

Agency: **United States Agency for International Development**

Contractor: Harza Engineering Company

Contract No.: LAG-I-00-98-00002-00

Task Order No: 803

Mission Office: Romania

Date of Report: December 25, 2001

Title: ***Interim Progress Report, Assessment of Proposed Project Viability***

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Project Title: Energy Efficiency Projects Selection Technical Assistance, Romania

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UNITED STATES
AGENCY FOR INTERNATIONAL DEVELOPMENT

Interim Progress Report
Energy Efficiency Projects Selection
Technical Assistance

ASSESSMENT OF PROPOSED PROJECT VIABILITY

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December 25, 2000

A. General Information

1. Project Identification Title: Energy Efficiency Projects Selection Technical Assistance
2. Project # 9073G-001-LAG-I-00-98-00002-00
3. Contract # LAG-I-00-98-00002-00
4. Task Order # 803
5. Contractor: Harza Engineering Company
6. Subcontractor: Electrotek Concepts, Inc.
7. Period of Performance: October 25, 2000 – December 25, 2000
8. Start Date: September 25, 2000
9. Projected completion date: June 30, 2001
10. Project Manager: Mikhail Velikanov

B. Interim Progress Report

Project Description: The project continues USAID support to the Romanian energy sector and energy efficiency market with focus on the improvement of public energy services (heating and lighting), and rehabilitating and modernizing related municipal infrastructure. The activity includes the assessment of project viability, establishment of a list of the best candidate projects and development of two pre-feasibility studies for the best candidates from the priority list.

Developments in this Reporting Period

The specific tasks undertaken during this reporting period include the following:

- The Electrotek team made trips to seventeen Romanian cities excluding Bucharest during this period. Gregory Lvovsky and Yevgeny Guterman visited Bucharest, Targoviste, Campina, Slobozia, Mioveni, Botosani, Piatra Neamt, Reghin, and Campia Turzii from October 23 through November 4. Mikhail Velikanov visited Bucharest and Urziceni from November 13 through November 16. Yevgeny Guterman and Vitaly Peisakhovich visited Bucharest, Urziceni, Braila, Tulcea, and Medgidia from November 13 through November 18. Vitaly Peisakhovich and Dimtcho Linkov visited Bucharest, Arad, Deva, Alba Iulia, Sebes, and Brasov from November 20 through November 24. The purpose of these trips was to identify energy efficiency opportunities at different types of facilities owned by municipalities and to collect technical, financial and institutional information for the assessment of opportunities for bankable projects in visited cities.
- Doina Caloainu was hired by Electrotek as a full-time Project Coordinator and began to coordinate the project implementation on November 27.
- Electrotek formed a team of local technical and financial experts. Stefan Cristescu, Parik Stefanov, Natalia Burchiu and Bogdan Erdeli participated in site visits, collected

technical and financial information and presented this information in formats required by Electrotek for a further analysis.

- Peter Borgo, Gregory Lvovsky, Yevgeny Guterman and Vitaly Peisakhovich visited Romania from December 11 through December 22 to assess the viability of projects proposed by municipalities in visited cities.

Results of Site Visits

Gregory Lvovsky and Yevgeny Guterman visited Targoviste, Campina, Slobozia, Mioveni, Botosani, Piatra Neamt, Reghin, and Campia Turzii from October 24 through November 3. Mikhail Velikanov, Yevgeny Guterman, Viatly Peisakhovich and Dimtcho Linkov visited Urziceni, Braila, Tulcea, Medgidia, Arad, Deva, Alba Iulia, Sebes, and Brasov from November 14 through November 24. Municipalities of these cities expressed an interest in the participation in the USAID project and bankable energy efficiency project development and informed ARCE about their intentions. Patrik Stefanov provided logistical and technical support during all visits, Stefan Cristescu provided a technical support during the visits to first eight cities from October 24 through November 3, and Natalia Burchiu provided a technical support during other site visits in November. Corneliu Rotaru, ARCE, took part in the meeting in Brasov, Anca Golita, ARCE, participated in meetings in Targoviste, Campina, and Slobozia, and representatives of ARCE branches participated in other meetings. In all cities the Electrotek team met with municipal governments and district heating companies (DHC) management and introduced the objective and tasks of the project initiated and funded by USAID Bucharest. The team asked municipalities and DHCs to answer on a number of technical and financial questions, which were critical for the assessment of the municipal and DHC creditworthiness and projects technical and financial viability. In all cities the Electrotek team noted that 1) the pre-feasibility studies would be developed only for energy efficiency projects, which would generate cash flow essential to return investment in commercial terms, and 2) projects should be affordable for municipalities and DHC and secured by them.

Doina Caloianu, Stefan Cristescu, Natalia Burchiu and Bogdan Erdeli followed up the meetings in visited cities, contacted municipalities and DHCs and collected technical and financial information requested by Electrotek.

Targoviste

Financial issues. Municipal revenues in 1999 were ROL 102 billion including 16% provided from the national budget. Although the last year the Municipality was supposed to receive ROL 24 billion from the national budget as heat subsidies; in fact, they got only ROL 10 billion, and the local budget came up with additional ROL 7.3 billion for DHC Termica. Ultimately, the Municipality could not provide planned capital investments in the district heating system (DHS). The Municipality generally has problems with own payments for heat and fuel. The city has a water project, and the Municipality guaranteed a part of the loan in the amount of \$ 5,7 million. The municipal forecast of the situation for 2001 seems to be overly optimistic and not substantiated enough.

The Deputy Mayor expressed a support for the project. The Chief of the Accounting Department of the Municipality generally seemed knowledgeable and enthusiastic about the project, but some of the answers raised concerns. For instance, she stated they were going to use land and real estate as collateral for a loan, and that there were no legal restrictions for this.

DHC Termica has a concession with the Municipality to operate with the municipally owned DHS. Termica buys about 20% heat for resale from a CONEL coal-fired cogeneration plant. The rest is produced by municipal gas-fired boilers (70% of domestic gas and 30% of import gas). CONEL informed the Municipality that they planned to phase out this plant by the year 2002 – 2003. The wholesale tariff for heat from CONEL is not settled yet for this year; they expect it to be at the level of 500,000 ROL/Gcal. Termica estimates heat losses in the municipal DHS as 16-17%.

Non-payments exist, but this is not a major problem: for population, it's about 30%, for economic entities – 15%. Termica does not have this problem with budget organization due to the system of offsets. People often ask Termica to cut them off from the heat supply system when they don't have money to pay; in many cases they ask for the heat supply only in the morning and in the evening. Therefore, instead of the problem of non-payment Termica may have a problem of a solvent demand.

Technical Issues. The first impression of the Electrotek team was that the investment package in the amount of \$ 36.0 million proposed by the city exceeded the project cost affordable for the municipal budget something around 10 times. Therefore, the team suggested the municipality and Termica to consider only most feasible and urgent measures.

In spite of the fact that all equipment of the central boiler house (BH) rather aged and worn-out, a presently available heat capacity significantly exceeds the demand. Proposed by the city energy efficiency improvements at supply side (the central BH) would increase the capacity even more. At the same time proposed investments in transmission and distribution systems lead to the reduction of a heating load. The Electrotek team's recommendation was to reduce the investments in BH and target them only on the replacement of the equipment, which will be in operation in the future.

During the meeting it was revealed that the existing gas supply pipe to the city is not sufficient to support a future heat generation, and a construction of a new gas supply pipeline of 6 km is needed. In this case investment into the second pipeline should be included into proposals.

Campina

Financial Issues. In 1999 municipal revenues were ROL 49.7 billion including 1% provided from the national budget. According to the Municipality they do not have problems with the budget. During the last year only 1% of the budget was received from the national budget. The city has four major enterprises with more than 5000 employees

each: a refinery, a machine building plant, a metallurgical complex, an automobile repair facility. Some of them export their products.

The Municipality has some experience with short-term loans, but did not have any long-term loans. They tried to get a commercial long-term loan but could not do it since a public property could not be used as a collateral.

Compania Publica de Gospodarie is in charge with a heat supply, a water supply and a sewerage. The company is a concessionaire, and the district heating infrastructure belongs to the Municipality. The General Director is appointed by the Mayor and signs four-year contract (last time approved December 22, 1999); the contract is paid by the County Department of the Public Works.

Current tariffs for heat is 436,135 ROL/Gcal (including VAT) for population and 366,500 ROL/Gcal (excluding VAT) for other customers. This includes a profit margin of 8%, which is higher than usual 5%, since they were expecting to do some capital investments.

Technical issues. There is a feasibility study developed by a German company. In the first opinion of the Electrotek team the proposed project cost in the amount of DM 30 million exceeded financial abilities of the Municipality and Compania Publica de Gospodarie to secure such investments. Additionally, under existing economic conditions in Romania, such project would not have a bankable payback period.

The Electrotek team and representatives of Compania Publica de Gospodarie agreed that they should review their proposals starting primary from the project cost affordable for the Municipality and the company. The program of the replacement of all extremely non-efficient municipal boilers (one-by-one) with the new efficient ones looks as a least-cost solution for this city. Each replacement would provide very fast return, which could be used for other facilities. In order to protect new boilers heat exchangers separating boiler houses loops from leaking network must be installed, since the cost of the network replacement would be very high. The last measure certainly should be done, but gradually and out of the frame of the pilot project.

Slobozia

Financial issues. Municipal revenues were ROL 54.4 billion in 1999 including 8% received from the national budget. The city was developed around the chemical plant Amonil that produces fertilizers (the source of raw materials is the gas coming from Ukraine and Transylvania). Now the production at Amonil is down (the enterprise used to have about 4000 employees, now Amonil employs 500 people only). Amonil has a boiler, which used to provide up to 60% of a heat supply over 7-km pipeline to the city, and at present the plant provides only 20% of the demanded heat. The Municipality needs its own sources of heat as a bargaining leverage. The Mayor said that since they need about 40 Gcal/hr for the city and at present have 25 Gcal/hr, they would like to invest into extra 16 – 18 Gcal/hr.

The gas-fired boiler within the Amonil gate was constructed in the past with the local budget participation. Later, during the privatization, it was given to the new owners. The Municipality launched a complaint to the government, and a formal investigation by the Ministry of Internal Affairs followed but failed to get the boiler, and the relations with Amonil went sour. Now the Mayor decided to stop relying on Amonil and to get its own heat sources. Another consideration is price difference for domestic and imported gas. The Municipality thinks that precludes transparency in Amonil cost calculations. Still, the Mayor wants to invest some funds in maintenance of connection pipe from Amonil heat sources to supply city with hot water during the summer (the tariff for Amonil-produced heat via heat recovery is 136,000 ROL/Gcal, or about 200,000 ROL/Gcal after the distribution charges, which is still much cheaper than heat produced otherwise).

The company Compania Publica de Gospodarie deals with a heat and water supply and sewerage. 90% of annual revenues were from the population in 1999. The residential non-payment is 30%. A number of apartments requested cut-off from DHS and installed individual gas heaters. After an installation of hot and cold water meters in 75% of apartments the accrual revenues dropped.

The current heat tariff for population is 400,000 ROL/Gcal without VAT. Compania Publica de Gospodarie assumes that the consumption will be constant from now to the future since they expect the population will be constant.

The company has no commercial loan experience other than with short-term loan in the amount of ROL 500 million.

Technical issues. Due the remote location of the chemical plant Amonil and a high annual cost of the transmission pipeline maintenance it doesn't make sense to plan purchase of heat from Amonil. The first impression of the team was that developing local heating systems looks more promising.

As the city gained an experience with the installation of relatively large and relatively small boilers, it doesn't look as a problem to select feasible measures on the basis of a least-cost analysis.

Mioveni

Financial issues. In 1999 municipal revenues were ROL 43,3 billion, which included only 3% of subsidies from county and national budgets.

The city is heavily dependent on Dacia, which is currently downsizing. Although Dacia used to employ up to 12,000 people, after the restructuring next year they expect to get down to the half this number. Since the Municipality thinks that Dacia masks a true heat production cost, the main goal of the Municipality is to break free from Dacia.

One of the Mayor's goals is a creation of new jobs for residents. He considers a construction of a new CHP as an option. They would also like to obtain a license to manufacture micro boilers and to sell these boilers in the country.

Technical issues. Proposals of DHC and the Municipality are based on the feasibility study, which was prepared by the local design company. They suggested converting 7 remaining central heating substations into local boiler houses of 8 – 10 Gcal/hr of the heat capacity each. In addition, worn-out distribution pipes supposed to be replaced with pre-insulated pipes. The Municipality obtained the letter from Romgas confirming an ability of supplying gas to these new boiler houses. In general city proposals show a right direction for the improvement of the heating system performance. Eventually, it would solve most of problems, and in parallel improving energy efficiency and reducing a heat cost. These technical measures were recently implemented in the city.

The main problem was that in the initial Electrotek team's opinion a total project cost in the amount of \$ 11 million significantly exceeded investments affordable for the Municipality. The program of DHS rehabilitation should start with converting 2 – 3 central heating substations into boiler houses. Such replacement would provide fast return, which could be used for the next investment.

Botosani

Financial issues. Although in 1999 municipal revenues in the amount of ROL 227.5 billion were substantial for Romania cities, 55% of this amount represented subsidies form the county budget.

The municipality has to supply heat to about 95,000 people leaving in 30,000 apartments. They have one CHP that is the only source of heat. Since CHP belongs to the Municipality, DHC Termica S.A. sells electricity to CONEL. The Municipality receives subsidies in the amount of 70% of the energy cost to cover an inefficient production. Population non-payments are very high, and in addition during last tow years there were significant losses and a default on the loan from a commercial bank.

At the same time, a number of feasibility studies were prepared by different companies, and the Municipality got funds for some capital investment directly from the Ministry of Finance for rehabilitation of CHP and DHS.

Technical issues. The municipal project proposals are based on the feasibility study developed by the local company and on some materials from the Japanese company. In general these proposals suggest to refurbish CHP as well as heat transmission and distribution systems. The proposed project cost was \$ 43 million. There is no doubt that the proposed investments are not affordable for the municipality. Furthermore, even with these investments a remote location of CHP makes impossible to delivery heat to end-users at a reasonable price level. It looks like from the economic point of view the heat supply from CHP does not make sense and the plant should be decommissioned. The preferable solution is to convert 47 existing central heating substations into boiler houses. Under such solution the project cost could drop more than twice.

Piatra Neamt

Financial issues. In 1999 municipal revenues were ROL 101,9 billion including 11% of subsidies from the national budget. In general the economic situation seems to be better to compare with other cities visited before. There are several major employers: the chemical plant Savinesti that has 6,000 employees (down from 13,000 before, but now stable), a chemical plant that has 600 employees and is being privatized with a participation of an Italian company Rifil, an agricultural machinery plant with some participation of FIAT and wood processing enterprises employing about 4,000 people.

According to the information received during meetings in the city non-payments from population are less than 10%, no non-payments from commercial entities and no more than 6-month delays with budget organizations.

Technical issues. Proposals of the city are based on the pre-feasibility study developed in the year 1998 by German firm MVV Mannheim. Several alternatives were evaluated, and the following measures were selected as a least-cost solution:

- Modernization of BH;
- Rehabilitation and replacement of 88 km of the heating network;
- Installation of individual heating substations in apartment buildings;
- Improvement of internal networks inside apartment building, including installation of thermostatic valves;
- Installation of SCADA.

Presumably it would reduce a heat demand by 30 %. The total cost of this investment program is around \$ 63 million.

The main comment of the Electrotek team was that proposed investments were not affordable for the municipal budget, and should be reduced by at least 10 times. All propose measures should be reviewed. For example, only most deteriorated sections of piping system should be replaced.

Reghin

Financial issues. In 1999 municipal revenues were ROL 26.4 billion, and 42% of these revenues were received as subsidies form the national budget. The city made a strange impression of contradicting pictures. The city has problems with major industries. Three of five major enterprises the city development in the past have closed, or they work at very low capacity, like the Republica metallurgy plant that retains 450 out of 5000 employees. The municipal budget was on the level of \$43 per capita at the end of 1999, and the Municipality informed the team about the very low family income in the city.

Technical issues. The feasibility study, which was developed three years ago, established a basis the investment package proposed by the Municipality. The Municipality is looking for investments to rehabilitate 7 isolated systems. Specifically it includes:

- Replacement of all aged boilers similarly as done at one BH,

- Replacement of all deteriorated networks with pre-insulated pipes,
- Introduction of SCADA system and leakage detection system

The total cost of the investment program is \$ 11 million.

The Electrotek team expressed a first impression that the proposed project cost was not affordable for the municipality, and proposed measures should be reviewed and only most feasible of them should be selected for the implementation. For example, only most deteriorated sections of piping systems should be replaced. Additionally, the visit to the new boiler house converted from the central heating substation showed that potential energy savings were not completely realized in the system. For example, controls were not installed at the demand side.

Campia Turzii

Financial issues. Campia Turzii, with its population of 31,000 and ROL 16,8 billion budget, just recently became a city. Actually, only about 15,000 people live under urban conditions in 5,185 apartments, and the rest live in small villages incorporated into the city and get heat from gas stoves. The main industry in the city is a steel-wire plant providing the whole country with its products. The plant is being renovated, and besides the plant there are only small service enterprises in the city. An economic situation in the city was unclear. The representative of the Municipality talked about recovering after a decline, but there were not enough evident signs of it. Population had difficulties paying for heat, and non-payments were very high.

Technical issues. The intention of the city is to upgrade all 10 isolated systems with their boiler houses. The cost of investment program was stated in the amount of \$ 7.1 million. Since unlikely that these investments are affordable for the municipality, the proposed investments should be reviewed for the selection of most feasible and urgent measures. In addition, the visit to the boiler house, which was rehabilitated recently, led to the recommendation to include controls at the level of apartment buildings. Having these controls boiler houses would be operated more efficiently, and some savings might be achieved within the distribution systems.

Urziceni

Financial issues. The city of Urziceni is small, and in 1999 municipal revenues were ROL 15.7 billion. The municipality expects the surplus of the budget at the end of 2000. The Mayor informed the Electrotek team about a number of good performing enterprises in the city. The first impression of the team was that economic situation looked relatively stable in this small city.

Although the Mayor expressed an interest in the development of the commercial viable project for modernization of DHS, he noted that the Municipality would only consider projects affordable for the city.

The municipally owned company Terma operates with DHS, which includes boiler houses and distribution networks owned by the Municipality. The company is also in charge of the operation of water supply and sewage systems, as well as a public transportation.

Technical issues. The company Terma proposed the following measures:

- Replacement of all old boilers and heat exchanges by the new equipment and installation of controls;
- Rehabilitation of the distribution network.

Although the first impression was that \$ 4,7 million project proposed by the city exceeded by approximately 10 times the cost of the bankable project, the Municipality and Terma showed a large interest in the cooperation with the USAID project in the selection of the feasible pilot project.

Braila

Financial Issues. In 1999 municipal revenues were ROL 204.2 billion. The Mayor presented rather pessimistic picture of the city economy. In the past the most important industries and main employers were eight textile factories. The largest factory had 3600 employees, and seven others factories employed around 1200 employees each. The Mayor noted that all these factories were privatized, and had foreign owners from U.K., Italy, Turkey, and also some local owners. At present the production is very low in all these factories, and some of them are out of the business at all. The same situation exists with other enterprises. Thus, the Mayor expressed rather negative attitude toward a privatization. The agricultural sector, which flourished in the past, is currently in poor shape also. The Mayor claimed that around 40,000 people were unemployed, and many of them were living below the poverty level.

Technical issues. The feasibility study for DHS rehabilitation developed by the German company proposes the project in the amount of \$ 5 million, which includes the following measures:

- Reconstruction of the old steam boiler house with transformation into CHP (in the past this big boiler house belonged to the industrial enterprise, and its ownership was recently transferred to the Municipality);
- Replacement of the network.

Tulcea

Financial issues. In 1999 municipal revenues were ROL 80.8 billion. The most important industries for city's economy are the following: a chemical plant, an aluminum plant owned by the U.K. company BBG Alum, two shipyards, one of them is owned by a Norwegian company, and a number of food processing facilities owned by companies from Spain and Italy.

The municipal district heating company, which is also in charge of water supply and sewage services, doesn't have own heat sources. The company purchases heat from two boiler houses owned by the chemical plant and BBG Alum. These boiler houses are located in 3 km from the city's border, and flow meters and thermometers are installed next to the gates of the enterprises. The transmission pipeline from these boilers to central heating substations belongs to the Municipality. Substations and secondary networks belong to the Municipality also. In the past DHS provided heat to 15,000 apartments, but by this time about 3,000 households decided to be disconnected from these systems by various reasons (low quality of heat supply, high cost of services, often interruption in water supply, etc.).

Since the DHS infrastructure was deteriorated, the Municipality in the past decided to establish local heat supply sources and to terminate heat purchase from industrial boiler houses. In order to achieve this goal the program for the conversion of substations into boiler houses was initiated. The French company Montenedy Dalkia made investments into conversion of substations into boiler houses, and obtained a concession for the operation of new 15 local systems up to the time when the investment would be returned.

Although the households connected to these new systems obtained a reliable heat supply, such action doesn't look as a sound solution from the economical point of view. Old inefficient industrial boiler houses utilizing expensive heavy liquid fuel sell the heat under the tariff of 700,000 ROL/Gcal, new local boilers use even more expensive light fuel, and their tariff is 850,000RO/Gcal.

After establishing of new boiler houses, the problems for residents still supplied from industrial boiler houses became even worse. Even before the disconnection of large number of users, the equipment at industrial boiler houses was oversized. After reduction of the residential load the situation worsened, especially in summer time. At low load it became technically impossible to have any supply. The team was informed that these residents don't have a domestic hot water supply for two years. Due low quality of services during heating seasons they were forced to use even more expensive electricity to heat their dwellings. Furthermore, there is no gas network in the city, and the population uses for cooking LPG. Thus, expenses for energy bills (electricity, LPG, space heating) consume most of residents' income.

Technical issues. Municipal and DHC management have various plans to continue purchasing heat from BBG Alum, or to launch the program of the modernization of central heating substations and transformation them into boiler houses. The other option may be an installation of additional boilers in the pump station for domestic hot water.

Arad

Financial Issues. In 1999 municipal revenues were ROL 214.1 billion including 3% subsidies from the national budget. The Chief of the Economic Department informed the Electrotek team about two most important projects for the Municipality: the DHS rehabilitation and an incineration plant construction. The Municipality is not ready with both projects in terms of a scope of work and a project cost. The Municipality thinks

seriously to issue bonds to finance their contribution to the projects. The Mayor explained that DHS energy efficiency improvement was a very important task for the city.

The DHC SC Arterm SA operates under a concession agreement with the Municipality. The current contract is signed in 1995. The DHC was registered as a commercial company in 1995 with 85.9% owned by the municipality, 12.26% owned by the City Council, and the remaining 1.84% owned by employees and different companies. Arterm buys heat from a CONEL plant and resells it to consumers through 45 substations and 170 km of secondary networks. Arterm supplies heat to 105,000 residential consumers. 100% of the CONEL heat is metered, and 100% of the heat, which goes out of substations is metered also. Moreover, 50% of consumers have meters for space heating. Wherever heat meters are installed, also thermostatic valves in combination with electronic heat allocators are installed. DHC provides the service of heat meters, thermostatic valves and heat allocators and their installation to the consumers. Arterm is booked by customer's orders for these installations for the next 6 months. They have invested own resources to change old heat exchangers in three substations with plate heat exchangers with automatic controls and have started some rehabilitation of the network with pre-insulated pipes.

Their current tariff is 400,000 ROL/Gcal without VAT. Annually, they pay for an energy audit with an energy balance of their system, which is undertaken by the energy design institute. The last audit in December 1998 showed that total losses were 17.8%. They have paid for the new audit, which will be completed in a month.

Technical issues. DHC and the Municipality were willing to improve an economic performance of 45 existing substations and the secondary distribution network keeping in mind that state subsidies would be removed in the future. As the first stage the Municipality and DHC proposed to select heating substations for the first project, which would correlate with the ability of the municipal budget to secure the project financing.

Deva

Financial issues. In 1999 municipal revenues were ROL 82.8 billion. The Mayor informed the Electrotek team that many foreign companies invested in the town. An US-Australian consortium invested \$ 35 million and took in a concession all mining surfaces in the region. Additionally, the German company Heidenberg and Japanese Sumitomi invested recently in the region. The Mayor stated that the Municipality received a grant from ISPA for the water network reconstruction.

The Mayor told about the \$ 6 million loan from a US company Lemna International for the construction of a landfill. The loan term is 10 years with 3 years grace period and floating interest rate of 6.55% - 7.0%. The Mayor stated that they were very interested in obtaining long term financing for the DHS project at similar conditions.

The director of the DHC considered only a \$ 10 million project and a ten-year loan, since he was convinced that the Municipality can annually provide \$ 1 million guarantees. The director of DHC stated they were not interested in projects smaller than \$ 10 million.

Technical issues. Proposals of the city are based on the pre-feasibility study developed in 1995 by the local company. The following alternatives were proposed:

- Modernization of central heating substations with installation of new heat exchangers, where it is needed with controls and
- To leave heat exchangers for heating at present location at substations and installation of domestic hot water preparation system at consumer sites;
- Replacement of central heating substations by individual heating substations inside buildings equipped with up-to-date controls.

According to the initial opinion of the Electrotek team the investment in the amount of \$ 10 million is not affordable for the Municipality for commercial financing, the team suggested to revise the project and to propose most feasible and urgent measures. However, the management of DHC did not support this idea and noted that after finishing by Electrotek the feasibility study for the entire DHS they would extract from it a pilot project.

Alba Iulia

Financial issues. In 1999 municipal revenues were ROL 76.5 billion. The Mayor told that the Municipality considered borrowing at commercial banks for improvement of the district heating system. More specifically, they discussed a ROL 10 billion loan with Demir Bank, Bucharest and Bank of Transylvania, Cluj. Since both banks requested the municipal real estate as a collateral and refused to consider municipal revenues for the loan security, the negotiations were stopped.

There are several local and foreign owned shoe factories in the city. There are Italian investors in an electronics factory an the textile industry, and, a local greenhouse was bought by Italians. As well, in 1999 the Italian consortium Frati invested million in a green field project – the factory for wooden fiber and finishing elements for the furniture industry. Unemployment rate is 9-10%.

There are two companies in the city providing district heat to consumers.

1. The company Dalkia 100% owned by the Vivendi group has a concession with the Municipality to operate with DHS. The concession agreement is signed on January 1,1992 for 20 years.
2. S.C. Apa – Kanal is a 100% municipally owned water supply and sewerage utility. Since 1999 they have been operating four boiler houses and supplying heat to a small part of the city.

Dalkia has only limited own tangible assets such as cars, etc. The tariff is 416,000 ROL/Gcal including VAT. The average delay in the residential payment collection is 130-150 days.

Apa-Kanal also have a big problem with collection of revenues from the population, and the collection rate is around 60%. The tariff approved on October 26, 2000 is 436,000 ROL/Gcal. DHC sells 95% of heat to the population. The company has a small credit line in the amount of ROL 300 million.

Technical issues.

DHS operated by Dalkia. The feasibility study for rehabilitation of the municipal heating system was developed in 1995 and proposed the following measures for the modernization of 16 isolated heating systems:

- Replacement of all old boilers;
- Replacement of all deteriorated networks with pre-insulated pipes.

The total cost of the investment program is above \$ 10 millions. However, the pilot project in the amount of \$ 500,000-600,000 might be extracted from the total investment package.

DHS operated by Apa-Kanal. The feasibility study developed in 1995 includes the following measures:

- Modernization of four central heating substations and transformation them in local boiler houses;
- Division of the system into 4 local thermal areas with installation in each zone a small local boiler house practically without a distribution network. Totally, 70 small local boilers should be installed.

Although the total project cost is about \$US 3 millions, the pilot project might be identified also.

Sebes

Although the city of Sebes was not included in the initial schedule, during the visit in Alba Iulia, the Electrotek team received a request from the Mayor of the city of Sebes to meet with him. In 1999 municipal revenues of Sebes were ROL 22.3 billion.

The Mayor told about the following projects, which they would like to implement:

1. The water treatment station;
2. Rehabilitation of existing water and sewerage networks;
3. Construction of a new DHS for heat supply of 1,900 people in one of districts of the city.

The Mayor expressed an interest in the cooperation with the USAID project.

Brasov

Financial issues. In 1999 municipal revenues were ROL 279 billion including 4% of subsidies from the national budget. The Mayor noted that the City Council approved the implementation of the project for the district heating system. The City Council approved the reconstruction of DHS within an investment of \$ 70 million. Although the Mayor stated that the city agrees to guarantee a loan from IFI for the implementation of DHS projects, he stressed that the Municipality wants a future concessionaire to be a borrower,

and the Municipality can provide guarantees. The Municipality should not be considered as a borrower for the project.

The City Council received expressions of interest for the concession of DHS from the following companies:

- The German company VEW, which recently merged with RWE;
- CALDOROM, which already operates with DHS (under a kind of a sub-concession agreement with DHC);
- DHC, which is a current operator;
- CONEL CHP, which currently supplies 1/3 of the heat to DHC;
- Different association of owners for the concession of some particular substations and boiler houses.

The intentions of these companies are the following:

- The German VEW expressed interest in establishing a joint venture with the DHC;
- CALDOROM wants to operate jointly with the DHC;
- CONEL CHP wants to have a concession only for 42 substations supplied by CHP;
- DHC considers operating the whole system;
- Some owner associations want to operate single boiler houses.

The Chief of the Utility Department told the Electrotek Team about the decision of the City Council to give a concession to at least three separate companies. Each of the concessionaires should get rights on a separate part of DHS. There is no time constraints for the implementation of the City Council decision. According to the Chief of the Utility Department at least two years would be necessary to study all opportunities, to collect expressions of interest and to prepare concession agreements.

Technical issues. The following feasibility studies were developed for the rehabilitation of the DHS:

- A feasibility study developed by the Danish Environmental Protection Agency (DEPA), which proposed the investment in the amount of \$100M to unify all separate thermal systems and to make system more flexible;
- A feasibility study completed in 1997 by the French company Ingerex for the modernization of the existing centralized DHS, which receives heat from CONEL CHP, and decentralization of DHS through conversion of substations into boiler houses. Total project cost is \$75M;
- A feasibility study prepared by the German company VEW proposed DM153 million project to modernize the existing centralized DHS with rehabilitation of heating substations and pipelines and transformation of separate substations into boiler houses;
- The separate proposal is to transform all central heating substations into boiler houses with rehabilitation of the secondary network. The total cost of the project is DM 158 million.

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Financial Issues. In 1999 municipal revenues were ROL 48.9 billion including 10% of subsidies from the national budget. There is a number of enterprises essential for the city's economy. An agricultural machinery plant had 5000 employees in the year 1990, but now the number reduced to 240. Recently the plant was privatized, and there is a hope that it would increase the production and employ more workers. A cement plant had 2700 employees in the year 1990, and now the plant is owned and operated by the French company, but employees number is less. There are open pits, which provide raw materials for ceramic and porcelain production, vegetable oil factories, winery, and some other enterprises. These enterprises are located in the industrial zone, with the well-developed infrastructure and connection to the sea harbor. Although the reported unemployment rate in the city is 19%, which is quite high, the impression of the team was that the city was not in a bad shape. The Municipality invested into the construction of the 26 km gas pipeline to the city, and 17 km of the pipeline are already built. Investments were made into water supply and sewage systems. The roads are well maintained, and recently the street lighting project was implemented. There is a plentiful agricultural land around the city. There are many gardens around the city, and 1700 ha of the land are under the grape vine. It provides an essential income for the population.

The Mayor and Vice Mayor hold their positions from the beginning of nineties, being re-elected twice.

The municipal company operates with DHS, water supply and sewage systems, and an urban waste collection. Eighteen boilers generate heat, which is distributed by 18 isolated systems. Around 50% of city population (20,000 residents in 174 apartment buildings) is served by DHS. The company does not buy heat from outside sources. Although the Municipality has limited resources for the investment in DHS, five boiler houses had been refurbished, and the new equipment was installed.

Technical issues. Proposals of DHC and the Municipality are based on results of the feasibility study, which was prepared by the local design company. In general they suggested reconstruction of five boiler houses, which have 4 – 6 Gcal/h of the capacity.

There is an open channel for discharge of cooling water from nuclear reactor of 500 MW at the Chernavoda NPP located approximately in 1 km from city's borders. It was stated that water temperature in this channel in winter is around 12°C, which is a potential source for a heat pump installation. If this statement is correct, the heat pump might become an attractive alternative for meeting domestic hot water demand in summer time, and space heating and domestic hot water in fall and spring. In winter some heat have to be generated at boiler houses in addition to the heat pump supply. The Electrotek team and DHC agreed that they would measure the temperature inside discharge channels during coldest winter days.

Specific Progress on Assessment of the Proposed Project's Viability

After finishing site visits in October-November, Stefan Cristescu and Natalia Burchiu followed up the meetings in visited cities, contacted municipalities and DHC and collected technical information requested by Electrotek before and during meetings in cities. Bogdan Erdeli collected financial information for the assessment municipal and DHC creditworthiness. Doina Caloianu provided coordination of local consultant's work on collecting information and preparation this information in required formats.

Peter Borgo, Gregory Lvovsky, Yevgeny Guterman and Vitaly Peisakhovich visited Bucharest from December 11 through December 22 to provide an assessment of a viability of projects proposed by municipalities and DHC. Doina worked with the Electrotek team and provided technical and logistical support. Stefan, Natalia and Bogdan cooperated with the Electrotek team on the analysis of the collected information and the assessment of opportunities for bankable projects in visited cities.

The Electrotek presented results of the initial project assessment to Corneliu Rotaru and Anca Golita, ARCE. ARCE supported all principal conclusions of the Electrotek team and gave comments on financial and intuitional frameworks in a number of visited cities.

Since the part of colleted technical and financial information was inconsistent in all cities, the Electrotek team sent out additional questions and comments to clear up critical issues for the final assessment of projects and the selection of most promising of them. The initial project assessment can be changed upon the collection of the additional information and clarification of some important technical and financial issues.