TIMISOARA COMBINED HEAT AND POWER REHABILITATION FOR CET SUD LOCATION

PROJECT DESIGN DOCUMENT (PDD)
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TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

List of abbreviations

AAU	Assigned Amount Unit
ANRE	Romanian Electricity and Heat Regulatory Authority
APER	Romanian Energy Policy Association
ARCE	Romanian Agency for Energy Conservation
C	Fuel Consumption (coal, gas or oil)
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH_4	Methane
CHP	Co-generation of Heat and Power
CHPP	Combined Heat and Power Plant
CM	Combined Margin
CO_2	Carbon Dioxide
DH	District Heating
DHS	District Heating System
EPI	Environmental Protection Inspectorate
ERU	Emission Reduction Unit
EUR	Euro
Gcal	Giga-calorie (1 Gcal = 4.187 GJ)
g_{cc}	Gram of Conventional Fuel (1 g_{cc} = 8.141 * 10^{-3} kWh)
g_{oe}	Gram of Oil Equivalent (1 g_{oe} = 11.63 * 10^{-3} kWh)
GHG	Greenhouse Gases
GWP	Global Warming Potential
ICIM	The National Research and Development Institute for Environmental Protection ()
IE	Independent Entity
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
JI	Joint Implementation
HPP	Heat and Power Plant
HWB	Hot Water Boiler
kWh	Kilowatt hour (1 kWh = 3’600’000 Joule)
MoU	Memorandum of Understanding between countries
MP	Monitoring Plan
MWh	Megawatt hour (1MWh = 3’600’000’000 Joule)
N_2O	Nitrous Oxide
NPG	National Power Grid
NPP	Nuclear Power Plant
OM	Operating Margin
PDD	Project Design Document
PPA	Power Purchase Agreement
ROL	Romanian Lei (currency)
SB	Steam Boiler
ST	Steam Turbine
STEM	Swedish Energy Agency
TPP	Thermal Power Plant
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

The project Timisoara Combined Heat and Power Rehabilitation for CET Sud Location ("the Project") is a joint implementation (JI) project and part of the Swedish International Climate Investment Program.

The Romanian state is the host country and the Swedish state is the investor country in accordance with the bilateral agreement signed. The carbon purchaser is the Swedish Energy Agency and the project developer is SC Colterm SA, which is owned by the Municipality of Timisoara.

The goal of the project is to upgrade the existing heat production plant CET Timisoara Sud with cogeneration capcity. Electricity consumed internally in the heat production plant and for distribution of district heating water will be covered by the new cogeneration capacity. The project foresees an installation of a steam turbine of about 18 MW in the current district heating plant of CET Timisoara Sud. The project is in an advanced stage of development and expected to be commissioned by the mid of 2006 (beginning of the 2006 – 2007 heating season). The new and improved cycle, utilizing the existing steam boilers in the most efficient way, will produce some excess electricity at certain time periods. Excess electricity will be sold to the national power grid (NPG) or will be used for other internal consumption of the company at other locations in the city. The project would contribute to the mitigation of global warming as well as to sustainable development of the host country by increasing the supply of electricity produced efficiently through cogeneration.

The project cost is 5.433 million Euros. It is financed by local debt, equity and the sale of emission reduction units (ERU) under the JI program. The equity is covered by own equity from SC Colterm SA. Municipal debt notes underwritten by the Municipality of Timisoara cover the debt. Both financing sources are available but cannot cover the required project funding; the sale of ERU is needed. For the period from the end of 2007 until 2012 greenhouse gas (GHG) emission reductions of the Project are estimated to reach **34'671 tCO_2/year**. These reductions account for around 1 million Euros (assumption: 5 Euros per t_{CO2}) in terms of sales of ERUs.

Emission reductions will be achieved through displacement of current electricity production in the NPG based on lignite with electricity produced in energy efficient cogeneration.

The risk of implementing the project is low due to local Municipality support.

This Project Design Document (PDD) contains the information required to implement the project, including a project description, baseline study, monitoring plan, GHG emission reductions calculation, environmental impacts and stakeholder comments.

The PDD is based on the Operational Guidelines for Project Design Documents of Joint Implementation Projects of the Ministry of Economic Affairs of the Netherlands, on the Basrec Regional Handbook on Procedures for Joint Implementation in the Baltic Sea Region, the Marrakesh Accords of the UNFCCC, and on Guidance on criteria for baseline setting and monitoring of the JI Supervisory Committee (JISC).

A. General description of project activity

A.1 Title of the project activity

Timisoara Combined Heat and Power Rehabilitation for CET Sud Location ("the project")

A.2. Description of the project activity

The goal of the project activity is to upgrade the existing heat production plant CET Timisoara Sud with cogeneration capacity. This would improve the system efficy, decrease consumer costs and reduce the impact of the activity on the environment. The main objectives for the owner of the facility, Timisoara Municipality, are:

1. To improve the quality and efficiency of the district heating plant
2. To conserve and develop the district heating system in Timisoara City.

The reason for this project is that CET Timisoara Sud is one of the main heat sources of Timisoara City. Currently heat is produced in hot water boilers (HWB) and in steam boilers (SB) (see Annex 4 "Heat Balance Calculation"). The plant has low global energy efficiency with direct implications on generation costs, mainly because of the technical solution chosen. The plant is not equipped for cogeneration.

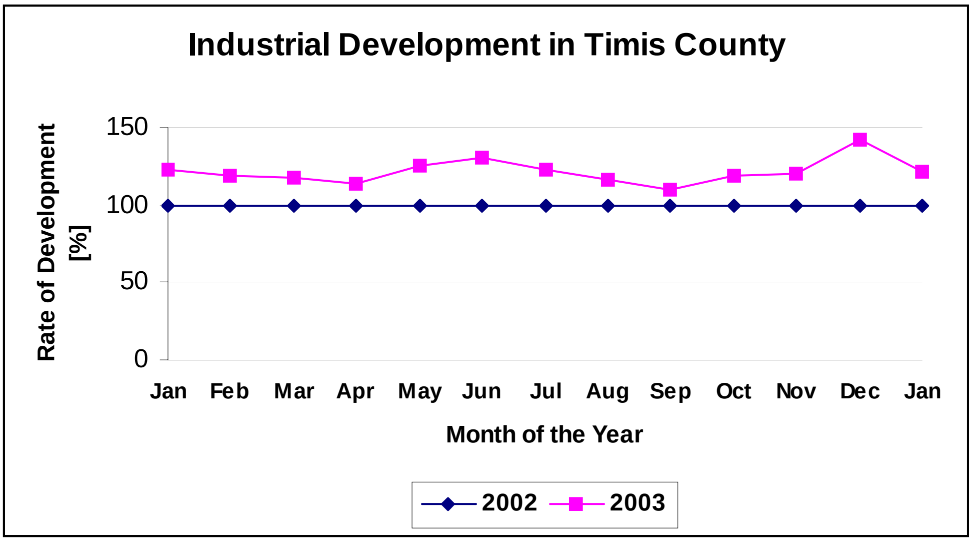
The technical solution of the project consists of installing a backpressure steam turbine (ST) in CET Timisoara Sud to process the steam produced in the SB, increasing the energy cycle efficiency. The installed power of the project will be about 18 MW, starting to be operational at the beginning of the 2006 – 2007 heating season.

SC Colterm SA is the operator of the entire district heating system (DHS) chain in Timisoara City: production (CET Timisoara Sud and CET Timisoara Centru), transport and distribution. The DHS of Timisoara City has experienced continuous modernizations since 1990, but is still suffering from significant losses in its distribution and an in-efficient heat production.

Currently the electricity needed for heating plant operation and heat distribution in CET Timisoara Sud is bought from the national power grid (NPG). The price of electricity bought from the NPG continues to increase.

Under the proposed project, electricity consumed internally in the heat production plant and for distribution of district heating water will be covered by the new cogeneration capacities. The new and improved cycle, utilizing the existing steam boilers in the most efficient way, will produce some excess electricity at certain time periods. Excess electricity will be sold to the NPG or will be used for other internal consumption of the company at other locations in the city. The electricity produced in the new equipment is about 66'800 MWh/year, out of which about 30'600 MWh/year is electricity used for own consumption.

Currently, SC Colterm SA supplies heat for the about 230'000 inhabitants of Timisoara, this accounts for around 70% of total heat demand of the city. The industrial and commercial sectors of Timisoara display also positive trends, the county being one of the promoters of economic development in Romania. Statistical information shows that the City of Timisoara and the entire County are following a positive trend in industrial development:



Source: Monthly Counties Statistical Bulletin - National Statistical Institute

Figure 1: Industrial development in Timis County

The proposed project will contribute to the sustainable development of the area and of the host country by increasing the supply of electricity produced efficiently through cogeneration.

A.3. Project participants

The project developer is SC Colterm SA, wholly owned by the Municipality of Timisoara. SC Colterm SA operates distribution of district heating in the city of Timisoara under an exclusive arrangement with the city.

SC Colterm SA is a recently created company, operating on the market from the beginning of 2004. Although it is a newly created company it has a large experience in the energy field. It has been created by merging Termocet 2002, the local producer of the heat (and of a very small amount of power) with Calor, the transporter and distributor of the heat in the system.

The carbon purchaser would be the Swedish Energy Agency (STEM). STEM has noted the importance of the investments in the Romanian energy in a study commissioned from ECON center for economic analysis. It is stated in the study joint implementation, country study, ER 22:2002 under the headline "Huge need for energy efficiency improvements", page 10 "The analyzed countries [including Romania] are among the most energy intensive and the least energy efficient countries in Europe. Their energy intensity is other more than twice of that in the Western European countries. Energy production and distribution systems are mostly very inefficient and worn out, and there is a huge need for investments to upgrade all parts of the energy systems and improve efficiency. Problems of non-payment for the energy consumed after the energy price liberalization occurs, but collection rates are also a problematic issue in Bulgaria and Romania. Most of the countries have carried out some energy section reforms focused on energy sector deregulation, energy price liberalization, privatization and competition. Focus has also been on energy efficiency improvement and security of energy supply. **However, in most countries rather few investments have been implemented compared to the huge need**".

The project involves the Romania state as the host country and the Swedish state as the investor country in accordance with the bilateral agreement signed between the parties allow for joint implementation projects to be implemented.

The two states have further signed an international agreement for cooperation in the field of power and environment, dated November 26, 2001, to increase the participation of Sweden in the Romanian power and environment sector. The agreement has been ratified by the Romanian Governmental Decision no. 65 / January 24, 2002 and published in the Official Gazette no. 86 / 1.02.2002.

Project advisor is Eninvest SA.

The following picture gives an overview of the project participants (Annex 1 provides detailed information):

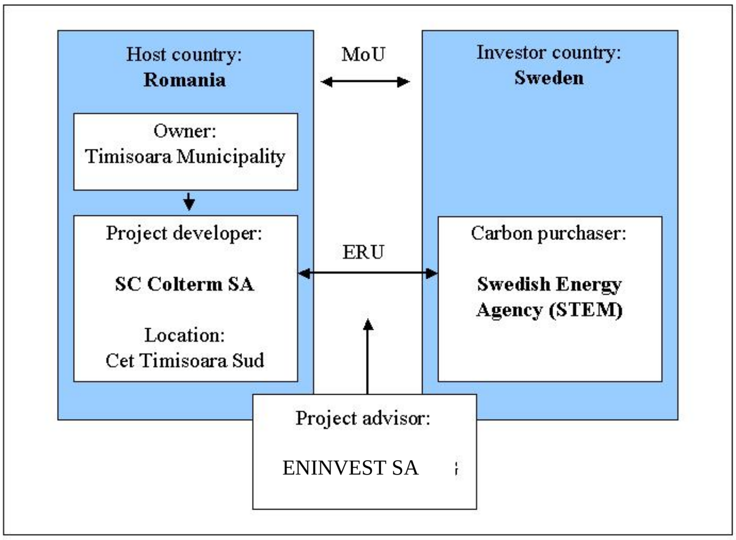


Figure 2: Project participants

A.4. Technical description of the project activity

A.4.1. Location of the project activity

A.4.1.1 Host country Party(ies)

Romania

A.4.1.2 Region/State/Province

Timis County

A.4.1.3 City/Town/Community

Timisoara City

A.4.1.4 Detailed description of the physical location

The project is located in Timisoara City, which is the administrative center of the Timis County. The Timis County has the biggest size among the counties of Romania and is located in the western part of Romania, as shown in the following map:

Figure 3: Romanian map

Situated at 571 km far from Bucharest, Timisoara is the biggest city from the western side of Romania hosting about 334'000 inhabitants, when including surrounding areas. Regarding the number of inhabitants, at national level, Timisoara is considered a second rank city, together with Iasi, Constanta, Cluj-Napoca and Brasov, and has got the most extended influence zone (about 5000 sqm), after the capital of Romania. The influence zone covers Dumbravita, Ghiroda, Giroc, Mosnita Noua, Sacalaz and Sanmihaiu Roman Communes.

CET Timisoara Sud is placed in Giroc village. The site covered by the plant is of about
1 299 751 sqm shared as follows:

- for technologic installations: 1 158 253 sqm
- for construction site: 141 498 sqm.

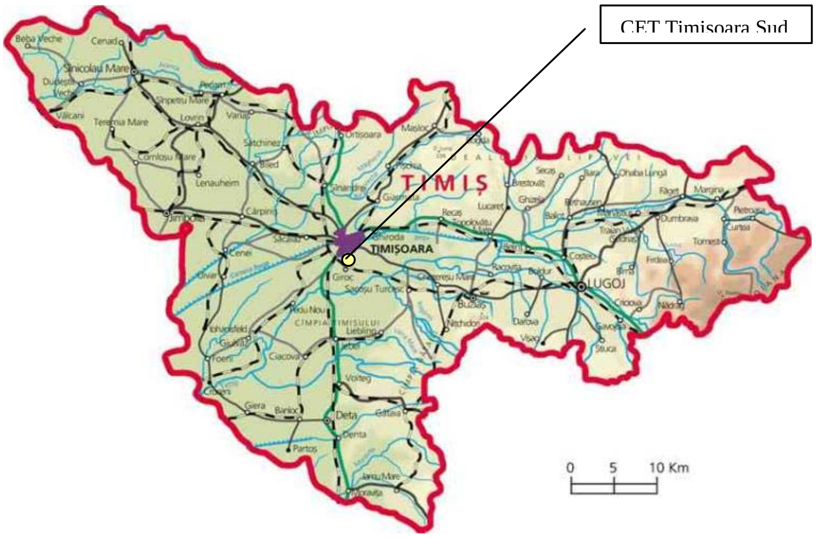


Figure 4: Timis County map and plant location

A.4.2. Category(ies) of project activity

The category of project activity comprises technologies to improve the efficiency of fossil fuel generating units that supply an electricity or thermal system by reducing energy or fuel consumption (even if not on site).

A.4.3. Technology to be employed by the project activity[1]

Currently CET Timisoara Sud produces heat in the existing hot water boilers and steam boilers and buys electricity for self-consumption from the NPG. The heat is mostly produced in the hot water boilers to avoid steam–water transformation losses. Still, there is an amount of heat that is being produced in the steam boilers. The produced steam is tapped off from the boiler outlet, sent into a collector and, after passing through the pressure reduction station, arrives at the heat exchangers.

The existing facility includes three large steam boilers, connected to the district heating heat exchangers with a pressure reduction station, reducing the pressure to an acceptable level. The system is not working optimally, since it utilizes electricity for the feed water pumps to increase the pressure to about 16 bar and then through the pressure reduction stations bring the pressure down to about 2 to 3 bar before transferring the heat to the district heating water flow.

[1] For further information see also annex 4 heat balance calculation and annex 5 plant layout.

The project proposes to produce the steam in the steam boilers and process it in a backpressure steam turbine. From the turbine outlet, the steam will be collected and sent to the heat exchangers. The steam turbine will produce the electricity needed for the plant self-consumption and an excess component will be sold to the grid (or used for the company's own needs elsewhere in the city).

The project consists of including backpressure steam turbine in the energy cycle, between the steam boilers and the heat exchangers, improving the efficiency for the electricity that would otherwise have been produced in the NPG. The steam turbine intended to be used instead of the pressure reduction stations, generating electricity on site and thereby converting the heat only cycle to a combined heat and power cycle, generating the same amount of heat but now also covering the internal need of electricity as well as some capacity that may be used by the company elsewhere in its operation or sold to the NPG.

A.4.4. How anthropogenic GHGs are to be reduced by the activity

Currently electricity needed for heat production and transport in CET Timisoara Sud, is bought from the grid. Under the proposed JI project, electricity consumed internally in the heat production plant and for distribution of district heating water will be covered from cogeneration capacities. The heat produced in the cogeneration equipment will cover, basically, the entire heat demand. Technically, using a backpressure steam turbine to cover the heat demand, SC Colterm SA will produce more electricity than needed for the plant's own consumption. Excess electricity will be sold to the grid, used by SC Colterm SA in other locations, or sold to the Municipality, the owner of SC Colterm SA.

The proposed project replaces electricity produced within NPG in thermal power plants using coal with electricity produced in cogeneration power plant. In terms of fuel consumption it means that overall the quantity of fuel-consumed decreases. It results in a yearly decrease of GHG emissions of about 34'670 t_{CO2}.

Currently the electricity needed for own consumption in CET Timisoara Sud is produced in the NPG in the existing low efficiency energy cycles. Also, this amount of electricity has to transit the equipment of the electricity transporter and distributor, resulting in great losses. According to the Romanian Yearly Book, the electricity produced in 2001 was about 25 % greater than the electricity consumed and this is one of the lowest levels from the last 5 years. From unofficial studies, the electricity losses in the NPG are about 14 %.

A.4.5. Public funding of the project activity

The project has a preliminary finance plan, where a certain amount of the total project cost is provided from SC Colterm SA's own funds (estimated to about 60% of total project cost).

Total project cost defined as the sum of:

- material (mainly steam turbine, pipes, foundations, buildings, electrical works, mechanical works and an initial set of spare parts),
- services during the development of the project (such as construction permit, other permits and time spent by SC Colterm's SA personnel),

- services during construction (such as installation, supervision, and commissioning),

The remaining will be split between local debt issued with either SC Colterm SA's assets or cash flow as security and funds from the sale of ERU credits. See details below in Table 1.

There is **no public funding** involved in the project activity.

The finance plan is as follows (all in 1000 Euros):

	Pre-Sale of ERU	Upfront ERU	D/E with ERU	Amount
Local debt	32.3 %		30.63 %	1664.355
Equity	67.7 %		64.23 %	3489.906
Grant		5.14 %	5.14 %	279.400
Total project cost			**100.00 %**	**5433.661**

Note: D/E is Debt to Equity ratio or Sale of ERU to Equity ratio

Table 1: Finance plan

SC Colterm SA is wholly owned by the Municipality and as such operates as a public incorporated company. SC Colterm SA's present operational performance shows a significant dependence on subsidies from its owner, the Municipality. The company operates under regulation from Romanian Electricity and Heat Regulatory Authority (ANRE), which on an annual basis sets the national reference price for the heat supplied to the customers of SC Colterm SA. Due to the higher costs of operation, SC Colterm SA is not able to cover the operational expenses such as fuel, electricity, make-up water, salaries, regular maintenance etc. The company therefore depend on a significant subsidy from the Municipality. The Municipality stands under the control ("Budget Dependant Entity") of the Ministry of Public Administration and Internal Affairs, which provides funding from the state budget (under the control and supervision of the Ministry of Public Finance). Funding for the operational losses are covered from public funds, however, the national reference price does not allow for any profit to be included in the pricing of the national reference price and SC Colterm SA does therefore not have any money available from the public funds for any investments (or major maintenance). This leads to a continuous deterioration of existing assets.

Through its own operational skills the company has been able to save money (estimation is about three million Euros), which it now wants to invest in a project that can provide significant operational savings.

The savings from the project is electricity generated at a cost below the present pricing from the NPG (note: due to local generation, grid losses in the NPG will be avoided, increasing the benefit of the project).

The company has certain (non-operating) assets, such as the office building that may be used as security for the debt. In addition, collateral may be given as a first charge on revenues from the customers. In total, it is estimated after preliminary discussions with lenders that the securities will be enough to cover the debt proposed above. However, it is very unlikely that further debt can be raised (in excess to the finance plan), in particular in a market with interest margins increasing. It has also been showed while reviewing potential finance plans, that the expected debt service cover ratios fall below acceptable levels if further debt would be added as a substitute for the investment capital or the sale of ERU.

The sale of ERU is therefore crucial and necessary for the implementation of the project. It is expected that the company will be able to generate a reasonable return on its own funds. Presently in the market it is expected that investors (Euro based) would require about 18%. The funds that are generated will be re-used in the operation to either an early repayment of the debt or for further investment improvements, such as the rehabilitation of the network of pipes.

B. BASELINE METHODOLOGY

B.1 Title and reference of the methodology applied to the project activity

According to the JI Supervisory Committee (JISC) Guidance on criteria for baseline setting and monitoring a baseline may be established that is in accordance with appendix B to decision 9/CMP.1. In doing so selected elements of baseline and monitoring methodologies approved by the CDM Executive Board may be used, as appropriate.

The project of SC COLTERM SA is a project that adds new electricity generation capacity and is also connected to the power grid; therefore, the project falls into the prescriptions of ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” with respect to the estimation of emission reductions arising in the external grid. For two main reasons, however, the ACM0002 cannot be applied without modification. As shown already from the title, ACM0002 is intended for projects generating electricity from RES, while this project is a fossil-based CHP project. Moreover, the ACM0002 has been developed for projects in non-Annex 1 countries where power grids lack installed capacity, which is not the case for the Romanian NPG.

In the following paragraphs it is explained how ACM0002 has been applied to this project.

The project in CET Timisoara Sud is a CHP project; therefore two different approaches need to be used to estimate the baseline emissions: one for heat generation and one for electricity generation.

Heat generation

Regarding the baseline for heat generation, it is assumed that the heat demand, as well as the heat generation will follow the historical pattern. This assumption is supported by the fact that for the crediting period (2008 – 2012) there was no plan for major retrofits or rehabilitations for the existing equipment in CET Timisoara Sud. In the absence of the JI project it is therefore justified to assume that the facility would have continued to operate in the same way as historically. Based on recommendations in ACM0002, historical data for the last three years of operation were used to determine the GHG emissions for heat generation on site.

Electricity generation

In the absence of the Project, the electricity that the Project would generate could be generated in three principal ways:
1. Existing generation sources last on the dispatch priority (operating margin);
2. Generation sources that would have been added to the grid in absence of the proposed project (build margin); or,
3. A combination of operating margin and build margin generation sources (combined margin).

According to the ACM0002, the baseline shall be calculated on a combined margin basis. The recommendation regarding the weights for the build margin and for the operating margin is 50%:50% for other generation technologies than solar PV and wind power. It is important to note, however, that in the case of the CDM, projects are implemented in countries in development that generally have a deficit in electricity production. The context of this Project is different. According to the last report (2004) of the National Regulation Authority for the Electricity and Heat Sectors, the installed power of the Romanian NPG is about 17 000 MW, while the peak capacity used in 2004 was about 8000 MW. There has been no addition or major rehabilitation in the system for over 10. Moreover, the second Romanian nuclear unit will be operational by 2010 (Roadmap for electricity sector 2003 – 2015) adding 700 MW installed power. GDP is foreseen to increase by an average of about 4 – 5 % per year and to be followed by the increase of electricity consumption, but only with about 2.7 % per year. This increase of electricity consumption will allow the new nuclear unit to operate without provoking disturbances in the operation of the NPG.

The Project in Timisoara Sud is small (18 MW electric installed capacity) compared to the installed capacity of the NPG. The ratio between the installed power capacity of the new Project equipment and the installed power of the fossil fuel electricity production facilities in the Romanian NPG is approximately 0,1 % (the ratio between the electricity estimated to be produced annually by the Project and the average electricity production from fossil fuels in Romania in the last 5 years is approximately about 0.1 %).

Based on the documented existing surplus electricity production capacity in Romania, the forthcoming addition of a 700 MW nuclear power unit and the small relative size of the Project installed capacity it can be concluded that the new facility will have negligible influence over the installation of new electricity production capacity in the Romanian NPG.

Considering the mentioned arguments, options (2) and (3) above are rejected and the calculation of the baseline emissions for electricity production is carried on the basis of an operating margin.

Estimation and justification of the operating margin used

The implementation of the project will influence the operation of the existing NPG installed equipment and especially the equipment supplying marginal electricity. As a first step, low-cost, must-run power plants supplying electricity to the Romanian NPG shall be identified: Firstly, due to the special operating conditions and variable cost level, nuclear power plants operate on base load and may, therefore, be considered as must-run. Secondly, at the NPG level, there are restrictions regarding the operation of the on-the-river hydroelectric power plants, which must also operate on the base load. A characteristic of the Romanian hydro power plants is that they are installed on rivers and they are operated without large accumulations of water; therefore they are must run power plants. As the report of ANRE for 2004 shows, Hydroelectrica produced approximately 31 % of the electricity produced in the NPG in 2004. The cumulated electricity production of these low cost, must-run power plants in the Romanian NPG is 39% of the total electricity demand as a five-year average for 2001-2005.

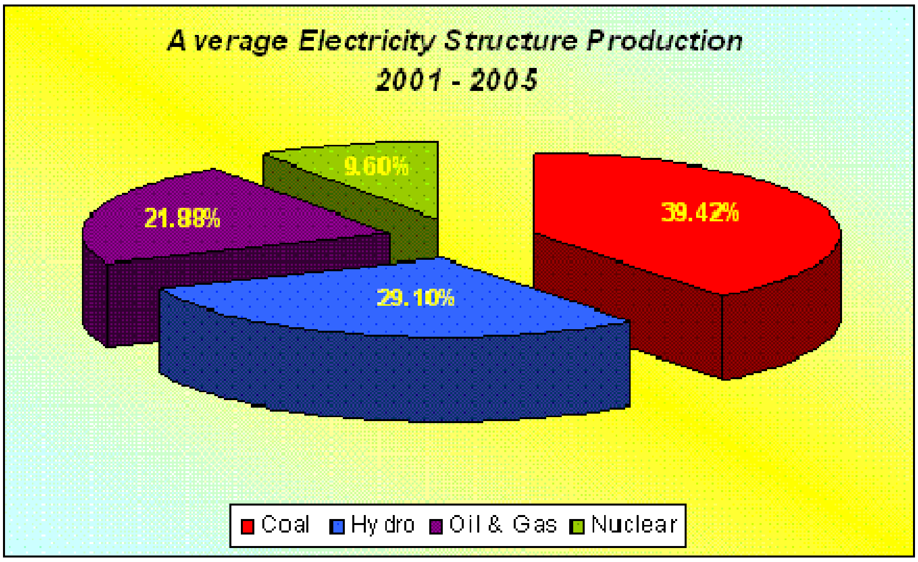


Figure 5: Resources' share of electricity production in Romania, five-year average for 2001-2005. Source: Ministry of Commerce and Industry- NDC

Due to the current lack of available data regarding the Romanian NPG and to the restrictions with respect to access to existing data, it is not possible to use all the recommendations of the ACM 0002 for the determination of the baseline emissions. Moreover, considering the evolution and the forecasts of the price of the natural gas on the international markets, and the available coal-fired installed power of the Romanian NPG, it's justified to consider that the marginal plant is coal-fired. Therefore for the calculation of the emissions in the baseline, we have used the marginal plant emissions factors calculated as coal-fired power plants and based the calculations on the information available in the Yearly Book of Romania for year 2004.

The calculation was made for a period of 10 years, starting year 1994.

	MU	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Specific fuel consumption for the plants operating on lignite	goe/kWh	314	310	299	295	300	284	266	268	242	268	260	255
Specific fuel consumption for the plants operating on lignite	gcc/kWh	449	443	427	421	429	406	380	383	346	383	371	364

B.2. Project category applicable to the project activity

The proposed project enables an improvement of the overall efficiency in fuel utilization. Given the specific actions of the proposed project (replacement of the pressure reduction stations with backpressure steam turbine; and replacement of heat and power produced separately with heat and power produced in cogeneration), the most suitable baseline method for the present project is the approach mentioned.

The following aspects underline the applied methodology:

- According to the Romanian regulation, each electricity producer can make an offer and participate at covering the electricity load curve;

- The proposed project replaces an existing low efficient heat production process (hot water production in heat exchangers from steam boilers through pressure reduction stations) with an efficient combined heat and power production process (cogeneration);

- The proposed project replaces electricity produced within NPG in thermal power plants. It is reasonable to assume that the project will replace marginal electricity produced in coal fired power plants.

- The new facility of COLTERM will produce electricity during the heating season and a small amount during summer.

According to the Romanian Yearly book 2004, among the fossil fired power plants, power plants using coal as main fuel have the highest specific fuel consumption (about 266 g_{oe} = 380 g_{cc}, but lignite fired power plants have even a worse specific fuel consumption of 268 g_{oe} = 383 g_{cc}).

- The project does not result in any significant leakage of CO_2 emissions or an increase of non-CO_2 emissions. Project proponents claim mainly reductions of CO_2 emissions.

B.3. Description of how the methodology is applied in the project activity

The chosen methodology has been applied in the context of the project through the determination of the emission factor. Additionality questions have been answered. The “minimum specific fuel consumption” has been used for calculation (see in detail Annex 2 Baseline Study).

B.4. Description of how the anthropogenic GHG emissions by source are reduced

In the baseline scenario, CET Timisoara Sud produces heat for urban consumers and buys electricity for own consumption. The heat for urban consumers is produced in the existing hot water and/or steam boilers.

The electricity that will be produced by the new Project equipment is currently produced in the NPG.

In the project scenario, CET Timisoara Sud produces heat, at the base of the heat load curve (for the duration of operation of the power plant), in cogeneration in the new equipment and in the existing equipment.

Following explanation is based on the EB 22, Report, annex 8 (version 02): “Tool for the demonstration and assessment of additionality”. These guidelines provide for a step-wise approach to demonstrate and assess additionality of the Project Activity. These steps include:

- Step 1: Identification of alternatives to the project activity;
- Step 2: Investment analysis; or
- Step 3: Barriers analysis;
- Step 4: Common practice analysis; and
- Step 5: Impact of registration of the proposed project activity as a JI project activity.

These guidelines are applicable to this Energy Efficiency project as it provides a general framework for demonstrating and assessing additionality. For the situation of the Energy Efficiency Investment Program at Timisoara Sud CHP these guidelines were applied, by using step 2 (Investment Analysis) and not step 3.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

The energy sector represents a strategic infrastructure of the national economy on which relies the overall development of the country. In the same time the energy represents a public utility with an important social impact.

In order to upgrade the national energy system in Romania large-scale investments are needed for modernization and reconstruction

Despite of the efforts made in the generation sector, this sector is, and will be, the most intensive investment sector to cover the target for upgrading as well as for the new projects. It is very significant that for more than 5000 MW from the fossil fuel generation, the equipments are very old; more than 32% of the equipments are of more than 30 years of age, 50% are between 20-30 years old, and only 0, 7% being less than 10 years old.

According to the Roadmap for the Energy Sector (2003-2015) of the Ministry of Economy and Trade, the production and transmission infrastructure need urgent modernization. It is necessary to rehabilitate thermal facilities and to introduce modern and efficient equipment, efficient cogeneration in particular. Actions need to be taken in order to prevent deterioration of the energetic infrastructure and to implement investment and repairing programs in due time.

According to the Romanian Energy Policy 2006-2009 of the Ministry of Economy and Trade, some of these actions must be orientated to the cogeneration sector by the means of restructuring, upgrading and adjusting the existing co-generation systems to the local heating market under a common management for heat production.

In order to increase the generation process efficiency the SC COLTERM SA needs to invest. Furthermore, it will need to do Environmental Investments to comply with Environmental regulations imposed by the Romanian Government due to future entrance of Romania to the EU.

Step 2: Investment analysis

The investment analysis identified the project financial indicators, such as IRR and NPV without ERU sales. The analysis took in consideration an investment execution period of 2 years and an investment operation period of 10 years.

Total project cost is 5 433 661 Euro and it is defined as the sum of:

- material (one steam turbine, heat recovery steam boiler, pipes, foundations, building rehabilitation works, electrical works, mechanical works and an initial set of spare parts),
- services during the development of the project (such as construction permit, other permits and time spent by SC Colterm's SA personnel),
- services during construction (such as installation, supervision, and commissioning).

The finance plan is as follows:

	D/E with ERU	Amount
Local debt	30.63 %	1664.355
Equity	64.23 %	3489.906
Grant	5.14 %	279.400
Total project cost	**100.00 %**	**5433.661**

The company has certain assets that may be used as security for the debt. In addition, collateral may be given as a first charge on revenues from the customers. In total, it is estimated that the securities will be enough to cover the debt. It is very unlikely that further debt can be raised (in excess to the finance plan), in particular in a market with interest margins increasing. It has also been showed while reviewing potential finance plans, that the expected debt service cover ratios fall below acceptable levels if further debt would be added as a substitute for the investment capital or the sale of ERU.

The project is able to reach a return on investment for ten years of about 13.4% with ERU sales. This is normally not an acceptable return on investment but is acceptable for a Municipality owned project.

Without the sale of the ERU the IRR falls to 12%. However, the equity investment has to be increased with 8% in order to reach acceptable cover ratios for the debt. This would result in about 300 000 Euros in equity, which is exceed the available funds from SC Colterm SA. In other words, unless debt can be increased (no further available security can be provided by SC Colterm SA) through an external guarantee, such as the Municipality (no available guarantees) or a sovereign guarantee (not available) the project cannot be built without sale of ERU.

SC Colterm SA's present operational performance shows a significant dependence on subsidies from its owner, the Municipality. The company operates under regulation from Romanian Electricity and Heat Regulatory Authority (ANRE), which on an annual basis sets the national reference price for the heat supplied to the customers of SC Colterm SA. Due to the higher costs of operation, SC Colterm SA is not able to cover the operational expenses such as fuel, electricity, make-up water, salaries, regular maintenance etc. The company, therefore, depends on subsidy from the Municipality. The Municipality stands under the control ("Budget Dependant Entity") of the Ministry of Public Administration and Internal Affairs, which provides funding from the state budget (under the control and supervision of the Ministry of Public Finance). Funding for the operational losses are covered from public funds, however, the national reference price does not allow for any profit to be included in the pricing of the national reference price and SC Colterm SA does therefore not have any money available from the public funds for any investments (or major maintenance). This leads to a continuous deterioration of existing assets. Through its own operational skills the company has been able to save money (estimation is about four million Euros), which it is now willing to invest in a project that can provide significant operational savings. The savings from the project is electricity generated at a cost below the present pricing from the NPG.

Step 3. Barriers analysis

This step was not applied to show additionality of the project activity, as Step 2 was deemed more applicable to the type of project.

Step 4: Common practice analysis

The Company, and therefore the Project, is very important due to fact that ensures a public utility delivering electricity and heat for Timisoara population.

Step 5. Impact of JI registration

JI also represents an important factor for ensuring company debt service payments to the bank in case of uncertainty and changes in the natural gas prices, case that can make the project a non-feasible one economical and financial.

The estimation of ANRGN (The National Regulatory Authority for Natural Gas) regarding natural gas price evolution for 2007, based on mixed of 65% local production and 35% from import, was exceeded because of the unexpected evolution of the barrel oil price on the international market in the last period.

After Romania joining the EU, the mix will be 55% local production and 45% from import and prices for local production will have to follow the international trend; so the evolution of gas prices on the world market will have a much bigger impact on the operating activity of COLTERM SA Timisoara. The Municipality will not be able to increase tariffs for population as quick and to the same level the gas price might be rising, fact that, without any political support, the operation losses of COLTERM could endanger the debt service payment.

On the other hand, increasing the prices these will go beyond the affordability limit of the final consumers that might lead to slow payments or even disconnections, facts that could endanger company in meeting its financial obligations.

Under the conditions of ERU selling, the debt service of the loan may be secured through these extra incomes, being regarded as a reserve for the company in meeting its due terms.

The sale of ERU is crucial and necessary for the implementation of the project.

B.5. Description of the project boundary for the project activity

The expected energy cycle including the backpressure steam turbine represents the optimum solution for CET Timisoara Sud:

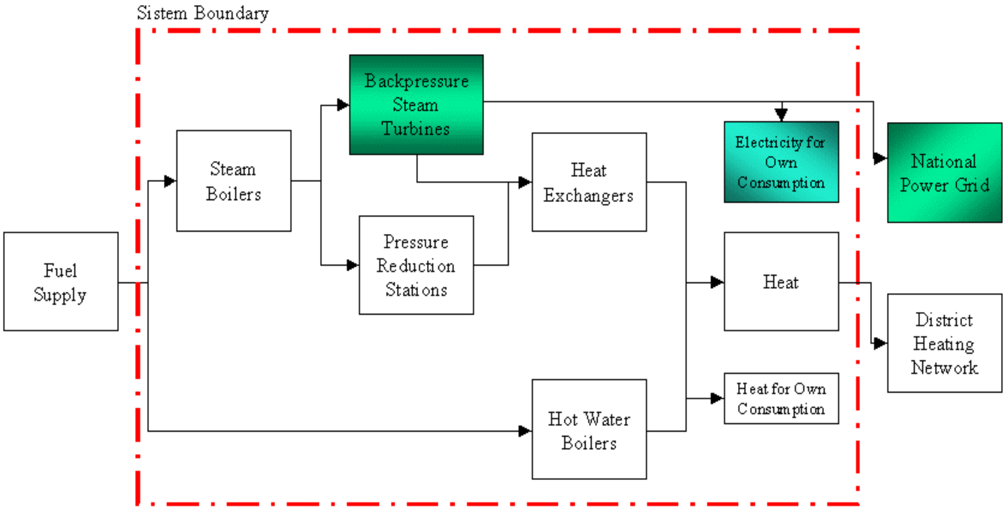


Figure 6: Flowchart expected energy cycle

B.6 Details of baseline development

B.6.1 Date of completing the final draft of this baseline section

The proposed date for the completion of the final draft of the baseline section is the 20th of January 2006.

B.6.2 Name of person/entity determining the baseline

The baseline study has been conducted by ENinvest SA.

C. DURATION OF THE PROJECT ACTIVITY AND CREDITING PERIOD

C.1 Duration of the project activity

C.1.1. Starting date of the project activity

The project is based on a feasibility study designed on 2003. According to the feasibility study, it has to be developed and implemented in 22 months. The owner of the facility has thought of commissioning the unit by mid 2006 (before the 2006 – 2007 heating season).

In order to begin the project implementation and detailed design, the owner of the project organized a tender for the 31st of March 2004 for the procurement of the steam turbine. Due to a lack of ST offers a second tender was held on 5th of May 2004. In September 2005, the steam turbine was delivered to SC COLTERM SA.

C.1.2. Expected operational lifetime of the project activity

According to the feasibility study, the project lifetime is supposed to be of 20 years.

C.2. Choice of the crediting period and related information

As a JI project, installing of a steam turbine at CET Timisoara Sud is ought to offer the credits for the 1st commitment period (2008 - 2012), but the company is also interested in selling the emission reduction units (allowance units) achieved before 2008. Practically, the company is interested in selling all the allowances resulting from the operation of the steam turbine from the moment of commissioning till 2012.

The contract for selling of these emission reduction units and the price for them will make the object of a direct negotiation process.

Project schedule:

Activity / Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Design	■	■	■																			
Tender Organization for Equipment Procurement				■	■																	
Detailed Design						■	■															
Tender Organization for Construction							■	■														
Site Organization									■	■												
Construction Works										■	■	■	■									
Unit Assembly														■	■	■	■					
Unit Commissioning																		■				

Table 2: Project schedule

D. MONITORING METHODOLOGY AND PLAN

The complete monitoring plan can be found in Annex 3 of this PDD.

D.1. Name and reference of the methodology applied to the project activity

Please refer to Annex 3 monitoring plan.

D.2. Justification of the choice of the methodology

According to ERUPT guidelines[2], to enhance the reliability of indicators used for crediting, it is recommended to use for monitoring and reporting, to the extent possible, those indicators that are already in use for normal business practice. The advantage is that parties outside the project already have verified such indicators. This enables the project developer to use established data records from their archives, instead of developing a new set of records. An example is a DHS, which typically will have records from purchased fuel, as well as records from sold heat and/or electricity.

D.3. Data to be monitored

The important data for controlling and reporting of project performance are the output of heat and electricity and the fuel consumption. These factors will be measured on a regular basis during operation:

- Volume of natural gas consumed, m^3
- Volume of lignite consumed, t
- Heat supplied, GJ
- Cogeneration electricity consumed in own plant, MWh
- Cogeneration electricity supplied to NPG, MWh

[2] ERUPT vol 1, June 2003, page 27.

The table below shows the different data to be monitored:

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Volume of natural gas consumed	MEC_{NG}	tm^3	m Invoices and through plant meters	monthly	100%	Electronic (spreadsheet)	8 years	-
2	Volume of lignite consumed	-	t	m Invoices and through boiler weighing machines	monthly	100%	Electronic (spreadsheet)	8 years	-
3	Heat supplied	MCHO	GJ	m	monthly	100%	Electronic (spreadsheet)	8 years	-
4	Cogeneration electricity consumed in own plant	MCEO	MWh	m	monthly	100%	Electronic (spreadsheet)	8 years	-
5	Cogeneration electricity supplied to NPG	MCEO	MWh	m	monthly	100%	Electronic (spreadsheet)	8 years	-

Table 3: Monitored data

A certain amount of electricity will be bought from the system during the plant start-up phase. This amount of electricity will be measured and subtracted from the quantity of electricity produced.

D.4. Quality control and quality assurance

Quality control and quality assurance will be ensured in a quality control process (see also Annex 4 monitoring plan).

Data	Uncertainty level of data (High/Medium/Low)	Are QA/QC procedures planned for these data?	Outline explanation why QA/QC procedures are or are not being planned
1	Low	Yes	These data will be used for calculation of emission reductions
2	Low	Yes	These data will be used for calculation of emission reductions
3	Low	Yes	These data will be used for calculation of emission reductions
4	Low	Yes	These data will be used for calculation of emission reductions
5	Low	Yes	These data will be used for calculation of emission reductions

Table 4: Data quality control

D.5 Name of person/entity determining the monitoring methodology

ENINVEST SA is the entity determining the monitoring methodology and participates in the project as advisor. The contact data are listed in Annex 1 of this document.

E. CALCULATION OF GHG EMISSIONS BY SOURCES

E.1 Description of formula used to estimate emissions of the project activity

Steps taken for GHG calculation:

1. Calculating the heat balances including the load of equipment on specific load regimes.
2. Calculate the heat production of each load using the formula:

$$Q_l = q \times t,$$

$$Q = \Sigma Q_l$$

Q annual heat produced [MWh/year]
Q_l total heat produced per specific load [MWh/year]
q medium heat load per load regime [MW]
t length of using the specific load [h/year]

3. Calculate the electricity production on each load using the formula:

$$E_l = P \times t,$$

$$E_{project} = \Sigma E_l$$

$E_{project}$ annual electricity produced [MWh/year]
E_l total electricity produced per specific load [MWh/year]
P medium power produced per load regime [MW]
t length of using the specific load [h/year]

4. Estimating internal electricity consumption [MWh/year] based on the historical data and on estimations made on the feasibility study (including electricity used for pumping of the condensate through the entire technological chain to the steam boilers).

   Estimating electricity replaced in the National Power Grid as difference between the electricity production and internal electricity consumption.

5. Calculate the fuel consumption on each load using the formula:

$$B_{project} = b_{Eproject} \times E_{project} + b_Q \times Q,$$

$B_{project}$ annual fuel consumption [MWh/year]
$b_{Eproject}$ specific fuel consumption for electricity [kWh/kWh]
b_Q specific fuel consumption for heat [kWh/kWh]
(specific fuel consumption for heat produced in the project situation is assumed to be equal with the specific fuel consumption for heat produced in the baseline situation).

6. Transform the annual fuel consumption in [TJ/year].

7. Establish the amount of natural gas used (in TJ/year) and the amount of coal (lignite) (in TJ/year) based on the historical data collected from the project owner.

Natural gas consumption:	$B_{ng} = 31\ \% \times B_{project}$	[TJ/year]
Lignite consumption:	$B_{l} = 69\ \% \times B_{project}$	[TJ/year]

8. Calculation of the carbon emissions per each type of fuel based on IPCC indices for the C content of the fuel.

Carbon content of natural gas consumed:
$C_{cng} = 15.3\ [t_C/TJ] \times B_{ng}\ [TJ/year]$ [t_C/year]
Carbon content of lignite consumed:
$C_{cl} = 27.6\ [t_c/TJ] \times B_{l}\ [TJ/year]$ [t_C/year]

Total carbon content of fuel consumed: $C_C = C_{cng} + C_{cl}$ [t_C/year]

9. Calculation of the CH_4 emissions per each type of fuel based on IPCC indices for the CH_4 content of the fuel.

CH_4 content for natural gas:	$C_{CH4\,ng} = 1.4\ [kg/TJ] \times B_{ng}\ [TJ/year]$	[kg $_{CH4}$/year]
CH_4 content for lignite:	$C_{CH4\,l} = 1\ [kg/TJ] \times B_{l}\ [TJ/year]$	[kg $_{CH4}$/year]
Total CH_4 content:	$C_{CH4} = C_{CH4\,ng} + C_{CH4\,l}$	[kg $_{CH4}$/year]

10. Calculation of the N_2O emissions per each type of fuel based on IPCC indices for the N_2O content of the fuel.

N_2O content for natural gas:	$C_{N2O\,ng} = 0.1\ [kg/TJ] \times B_{ng}\ [TJ/year]$	[kg_{N2O}/year]
N_2O content for lignite:	$C_{N2O\,l} = 1.4\ [kg/TJ] \times B_{l}\ [TJ/year]$	[kg_{N2O}/year]
Total N_2O content:	$C_{N2O} = C_{N2O\,ng} + C_{N2O\,l}$	[kg_{N2O}/year]

11. Correcting the amount of carbon contained in the fuel used based on IPPC indices.

Corrected carbon content for natural gas:		
	$Cc_{cng} = C_{cng} \times 0.995$	[t_C/year]
Corrected carbon content for lignite:	$Cc_{cl} = C_{cl} \times 0.98$	[t_C/year]
Total corrected carbon content:	$Cc_{c} = Cc_{cng} + Cc_{cl}$	[t_C/year]

12. Determining the CO_2 emissions for the project.

The resulting amount of CO_2 from the project is:
$C_{CO2} = Cc_c \times 44/12$ [t_{CO2}/year]

13. Calculating the CO_2 equivalent of CH_4 and N_2O using the IPCC indices.

The global warming potential (GWP) of these gases are:

21 – for CH_4
310 – for N_2O

The $CO_{2\ equivalent}$ resulting from the fuel combustion is:

$CO_{2\ equivalent} = C_{CO2} + 21 \times C_{CH4} /1000 + 310 \times C_{N2O} / 1000$ [t_{CO2}/year]

E.2 Description of formula used to estimate leakage

Considering that the project has no indirect emissions, there is no leakage. The potential source of leakage is considered as direct off-site source of emissions.

E.3 Project activity emissions

$CO_{2\ equivalent}$ (E3) = $C_{CO2} + 21 \times C_{CH4} /1000 + 310 \times C_{N2O} / 1000$ [t_{CO2}/year]

E.4 Description of formula used to estimate emissions of the baseline

1. Calculating the heat balances including the load of equipment on specific load regimes

2. Calculate the heat production o each load based on historical data:

$$Q_l = q \times t,$$

$$Q = \Sigma Q_l$$

Q – annual heat produced [MWh/year]
Q_l – total heat produced per specific load [MWh/year]
q – medium heat load per load regime [MW]
t – length of using the specific load [h/year]

According to the historical data and to the forecasts of SC COLTERM SA, the heat production is about 698079 MWth.

3. Estimating electricity for own consumption and the supplementary electricity production [MWh/year] based on the historical data and on estimations made on the feasibility study (based on the data regarding the electricity losses in the NPG) (at present the water resulting from condensing of the steam in the heat exchangers is driven to the deaerators by the high pressure of the steam) and taking into consideration the grid losses for this amount of electricity.

   NOTE: Timisoara area is supplied with electricity from the NPG. The electricity sources in the area are very small compared with the electricity demand. Therefore, electricity is transported from the producing power plants from the grid. The transport and distribution of electricity involve losses in the grid. But in the calculation of the baseline we have included losses only for the electricity used for own consumption of the facility, not also for the electricity delivered to the grid and consumed in Timisoara area. There is a lack of publicly available data regarding the losses of electricity in the NPG; although we have found in some confidential studies that the losses are about 14 - 15 % (transport + transformation + distribution).

Based on the data regarding the operation of the new equipment and on the data regarding the own consumption of the facility and the NPG electricity losses, we have calculated the total amount of electricity that should be produced in the NPG if the project will not be implemented.

E = E for own consumption (current operation) * grid losses + E produced by the new equipment [MWh/year]= 24578 * 14 % [MWh/year] + 66862 [MWh/year] = 70303 [MWh/year]

If the project will not be implemented, all this electricity will be produced in the NPG.

In accordance with section B, baseline emissions in the NPG are estimated based on the basis of an operating margin emission factor. Considering the evolution and the forecasts of the price of the natural gas on the international markets, and the available coal-fired installed power of the Romanian NPG, we can consider that the marginal plant is coal fired.

	MU	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Specific fuel consumption for the plants operating on lignite	goe/kWh	314	310	299	295	300	284	266	268	242	268	260	255
Specific fuel consumption for the plants operating on lignite	gcc/kWh	449	443	427	421	429	406	380	383	346	383	371	364

Table 5: Specific fuel consumption for the power plants operating on coal

In order to remain conservative, the minimum specific fuel consumption, 346 gcc/kWh (2.816 kWh/kWh).

4. Calculate the fuel consumption for electricity:

$$B_E = b_E \text{ x } E$$

B_E – annual fuel consumption [MWh/year]
b_E – specific fuel consumption for electricity [kWh/kWh]
E – annual energy produced in the grid, including losses for the transport of electricity needed by CET Timisoara Sud for own consumption [MWh/year]

B_E = 2.816 * 70303 = 197973 [MWh/year] = 713 TJ/yr

5. Calculate the resulting amount of CO_2:

C_{CO2E} = (714 * 27,6 * 0.98) * 44/12 = 70706 [t_{CO2}/year]

6. Calculation of the CH_4 emissions based on IPCC indices for the CH_4 content of the fuel.

   CH_4 content for lignite: $C_{CH4\ l} = 1$ [kg/TJ] x B_l [TJ/year] [kg $_{CH4}$/year]

   Total CH_4 content: $C_{CH4} = C_{CH4\ l}$ [kg $_{CH4}$/year]

   Total CH_4 emissions = 713 * 1 / 1000 = 0.71 [t $_{CH4}$/year]

7. Calculation of the N_2O emissions per each type of fuel based on IPCC indices for the N_2O content of the fuel.

   N_2O content for lignite: $C_{N2O\ l} = 1.4$ [kg/TJ] x B_l [TJ/year] [kg$_{N2O}$/year]

   Total N_2O content: $C_{N2O} = C_{N2O\ l}$ [kg$_{N2O}$/year]

   Total N_2O emissions = 713 * 1.4 / 1000 = 1 [t$_{N2O}$/year]

8. Calculating the CO_2 equivalent of CH_4 and N_2O using the IPCC indices:

   The global warming potential of these gases are:

   21 – for CH_4
   310 – for N_2O

   The CO_2 equivalent = Total CH_4 emissions * 21 + Total N_2O emissions * 310 = 325 [t$_{CO2eq}$/year]

   In order to remain conservative this amount is not included into the total CO_2 eq emissions.

9. Calculate the fuel consumption for heat, for the current operation, on each load using the formula:

   $$B = b_Q \times Q,$$

   b_Q – specific fuel consumption for heat [kWh/kWh]

   According to the data provided by SC COLTERM SA, the average specific fuel consumption of the equipment installed in CET Sud is about 1.267 MWh/MWth. The heat production is 698079 MWth.

$B = b_Q$ x $Q = 1.267 * 698079 = 884466$ MWt

10. Transform the annual fuel consumption in TJ/year

$B = 884466 * 0.036 = 3184$ TJ/yr

11. Establish the amount of natural gas used (in TJ/year) and the amount of coal (lignite)(in TJ/year) based on the historical data collected from the project owner.

Natural gas consumption:	B_{ng} = 31,33 % x B	[TJ/year]
Lignite consumption:	B_l = 68,66 % x B	[TJ/year]

Based on anual historical data, the fuel structure for producing heat in CET Sud is:
- natural gas: 31,33 %
- lignite: 68,66 %

Calculation of the carbon emissions per each type of fuel based on IPCC indices for the C content of the fuel.

Carbon content for natural gas:	C_{cng} = 15.3 [t_C/year] x B_{ng} [TJ/year]	[t_C/year]
Carbon content for lignite:	C_{cl} = 27.6 x B_l [TJ/year]	[t_C/year]

Total carbon content:	$C_C = C_{cng} + C_{cl}$	[t_C/year]

Correcting the amount of carbon contained in the fuel used based on IPPC indices.

Corrected carbon content for natural gas:	$Cc_{cng} = C_{cng}$ x 0.995	[t_C/year]
Corrected carbon content for lignite:	$Cc_{cl} = C_{cl}$ x 0.98	[t_C/year]

Total corrected carbon content:	$C_{Cc} = Cc_{cng} + Cc_{cl}$	[t_C/year]

Determining the CO_2 emissions for the project.

The resulting amount of CO_2 from the project is: $C_{CO2} = C_{Cc}$ x 44/12 [t_{CO2}/year]

C_{CO2} = (3184 * 31,33 % * 15,3 * 0.995 + 3184 * 68,67 % * 27,6 * 0.98) * 44/12 = 272439 [t_{CO2}/year]

12. Calculation of the CH_4 emissions per each type of fuel based on IPCC indices for the CH_4 content of the fuel.

CH_4 content for natural gas:	$C_{CH4\ ng}$ = 1.4 [kg/TJ] x B_{ng} [TJ/year]	[kg $_{CH4}$/year]
CH_4 content for lignite:	$C_{CH4\ l}$= 1 [kg/TJ] x B_l [TJ/year]	[kg $_{CH4}$/year]

Total CH_4 content: $C_{CH4} = C_{CH4\ ng} + C_{CH4\ l}$ [kg $_{CH4}$/year]

Total CH_4 emissions = 3184 * 31,33 % * 1.4 / 1000 + 3184 * 68,67 % * 1 / 1000 = 3.6 [t $_{CH4}$/year]

13. Calculation of the N_2O emissions per each type of fuel based on IPCC indices for the N_2O content of the fuel.

N_2O content for natural gas: $C_{N2O\ ng}$ = 0.1 [kg/TJ] x B_{ng} [TJ/year] [kg$_{N2O}$/year]
N_2O content for lignite: $C_{N2O\ l}$= 1.4 [kg/TJ] x B_l [TJ/year] [kg$_{N2O}$/year]

Total CH_4 content: $C_{N2O} = C_{N2O\ ng} + C_{N2O\ l}$ [kg$_{N2O}$/year]

Total N_2O emissions =
3184 * 31,33 % * 0.1 / 1000 + 3184 * 68,67 % * 1.4 / 1000 = 3.2 [t$_{N2O}$/year]

14. Calculating the CO_2 equivalent of CH_4 and N_2O using the IPCC indices:

The global warming potentials of these gases are:

21 – for CH_4
310 – for N_2O

The CO_2 equivalent = Total CH_4 emissions * 21 + Total N_2O emissions * 310 = 1055 [t$_{CO2eq}$/year]

The resulting amount of CO_{2eq} from burning the fuel is:

CO_2 equivalent (E4) = C_{CO2E} + C_{CO2} + the CO_2 equivalent = 70706 + 272439 + 1055 = 344200 [t$_{CO2}$/year]

E.5 Emission reductions of the project activity

E4 – E3 = Emission reductions

The resulting emission reductions are:

344’200 – 309’529 = 34’671 t CO_2/year

E.6 Table providing values obtained when applying formula above

1 tcc = 8.141 MWh

CO2 Emissions (t_{CO2}/yr)	
without project	with project
344200	309529
Emissions Reduction	
34671	

Table 6: Emission reductions

Expected Energy Cycle

Heat produced in CET Timisoara Sud	600240	Gcal/year	
Electyricity produced in CET Timisoara Sud	66862	MWh/year	
Electricity used for own consumption	30597	MWh/year	
Grid losses	0.00		
Electricity produced in the National Power Grid (NPG) - on coal plyearts	0	MWh/year	
Do we produce electricyty in the NPG (value: yes =1; no = 0)	0		
Specific fuel consumption for electricity produced in the NPG	346	gcc/kWh	
Specific fuel consumption for electricity produced in CET Timisoara Sud	214	gcc/kWh	
Specific fuel consumption for heat produced in CET Timisoara Sud	181	kgcc/Gcal	
Natural gas LHV	8500	$kcal/Nm^3$	
Coal LHV	1600	kcal/kg	
Coal LHV	6.70	$TJ/10^3$ t	
Natural gas LHV	0.036	$TJ/10^3$ Nmc	
Natural gas density	0.7168	kg/m^3	
Total fuel consumption in CET Timisoara Sud, out of which	122910	tcc/year	
Fuel consumption - natural gas -at CET Sud	38508	tcc/year	31%
Fuel consumption - coal - at CET Sud	84402	tcc/year	69%
Fuel consumption in the NPG plants	0	tcc/year	
Fuel consumption - natural gas -at CET Sud	31712	mii Nm3/year	
Fuel consumption - coal - at CET Sud	369260	t/year	
Fuel consumption in the NPG plants	0	t/year	
Fuel consumption in the NPG plants	0	TJ/year	
Fuel consumption in CET Timisoara Sud	2475	TJ/year	
natural gas	1129	TJ/year	
coal	2474	TJ/year	
Total fuel consumption	2475	TJ/year	
Coal carbon content	27.6	t C/TJ	
Natural gas carbon content	15.3	t C/TJ	
Yearly carbon content for natural gas used in CET Timisoara Sud	17268	t C/year	
Yearly carbon content for fuel burned in the NPG Plants	0	tC/year	
Yearly carbon content for coal used in CET Timisoara Sud	68275	tC/year	
Carbon correction for natural gas	0.995		
Carbon correction for coal	0.98		
Total carbon content for natural gas	17182	t C/year	
Total carbon content for coal	66910	t C/year	
CO_2 Emissions	***308335***	***t CO2/year***	
Coal CH_4 content	1	kg/TJ	
Natural gas CH_4 content	1.4	kg/TJ	
Total CH_4 content of the fuel	4	t/TJ	
Coal N_2O content	1.4	kg/TJ	
Natural gas N_2O content	0.1	kg/TJ	
Total N_2O content of the fuel	4	t/TJ	
GHG Potential of CH_4	21		
GHG Potential of N_2O	310		
CO_2 Equivalent	1194	***t CO_2/year***	
Total CO_2 Emissions	**309529**	***t CO_2/year***	

Table 7: Expected energy cycle

Existing Energy Cycle

Heat produced in CET Timisoara Sud	600240	Gcal/year	
Electyricity produced in CET Timisoara Sud	0	MWh/year	
Electricity used for own consumption	24578	MWh/year	
Grid losses	0.14		
Electricity produced in the National Power Grid (NPG) - on coal plyearts	70303	MWh/year	
Do we produce electricyty in the NPG (value: yes =1; no = 0)	1	-	
Specific fuel consumption for electricity produced in the NPG	346	gcc/kWh	
Specific fuel consumption for electricity produced in CET Timisoara Sud	0	gcc/kWh	
Specific fuel consumption for heat produced in CET Timisoara Sud	181	kgcc/Gcal	
Natural gas LHV	8500	kcal/Nm^3	
Coal LHV	1600	kcal/kg	
Coal LHV	6.70	TJ/10^3 t	
Natural gas LHV	0.036	TJ/10^3 Nmc	
Natural gas density	0.7168	kg/m^3	
Total fuel consumption in CET Timisoara Sud, out of which	108601	tcc/year	
Fuel consumption - natural gas -at CET Sud	34026	tcc/year	31%
Fuel consumption - coal - at CET Sud	74575	tcc/year	69%
Fuel consumption in the NPG plants	24325	tcc/year	
Fuel consumption - natural gas -at CET Sud	28021	thou Nm^3/year	
Fuel consumption - coal - at CET Sud	326267	t/year	
Fuel consumption in the NPG plants	106421	t/year	
Fuel consumption in the NPG plants	713	TJ/year	
Fuel consumption in CET Timisoara Sud	2187	TJ/year	
natural gas	997.27	TJ/year	
coal	2186	TJ/year	
Total fuel consumption	2900	TJ/year	
Coal carbon content	27.6	t C/TJ	
Natural gas carbon content	15.3	t C/TJ	
Yearly carbon content for natural gas used in CET Timisoara Sud	15258	tC/year	
Yearly carbon content for fuel burned in the NPG Plants	19677	tC/year	
Yearly carbon content for coal used in CET Timisoara Sud	60326	tC/year	
Carbon correction for natural gas	0.995		
Carbon correction for coal	0.98		
Total carbon content for natural gas	15182	tC/year	
Total carbon content for coal	78403	tC/year	
CO_2 Emissions	***343145***	***t CO_2/year***	
Coal CH_4 content	1	kg/TJ	
Natural gas CH_4 content	1.4	kg/TJ	
Total CH_4 content of the fuel	3.58	t/TJ	
Coal N_2O content	1.4	kg/TJ	
Natural gas N_2O content	0.1	kg/TJ	
Total N_2O content of the fuel	3.16	t/TJ	
GHG Potential of CH_4	21		
GHG Potential of N_2O	310		
CO_2 Equivalent	1054.7	***t CO_2/year***	
Total CO_2 Emissions	**344200**	***t CO_2/year***	

Table 8: Existing energy cycle

F. ENVIRONMENTAL IMPACTS

F.1. Documentation on the analysis of the environmental impacts

Implementing the steam turbine in CET Timisoara Sud is technically feasible, environmentally sound, will promote energy efficiency in current equipment and improve its quality.

The proposed JI project will contribute to the sustainable development of the host country by increasing the supply of electricity production in cogeneration.

F.2. Environmental impact assessment

A first environmental impact research has been done in the feasibility study of Trapec. In the following detailed design stage of the project, an environmental documentation according to the Romanian law will be developed.

G. STAKEHOLDERS COMMENTS

G.1. Stakeholder comments process

The preparation of the steam turbine in CET Timisoara Sud has gone through a public consolidation process, whereas there have been meetings with

- Timisoara Municipality
- Environmental Protection Agency Timis
- Ministry of Environment and Waters Management

G.2. Summary of the comments received

In general there are no objections to the project. The project of installing a backpressure steam turbine in CET Timisoara Sud is part of the approved strategy of the local Municipality.

References

- Basrec Regional Handbook on Procedures for Joint Implementation in the Baltic Sea Region, January 2003
- EBRD website: http://www.ebrd.com/carbonfinance
- Governmental Decision no. 890/2003 Regarding the Approval of the Romanian Roadmap in Energy Sector
- International Energy Agency Web site: http://www.iea.org/statist/index.htm
- IPCC. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, 1996, Vol. 1-3
- Leitfaden fuer die klimaschutzpolitische Bewertung von emissionsbezogenen JI- und CDM-Projekten, Bundesamt fuer Umwelt, Naturschutz und Reaktorsicherheit, Ver. 1, Band I-III,
- The Ministry of Economy and Trade website: http://www.minind.ro
- The Ministry of Environment and Waters Management website: http://www.mappm.ro
- The National Institute of Statistics website: http://www.insse.ro
- National Regulatory Authority in Natural Gas Sector website: www.anrgn.ro
- Operational Guidelines for Project Design Documents of Joint Implementation Projects, Ministry of Economic Affairs of the Netherlands, June 2003, vol.1 & 2
- Practical Baseline Recommendations for Greenhouse Gas Mitigation Projects in the Electric Power Sector - OECD Environment Directorate and International Energy Agency, 2002
- "Procedures for Accounting and Baselines for JI and CDM Projects - Baselines for Joint Implementation projects in EU Candidate Countries in the context of the Acquis Communautaire" - EU Fifth Framework Programme Sub-programme: Energy, Environment and Sustainable Development
- Report of the Conference of the Parties on its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001 - THE MARRAKESH ACCORDS
- Road- Testing Baselines for Greenhouse Gas Mitigation Projects in the Electric Power Sector – Martina Bosi, International Energy Agency, and Amy Laurence, International Energy Agency, 2002
- The Romanian Electricity and Heat Regulatory Authority website: http://www.anre.ro
- The Romanian Electricity Market Operator website: http://www.oper.ro
- The Romanian Yearly Book 2002
- UNFCCC (United Framework Convention on Climate Change), 2001, The Marrakesh Accords & the Marrakesh Declaration

LIST OF ANNEXES

Annex 1: Contact information on project participants

See separate document.

Annex 2: Baseline study

See separate document.

Annex 3: Monitoring plan

See separate document.

Annex 4: Heat Balance calculation

See separate document.

Annex 5: Plant layout

See separate document.

Annex 6: GHG emission reductions calculation

See separate document.

Annex 7: Investment model

See separate document.