



ROMANIAN ENERGY EFFICIENCY FUND

CASE STUDY: TRANSGEX Oradea

Project Name	Connection of 5 District Heating substations to geothermal energy in Oradea
Sector	Municipal Infrastructure
Borrower	Private enterprise "TRANSGEX SA ,Oradea"
Lender	Romanian Energy Efficiency Fund
Financing Starting Date	November 2004
Project Size/Loan Amount	USD 1,178,474/425,000

Summary

TRANSGEX SA is involved in geological explorations and surveys for geothermal water resources, drilling of geothermal wells and provision of sanitary hot water and heat extracted from geothermal energy to the general public (private, public and institutions). The company holds concession licenses for geothermal areas situated in the north-western part of Romania, representing approximately 50% of the whole country's resources.



The project will be partially financed with a 3-year FREE loan and will increase the heat production from geothermal resources in Oradea, replacing supply from the CHP-based district heating system. The simple payback period of the project is estimated at 2.5 years. This project will also reduce emissions of air pollutants, including CO₂ emissions.

Description of the project

The project consists in connection of 5 thermal substations in Oradea city (Iosia Nord quartier) to the geothermal well no. 4767. In order to implement the project, the company concluded with the Municipality/Local Council an association contract. A geothermal substation will be built next to the well. It will prepare the hot and warm water for district heating and sanitary water purposes, based on the geothermal energy source available in the area. The five thermal substations will be fully modernized by using plate heat exchangers, high energy efficiency pumps and automation equipment.

Presently, in Oradea, geothermal energy covers about 50,000 Gcal/year, about 5% of the annual consumption of heat in Oradea city. The rest of 95% is supplied mainly by combined heat and power (CHP) plant. The CHP plant is selling the heat at about 38 USD/Gcal. The financial gap between this price and the price paid by final consumers (28 USD/Gcal) is currently subsidized by the Municipality. Heat and hot water from the geothermal resources will be sold to customers at 24.71 USD/Gcal.

Aim of the project

The aim of the project is to replace the use of heat from CHP plant by geothermal energy available in the area. The main advantages achieved by project implementation are:

- **Use of renewable energy resources:** using the geothermal energy for covering a part of heat consumption of Oradea city leads to savings of fossil fuels; meanwhile the production costs and the selling price for heat is significantly lower than before the project implementation;
- **Heating network rehabilitation:** transport pipes for hot and warm water will be replaced. This will reduce energy and water losses and thus it will reduce the operating costs;
- **Environmental impact:** replacing the use of fossil fuels in the CHP facility by using geothermal energy for heat generation will lead to important reduction of pollutant emissions.

Economic evaluation of the project

The project will be implemented in two stages. The first one, initiated in 2004, led to a financial investment of about USD 690,000. The second phase, consisting of about USD 490,000, will raise the total financial effort to about USD 1,800,000, including all auxiliary expenses. The second phase already started by installation of two hot-water peak boilers in the geothermal substation, in order to cover peak loads. The project costs are detailed in table 1.



Project savings

The project is expected to lead to the following savings:

- **Primary energy:** using a renewable source of energy, the project will reduce fossil fuel consumption, mostly coal, of the CHPP facility in Oradea city; these savings are estimated at about 42,000 Gcal/year.
- **Labor, maintenance:** installing new, more reliable, fully automatic equipment, other financial savings will be generated; the project uses plate heat exchangers, a proven technology that reduces thermal losses and minimizes spare part costs; nevertheless, these savings were not determined separately and are included in the above figures.

Financial evaluation

The analysis of the cash flow for the next 10 years was made based on 2004/2005 energy prices. The evaluation of the feasibility of this project was performed taking into consideration the following



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criteria: Payback Period, Internal Rate of Return (IRR), and Net Present Value (NPV), based on a discount rate of 12%. The full financial analysis is given in table 2.

Considering the total financial investment of USD 1,178,474 and the annual financial savings of about USD 472,000, the simple payback period is estimated at 2.5 years.

Financing

The financing of the project has been covered as follows: in the first phase 60% covered by a loan from the Romanian Energy Efficiency Fund and the rest by TRANSGEX and others; the second phase is completely covered by TRANSGEX with their own funds.

The USD 425,000 FREE loan has a maturity of 3 years and a 6 months grace period. The loan will be reimbursed in unequal quarterly installments according to the company's request and to the project cash flow.

For covering a part of the first phase investment TRANSGEX concluded "an emission reduction purchase agreement" with the Danish Environmental Protection Agency, for the project

"Geothermal Energy in Oradea - Area II and Beius". The "crediting period" is from January 1st, 2005 to December 31st, 2012. The total amount to be paid by the Danish party to TRANSGEX is EUR 473,400, consisting of (i) an advance payment of EUR 54,600 (which TRANSGEX already received) and (ii) 8 equal annual payments of EUR 52,350 each, starting in the year 2006.

Expected Impact

Annual fuel savings, estimated at about 5,800 tep, will have a positive environmental impact by reducing pollutant emissions. Considering that the CHPP facility uses coal and natural gas to generate heat, annual CO₂ emission reductions are estimated at about 14,300 tons. This quantity is the baseline used to trade carbon gas emissions with the Danish Government. Moreover SO₂, NO_x and particulates reductions are significant.

As long as the subsidies for the domestic heating are provided, the use of a cheaper heat source will also lead to financial savings for the municipality and, eventually, for heat customers.

Table 1

Item	USD*
Thermal point building (2004)	91,810
Geothermal point equipment (2004)	174,303
Transportation network (2004)	220,199
Thermal points equipment 510-514 (2004)	101,007
Well pump (2004)	104,032
Total (2004)	691,351
Geothermal point equipment (peak boilers) (2005)	57,997
Distribution network rehabilitation (2005)	426,126
Total (2005)	487,123
Total project	1,178,474

* - The costs include import duty, customs storage charges and delivery to site, VAT excluded.

Table 2

Item	Year										
	0	1	2	3	4	5	6	7	8	9	10
	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD
Initial investment	-1,178	-	-	-	-	-	-	-	-	-	-
Cash Flow	-1,178	472	472	472	472	472	472	472	472	472	472
Accumulated Cash Flow	-1,178	-706	-234	238	710	1,182	1,654	2,126	2,598	3,070	3,542
Discount Factor	1	0.89	0.80	0.71	0.64	0.57	0.51	0.45	0.40	0.36	0.32
Present Value of the Cash Flow	-1,178	-757	-380	-44	256	523	763	967	1,167	1,337	1,489
Payback Period	2.5	years									
Discount Payback Period	3.1	years									
Net Present Value	1,489	kUSD									
Internal Rate of Return	40	%									

FREE financing advantages

Main advantages of the FREE financing are:

- FREE is a unique Romanian financier in energy efficiency field;
- FREE is actively supporting the companies during the energy efficiency project analysis;
- FREE offers flexible and attractive ways to guarantee the loans;
- FREE facilitates the access of the companies for financing feasibility studies, energy audits, etc.;
- FREE offers low cost financing for companies;
- FREE offers technical assistance.