentru care a fost dechisa piata de electricitate a fost acela ca energia sa poata migra din zone in care ea se produce ieftin catre zone in care producerea este scumpa.

Inlocuirea retelelor de apa potabila pentru prepararea apei calde la nivel local nu reprezinta o problema atata vreme cat consumul de apa rece s-a redus dupa contorizare, avand o capacitate suficienta in sistemele locala.

Conditiile de furnizare pentru gazul natural ar trebui sa fie unul dintre parametrii utilizati la stabilirea locatiilor pentru cazanele de acoperire a varfului de consum.

Observation 2.11.8:

Please clarify these aspects of bio- fuel sources:

1. What type of fuel is provided for the decentralized CHP's and HoB's?
2. If the evaluation of investments for production include the producing their own bio-fuel. Where is forecasted to be the bio-fuel production source?
3. What storage spaces are required for tanks for bio-fuel from CHP's and HoB's? (storage capacity are needed in order to study the possibility of location in the decentralized units)
4. Evaluation of the investments in CHP's on bio-fuel includes all equipment, or just to replace the burners (gas decentralized adaptations of plants)

Observatia 2.11.8:

Va rugam sa ne clarificati urmatoarele aspecte referitoare la sursele pe biocombustibil:

1. ce tip de combustibil se prevede la CET-urile descentralizate si la CAF-uri?
2. daca evaluarile privind sursele de producere cuprind si investitiile in producerea propriu zisa a biocombustibilului. Unde se evalueaza a fi sursa de producere a biocombustibilului?
3. Ce spatii de depozitare sunt necesare pentru gospodariile de biocombustibil la CET-uri si CAF-uri? (capacitati necesare de depozitare, pentru pentru a se putea studia posibilitatile de amplasare in unitatile descentralizate)
4. evaluarea investitiilor in CET-uri pe biocombustibil cuprinde intregul echipament al centralei sau doar inlocuirea arzatoarelor (adaptari ale centralelor descentralizate pe gaz)

Answer 2.11.8:

1. In a short-term perspective mainly natural gas with oil as back-up, where necessary. In a longer perspective bio fuel (liquid or bio gas).
2. Bio fuel is traded as all other fuels. Romania currently export raw materials for production of bio fuels and the first plant for production is already establish in Romania.
3. Supply of bio fuel is assumed contracted with a supplier having a centralized storage outside Bucharest. Thus, the local storage can be limited to few days of production. Below is shown a calculation example for a 3

Raspuns 2.11.8:

1. In perspectiva pe termen scurt in principal gazele naturale si petrolul ca si rezerva, unde este necesar. Intr-o perspectiva pe termen lung bicombustibil(lichid sau gaz).
2. Biocombustibilul este comercializat ca si oricare alt tip de combustibil. In prezent Romania exporta materie prima pentru producerea biocombustibilului si prima fabrica de producere este deja in functiune in Romania.
3. Furnizarea biocombustibilului se va contracta cu un furnizor care va avea un depozit central

MW/3MJ/sec CHP unit:

Calculation on 100% load

Power generation	MW	3.00
Heat production	MJ/sec	3.00
Overall efficiency	%	0.95
Heating value	GJ/m3	36.00
Fuel consumptopn	GJ/h	22.74
	m3/h	0.63
	m3/day	15.16
	m3/4 days	60.63
Truck transport	m3/truck	20.00
	truck/day	0.76

4. The CHP plant shall be specified able to run on natural gas and/or bio fuel. The estimated costs include this facility including storage for the bio fuel. However, the estimate assumes the CHP units installed in/at the present substations where connection to utilities are already available.

in afara Bucurestiului. Astfel, depozitele locale pot fi limitate astfel incat sa asigure producerea pentru cateva zile. Mai jos sunt prezentate exemple de calcul pentru o unitate de cogenerare cu 3 MW/3MJ/s :

Calculatie la 100% incarcare

Generare electricitate	MW	3.00
Producere incalzire	MJ/s	3.00
Eficienta generala	%	0.95
Coeficient caloric	GJ/m3	36.00
consum de combustibil	GJ/h	22.74
	m3/h	0.63
	m3/zi	15.16
	m3/4 zile	60.63
Transport cu camion	m3/camion	20.00
	camion/zi	0.76

4. Unitatile de cogenerare trebuie specificate astfel incat sa fie capabile sa functioneze atat pe gaze naturale cat si pe biocombustibil. Costurile estimate includ aceste unitati impreuna cu facilitati pentru depozitarea biocombustibilului. Totusi, estimarea considera ca unitatile de cogenerare se vor instala in/la nivelul punctelor termice existente unde conectarea la utilitati este posibila.