CONTENTS

1. PROJECT CHARACTERISTICS

1.1. Project developer

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Registration number:	Trade Register Sibiu County, J32/488/1997
Date of registration:	October 16, 1997

1.2. Guarantor data

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Registration number:	Trade Register Arnhem, 09117658
Date of registration:	December 28, 2000

1.3. Project partners

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Position in the project:	Partner and Beneficiary
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Position in the project:	Partner and Beneficiary
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Registration number:	Trade Register Dambovita County, J15/141/1998
Date of registration:	April 29, 1998

1.4. Project Abstract

- Project Title: Municipal Cogeneration Târgovişte
- Host Country: Romania
- Abstract:
  The proposal is to install new cogeneration facilities with a total capacity of about 6.8 MWe and new heat only boilers with a capacity of 14.0 MW_{th}, as well as to rehabilitate the existing heat transportation networks and an existing heat only boiler with a capacity of 58.2 MW_{th}. The project will solve the heat supply problems in the City of Târgovişte, will drastically improve the efficiency of electricity and heat production and will produce electricity and heat at lower cost and environmental friendlier than at present. The produced electricity will be partly consumed internally by the beneficiaries of the project and partly sold to a third party, whereas the produced heat will be delivered to the customers of S.C. TERMICA S.A.
- Location of project: Str. Laminorului nr.14, Târgovişte
- Date of go/no-go decision of project: August, 15th, 2004
- Expected construction starting date: September, 1st, 2004
- Expected construction finishing date: December 31st, 2006 (cogeneration and heat only boilers; the upgrading of the primary heat networks will be finished by 2011)

Figure 1 Location of the project

1.5. Background and justification

The Municipal Cogeneration Târgovişte Project has been one of the first projects initiated within the scope of the first framework agreement between the Netherlands and Romanian governments, intended to stimulate the development of a number of modern cogeneration projects as Commercial Joint Implementation projects.

Based on a proposal made by the Municipality and the municipally owned S.C. TERMICA S.A. ("**TERMICA**"), the experts of NUON, the Municipality and TERMICA have carried out a study on the limitations of the present thermal energy production, transport and distribution systems and of the possibilities to improve them. The existing heat production facilities are rather old (25 – 30 years), which means not only a limited residual lifetime, but also a poor thermal efficiency. Besides, the existing heat production capacity is not sufficient for covering the heat demand during cold spells, leading in such periods to discomfort and unhappiness of the inhabitants.

Although TERMICA has spent a lot of effort during recent years to improve the condition of its heat transport and distribution networks, the present energy losses during the transportation of heat are still too high, making it obvious that a project intended to minimize the CO_2 emission levels should address not only the generation level, but also the other processes within the chain.
Based on an extensive feasibility study, a proposal has been made to the first ERUPT tender organized by SENTER, the proposed project being one of the five winners of that tender. Unfortunately, some legislative and regulatory aspects did not allow the project developers to meet the imposed deadline for the finalization of a number of contractual issues. The solution of the issues raised proved to be beyond the reach of the project partners and they decided to withdraw the project from the ERUPT 1 procedure, to reshape it and to propose it for this ERUPT 4 tender. While reshaping the proposal, attention has been paid not only to its size, but also to the contractual relationships and to the financial plan, so as to take advantage of the most actual legal provisions and of the newest regulations of the applicable secondary legislation.

During this period of time, a close cooperation has been developed between S.C. NUON ENERGY ROMANIA S.R.L. ("**NER**") and TERMICA. So is TERMICA one of the sub-contractors of NER for the implementation of the PSO Project "Energy Management through Demand Side Management in the City of Sibiu, Romania", Within the scope of this project, fully financed by the Dutch Government through SENTER, the interior installations in the apartments supplied with thermal energy by NUONSIB are being replaced. The change from the vertical to the horizontal concept allows for a real individual metering of each customer. In the mean time, TERMICA has started with the modernization of the apartments in Târgovişte, applying the same technical concept as in Sibiu.

During the last year a lot of effort has been spent by NER and TERMICA for developing a new contractual framework, based on the concept of financial leasing, the *lessor* (NER) conveying the tenement to the *lessee* (TERMICA) for a specified time and in consideration of rent. The lease concept is much more transparent and easier to implement, because no new company needs to be created, no modification of the present concession agreement between the Local Council and TERMICA is necessary and the lessor has no interference, whatsoever, with the secondary legislation on the electricity and heat markets.
In order to prove the adequacy of this newly developed concept, last year, a small project has been initiated and successfully implemented. It concerns a small gas engine with an installed capacity of 165 kWe / 266 kWth. The installation works have been performed by NER personnel, the cogeneration unit has been officially committed on November 27th, 2003 and it has been, since then, practically continuously in operation.

1.6. Intervention

- Description of the GOALS of the project:

The new production facilities (cogeneration installations and heat only boilers ("**HOB**"), together with the rehabilitation of the existing HOB and of the heat transportation networks, will lead to a more efficient heat production and supply, diminishing considerably the use of primary fuels and leading at the end to a less expensive product, with a much lower environmental impact than today. This will combine with a higher level of comfort of the customers. It is proven, by another cogeneration/district heating project of NUON, in the City of Sibiu, also in Romania, that there is a direct relationship between the quality of the services offered and the readiness of the customers to promptly pay their bills. On its turn, this prompt collection of revenues enhances the cash-flow position of the project beneficiary, increasing the project's financial attractiveness for all parties involved.

The project will serve as an example and will undoubtedly create a competitive advantage for NER, in its ambitions to expand steadily on the Romanian market.

- Description of the PURPOSE of the project:

The main reason this project is carried out is to cover the thermal energy demand efficiently, at lowest possible cost and with due respect for the EU legislation regarding the emission of pollutants to the environment. To achieve this, a significant capital expenditure is required to construct new electricity and heat production facilities and to upgrade one of the existing HOB and the heat transportation network.

The cogeneration process leads to the generation of a certain amount of electricity. As the project will displace older and more polluting power plants in Romania, switching also from lignite to natural gas burning, there will be a significant reduction in the amount of CO_2 released into the atmosphere.

Alongside with the introduction of cogeneration, the installation of new, very efficient HOB's together with the upgrading of one of the existing HOB's and of the heat transportation networks will decrease considerably the losses into the system and will increase the efficiency of the heat production. The much lower pollution will be the combined result of:

- A lower heat demand by the end user;
- Lower losses during production and transportation of the thermal energy;
- The lowered production will be realized with a much higher efficiency. Besides, since part of heat is produced in cogeneration, the electricity produced will replace electricity which otherwise will be produced with a much lower efficiency and from more polluting fuels.

- Description of the RESULTS of the project:

The concrete outputs produced by the project for it to achieve the purpose are:

- Decrease of the net heat demand by 36,100 GJ/year;
- Decrease of the heat transportation and distribution losses by 10%[1] (99,928 GJ/year);
- Heat production in cogeneration: 285,333 GJ/year;
- Heat production by new HOB: 235,398 GJ/year (after full project implementation);
- Heat production by rehabilitated HOB: 258,709 GJ/year (after full project implementation);
- Electricity production cogeneration plant: 53,961 MWh_e/year

[1] Gradually

- CO_2 emission reduction (ktonne/year): 81.92/2006, 82.54/ 2007, 80.72/2008, 79.05/2009, 77.50/2010, 76.08/2011 and 74.77/2012.

- Description of the ACTIVITIES of the project:

  The following activities will be carried out in order to realize the results:
  - NER will build and own for the period of the lease contract the new cogenerating facilities and the new HOBs. At the end of the lease period the ownership of these assets will be transferred to TERMICA, in accordance with the terms of the contract. At this point in time TERMICA will become contractually the supplier of ERUs, releasing NER from this obligation. The Contract to deliver Emission Reductions to the Netherlands will explicitly mention this.
  - TERMICA will be in charge for the rehabilitation and the upgrading of one of the existing HOBs and of the heat transportation networks;
  - N.V. Nuon Warmte will make all the necessary arrangements for NER to finance and erect the cogeneration facilities and the new HOBs;
  - TERMICA and the Local Council will make all the necessary arrangements to ensure the financial closure for the rehabilitation of the existing HOB and heat transportation networks.
  - NER and TERMICA will cooperate so as to competently, efficiently and professionally manage the project in order to minimize heat and electricity costs to the consumers;
  - The City is to provide, whenever necessary, the land, free of encumbrances, for the construction of the new facilities.

1.7. Detailed Project Description

- Description of the technology:

  - The cogeneration part of the project will be based on the well-established gas engine technology, renown for its reliability and robustness, and also for safely operating at very low gas pressure, what is a prerequisite in the Romanian context. Nuon's ability and experience record with such projects has been demonstrated by the results in the Netherlands, where more than 650 gas engine installations with a total installed capacity of about 1,000 MWe, comparable to those to be installed in Târgovişte are running efficiently and at low cost. Also NER is experienced with the installation and operation of such projects. Firstly in Sibiu, where NER is maintaining NUONSIB's gas engines on a contractual basis, as well as in Târgovişte, where NER has installed a first gas engine with no external support, and is also in charge for the maintenance of the installation. Since this technology has been already demonstrated for a long period of time in Sibiu and, in the mean time, a first gas engine installation is successfully operating in Târgovişte no bottlenecks whatsoever are being expected in implementing this technology.
  - The new HOBs will be of Romanian make, responding to the most actual international requirements with respect to efficiency, emission levels and reliability. During the last three years, NER has built-up a good cooperation with one of the most renown Romanian boiler manufacturers and the three new HOBs in operation in Sibiu have proved to respond to the above mentioned requirements.
  - TERMICA and NER as well have a vast experience with upgrading heat transportation networks, using the most advanced materials and technologies available today.
  - The data related to the expected efficiency of the existing HOB after its upgrading is based on a very detailed study which has been carried out for TERMICA by one of the leading Romanian consulting firms. The proposed upgrading will include the replacement of the existing burners by new, very efficient ones, which, in combination with the upgrading of other components, will lead to an important increase of the thermal efficiency of his boiler. Together with the higher efficiency, the reliability and availability of the boiler will also increase, as well as its remaining lifetime.

- Technical capacity:

As it has been mentioned above, in the Netherlands, Nuon has designed and implemented more than 650 cogeneration plants based on gas engine technology, with a total installed electric generating capacity of about 1000 MWe. The gas engine installations are mostly serving district heating, green-houses, hospitals, swimming pools and loads of utility buildings. The majority of them are owned by Nuon, the remainder being co-ownerships.
Nuon has combined in all these projects its knowledge and experience on energy conservation first, followed by modern cogeneration technologies for the lowered heat demand.
Good examples of such projects are: de Wenk in Amsterdam, WKC Wageningen and WKC Lelystad.

In Romania, Nuon is professionally active since 1996, when started a joint venture with the Local Council in the City of Sibiu. At the premises of NUONSIB (66% Nuon and 34% Local Council of Sibiu) new cogeneration facilities have been installed, the old and obsolete heat only boilers have been replaced by new ones, together with all heat exchangers and recirculation systems. Today, the performance of this Romanian project is similar with that of similar projects in the Netherlands. The Sibiu project shows Nuon's ability to realize such projects in the Romanian conditions and context.

TERMICA has also a remarkable record of service regarding the maintenance of existing installations and renovation of heat transportation and distribution networks.

Another relevant project has been implemented last year in Târgovişte, at the premises of the partner of this proposal, TERMICA SA. As it has been explained in Chapter 1.5, this small installation served for testing the viability and appropriateness of the newly developed approach of Financial Leasing. The installation has been commissioned in October 2003, and is since December 1st, 2003 commercially operating.

Figure 2 Cogenerating facilities operating in Sibiu since 1997

Figure 3 New heat only boiler during its installation last year in Sibiu

Figure 4 ANDREEA, the new cogeneration installation in operation in Târgovişte since October 2003

- Expected availability:

  The experience accumulated in Sibiu since 1997 shows that, when properly maintained, the availability of both, cogeneration and HOBs, is as high as of comparable installations in the

Netherlands. The maintenance of the new installations in Târgovişte will be based on a contract strictly stipulating the frequency and the type of all maintenance activities. It is therefore to be expected that these installations will achieve the same availability as the ones operating at NUONSIB premises in Sibiu, e.g. 95% or more.

- Expected capacity factors and the related project activity level:

Besides the technical availability, the shape of the demand is influencing the way the new installations will be used and the related capacity factor. A simulation of the future operation of the heat and power generating facilities of TERMICA, with as objective function the minimization of the variable costs, has been performed. The figure 5 below shows the results from this simulation.

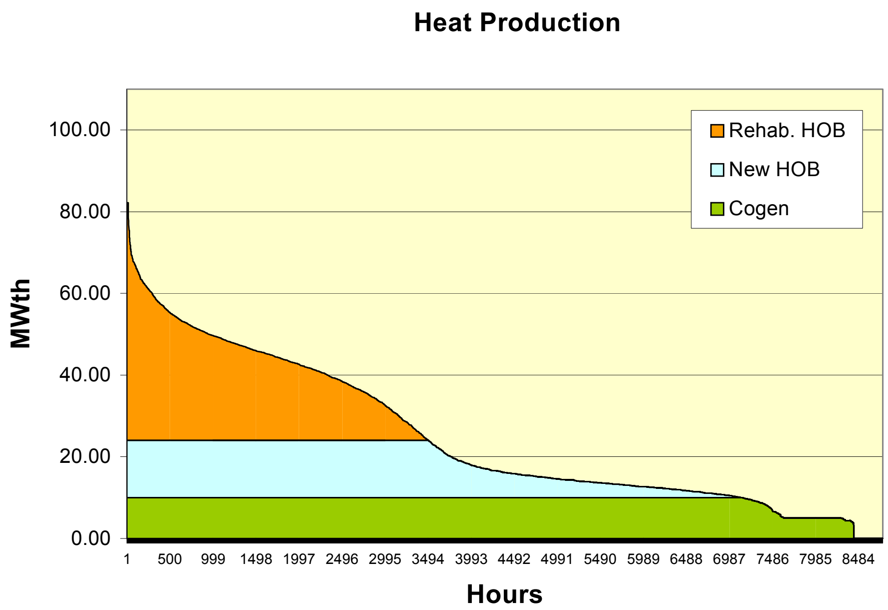

Figure 5 Load Duration Curve for the heat production

The related capacity factors and the annual production of each type of installation are given in Table 1 below.

Table 1 Capacity factors and project activity levels after full project implementation

Installation	Electric capacity	Thermal capacity	Capacity Factor	Electricity production	Heat production
	MWe	MWth	%	MWhe	GJ
Gas engines	6.8	10.0	90.39	53,961	285,333
New HOB	NA	14.0	53.32	NA	235,398
Rehab. HOB	NA	58.2	14.11	NA	258,709

2. CURRENT SITUATION

2.1. Status and adequacy of the current delivery system

The municipally owned TERMICA supplies thermal energy for the district heating system of the city Târgovişte. Târgovişte is located about 80 kilometres North West of Bucharest. It is the capital of the province Dambovita, former capital of Romania and an important industrial city. It has about 100,000, the majority of them living in large apartment buildings. At present Termica supplies thermal energy for space heating and hot tap water to about 16,000 apartments (88% out of total consumption) and 370 businesses, schools and kindergartens.
The heat transportation network has a length of 17.3 km, while the length of the distribution networks amounts to 42 km. The heat transportation network is located 25% above ground and 75% underground and it is about 18 years old (mean value). Although during recent years TERMICA allocated as much as possible funding to the rehabilitation of this network, its technical status is still very poor, leading to about 22% losses during the transportation of the thermal energy from the points of production to the thermal substations. The status of the 32 substations is much better; the old-fashioned tube-and-shell heat exchangers have been replaced by flat heat exchangers and the newly installed automated system controls the flow of hot water in function of the ambient temperature. From the existing 32 substations, at present only 29 are interconnected through the heat transportation network, three of them being isolated and serving local heat loads.

The consumption of hot tap water is measured in proportion of 100% for each stair case separately, whereas the consumption of energy for space heating is monitored for 80.9%. As it has been expected, the monitoring of energy consumption has a positive impact on the consumption figures, in 2002 being registered a decrease of consumption with about 20% in comparison with the year 2000. The figure below shows the monitored trend of energy consumption. It should be noted the figure below indicates the heat delivery, which represents correctly the actual consumption but is an underestimate with regard to the real demand. During the years 2002 and 2003 (as well as the winter months of 2004) the available heat generating capacity was not sufficient to cover the peak demand during very cold periods. Recorded data and analyses performed by TERMICA indicate that the unserved demand represents about 10% of the amount of delivered thermal energy.

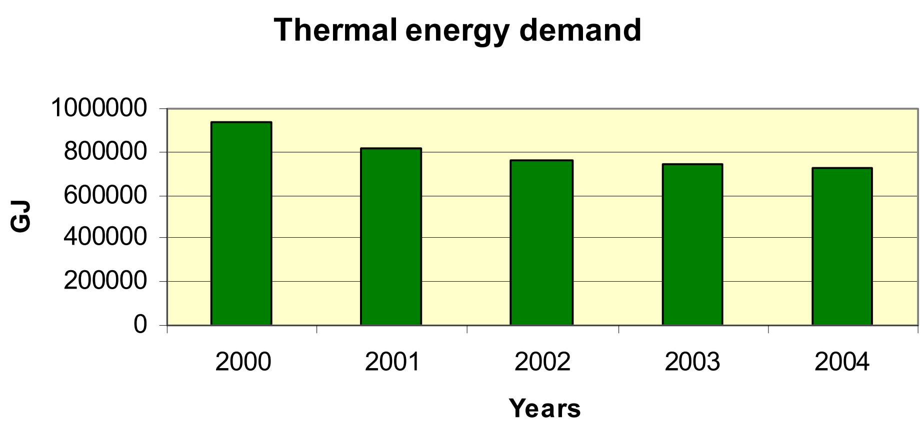

Figure 6 Evolution of the thermal energy consumption

The existing heat only boilers have a low efficiency, leading to a high consumption of natural gas for the production of heat. During the last years TERMICA has paid much attention to the increase of the availability of these old boilers, in order to be able to avoid, as much as possible, the implication of the Doicesti power station into the coverage of the heat demand.

But, as it has been mentioned above, due to the inadequacy of the heat generating system, TERMICA has not been able to cover about 10% of the thermal energy demand. Although average consumption data over the last years give a better representation of the demand differences caused by warmer or colder winters, as a conservative assumption, the figure for the year 2003 has been used as starting point of the analysis. This figure, however, has been corrected so as to account for the amount of energy demanded but not served.

2.2. Operation mode of the current delivery system

The operation mode in the current situation is schematically presented in the figure below. This current situation has been used as the starting point for the definition of the baseline.

The steam boilers K11 and K12 have been taken out of operation and are conserved. As mentioned before, some parts of the city are not yet connected to the main district heating system and locally situated heat only boilers, connected to local area networks, produce the heat and hot tap water for the apartment buildings. They are indicated in the figure 7 hereunder as "*3 x Local Thermo Plant*". The heat demands of these three areas, as well as the related heat production have been added to the centralized demand and the associated production. In this way the heat demands in the baseline and the project scenario have been consistently defined.

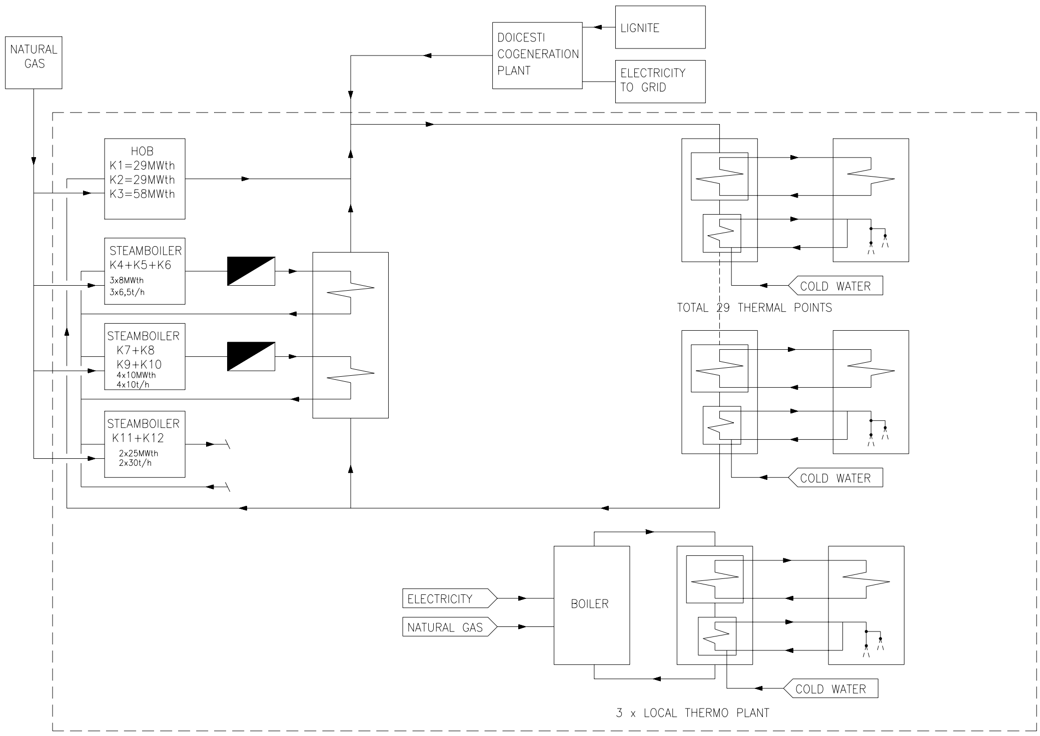

Figure 7 Schematic presentation of the current situation

As it has been previously mentioned, in the past, during cold spells, it has been necessary to cover the heat demand partly by heat produced by the Doicesti power plant. Depending on the severity of the winter, in the past such situations occurred during periods of a few weeks to a few months per year. During the last two winters TERMICA did not requested any thermal energy from the Doicesti power plant. This is decreasing the transportation losses, since it avoids the transportation of heat from the Doicesti power station over a length of 12 km, through an obsolete transport system. However, as already has been said, this had as consequence that during the cold days the demanded energy remained partly uncovered, leading to discomfort for the clients of TERMICA.

In the absence of the new project, in the future the necessity to use some heat from Doicesti will reappear, unless one or both of the conserved boilers K11 or K12 will be brought back into operation. For the baseline definition it has been assumed that these boilers will be operating again, avoiding the need to import heat produced by the Doiceşti power station in order to cover the heat demand in Târgovişte. This is a conservative assumption with respect to the baseline emissions level, since the heat produced by the Doiceşti power station is much more polluting than the heat produced by the old boilers of TERMICA.

The best of TERMICA's heat only boiler is the K3 boiler, with an installed capacity of 58 MW_{th}. A combustion efficiency test performed some times ago by a Romanian specialised company revealed a thermal efficiency of 73.5%, based on the lower heating value of the burned gas. As known, the combustion efficiency test relates to a situation when the boiler is operating under a steady load and therefore does not give the overall efficiency of the boiler plant, but tells how far boiler efficiency drifts away from the best efficiency that one can achieve when the boiler is fully tuned up. The test does not reveal standby losses, which occur between firing intervals. Under normal operation conditions, the efficiency of the boiler drops to about 69% to 70%, influenced by a number of factors as heat loss from the surface of the boiler to the surrounding space, blowdown loss, incomplete combustion of fuel, etc. The combustion efficiency test also does not account for the energy use by auxiliary equipment, such as burners, fans, and fuel pumps.

The thermal efficiency of the other HOBs in operation is even lower and this is also the reason that only the K3 boiler has been proposed for rehabilitation. Under normal operation conditions, these boilers achieve a net thermal efficiency of around 65%, driving the weighted average efficiency of the heat production to about 67%. This figure will decrease further when one or both K11 and K12 boilers will be brought back in operations. These 27 old boilers have been designed as superheated steam boilers, but have been modified by the elimination of the superheaters after TERMICA lost her steam consuming clients. This influenced negatively the efficiency of the boilers. Moreover, the boilers have a manual combustion air supply regulation, leading to an uncontrollable amount of excess combustion air and a large amount of unburned fuel.
Steam is produced at higher pressures than in demanded process requirements. In cost-effective applications, a backpressure steam turbogenerator is used to reduce the pressure of steam. In our case, however, steam passes through pressure-reducing valves (letdown valves) to reduce its pressure. This waste of energy, combined with the impact of the other factors as mentioned above lead to a very low net efficiency of these installations. Although we estimate that the net thermal efficiency of these boilers, in their actual state, will not exceed 50-55%, we agreed with the validator to assume a net efficiency of 60% for these boilers for the calculation of the baseline emissions. This leads to a weighted average efficiency for the total heat production (including the 10% actually not covered demand) of 65%.

3. GREENHOUSE GAS SOURCES AND PROJECT BOUNDARIES

3.1. How the project is influencing the current system

The flowchart in the figure below describes which components of the current system are influenced by the project.

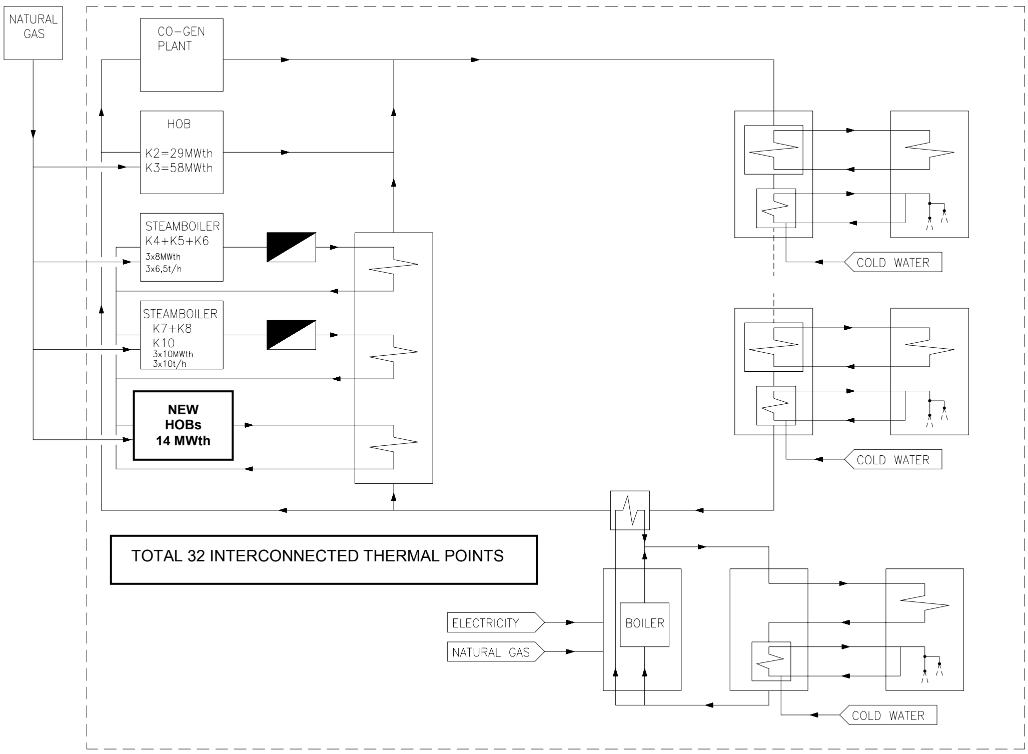

Figure 8 Schematic presentation of the future situation (project scenario)

Changes in comparison to the present situation (see also figure 7) are:

- Addition of the cogenerating facilities, which will deliver the produced heat to the primary heat network and the electricity to the local distribution network;
- Installation of new heat only boilers with a very high efficiency of 94% (LHV), increasing also the capability of the heat production system by 14 MWth.
- Modernization of the existing heat only boiler with a capacity of 58.2 MWth, in order to increase their lifetime and efficiency. Due to the replacement of the heat exchangers, pumps, valves and burners, the boiler will achieve a net efficiency of 90% (LHV).
- Connection of the three actually separated local thermal plants to the primary heat network, enlarging the main heat interconnected system with these three areas. At present the heat demand of these areas is covered by production with three heat-only-boilers, as it is shown in figure 7. Through the connection of these three isolated networks to the central network it will become possible to cover also the heat demands in these areas partly from the cogeneration plants which will be feeding into the centralized network (see figure above). This will increase the heat demand to be covered from cogeneration, making possible the economic increase of the total installed cogenerating capacity, which at the end will lead to a higher production of electricity and consequently to a higher CO_2 emission reduction and a better financial result.

- Modernization (partly repairs, partly replacement) of the heat transportation network, decreasing gradually the losses during the transportation of heat from the production site to the substations from the present 22% to only 12% by the year 2012.

3.2. Direct and indirect emissions

3.2.1. Current situation

The GHG emission sources in the current situation are:

- Heat production by the heat only boilers (direct on-site)
- Electricity production by other power plants (direct off-site)

There are no significant indirect on-site and off-site emissions.

3.2.2. Project situation

The GHG emission sources in the project situation are:

- Heat production by the heat only boilers (direct on-site)
- Electricity and heat production by the cogeneration units (direct on-site)
- The lower heat consumption in the apartment buildings and other types of buildings supplied by heat through the project leads to a lower necessary heat production and of the related CO_2 emissions (indirect on-site)
- The electricity produced in cogeneration by the project replaces the same amount of electricity which otherwise would have been produced in other plants elsewhere (indirect off-site)

3.3. Project boundaries

The flowchart of the current situation is given in the figure 9 below.

TERMICA is producing only thermal energy by the existing heat only boilers, and this energy is transported trough the heat networks to the final users. The electricity required for different processes is purchased from the regional electricity distribution company.
In this figure no separation has been indicated between primary and secondary networks, which means that the rectangle indicating the "Heat networks" include the primary (transport) heat networks, the substations (mentioned as "Thermal points" in the figures 7 and 8, as well as the secondary (distribution) networks.

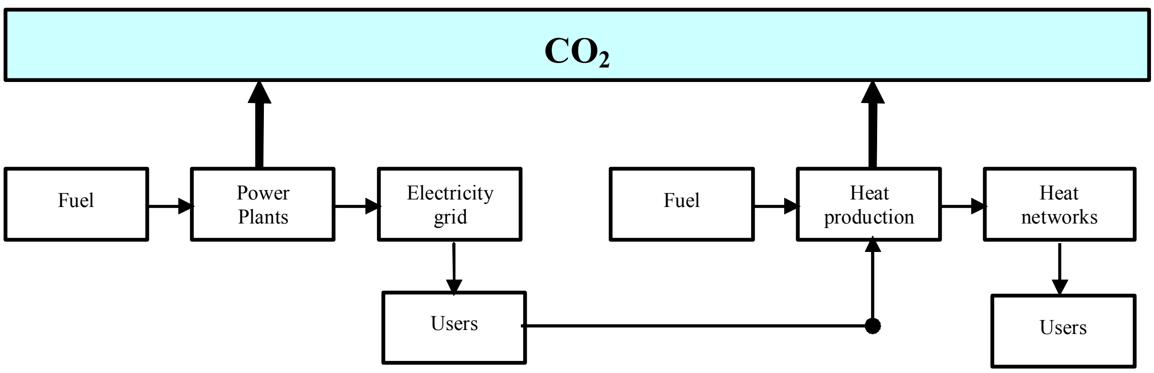

Figure 9 Flowchart of the current situation

The flowchart of the project (see figure 10) indicates the changes induced by the project, as well as the project boundaries.
Since the project also involves interventions to the heat transportation networks (up-to the substations), this component has been also placed within the project boundaries.
Also the emissions from the generation of electricity off-site are taken into account, since part of this production will replaced by the electricity generated by the project.

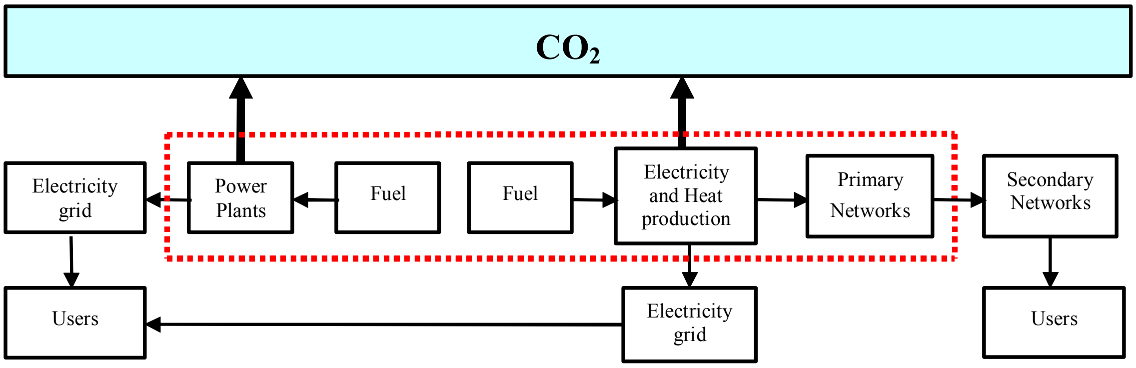

Figure 10 Flowchart of the Project

Within the project some electricity is used for a number of processes such as recirculation of water in the heat transportation and distribution systems, automation, lighting, etc. Although it is to be expected that, due to the use of better performing equipment, the internal consumption of electricity will decrease in comparison with the present situation, this decrease of electricity consumption and the related decrease of CO_2 emission has not been taken into account. The main reason for not considering this decrease of electricity consumption is located into the relative low impact on the project results, combined with the difficulty of providing a reliable figure within the required confidence interval. It is important to underscore that this simplification is decreasing and not increasing the calculated emission reduction and the related attractiveness of the project. The assumption of equal consumptions of electricity in the baseline and in the project scenario is illustrated by the "PM" posts in the emissions calculation tables (items B10, P10 and P14).

4. KEY FACTORS

As in any other project, also this one is determined by a variety of project/sector-specific and country-specific factors. Some of these factors having a crucial impact have been considered *key factors* and therefore included in the procedure leading up to the baseline definition. They affect either:

- The baseline development of emissions, and/or
- The project's activity level and GHG emissions, or
- The risks for the project

4.1. External (off-site) key factors

4.1.1.Sectoral reforms projects

With its "Road Map for Energy Sector of Romania" ("**Road Map**"), the Romanian Government presented in July 2003 the country's updated long-term energy policy.
Recognizing that Romania has continued to make progress towards being a functional market economy, this Road Map is focusing on the remaining steps Romania needs to follow in order to accelerate the alignment of its policies with the EU "acquis" in the energy field.

This roadmap has been drafted based on the energy policy of the Romanian Government, by identifying specific task and targets, timetable for their implementation, as well as the needed financial effort and expected resources to cover.
The Road Map provides a number of directions for a sustainable energy policy in Romania, including the liberalization of the domestic energy market, improved energy efficiency, energy conservation, increased utilization of renewable energy resources, strict pollution controls, improved energy management, diversification of energy supply sources, establishment of adequate domestic fuel stocks, increased research and development, and implementation of advanced energy technologies. It covers the power sector and natural gas sector; some other sub-sectors such as coal/lignite and oil, energy efficiency are dealt only briefly as supportive sectors (fuel suppliers) for the power sector. For these sectors separate detailed strategies have been prepared.

4.1.2. Economic growth, the economic situation in the electricity sector and resulting predicted power demand

The Road Map indicates that Romanian's Government policy is to sustain an accelerated growth of the GDP in view of achieving the strategic objective of reduction of the economic discrepancy between Romania and EU countries. Two scenarios of GDP growth, where basically considered for the period till the year 2015. The related figures are given in Table 2 below.

Table 2 Development of GDP

	Achieved 2000 - 2001	2002 – 2005	2006 – 2010	2011 - 2015	Average 2002 - 2015
Base Case Scenario	5.2%	5.1%	6.0%	5.2%	5.46%
Alternative scenario	NA	4.4%	5.5%	4.8%	4.9%

The basic scenario is the one the Government is keen to implement, based on accelerated development of the economy, where industry development has a key role, as well as acceleration of the privatization in the electricity gas and oil sectors, but also accomplishment of the privatization in other sectors of the national economy.
The alternative scenario has been considered having in view to the possible negative impact of the trend of the worldwide economy on the Romania market which could slow down some economic processes.

With respect to the energy efficiency, the basic scenario counts on a decrease of the overall energy intensity by 30-50% till the year 2015, in a complex process which involves replacing of old, high energy consuming, technologies, by new, modern ones, in a structural adjustment of the economy.
The alternative scenario is based on the assumption that, over the same period, the energy intensity will decrease by only 25%.

It is foreseen that the population of Romania will be of 22.2 to 22.3 million inhabitants by the year 2007 and 22.6 million by the year 2015. Although the household appliances will become more and more efficient, due to an increase in their number it is expected that the domestic electricity consumption will increase too.

Based on the objectives of GDP growth, reduction of the energy intensity by 30-50% and an increased consumption in households, the Road Map forecasts a demand growth of 2.7% per year, at an annual GDP growth of 4-5 %.

More information on the macroeconomic and electricity consumption indicators is given in the Appendix 1.

4.1.3. Legislation development

The energy market model approach of Romania is based on the liberalization (gradual opening) as an integral part of the overall philosophy of liberalization of the national economy and free circulation of goods and services. The aim is to create such structures and market environment so that to respond and cope with the increasingly integrated European energy market, where national markets are step by step losing their traditional borders and are becoming part of a common European market.
In the last three years, based on these trends, several important steps have been already taken in Romanian energy sector, by implementation of a deregulation process, based on the need of setting more market principles and free competition, as well as by promoting a sustained privatization process.
In this respect the following have been achieved:

- Unbundling of the vertically integrated power companies into independent Generation, Transmission, Distribution and supply entities;
- Further unbundling of the generation sector into 5 thermal power producers, one hydro producer, one nuclear producer and 14 cogeneration plants transferred to the local authorities; there also three small IPP separated in 1988;
- Regulated third party access, on a non discriminatory basis, to both electricity and natural gas networks;
- Two National Regulatory Agencies, one for electricity (ANRE) and one for gas (ANRGN) have been installed, with the aim of creating stable and transparent rules, encouraging commercial activity and safeguarding public interests, in accordance with the requirements of the EU Internal Electricity Market Directive 96/92/EC for the establishment of an independent regulatory body and of the Directive 98/30/CE of the European Parliament and of the Council of 22 June 1998 concerning common rules for the internal market natural gas;

Although these achievements are important prerequisites for stimulating investments in the electricity generating sector, the present approach of short term regulated contracts between independent producers, or autoproducers, and the distributors, instead of long-term power purchase agreements with clear and safeguarded stipulations, proved to be an important obstacle for new entrants on the electricity and heat generation market.

4.1.4. Capital availability

Now that Romania's economic growth is accelerating, pressure on electricity facilities and services is increasing, but raising the necessary investment resources is proving to be a major challenge. Power sector reforms were launched in the late 1990s and substantial progress has been made. However, some fundamental issues remain to be resolved before a well-functioning market can emerge and before the sector can operate within the larger regional and European networks.

Although also different smaller financial institutions have been involved in financing several projects in the energy sector, the EBRD and the World Bank are by far the largest moneylenders for such projects.

The EBRD is the largest international investor in Romania with commitments exceeding Euro 2 billion. Romania is the 3rd largest recipient of EBRD funding. The Bank's Romanian portfolio is rapidly expanding in areas such as large-scale privatisation with strategic investors, greenfield private sector investment, financial sector development and critical infrastructure such as power, transport, communications and municipal infrastructure. Whenever possible, the EBRD is encouraging the private financing of infrastructure through concessions and BO(O)T schemes.

EBRD is a major catalyst for investments in Romania, with cumulative business of EUR 2.37 billion and total funds mobilized of EUR 7.5 billion, while cumulative FDI in Romania is less than EUR 10.0 billion
In the context of much needed investments in infrastructure and the limited amounts available for sovereign guarantees EBRD declared that will seek to support ambitious investment programs by creating further non-sovereign finance structures for public utilities, concessions and other instruments. The Bank's focus will include the broader regional impact of energy investments in Romania. It will support the privatization momentum in the energy sector, particularly for SNP Petrom, the electricity and gas distribution companies as well as electricity generation plants. Thereby it will contribute to the improvement of the environmental conditions of those projects.

The World Bank is the second important financial institution active in the energy field in Romania. Since Romania joined the World Bank in 1991, Bank commitments to the country total over USD 3 billion for 30 operations. On June 12, 2003, the World Bank's Board of Executive Directors approved a 74.3 million Euro loan to Romania for the Electricity Market Project, which aims to develop a well-functioning wholesale electricity market and improve the efficiency and reliability of the transmission system.

Although the above mentioned figures are very impressive, they stimulate the implementation of larger projects. Financing of smaller projects, like ours, is more difficult and more costly. Smaller banks and investment funds, many times also with support from EBRD and the EU, offer financing for smaller projects, sometimes through special arrangements for medium and small enterprises (SMEs), but the interest rates for such financial arrangements are much higher than those for the large projects with direct involvement of the State.

4.1.5.Technology

The project will be based on the well-established gas engine technology, renown for reliability and robustness, and also for safely operating at very low gas pressure, what is a prerequisite in the Romanian context. Nuon's ability and experience record with such projects has been demonstrated by the results in the Netherlands, where more than 650 gas engine installations with a total installed capacity of about 1,000 MWe, comparable to those to be installed in Târgovişte are running efficiently and at low cost. Also NER is experienced with the installation and operation of such projects. NER has demonstrated its ability to erect and maintain such installations, first in Sibiu, where NER is maintaining NUONSIB's gas engines on a contractual basis, as well as in Târgovişte, where NER has installed a first gas engine with no external support, and is also in charge for the maintenance of the installation.

4.1.6.Social effects and local support

The general objective of the energy strategy of Romania is to satisfy the energy demand - corresponding to a modern economy and a civilized living standard -at the lowest price, observing the quality and supply safety standards and diminishing the environmental impact up to levels admitted in the European Union. Locally, the acceptance of the project is dictated by its impact on the quality and price of the services offered its impact on the environment and on the employment.

4.1.7. Fuel price and availability

Domestic natural gas production will register a sharp decrease due to limited natural reserves. Consequently the dependency on import will increase as given in Table 3, below.

Table 3 Natural gas consumption by sources

Overall gas consumption in Romania (all figures in billion m^3 unless others indicated)													
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Total consumption	18.3	18.3	18.4	18.8	19.2	19.6	20.0	20.4	20.8	21.2	21.6	22.0	22.4
Domestic sources	12.7	12.5	11.5	10.9	10.4	10.1	9.8	9.5	9.2	8.9	8.6	8.3	8.0
Import sources	5.6	5.8	6.9	7.9	8.8	9.5	10.2	10.9	11.6	12.3	13.0	13.7	14.4
Share of import, %	30.6	31.7	37.5	42.0	45.8	48.5	51.0	53.4	55.8	58.0	60.2	62.3	64.3

Source: National Regulatory Authority for Natural Gas Sector, Bucharest 2003

As in many other transition economies, also in Romania, in the past, the price of natural gas has been kept for a long period of time below its market value. In 2002 the price of natural gas has been set up at 82.5 USD/1000 m^3 for all user categories (the previous price was 45.12 USD/1000 m^3 for household consumers and 85.0 USD/1000 m^3 for industrial consumers). As of March 2003 the price level has been increased to 90.0 USD/1000 m3 and as of July 2003 at 99.0 USD/1000 m^3. This year, for the first time, the price for households has been increased more than for the industrial consumers. As from April 1st 2004, the price for residential consumers amounts to 138.0 USD/1000 m^3 and for industrial users 127.0 USD/1000 m^3.
This, at first sight insignificant difference, may play, however, a very important role into the future development of centralized production and supply of thermal energy. A correct pricing of the natural gas for the two categories of consumers will create a level playing field between the centralized and the individual production of thermal energy. The Government indicated that with the further steps in the increase of the price of natural gas, also the price difference between the industrial users and households will be increased. In 2002, the EU average price of the natural gas for industry amounted to 4.91 €/GJ (GCV) whereas the average price for households was 13.62 €/GJ (GCV) (Source: EU Energy and Transport Figures – Statistical Pocketbook 2003).
A further differentiation of the gas price for the two categories of consumers will create a further stimulus for the further expansion of cogeneration in combination of district heating, of course conditioned by a high quality and efficiency of the service offered.

4.1.8. Rate of return of different alternative projects

The very scarce Combined Heat and Power projects currently being undertaken in Romania are being financed with the support of the Government. This allows the owners and operators of the projects to sign long-term contracts for financing capital intensive energy efficiency improvement projects that are partly privately financed, with the payments being made from the resulted cost savings. The involvement of the Government as guarantor has a positive effect on the financing costs, since the risk to the financier is minimized. The investor of such projects should and will therefore accept a lower rate of return than for project financing with no sovereign guarantees. The lease concept complicates things further, since the cash-flow of the investor/owner, and the related return, is separated from the cash-flow of the user/operator/beneficiary of the project. It is clear that the required Return on Investment, will affect differently the Internal Rate of Return of lessor's cash-flow, compared to that of the lessee.

4.1.9. National expansion plan for the electricity sector

As it has been mentioned before, with its **Road Map**, the Romanian Government presented in July 2003 the country's updated long-term energy policy.

The need for new capacities has been determined based on the forecasted demand growth and the foreseen retirement program. The selection of the power projects to be promoted has been done on the merit order, using the levelized cost calculation. The results of this analysis are given in Table 4 hereunder.

Table 4 Retirement and capacity addition program (in MWe)

Period	**2003-2005**		**2006-2010**		**2011-2015**	
Type of capacity	**New capacity**	**Capacity to be retired**	**New capacity**	**Capacity to be retired**	**New capacity**	**Capacity to be retired**
Hydro: -New capacity -Rehabilitation	129 MW: 99 MW 30 MW	-	200 MW: 200 MW -	-	200 MW: 200 MW -	-
Thermal: -New capacity -Rehabilitation	555 MW: - 555 MW	1280 MW	3505 MW: 1445 MW 2060 MW	2185 MW	710 MW: 500 MW 210 MW	
Nuclear			707 MW		707 MW	-
Total	1284 MW	1280 MW	4412 MW	2185 MW	1617 MW	-

This merit order hierarchy has led to the following consideration:

- **Nuclear power generation**:
  Cernavoda unit 2 (707 MW) followed by Cernavoda unit 3 (707 MW).
  Nuclear energy is considered to be the main sector to cover the future increase of energy demand. The nuclear energy represents one of the most efficient energy and is reducing the dependency of import of energy resources;

- **Additional hydro power** generation capacity, economically feasible, estimated at 500-900 MW;

- **Power generation based on lignite and hard coal:**
  - by rehabilitation of some of the existing units there where the upgrading costs are less than 50% of that of new capacity**;**
  - and/or the installation of new units

  The following locations are envisaged: Turceni, Rovinari, Isalnita, and Deva-Mintia.
  The rehabilitation projects could represent 35-45% of the total newly needed power generation capacity.

- **Combined cycle gas turbines**:
  Only 15% of the total power generation will be secured by natural gas.

A more concrete denomination of the rehabilitation and new projects is given in table 5 below.

Table 5 Rehabilitations and capacity additions program (in MWe)

	2004	2005	Total 2004-2005	Total 2006-2010	Total 2011-2015	Total 2004-2015
	Installed power					
TOTAL	**272**	**412**	**684**	**4412**	**1617**	**6713**
1. Rehabilitated capacity	**240**	**345**	**585**	**2060**	**210**	**2855**
1.1. Thermal power plants	**225**	**330**	**555**	**2060**	**210**	**2825**
- Turceni - unit 5*, 6, 3 (L)		1 x 330	330	2 x 330		990
- Rovinari - unit 3, 5 (L)				2 x 330		660
- Isalnita - unit 7 (L)				1 x 315		315
- Deva - unit 3*, 1 (HC)	1 x 225		225	1 x 210		435
- Palas - unit 1 (FO)				1 x 50		50
- Galati - unit 3, 4, 5, 6 (NG)				1x105; 1x60	2 x 105	375
1.2. Hydro power plants (Portile de Fier)	**15**	**15**	**30**			**30**
2. New capacity	**32**	**67**	**99**	**2352**	**1407**	**3858**
2.1. Thermal power plants				**1445**	**500**	**1945**
- Paroseni - unit 4* (HC)				1 x 150		150
- Gas Turbines w/ Heat Recovery						
Grozavesti (NG)				2 x 50		100
Craiova II (NG)				1 x 25		25
Bucuresti Sud (NG)				1 x 71		71
Titan (NG)				1 x 13.5		13,5
Palas (NG)				1 x 25		25
- CCGT						
electricity only (NG)					2 x 250	500
Cogeneration						
- Bucuresti Sud (NG)				2 x 100		200
- Bucuresti Vest (NG)				2 x 100		200
- lignite-fired unit w/ AFBC boiler						
Rovinari (L)				2 x 330		660
Doicesti (L)						
2.2. Hydro power plants	**32**	**67**	**99**	**200**	**200**	**499**
2.3. Nuclear power plants				**707**	**707**	**1414**
***) Decided units**						

(L) = lignite, (HC) = hard coal, (FO) = fuel oil, (NG) = natural gas

The contribution of the different types of plants to the coverage of the required electricity production is shown in figure 11 below.

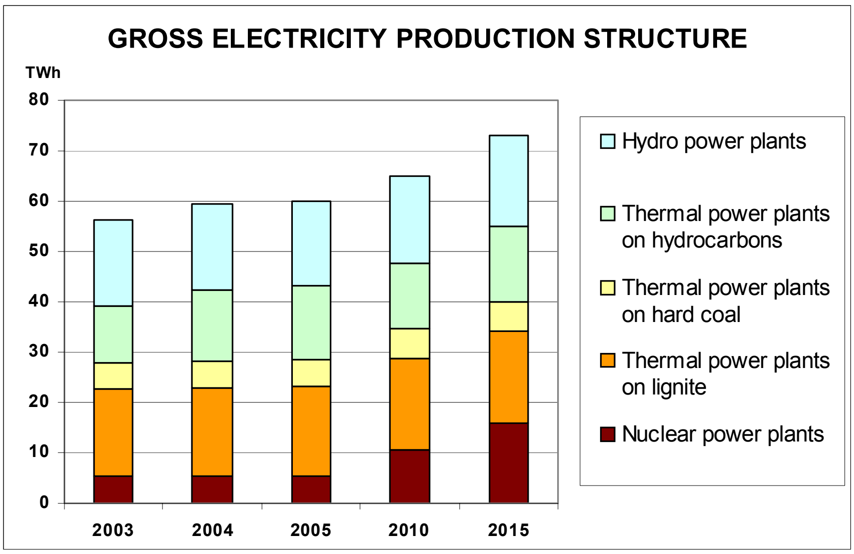

Figure 11 Electricity productions by type of fuels

The energy sector needs for investments should be fulfilled through the private equity participation to the maximum extend possible. The ongoing reform and restructuring of the energy sector should make the sector as attractive and convincing as possible for the private investors, so as to maximize the inflow of the foreign capital, to compensate for the limited financial capacity within the country.

The road map architects conclude that it is of outmost importance to promote an appropriate sequence of investments, starting with the most viable projects, which could represent a success story and encourage the investors, as well as a stable and transparent legal and regulatory framework and an appropriate market model and structure. New contracting mechanisms as described in the road map for regulation should be put in place to respond to the expectations of the investors and to limit the practice of long-term power purchase agreements which should be promoted on a very selective base and only if they will not break the EU Directives of "stranded costs" or "state aid".

Further, the Road Map states that the limited investment capacity of the state-owned companies (direct financing or sovereign guarantees) should be used in the next years only for those projects (natural gas and power production and transmission) important for the national system, but less attractive for foreign investors at this transition stage.

4.2. Project-specific (on-site) key factors

The on-site key factors who may affect its results are:
- The realization of the project within time and budget;
- Technical performance (availability and efficiency);

NER's experience record with the realization and operation of such projects represents a clear guarantee for the fulfilment of all these requirements and expectations.

5. CALCULATION OF THE BASELINE EMISSIONS

5.1. Key factors analysis and construction of the baseline scenario

The following alternatives have been identified as potential baseline options:

Baseline option 1: full implementation of the strategy as described into the Road Map scenario. This means that up-to the year 2010 3,465 MWe of existing fossil fuel capacity will be decommissioned, 2,615 MWe of the same type of capacity will be rehabilitated and only a very few number of new cogeneration units on natural gas (1,445 MWe) will be realized. Also Cernavodă 2 nuclear station and some hydro units will come online. After the year 2010, the commissioning of Cernavodă 3 is envisaged, together with 200 MWe new hydro capacity and 500 MWe condensing gas fired capacity, as well as the rehabilitation of the Galați units. This means that all new to be built gas fired units will have a must run obligation (due to obligation to deliver heat or to cover local industrial energy demands) and that the rehabilitation of existing lignite fuelled units will represent 35-45% of the total capacity additions requirements.

Baseline option 2: realization of the proposed project, as part as the strategy mentioned as option 1. For a local as well as an environmental point of view this strategy should be preferred, since it is solving the heating needs of Târgovişte in an environmental sound manner. This is, however, unlikely to occur without the income from the ERUs transaction, due to the unattractiveness of the economics of the project to a private investor. This conclusion is leading to the elimination of this option as baseline.

Argumentation for the elimination of some baseline options
The majority of the in the past realized projects was related to the rehabilitation of existing lignite and hard coal power plants. In Romania such projects are indicated as "rehabilitations" and not "refurbishments" or "revamping" in order to differentiate them from the last two categories of projects where the intervention is focused not only to lifetime extension and a higher availability, but also to achieving higher fuel efficiency. By contrast, the thermal efficiency of the rehabilitation projects remains practically unchanged or, in a best case, it is marginally increased. The Department for Planning, Studies and Engineering of TRANSELECTRICA S.A. indicates a net efficiency after rehabilitation of around 30% for these generating units.

For new projects private investment is needed. For strategic reasons, the government is actively promoting the nuclear and hydro projects. As it has been explained above, the official policy envisages the realization of only a few new gas fired (co)generating units, most of them in the Bucharest area, intended to solve the heating problems of the capital city. For smaller gas fired units it will be very difficult to compete with the rehabilitation of existing lignite units, although their local advantages (solving the heating problems) as well as national advantages (lower environmental impact) are evident. The consequence of this is obvious, namely that the only investments in large new generating facilities based on natural gas, those already listed into the Road Map, are making an acceptable chance to materialize. The Board of Termocentrale Bucuresti S.A., the largest producer of electricity and heat on natural gas in Romania after the split of TERMOELECTRICA S.A. in 2002, announced recently its intention to bring the company to the Bucharest Stock Exchange, in order to be able to finance its ambitious plan for the construction of new gas fired units in the Bucharest area. Smaller cogeneration projects, like the Târgovişte one, without the economy of scale of larger projects and the possibilities to attract capital of the larger companies, will not be able to materialize, at least not without additional sources of income like the carbon credits.

The conclusion of the above is also that, in the absence of additional sources of funding, like carbon credits, the baseline option 1 is the only viable one.
Consequences of the choice of the option 1 baseline
As it can be seen from tables 5 and 6, only a very limited number of gas fired units will come online in the period till 2015, their share into the future electricity production being limited to about 15%. Although a final decision for the realization of these units has not yet be taken, their role in the coverage of electricity and, mainly, heat demand in areas with shortage in generation capacity like Bucharest makes their coming undisputable.

The figures of the Road Map show also a relatively high amount of existing gas fired condensing units. One should ask the question whether the project will displace also some of the electricity generated by these units. The answer is no and the reason for this is quite simple. Today, the Romanian generating system is characterised by a relatively large overcapacity. Some of the existing gas fired generating units, however, are incapable to operate to their nameplate capacity, due to their physical condition, and many others are too expensive and are therefore not chosen by the Commercial Market Operator (OPCOM). This means that the share in the production of these units is much lower than their share in the "installed capacity". Nevertheless, such units are kept within the system because they are used in emergency situations. Units like Borzeşti, Galaţi and Brăila are used in emergency situations, but they operate for a maximum of 800 hours per year.
With respect to the Iernut power plant it should be mentioned that from the initially installed 800 MW, 200 MW has already been closed down and two other units of 100 MW each will be closed down soon. The remaining 400 MW is so expensive that it is not operating, except for situations of danger of overloading of the Sibiu – Cluj tieline. The Romanian High Voltage transportation system has a severe bottleneck in the N-W direction, which may lead sometimes to situations of overloading. To avoid overloading of this line, in critical situations, one of the two 200 MW units in Iernut is started up and is running for a limited

number of hours. Over a whole year, these units could achieve a few hundreds of hours of operation.
From the above it may be concluded that the new generating capacity to be installed in Târgovişte is not competing with these units, because their reserve role and the related limited hours of operation. This conclusion has been confirmed by the Studies Department of TRANSELECTRICA S.A.

Further, considering also that the expansion of the nuclear and hydro capacity is dictated not only by economic but, as already said, also by strategic reasons, the final conclusion is that the realization of any new project based on gas fired (co)generating capacity, beyond those mentioned into the Road Map, will compete with the rehabilitation of existing lignite fired units only. This will happen, however, only for timely implemented projects, this means before the lignite fired units have been rehabilitated. Once rehabilitated, the new projects will have to compete only with their operating costs (rehabilitation costs being then sunk-costs), which are very low, making the new projects economically unfeasible.

5.2. Calculation of the baseline carbon emission factors

The not yet rehabilitated lignite fired units operate presently at a net efficiency of 20% to 28% (LHV of fuel, net busbar efficiency). These figures have been confirmed by the Department for Planning, Studies and Engineering of TRANSELECTRICA S.A. This Department expects that after rehabilitation these units will achieve a net efficiency of around 30%. Some "best in class" units, like it was the case with Turceni #4 unit, may achieve 33% efficiency, but this figure is considered rather an exception than the rule. With this in mind and the conclusion form chapter 5.1, a baseline emission factor based on a gradual increase of the thermal efficiency of these units from the present average of 24% to a future 30% would be defendable. However, as a conservative estimate, for the calculation of the baseline carbon emission factor, we have assumed that until 2012 all these units will be gradually rehabilitated and that after rehabilitation all of them will achieve the highest net efficiency of 33%. The corresponding emission factor is decreasing gradually from 0.0013011 kton CO_2/MWh_e in 2006 to 0.001104 kton CO_2/MWh_e in 2012.

With respect to the local production of heat, in the absence of the proposed project, the use of the present heat only boilers will have to be continued. As it has been mentioned also in chapter 2.2, in order to avoid the dependency from the Doiceşti station for covering the heat demand of the city, the boilers K11 and K12 will have to be brought back into operation. Once again, this is a conservative estimate with respect to the baseline emission levels, since these boilers, fuelled by natural gas, produce a much lower CO_2 emission per GJ of generated heat, even when considering their low efficiency. Taking into account the weighted average net efficiency of 65% of all heat only boilers and the specific CO_2 emission factor of natural gas of 56.1 kg /GJ, the corresponding emission factor of the heat produced by these sources on site is 0.08630769 kton CO_2/TJ.

5.3. Activity level

Since the project does not include any DSM component, for the baseline the same heat demand as for the project scenario has been assumed. As it has been mentioned earlier, as a conservative estimate, the amount of 656,371 GJ of heat, in 2003 delivered at the substations, has been considered as starting point. From TERMICA's own analyses follows that the real heat demand, as also explained in chapter 2.1, is about 10% higher. The present heat demand amounts thus to 772,008 GJ, the difference between this number and the lower one recorded in the year 2003 as supplied heat at the substations represents the amount of thermal energy not served due to the inadequacy of the generating system. Further, it has been assumed that the future a further decrease of the heat demand by about 5%, will materialize, leading to a heat demand at the interface between the primary and secondary heat networks of 685,908 GJ per year. Considering the actual losses in the primary networks of 22%, in the absence of the project the necessary heat production will be 879,369 GJ per year.

With respect to the electricity production, only the amount of electricity that in the project scenario will be generated by the new to be installed cogeneration units has been considered. The local electricity consumption (recirculation pumps, ventilators, lighting, etc.) at TERMICA's premises has not been accounted for, considering that this consumption figure will remain unchanged also after the project implementation. This is a conservative estimate, since it is obvious that the new, more efficient, installations will lead to a decrease of the electricity consumption at the project site.

5.4. Estimation of the baseline emissions

Table 6 Reporting form for the baseline emissions calculation

B		Unit	2006	2007	2008	2009	2010	2011	2012	Average 2008-2012	Level of precision
B1	On site electricity consumption	MWh	P.M.	P.M.	P.M.	P.M	P.M	P.M	P.M	P.M.	
B2	On site heat consumption	TJ	P.M.	P.M.	P.M.	P.M	P.M	P.M	P.M	P.M.	
	Heat production										
B3	Heat produced by sources on site	TJ	879.37	879.37	879.37	879.37	879.37	879.37	879.37	879.37	H
B4	CO_2 equivalent emission factor of heat from sources on site	kton/TJ	0.08631	0.08631	0.08631	0.08631	0.08631	0.08631	0.08631	0.08631	H
B5	Heat from district heating grid	TJ									
B6	Losses in district heating grid	%									
B7	CO_2 equivalent emission factor of heat from district heating grid	kton/TJ									
	Electricity production										
B8	Electricity produced by sources off site	MWh									
B9	CO_2 equivalent emission factor of electricity from other sources on site	kton/ MWh									
B10	Electricity coming from grid	MWh	P.M.	P.M.	P.M.	P.M	P.M	P.M	P.M	P.M.	
B11	Losses in grid	%									
B12	CO_2 equivalent emission factor of electricity from grid	kton/ MWh									
	Other direct on site emissions										
B13	..	kton									
	Other direct off site emissions										
B14	Electricity produced by sources off site	kton	70.21	70.21	67.79	65.53	63.42	61.43	59.97	63.55	H

(*) H= high, M=medium and L=low

6. ESTIMATION OF THE PROJECT EMISSIONS

6.1. Project carbon emission factors

The new cogeneration units will have a net fuel efficiency of 35.7% and electricity to heat ratio (E/H) of 0.68. The last figure is a quite common ratio for this type of installations harmonizing with the installations from Sibiu and from many other Nuon projects in Holland. This means that with 1 GJ of natural gas 0.524 GJ heat and 0.0992 MWh of electricity will be produced. The production of these two quantities of electricity and heat will lead to the emission to atmosphere of 56.1 kg CO_2.

For the new heat only boilers a net efficiency of 94% has been assumed, figure proven in practice in Sibiu and also covered by the contractual guarantees offered by the boiler manufacturer. The existing boiler will reach after rehabilitation an efficiency of 90%. This figure comes from the study performed for TERMICA by a Romanian consulting firm, and it corresponds also to the design efficiency of this type of boiler. Considering the expected contribution of these two types of equipment to the future heat production (see table 1), the weighted average emission factor amounts to 0.06107 ktonnes/TJ.

6.2. Activity level

For the determination of the activity level the same heat demand has been used as for the baseline calculations. The installation of the new cogeneration units and HOBs, as well as the refurbishing of the existing HOB, will be finished by the end of the year 2006. The modernization of the heat transportation networks, however, will take place gradually and so will be the decrease of the losses in these networks. The pace of this modernization and of the related decrease of transportation loses is given in the table 7 below.

Table 7 Decrease of losses in the transportation networks and the related necessary heat production

	2006	2007	2008	2009	2010	2011	2012
Heat demand (GJ)	685,908	685,908	685,908	685,908	685,908	685,908	685,908
Transportation losses (GJ)	150,565	140,487	130,649	121,043	111,659	102,492	93,533
Heat production (GJ)	836,473	826,395	816,557	806,950	797,567	788,400	779,441

Although it is to be expected that the higher heat production in the years 2012 will be covered by the more efficient new HOBs, it has been conservatively estimated that the participation of both, new and refurbished boilers will increase proportionally. The resulting activity levels are given in table 8 below.

Table 8 Activity levels

	2006	2007	2008	2009	2010	2011	2012
Electricity production cogen (MWhe)	53,961	53,961	53,961	53,961	53,961	53,961	53,961
Heat production cogen (GJ)	285,333	285,333	285,333	285,333	285,333	285,333	285,333
Heat production new HOBs (GJ)	262,569	257,768	253,081	248,504	244,034	239,666	235,398
Heat production refurbished HOB (GJ)	288,571	283,294	278,143	273,113	268,200	263,400	258,709

6.3. Estimation of direct project emissions

The calculation of the on-site emissions is fairly straightforward as it involves the multiplication of activity levels and project carbon emission factors.

6.4. Prediction of indirect emission effects (leakage)

The decrease of the transportation losses will not affect the net consumption of heat. Further, the cleaner produced electricity and heat requires an important investment effort. Therefore, no indirect emission effects are expected.

6.5. Calculation of the total project emissions

Table 9 Estimation of the project emissions

P		Unit	2006	2007	2008	2009	2010	2011	2012	Average 2008-2012	Level of precision (*)
P1	On site fuel use	TJ	1,144.1	1,133.1	1,122.4	1,112.0	1,101.8	1,091.8	1,082.0	1,102.0	H
P2	CO_2 equivalent emission factor of fuel used	Kton/TJ	0.561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	H
	Heat production										
P3	On site heat consumption	TJ	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	
P4	Heat produced by CHP	TJ	285.33	285.33	285.33	285.33	285.33	285.33	285.33	285.33	H
P5	Heat from other sources on site	TJ	551.14	541.06	531.22	521.62	512.23	503.07	494.11	512.45	H
P6	CO_2 equivalent emission factor of heat from other sources on site	Kton/TJ	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
P7	Heat from district heating grid	TJ									
P8	Losses in primary district heating grid	%	18	17	16	15	14	13	12	14	H
P9	CO_2 equivalent emission factor of heat from district heating grid	Kton/TJ									
	Electricity production										
P10	On site electricity consumption	MWh	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	
P11	Electricity produced by CHP	MWh	53,961	53,961	53,961	53,961	53,961	53,961	53,961	53,961	H
P12	Electricity from other sources on site	MWh									
P13	CO_2 equivalent emission factor of electricity from other sources on site	MWh /MWh									
P14	Electricity coming from grid	MWh	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	
P15	Losses in grid	%									
P16	CO_2 equivalent emission factor of electricity from grid	MWh /MWh									
	Other direct on site emissions										
P17	..	MWh									
	Other direct off site emissions										
P18	..	kton									
	Indirect on site emissions										
P19	..	kton									
	Indirect off site emissions										
P20	..	kton									

(*) H= high, M=medium and L=low

7. ESTIMATION OF THE EMISSION REDUCTION

The entries in the tables of the baseline emissions (table 6) and those of the table of project emissions (table 9) have been used to calculate the emission reduction. In order to distinguish the different components in the emission reduction, the calculations have been split up per identifiable application.

Table 10 Estimation of the emission reduction (All figures are expressed in kton CO_2)

		2006	2007	2008	2009	2010	2011	2012	Average 2008-2012	Level of precision (*)
R1	Heat and electricity production	11.71	12.33	12.93	13.51	14.09	14.65	15.19	14.07	H
R2	Heat from grid									
R3	Electricity from grid									
R4	Replaced heat to grid									
R5	Replaced electricity to grid	70.21	70.21	67.79	65.53	63.42	61.43	59.57	63.55	H
R6	Other direct emissions									
R7	Other indirect emissions									
	Total	**81.92**	**82.54**	**80.72**	**79.05**	**77.50**	**76.08**	**74.77**	**77.62**	**H**

(*) H= high, M=medium and L=low

8. EVALUATION OF ADDITIONALITY

<table>
<tr><td>Why the project will not be undertaken, without being a JI project, given the age and expected lifetime of the components of the existing equipment</td><td colspan="3">The project is not business-as-usual and thus additional because without the sales of carbon credits the project is not economically viable. The up-front ERUs payments will be used to decrease the direct investment costs, decreasing proportionally the need for external financing.</td></tr>
<tr><td rowspan="3">Internal Rate of Return</td><td>Without carbon credits</td><td>With 100% carbon credits</td><td>With 90% carbon credits</td></tr>
<tr><td>-7.3%</td><td>19.5%</td><td>14.9%</td></tr>
<tr><td colspan="3">The calculated rate of return of the project shows that without 100% allocation of the carbon credits the project is not feasible.</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>What factors would impede private sector parties to invest in the project</td><td colspan="3">Low return on investment, uncertainty with respect to future electricity and heat prices.</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>Conclusion on the additionality of the project</td><td colspan="3">The income from the ERUs transaction is a key factor in the economic and financial feasibility of the project, making the project additional under the Marrakech accords.</td></tr>
</table>

9. MONITORING AND REPORTING

The monitoring activities will ensure that indicators showing the greenhouse gas emission levels from the project are recorded in a way that enables verification and comparison with the baseline scenario. The relevant factors and the key characteristics that will be monitored and registered are shown in the table below.

Table 11 Monitoring approach

Description of the general monitoring approach	• The total fuel consumption and the electricity and heat production are key parameters. They will be measured at the place of production. There will be separate measurements for the fuel consumed by cogenerating units and by HOBs, to be able to separately calculate the efficiency of these processes. • Measurements of the quantity of heat delivered at the interface between the primary and secondary heat networks (heat substations) will produce evidence on the losses in the primary networks.
Description of the data collection	The data will be collected in the following ways: • On-line measurements (see also fig. 12 below) of: ➢ The natural gas consumption (expressed in GJ); ➢ The produced electricity; ➢ The produced heat; • Annual bills from the gas supplier, from ELECTRICA for the delivered electricity and from the own administration for the invoices issued to the heat consumers; • The number of customer at the beginning and at the end of the year;
How to deal with missing data	There will be no missing data
Description of the measurement methods	State-of-art techniques for metering gas supply and electricity and heat deliveries (see also Appendix 2)
Frequency of measurements	• Continuous on-line measurements for gas consumption and electricity and heat production; • Monthly bills from the gas company and to the electricity company; • Annual data from the customers administration
Duration of the measurements	Whole lifetime of the project
Calibration methods and accuracy	In accordance with the EU standards and the standards imposed by the Romanian Metrological Institute
Measurement uncertainties	Standard deviations of the equipment used
Key factors for project performance: • Availability and efficiency of the power and heat generating equipment • Decrease of losses in the heat transport networks • Maintenance of the heat demand at the forecasted levels through quality of services offered and competitive pricing	

Parameters needed for emissions calculations:
• Gas consumption • Electricity production • Heat production • Heat transportation losses
Time series and confidence level of the above parameters: • Hour-by-hour for gas consumption • Hour-by-hour for electricity production • Hour-by-hour for heat production • All measurements (gas-electricity-heat) with a high level of confidence

The measurement points are shown in figure 12 below.

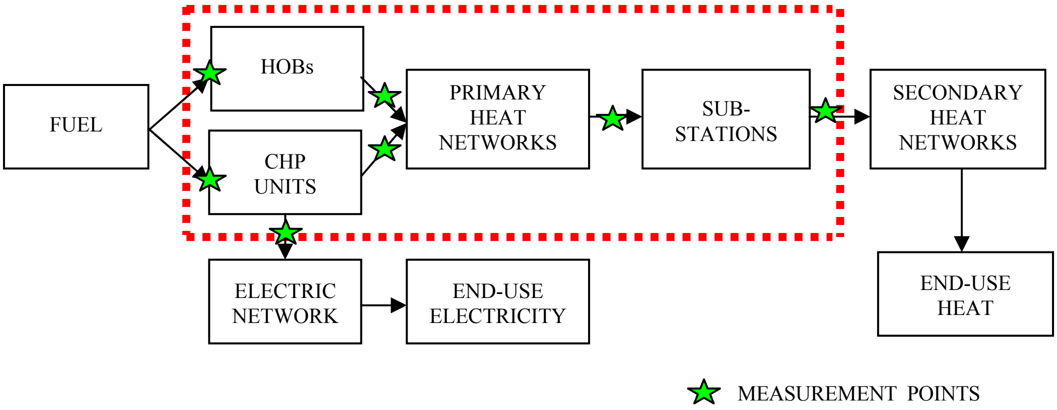

Figure 12 Measurement points for online measurements

All indicators needed for a correct monitoring and reporting are today in use as normal business practice, which means that parties outside the project already have verified and accepted these indicators.

It is intended to use an internationally recognized method for monitoring, measurement and reporting. The most appropriate methodology for this purpose is the Environmental Performance Monitor (EPM), an online system that is used to monitor, report and verify emissions and emission reductions from installations. The monitoring methodology is based on the UNFCCC guidelines on MRV (monitoring, reporting, verifying), the monitoring guidelines for the EU Emissions Trading Scheme, and on strict standards regarding information security. This Online Monitoring System generates reliable data on production and consumption of energy, based on on-site measurements. These data are processed to a data warehouse, in which the data are used to calculate the emissions and/or reductions the installation realized in a certain period. The emissions and reductions are verified by an Independent Entity, thus making it possible to certify the reduction, or to approve the emissions report. By using a secured IT-infrastructure, telemetric facilities and calculation software, the process of MRV of emissions and reductions is carried out fully automated and at low cost. More details over the EPM can be found at http://www.epmonitor.com.

10.STAKEHOLDERS COMMENTS

The Local Council of Târgovişte, the project developer, and TERMICA, together, have undertaken public consultations and disclosure activities for the project, with the intent of fully complying with usual international requirements regarding public consultation and disclosure.

The Local Council, TERMICA and the project developer have undertaken different activities in relation to the major milestones of the Târgovişte project development, like:

- publications in the local newspapers and other mass-media;
- stakeholders consultations, including owners of the apartments supplied with heat by TERMICA, NGO's, etc

For these activities have been used sensitive methods for carrying out public consultations activities, including:

- scheduling local consultations at times and locations most convenient for stakeholders;
- dissemination of project information during important national and international events, like regular meetings of APER (Romanian Association for Energy Policy), Agenda 21 (organized by the Government with the participation of all interested parties, including NGO's), etc.

Information on the project has also been made available on different Internet sites, like:
http://www.jxj.com/magsandj/cospp/2001_05/targoviste.html
www.wtcb.ro/others/events/caldura/ caldura-2002/prez/**termica**.pps
and will be shortly available on Municipality's site www.pmtgv.ro

The Local Council has also publicized its intention to realize this project in cooperation with NUON in its report "Local Strategy for a Sustainable Development of the City of Târgovişte" (Local Agenda 21), report disseminated by different means, including the Internet (http://www.pmtgv.ro/f3.html).

The Local Council has taken the necessary steps to disclose the results of the Environmental and Social Impact Assessment, carried out by KEMA POWER GENERATION AND SUSTAINABLES with the support of ICEMENERG ENERGY – ENVIRONMENT CENTER. . Although this Assessment has been made for the initial set-up of the project, as it has been proposed during the ERUPT-1 tender, the County Inspectorate for Environmental protection has declared that the analysis and the resulting document are still valid, since the present

All these activities have revealed that there is no opposition to the project, including the local and international NGO's.

A sample invitation for a stakeholders meeting and the related attendance list is added as Appendix 3 to this document.

11.ENVIRONMENTAL IMPACT

At the request of the project developer and an interested leading international financial institution, KEMA Netherlands and the local Romanian consultant ICEMENERG have prepared a comprehensive Environmental and Social Impact Assessment (EIA) for the Târgovişte Municipal Cogeneration Project. The EIA covers the construction of the new installations and the rehabilitation of existing heat only boilers and heat transportation and distribution networks. The EIA complies with Romanian, EU and World Bank environmental and social regulations, policies and guidelines. Although this EIA has been made for the initial set-up of the project, as it has been proposed during the ERUPT-1 tender, the County Inspectorate for Environmental protection has declared that the analysis and the resulting document are still valid, since the present project proposal can be seen as a first step for the implementation of the initial, much larger, one.

In cooperation with the involved parties, a fact finding mission took place in Târgovişte. During this visit especially information on the present situation has been obtained.
Parts of the visit were meetings with representatives of the Municipality, TERMICA and the local Environmental Inspectorate. Moreover, the production facilities and several heat distribution substations were visited.

The information on the project has been provided by Nuon. It is primarily based on the ERUPT-1 Emission Reduction Unit Procurement Tender document. Specific emission information on the cogeneration plant has been based on a Dutch license application for a similar plant owned by Nuon in the Netherlands.

In order to fulfil both international and Romanian requirements for this project, the report consists on a first part prepared by KEMA and a second part, fulfilling the Romanian regulations, prepared by ICEMENERG.

11.1. General international requirements

The nature of the proposed activity is such that, in the EU, it would normally not require an Environmental Impact Assessment. The World Bank requires a full EIA for power projects with an installed capacity lager than 50 MW_e. In the Netherlands an EIA is compulsory for power plants with an installed heat capacity of 300 MW_{th} or more. Nevertheless, the project developer has decided to follow a limited EIA procedure to make sure that the project has been carefully screened form an environmental point of view.

11.2. General Romanian requirements

AS the EU Council Directives 85/337/CEE and 97/11/CE on EIA have been totally transposed into Romanian Legislation by the Ministerial Orders 860/2002 and 863/2002, at present the Romanian legislation on environmental protection is completely aligned to the EU requirements.

The permitting procedures for "economic and social activities having an environmental impact" distinguish:

- An environmental *agreement* for *construction and erection* of facilities
- An environmental *permit* for the *operation* of facilities

Environmental agreement
An environmental agreement is required for the construction and erection of various facilities and infrastructures listed in Annex 1 to the Order. Thermo-power plants are mentioned as one of the activities for which an environmental agreement has to apply for. The competent authority for plants projected for the national power system is the Central Environment

Protection Agency (CEPA), for the remaining categories this is the Local Environment Protection Agency (LEPA).

Environmental permit
An environmental permit is required for the operation of facilities, listed under Annex No. 2 of the Order. This accounts for Power and thermal energy generation and Pipeline transportation.

It is obvious that the project is subject to application for an environmental agreement as well as an environmental permit. As the three activities envisaged in the project imply construction and erection activities according to the terms and definitions of the Order, this applies to:

- the construction of the new CHP
- the rehabilitation of the existing heat-only boilers
- the rehabilitation of the heat transportation networks

Procedure stages
The procedure stages are reviewed below in very simplified form. Essentially, the competent authority is entitled to require all environmental (impact) and operational data it deems necessary to take its decision. This decision takes into consideration public comment and is open to appeal. Without appeal the agreement / permit becomes effective after 30 days of the announcement. Document requirements and procedure stages, for instance the procedure for the public debate, are all described in the Order.

Simplified diagram of procedure stages environmental agreement / permit

Environmental agreement	Environmental permit
Application	Application
Environmental Impact Assessment (1)	*Environmental Audit (1)*
	Compliance Schedule (2)
Announcement	Announcement
Public comment / appeal	Public comment / appeal
Decision Issuance (within 30 days)	Decision Issuance (within 30 days)

1. if subjected to the regulation according to the list of activities (as is the case for the project) and after assessment by LEPA
2. alternatively to be included in the permit after decision of LEPA on the basis of audit results. Contains measures and deadlines in which to achieve compliance

11.3. Environmental Action Plan

One of the conclusions of KEMA's report is that "Given the fact that the main impacts of the project are beneficial and that all Romanian and International standards are met, and many environmental provisions form already part of the project, an extensive environmental action plan is not foreseen". However, the following actions are recommended:

- The establishment of a monitoring program for the expected impacts;
- Review and updating of the present environmental management system with respect to handling of hazardous agents and prevention of soil pollution.

TERMICA, as holder of all the required permits for construction and operation of all the equipments making the object of this project will comply with all the requirements and recommendation emanating from the EIA.

The summary of the related EIA has been included as APPENDIX 4 to this document.