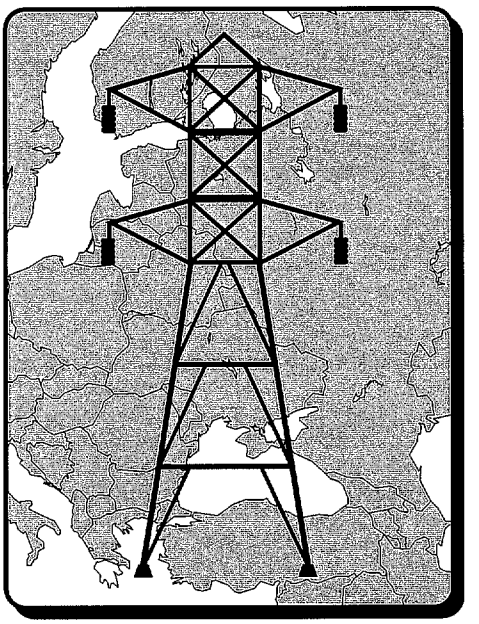
PD-ABP-519

Central and Eastern Europe Regional Energy Efficiency Project EUR-0030-C-00-2053-00



Energy Pricing, Energy Efficiency, and Energy Sector Restructuring Component

Final Report
December 1996

Volume V

Prepared for:
U.S. Agency for International Development
Bureau for Europe and NIS
Office of Environment, Energy, and Urban Development
Energy and Infrastructure Division

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CONTENTS

Volume I
Baltics: Assistance to EBRD on Project Development
Baltics: Lithuania DSM/IRP
Baltics: Equipment Procurement

Volume II
Baltics: Electric Power Contracting and Pricing
Regional: Invitational Travel and AEE Conference - 1992
Regional: Invitational Travel and AEE Conference - 1993

Volume III
Regional: Invitational Travel and AEE Conference - 1994
Regional: Invitational Travel and AEE Conference - 1995

Volume IV
Regional: Invitational Travel and AEE Conference - 1996
Regional Energy Efficiency Conference Hungary, 1995

Volume V
Follow-Up to Emergency Industrial Energy Efficiency
Regional Support to AEE Chapters

Volume VI
Regional: CEM Training Program
Poland: Energy Restructuring

Volume VII
Poland: DSM

Volume VIII
Poland: Private Power/Legal
Poland: Electricity Tariffs
Poland: IRP
Poland: Power Pricing

Volume IX
Poland: World Bank Support
Bulgaria: Electricity Action Plan

Volume X
Bulgaria: Energy Efficiency Market Development

Volume XI
Bulgaria: Equipment Procurement
Bulgaria: Private Power
Bulgaria: Energy Legal/Regulatory
Slovakia: ESCO Development & EPC Financing

Volume XII
Hungary: Energy Efficiency Market Development

Volume XIII
Hungary: Energy Office
Hungary: Equipment Procurement

Volume XIV and Volume XV
Romania: Energy Efficiency Market Development

Volume XVI
Romania: Equipment Procurement
Macedonia: Industrial Energy Efficiency
Macedonia: Private Power

CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT
EUR-0030-C-00-2053-00

Energy Pricing, Energy Efficiency, and Energy Sector Restructuring Component

Follow-Up to Emergency Industrial Energy Efficiency

Task Completion Memorandum

Prepared for:

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4

CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT

Task Completion Memorandum

Regional - Follow-Up to Emergency Industrial Energy Efficiency

Summary Task Description

The 1991 Emergency Energy Program for Eastern and Central Europe was among the first donor-sponsored programs of assistance to Eastern Europe, designed to help the emerging democracies cope with its transition to market-oriented economies. Component 1 - Industrial Energy Efficiency achieved measurable, short-term results and transferred skills and technology to Hungary, Poland, Czechoslovakia, Romania, Bulgaria, Yugoslavia, Estonia, Latvia and Lithuania.

Under the 1991 program, U.S. engineers introduced Western-style energy management techniques to representative industrial plants, putting in place an energy management program focusing on short-run operations and maintenance measures. The program used local engineers and consultants, serving to foster markets for energy efficiency services provided by technical institutes being privatized as joint ventures and new private sector firms. A tailor-made program was developed for each plant, including training, technical audits, efficiency measurements, statistical data evaluation, and process engineering evaluation. The project achieved implementation of recommendations to improve operational efficiency, including process productivity, quality control and energy efficiency. An appropriate package of U.S. efficiency equipment was specified and procured for each plant, with a total of over $1.5 million in procurement. Equipment procured included management information systems, combustion efficiency meters, steam flow meters, steam traps, exhaust gas analyzers, thermostatic radiator valves, electric power demand/load analyzers, and energy audit instruments.

In 1993 USAID contracted with Scientech to conduct an evaluation of the impact of the industrial energy component of the Emergency Energy Project. An evaluation team visited Bulgaria, the Czech Republic, Hungary, and Romania in the summer of 1993. Among its findings, the team noted that some USAID-funded equipment needed maintenance or spare

parts[1], and recommended that USAID assist the recipients of the equipment by providing spare parts and repair services.

Under the East European Regional Energy Efficiency Project, USAID subsequently asked Hagler Bailly to conduct a survey of all the organizations that received equipment under the industrial component of the Emergency Energy Project to: 1) find out what the status of all the equipment was; 2) analyze the results obtained with the equipment; 3) investigate how the recipients perceived the support they received from the U.S. suppliers; and 4) to coordinate with vendors and manufacturers to troubleshoot the equipment and insure that the equipment continues to be used in the future.

The purpose of this task was therefore to conduct a follow-up survey with the facilities which in 1991 received energy efficiency equipment under the U.S.A.I.D. - Emergency Energy Program for Eastern and Central Europe. Specific goals of the task were to analyze the benefits achieved with the supplied equipment, troubleshoot the equipment to maximize these benefits, and prepare case study reports to disseminate the results of the program and the lessons learned.

Specific Goals and Objectives

The goal and objective of this activity was to carry out activities as follow-up to the 1991 program:

- to ensure that maximum benefits are obtained from the equipment supplied;
- to disseminate the results of the program through case study reports.

Expected Outputs

This task was expected to assist U.S. suppliers exporting to the region, to assist industrial managers in eastern Europe who are interested in implementing energy efficiency projects, and to assist the World Bank and others developing energy sector loans.

The equipment follow-up component of the task was designed to increase the utilization of the equipment supplied to grantees in 1991, and increase the access between the industrial plant recipients and local consultants and the U.S. manufacturers/suppliers so that improved maintenance, repair, and replacement parts access will occur.

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[1] *A Project Evaluation of the Impact of the Industrial Energy Component of the Emergency Energy Project*, draft report prepared by Scientech, Inc. for AID/ENI/EEUD/EI.

The case studies were planned to expand awareness of the results/lessons learned, leading to improved energy efficiency programming and lending within the countries.

Deliverables

Quarterly equipment database reports
Equipment troubleshooting actions
Survey & troubleshooting reports
4 case study reports

All these elements were fulfilled as part of the task.

Results and Next Steps

Four case study reports were prepared. These reports presented the results of the in-depth follow-up visits that were conducted with four of the industrial plants that had participated in the Emergency Energy Program for Eastern and Central Europe in 1991-1992 to assess the long-term results of the project :

- Ceramic Plant, Sofia, Bulgaria
- Combined Heat and Power Plant, Bucharest, Romania
- Yeast and Alcohol Factory, Budapest, Hungary
- Basic Chemicals Plant, Budapest, Hungary

For the equipment follow-up component, information provided by the three contractors which had participated in the Emergency Energy Project (Hagler Bailly, IRG, RMA) was compiled into a central database covering all the plants and organizations that had received USAID-funded equipment under that project and centralizing information on all this equipment in a standardized format.

A survey was then sent to the 60 organizations that had received equipment, to ask them to fill out a questionnaire for each piece of equipment or system they had received, covering such questions as:

- How had the installation process gone?
- Was the equipment initially functioning correctly?
- Was the equipment in working condition at the time of the survey? What were the problems, if any?
- What sort of maintenance and repairs had been done on the equipment?
- Had the organization tried to get in touch with the vendor or manufacturer of the

7

equipment? Was their support satisfactory?
- How often did the organization use the equipment?
- What energy conservation results were achieved with the equipment?

Forty-nine responses to the survey were received (82% response rate), sometimes after several reminders and mailings.

After receipt of the responses to the survey, follow-up contact was made with all the plants that had indicated in their response that they were experiencing some problems or that some of their equipment was still not installed. A majority of the plants responded to this request for additional information on the equipment problems. Follow-up actions included providing spare parts to the recipient organizations, coordinating repairs for the equipment, and facilitating the exchange of information between the vendor, manufacturers, and the end-users of the equipment. Altogether, $19,000 of equipment and repairs were provided to the plants as part of this follow-up effort. These parts, supplies, and repairs have enabled the plants to make again full use of equipment worth over $135,000.

The parts and repairs that were provided included the following:

- Replacement natural gas flowmeter
- New fixed probe for an in-situ oxygen analyzer
- Repairs on electronic boards for a combustion analyzer and an ultrasonic flowmeter
- Two rechargeable batteries for a computer and a power analyzer.
- Sensors and consumables for 17 portable combustion analyzers.

In addition to the above actions, further detailed information was sent to several plants (instructions, manuals), and all the plants received a listing of updated contact information for the U.S. manufacturers and their local agents in Eastern Europe. This listing was assembled by writing to all the manufacturers of equipment funded by USAID under the Emergency Energy Program to ask them for full contact information for their offices, representatives, and agents located in Eastern Europe. The objective of that listing was to facilitate contact between the recipient plants and the manufacturers to insure that the USAID-funded equipment can be properly maintained in the future and to make it easier for these Central and Eastern European organizations to buy additional US-made equipment.

Based on the results of this activity, a set of recommendations was formulated for future equipment procurement, and these recommendations have been followed in subsequent equipment procurement activities under the Energy Pricing, Energy Efficiency, and Energy Sector Restructuring Component of the Central and Eastern Europe Regional Energy Efficiency Project.

These recommendations can be summarized as follows.

1) Wherever applicable, include local support and manufacturer's commitment as part of the bid evaluation criteria.

2) Continue to establish long-term working relationships with U.S. manufacturers, so that these manufacturers have a clear incentive to collaborate with the USAID programs by providing additional support, participating in local conferences, and providing testimonies on the programs.

3) Buy several pieces of equipment, or systems, from the same manufacturer for a given country, so that the equipment reaches a 'critical mass' in that country, making it more worthwhile for the manufacturer to insure appropriate support structures, and creating a bigger momentum for repeat sales and the possible establishment of representatives.

4) As much as possible, buy the equipment from the export department of the manufacturer, not from local US vendors, to:

- insure optimal response to item 1) above
- build-up the working relationship with the manufacturer
- make the manufacturer more aware of the sales volumes generated by the Central and Eastern European markets

5) Include on purchase orders the necessary information to allow USAID to 'get out of the loop' by facilitating direct contact between the manufacturer and the recipient organization:

- Name and contact information for the recipient organization
- Name and contact information for the local engineering consultant, if applicable.
- Notification that ownership of the equipment will be transferred to the plant, and that the manufacturer should use its best efforts to provide follow-up assistance directly to the plant, including on matters related to warranty claims.

6) Transmit a copy of the purchase order to the recipient organization, to make sure that the recipient has all the required information for follow-up maintenance:

- full contact information for the vendor
- complete ordering information for the equipment and for the principal spare parts

7) At the end of the procurement process, send to all the recipients a listing of contacts for the US equipment, similar to the one showed in Appendix L, in order to:

- centralize the support contact information for all the equipment received by the plant
- leverage the demonstration and export development efforts by making the recipients aware of what other brands have been provided, and what other manufacturers are represented in the Central and Eastern Europe.

RESEARCH CASE STUDY:
ENERGY EFFICIENCY AT A BULGARIAN CERAMICS PLANT

by

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Gregory Butera, U.S. Agency for International Development

May 15, 1995

SUMMARY

In early 1991, U.S. Agency for International Development (USAID) sponsored an energy management program at a Bulgarian manufacturer of porcelain and ceramic tiles. The program was built around an energy audit of approximately one week in duration, and included a training course on energy management for plant staff. The audit recommendations were presented to plant management and, with their agreement on the selection, USAID provided equipment worth approximately $25,000 to implement some of the low-cost measures identified. This process took approximately nine months.

The measures identified during the audit were primarily related to housekeeping and management, and not equipment technologies as the plant had expected. Many of the recommended measures seemed obvious to plant staff, who did not consider it appropriate or necessary for the consultants to comment on plant operation and maintenance. Eventually, plant staff installed most of the equipment procured by USAID. However, only those measures related to USAID equipment were implemented.

Analysis of plant energy and production data shows very positive results beginning soon after the USAID audit intervention in the plant Since the audit, the Ceramics Plant has achieved and maintained important energy savings, reducing its specific gas consumption by 15-20%, while production has remained constant. The USAID audit and equipment donation appear to have catalyzed a sustained effort on the plant's part to improve efficiency, spurred perhaps by the quadrupling of energy prices in Bulgaria during the audit period.

However, today, the Ceramics Plant gives little credit to the USAID audit. They profess disappointment that only no-cost and low-cost measures were considered, and lament that more funds were not available for process-oriented efficiency improvements. The plant staff affirm that most of the technical recommendations originated from ideas of the plant staff, and not from the consultants. Management-oriented recommendations regarding energy efficiency made during the audit appear to have fallen on deaf ears.

Still, USAID can claim success for its efforts. It was a combination of donated equipment and improved operations and maintenance that provided the bulk of the large thermal energy savings. Long after the audit,

steam system efficiency components, especially steam traps, continue being provided to the plant by a local representative of a U.S. manufacturer, who was introduced to the plant during the USAID audit.

PROJECT BACKGROUND

In early 1991, Bulgaria was in the middle of a wrenching transition from a centrally planned economy that was part of the Council for Mutual Economic Assistance (CMEA, a mutual support system comprising the Communist nations), to a market-based economy that was open internationally. Beginning in late 1990, CMEA's mutual support infrastructure began to unravel as traditional trading patterns and arrangements were discarded. While this change had broad ranging effects on all sectors of the economy and industry, the impact was especially dramatic on Bulgarian industry's energy picture. When energy inputs were available from former CMEA partners (e.g., the former USSR), after 1990 they had to be paid for in hard currency. For Bulgaria, the general energy crisis in Central and Eastern Europe was exacerbated by the fact that all its natural gas and most of its petroleum, was imported. Beginning in April 1991, the former USSR, until then a key supplier of electricity to Bulgaria, cut off supplies. Domestic electricity generation also began to decline with the temporary shutting down of the Kozloduy nuclear power station in the autumn of 1991, due to safety concerns. At the same time, the pressures of privatization resulted in the removal of many price controls for energy. These energy troubles were compounded by the reduced output volume and curtailed government funding that came on the heels of great economic uncertainty. Suddenly, energy became a major survival factor for industrial facilities.

Another problem was that most plants in Bulgaria had been designed when energy prices were low, supply was taken for granted, and energy efficiency was of little concern. This meant that the basic instrumentation and controls necessary for energy monitoring and evaluation were not available in most plants, nor was there a managerial discipline to deal competently with energy efficiency.

On February 15, 1991, USAID launched the 1991 U.S. Emergency Energy Assistance Program for Bulgaria. The major focus of this program was improving industrial energy efficiency. Its primary objective was to achieve immediate and lasting energy savings at low cost, particularly for oil and gas. International Resources Group (IRG) of Washington, D.C. served as the program's prime contractor with Ecotech Product of Sofia as its subcontractor.

IRG carried out the following activities:

1. Screened the Bulgarian industrial sector, and with the Bulgarian Ministry of Industry, identified eight representative and appropriate plants for the energy management projects. The eight plants selected were: dairy processing, poultry, pharmaceuticals, textiles, soda ash, ceramics, chemical, and iron and steel.

2. Conducted energy audits and training in each of the eight plants, focusing on the identification of short-term measures to be implemented at no cost, or at low cost with quick payback.

3. Identified low-cost equipment packages (such as energy monitoring instruments) to be procured for each of the eight plants under the program, up to about $30,000 per plant.

4. Procured equipment and delivered it to the plants.

5. Returned to each of the plants in January 1992 to monitor the results of the project and assist in resolving any problems related to the equipment.

6. Disseminated information and encouraged follow-up, through a wrap-up workshop in Sofia in January 1992 with the participation of the management and technical staff of the eight plants, the Ministry of Industry, and representatives of other similar plants throughout Bulgaria.

CASE STUDY OBJECTIVES

The goals of this case study are 1) to describe the effects of USAID's 1991 equipment and training interventions on energy efficiency and plant management in one of the eight plants participating in the USAID program, a ceramics plant, and 2) to highlight the technical and management responses in the plant and the reasons for them. It is intended for plant managers, local energy service consultants, energy efficiency equipment manufacturers, and policy officials concerned with energy efficiency. The case study covers the period 1991-1994.

THE CERAMICS PLANT DESCRIPTION

This section briefly describes the Ceramics Plant at the time of the USAID-supported energy audit in 1991. In fact, no major changes in the plant's process equipment or management infrastructure have occurred during the past few years, and the descriptions are for the most part still valid in 1994.

Plant Process Description

The Ceramics Plant consists of two manufacturing areas, producing porcelain and floor tiles, respectively. The annual production in 1990 was approximately 3,200,000 pieces (1,000 tons) of porcelain, and 800,000 square meters of floor tiles. The plant has 650 employees, and appeared to

12

be a profitable operation in 1991, at least by applicable local accounting standards. Of the two plants, the porcelain plant was the older of the two, requiring a significant amount of manual labor. In contrast, the tile plant was only two years old at the time of the energy initiative; it was mostly automated and constructed using Italian technology.

Porcelain production at the Ceramics Plant works in the following manner (see Exhibit 1). The raw material is mixed and then ground using one of ten mills, each electrically driven by 18.5 kW motors. After grinding, filter presses remove excess water and extrude the remaining material. The raw material then goes to the product fabrication line for molding. Wet molded pieces are dried in one or more of the eleven driers, which operate on steam-heated circulating air. With most of the moisture removed, the next process is burning or curing in the biscuit furnace, which uses electricity to heat the material to 1,000 degrees Celsius. The cured, cooled porcelain pieces are then manually dipped into a glazing mixture before going to the electrical glazing furnace. In the electrical glazing furnace, the porcelain is heated to 1,300 degrees Celsius in a reducing atmosphere created by introducing natural gas (incomplete combustion) on thirty-four burners. The iron reduction achieved thereby produces white, glazed porcelain. The last phase is hand decoration of the glazed porcelain, which takes place in a room with forced ventilation, and uses methylene chloride as the solvent.

The tile manufacturing process works differently (see Exhibit 2). The raw material, with a water content of 37%, is dried in an atomizing dryer down to a moisture content of 4%. The atomizing dryer burns large amounts of natural gas (350 nm^3/h). Next, the tiles are formed by one of three presses (each a 75 kWh model). The tiles are then fired in a natural gas-fueled rolling furnace. The average gas consumption rate of this furnace is 60 nm^3/h. The subsequent step is glazing, which is completed by loading the tiles on small rail cars and passing them through automatic, natural gas-fired furnaces (250 nm^3/h). Packing storage and shipment, using a combination of manual and mechanical means, complete the manufacturing process.

Plant Production

Detailed production records for the two primary products, porcelain and tiles, were available only beginning in 1990. Production of both dipped slightly between 1990 and 1991: annual porcelain production reduced 12% from 1111 to 977 tonnes, while tile production reduced by 9% from 795 to 726 m^2. In addition, approximately 1 to 3 tonnes of gifts and souvenirs were produced annually.

Frit was produced for glazing purposes until early 1992. While its production was accounted for separately, its energy consumption was not; it was included in the porcelain energy consumption.

13

Exhibit 1. Porcelain Production

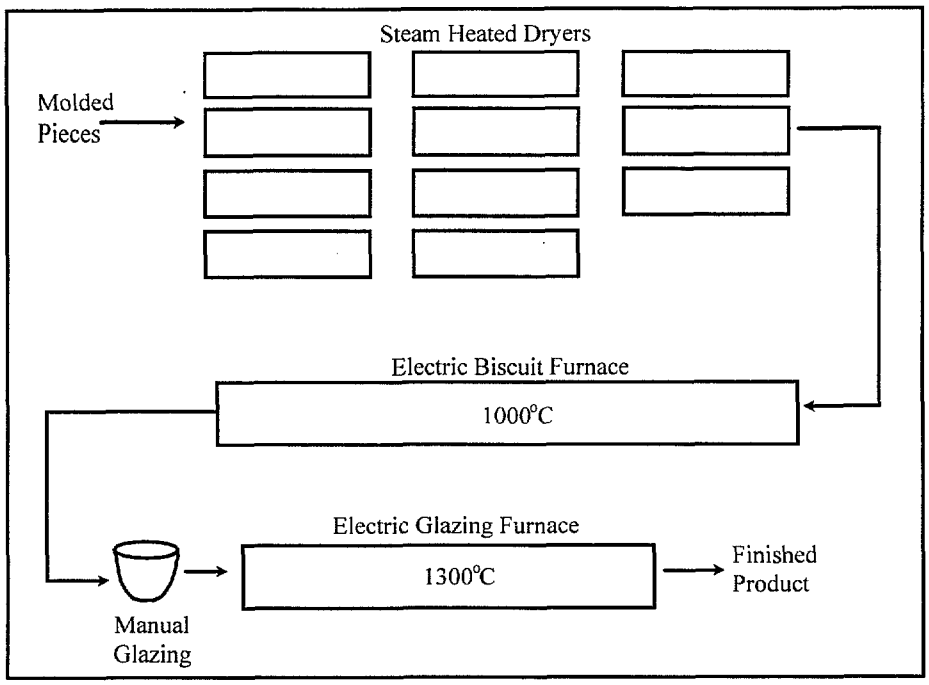
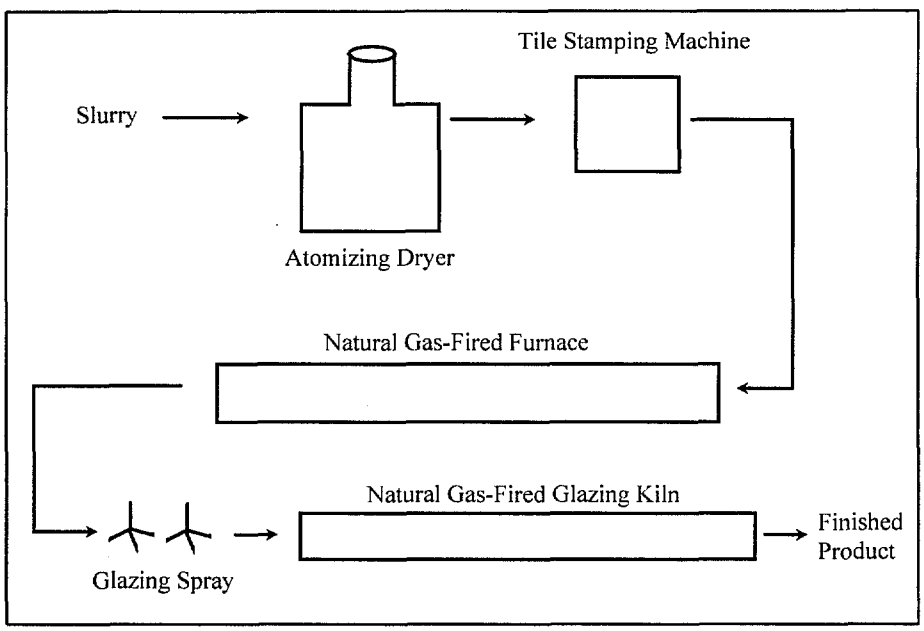


Exhibit 2. Tile Production Process



14

Plant Energy Consumption

The Ceramics Plant has three steam boilers, each with a capacity of four tons per hour (9.66GJ/h) of saturated steam operating at pressures of 4.5 to 5.0 bar. Since 1986, natural gas has been used as the boiler fuel, although the boilers could operate on fuel oil. Between 1990 and 1991, the price of gas increased by a factor of six (see Exhibit 3). The steam generated is used in the dryers, as well as for space heating, so the demand for steam varies seasonally and with humidity levels. At the time of the energy audit in 1991, approximately one-third of all building heating in the Ceramics Plant utilized heat recovered from returned condensate, implying some awareness of energy efficiency on the part of the plant's technical staff.

Electricity represented the major headache for the plant. Electricity accounted for almost 60% of the energy costs in the plant, due to the high consumption of the all-electric curing and glazing kilns on the porcelain line. In addition, energy costs for lighting accounted for approximately 15% of the plant's total energy expenses. Furthermore, rationing on a national scale reduced the plant's electricity quota to 75% of its 1990 consumption, while prices quadrupled; even still, electricity was often cut during peak hours. Exhibit 3 presents energy price and consumption data for the Ceramics Plant.

The value of the energy consumption of the plant at Western European prices was approximately US$ 2 million in 1990, and US$ 1.5 million in 1991. Even with the price rises in 1991, the plant still paid only a fraction of this value.

Exhibit 3. Ceramics Plant Energy Prices and Consumption

		1990	1991
Natural gas	price	112.6 lv/1000 nm^3	767.2 lv/1000 nm^3
	consumption	8,916,000 nm^3	6,604,000 nm^3
	cost in US$ at exchange rate	$68,000	$338,000
	cost in US$ at European prices	$939,000	$689,000
Electricity	price	0.055 lv/kWh	0.271 lv/kWh
	consumption	20,000,000 kWh	15,166,000 kWh
	cost in US$ at exchange rate	$73,000	$273,000
	cost in US$ at European prices	$1,083,000	$821,000

Staff Capabilities and Organization

The plant is run by a general manager, who supervises technical, product, financial and sales managers. The general manager and technical manager are also members of the plant's five-person board of directors, appointed by the Ministry of Industry, which oversees the operation of the plant.

The management team, consisting of the general manager, technical manager, finance manager and sales manager, is the locus of both strategic and day-to-day decision-making. This team tracks profitability on a product-line bases, and knows the costs and revenues associated with each line. Beginning in 1990, energy consumption for the two main products, porcelain and tiles, also began to be evaluated separately.

The Ceramics Plant seems fortunate in having good communications between management and staff; relations between the two were cooperative and relaxed. In addition, there was a culture of sharing data (e.g., monthly production analysis, "rejects" data) with the employees. The company seemed to benefit greatly from this relaxed environment. Since the audit in 1991, there have been few management changes, except for a new general manager, which took place over two years ago.

Both managers and workers had demonstrated that they could handle new technology introductions well. The most recent major new technology introduction was in 1989, when there was a major change in the tile production process. A state-of-the-art Italian production line was purchased and installed, and the process switched from two firings to one firing, together with a move from electricity to natural gas as the energy source. In addition to the cost, quality and energy efficiency benefits, this change cut the number of required workers (for the process) from 300 to 100. Due to the magnitude of the change, it took one year to implement. According to the plant staff, the payback projections of three to four years for the investment were realized.

Business Aspects

The plant exports its products because its management has understood the economics of competition and the benefits of export over domestic sales. There are only three or four other porcelain or ceramics manufacturers in Bulgaria, and there is minimal threat from imports. The Ceramics Plant had always had a good position in the industry, and exported almost half its production. With its strong record in international markets, the plant seemed well positioned to weather the transition from government subsidies to competitiveness in a free market. While it is nominally a state-owned company, plant management has full financial responsibility for the enterprise.

As part of its long-term planning, the plant staff's major objective has been to replace the electric-fired porcelain line with a new gas-fired line. The advantages in energy savings and energy prices

would help pay for a new technology which would also improve quality and increase production. Their success with the new tile line gave them confidence in the attractiveness of the porcelain project, if only they could find financing for it.

Energy Management Structure

The Ceramics Plant has an energy department, headed by the energy manager, who reports directly to the technical manager. The energy manager's responsibilities are the maintenance of the electrical distribution equipment in the plant, as well as the generation of periodic reports on energy consumption which are given to corporate managers and division chiefs. A program to encourage energy savings had been instituted by the plant. For example, gas consumption was metered and reported for tile production and at the main gas pipeline, and the managers had plans to install additional gas meters at the porcelain production facility. Also, the meters at the electrical substation are checked for accuracy on a monthly basis.

Nevertheless, the role of the energy manager seemed to be largely focused on equipment and consumption data rather than on operational practice. The energy manager collected energy data every day, and presented them to the accounts department for costing and other purposes. The energy data were also presented to management every six months, a procedure top management reported as "adequate" for them. As was typical in most Bulgarian industries, the energy manager had no mandate or responsibility to analyze or interpret the data, nor any authority to do anything about this.

While both management and staff claimed to be receptive to energy efficiency notions, the "energy ethic" had not been implemented in everyday practice. It was difficult to judge the actual resources (including money, equipment, training and attention) devoted to energy conservation, and it is likely there was no real commitment on this level. Basically, management considered the day-to-day operational functions insignificant compared to the potential to save energy by replacing the furnaces. As they had done with the tile line, management planned and waited for the opportunity to replace the porcelain line with a new efficient natural gas production line; to this day, this remains their primary goal.

THE ENERGY AUDIT

It was in this overall context that the USAID energy intervention took place in April 1991. The Ceramics Plant was one of the eight Bulgarian demonstration facilities selected by the USAID contractor in collaboration with the Ministry of Industry for inclusion in the energy assistance program. The audit took place over the course of one week with a U.S. energy efficiency expert and

17

a local Bulgarian engineer as a subcontractor. The plant collaborated closely with the energy audit team and participated in all the measurements and discussions.

The audit resulted in three concrete outputs. First, an energy management seminar was offered for the benefit of plant management and staff. Second, a set of recommendations was made with respect to energy management investments and actions. Third, a small amount of U.S. energy efficiency-related equipment was provided by USAID as a grant to the company.

The energy management seminar was aimed at providing plant management and staff with an overall framework for improved energy management, convincing them of the need to organize an energy management program as well as providing specific examples of energy savings. The seminar detailed several key aspects of energy management: the economic principles of energy management, specific energy efficiency recommendations, and energy monitoring and survey practices.

The recommendation for energy efficiency improvements included three sets of options: "no-cost," low-cost, and capital-intensive options. Each of these options is discussed below.

"No-Cost Options." This set of options (see Exhibit 4) consisted of energy efficiency improvements that could be initiated at very little cost, within the existing limited plant budgets for routine capital purchases, maintenance and housekeeping. Where some cost was involved, it would be the plant's responsibility.

Low-Cost Options. These options had higher cost implications than the first set, but were not considered to require large amounts of capital. Most of the USAID-donated equipment would come from these measures.

Capital-Intensive Options. These are two high-cost items that are not currently provided for by any funding program. While the new gas-fired porcelain furnace cannot be justified on energy

Exhibit 4. Recommendations from USAID Energy Audit of the Ceramic Plant

"No-Cost" Measures
Keep furnace and dryer doors closed
Repair lights and fixtures; clean windows
Optimize transformers and motors to loads
Keep plant doors and windows closed
Optimize boiler combustion
Optimize use of compressed air

Low-Cost Recommendations
Recover heat from furnaces
Recover condensate and condensate heat
Install gas flowmeters on separate users
Install gas pressure reducing valve
Install temperature measuring equipment
Use a portable thermocouple calibrator
Use a flue gas analyzer for all furnaces
Install continuous moisture analyzer

Capital-Intensive Recommendations
Analyze tile dryers, develop correlations between moisture content and gas use, and adjust accordingly
Replace electric furnace with natural gas furnace of double the production capacity

18

savings alone, when product quality and increased productivity are factored in, this may be an extremely attractive investment.

Based on the audit, the USAID consultants, with the agreement of the plant staff, selected certain U.S.-made equipment to be donated to the plant. This equipment supported some of the most attractive no-cost and low-cost measures, and represented mainly instruments which were difficult or impossible to obtain in Bulgaria at that time. A list of the equipment procured is presented in Exhibit 5. This equipment was received by the plant by early 1992.

Exhibit 5. Equipment Purchased for Ceramics Plant for Audit Implementation

Portable exhaust gas analyzer	US$ 6,000
Centrifuge for moisture determination	600
Natural gas flow indicator	2,400
Air flow meter	5,400
Inverted bucket steam traps	5,600
Portable thermocouples and indicator	2,000
Portable thermocouple checker	500
Gas pressure reducing station	500

The overall cost-benefit analysis for the energy audit is summarized in Exhibit 6. A total investment of approximately $100,000 was made by USAID to identify the measures in the plant, procure and ship the equipment, and monitor its installation. The consultants identified a total energy savings of $190,000 associated with the purchase of the equipment listed in Exhibit 5. This amount represents just under 10% of the total energy cost of the plant, but over 20% of the thermal energy costs, since all of the savings obtained from the purchased equipment will be in natural gas.

Exhibit 6. Energy Audit Cost-Benefit Analysis

Costs:	
Consulting Services (U.S. and Local)	
Energy audit labor	$30,000
Equipment design & specification	10,000
Procurement support	5,000
Installation support	5,000
Monitoring and Follow-up support	10,000
International travel expenses	10,000
USAID Equipment	$25,000
Total Costs	$95,000
Benefits:	
Energy cost savings of $190,000 per year	
Payback:	
$ 95,000 costs / $ 190,000 benefits = 0.5 year	

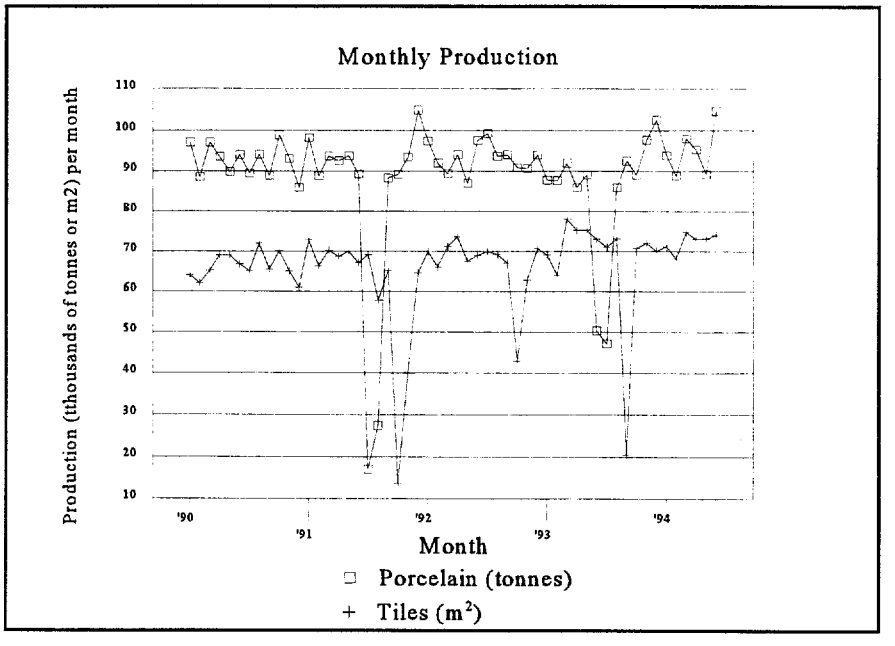
ENERGY AUDIT RESULTS

Audit results include the plant implementation of the purchased equipment, the actual savings obtained, as well as the plant staff reaction to the audit process and the recommendations made. This section presents the results of the energy audit from two viewpoints: first, an analysis of plant data before and after the audit; and second, the view of the plant management regarding the audit and its results.

What the Data Show

In spite of the insistence of the Ceramics Plant staff in downplaying the results of the audit, the data on energy consumption and production clearly show savings in specific energy consumption that began to be evident in the period following the USAID audit.

Exhibit 7. Ceramics Plant Production (1990-94)

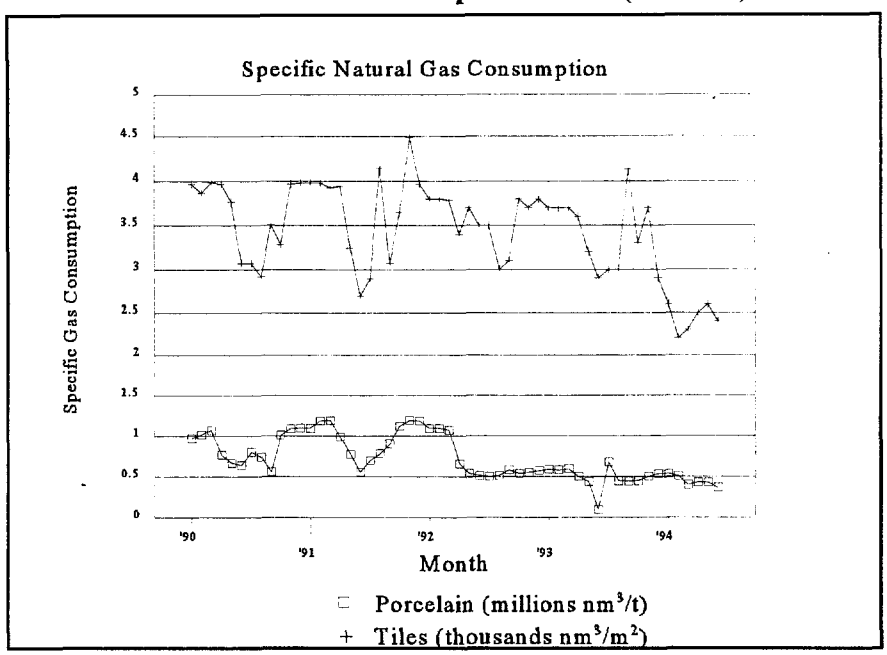


The plant's production, as shown in Exhibit 7, has remained stable throughout the economic crisis in Bulgaria as a result of the transition away from a socialist economy. This is quite contrary to the trend observed in most Bulgarian enterprises, which suffered a reduction in output on the order of 30% in the years between 1990 and 1993. In fact, a closer look at Exhibit 7 shows a slight upward tendency in the production of both porcelain and tiles. Ceramics Plant management attributes this to their good standing as one of three or four primary producers in Bulgaria, their relatively low cost compared to foreign producers, and Bulgarian currency regulations, which allow them to export up to 50% of their porcelain products. The picture presented is one of a small, well-run company with a clear market niche as a low-cost manufacturer of medium-quality products.

The plant has seen significant thermal energy savings in the years since the USAID energy audit. Exhibit 8 shows the downward trend in specific gas consumption of both porcelain and tiles in the post-audit period. While part of the porcelain improvement is due to the elimination of the frit production in early 1992, that action alone cannot account for the nearly 50% drop in the specific gas consumption. The ceramics plant did not have separate data on energy consumption of frit production, but estimates based on production data show that frit might have accounted for 30-40% of the porcelain consumption. Thus, savings from housekeeping and low-cost measures range from 10-20%. Perhaps more important is the fact that the trend continues downward: average specific consumption for the first six months of 1994 is 15% lower than for the same period of 1993.

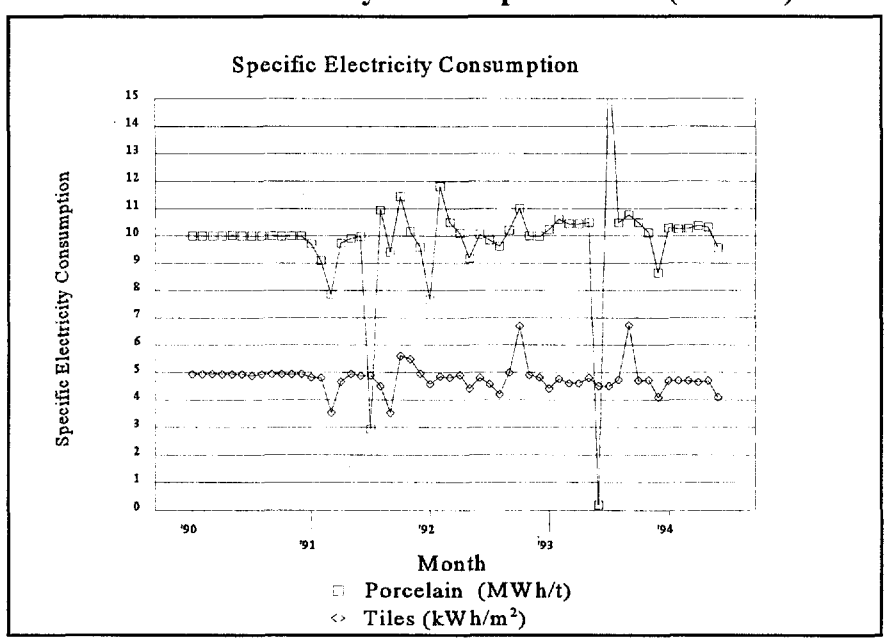
The tile specific energy consumption numbers in Exhibit 8 begin to show a decreasing trend at approximately the same time as porcelain, in the spring of 1992. In tile production, a large amount of the gas is used directly in the process; only a small part goes to steam production for space and hot water heating. While the audit recommendations can directly account for only part of this decrease, there were no major equipment or controls investments by the plant during this period. Therefore, the major part of this decrease must be due to installation of equipment provided by USAID, improved process operations, the monitoring of consumption, and proper maintenance, i.e., good energy management practice as advocated in the audit. Again, the continued downward trend is indicative of sustained attention to energy efficiency, operations and maintenance: the average specific consumption for the first 6 months of 1994 is more than 30% below that of the pre-audit 1990-91 period.

Exhibit 8. Gas Consumption Index (1990-94)



On the electrical side, Exhibit 9 shows a fairly constant specific electricity consumption over time. In the case of porcelain, the slight but continuing increase may well be due to

Exhibit 9. Electricity Consumption Index (1990-94)



21

the deterioration of the old electric tunnel kiln. In tile production, the slight decreasing trend reflects a similar reduction in specific gas consumption linked to improved energy management above. Other than operations and maintenance measures, the audit did not identify any specific electricity conservation recommendations.

The plant staff, while maintaining their registry of daily consumption and production data, maintain that monthly data are the most reasonable basis for analyzing energy efficiency, both due to manpower limitations and the fact that many of the processes are more than 24 hours long, and thus do not lend themselves to daily measurement. Nevertheless, there are significant variations in some of the monthly data, which will likely require an analysis of daily or weekly operations in order to explain.

The Plant Management's View

The plant's view of the audit and its results, as expressed by the technical manager and the energy manager, was basically one of disappointment. In spite of the clearly spelled out audit work plan and the objectives of USAID involvement, plant staff had apparently hoped for two things from the audit: first, some ceramics process expertise to help them fine tune their production processes and learn about U.S. practices in such factories; and second, an important sum of money (either grant or financing) to help invest in process changes.

In this context, the list of recommendations presented by the audit consultants appeared vague, yet obvious, to the plant staff. In fact, plant staff claimed that essentially all of the ideas in the list of recommended measures were developed by the plant, and in fact known long before the audit was performed. It was painfully clear to the plant that the audit consultants were not experts on the ceramics industry. Thus plant staff, while open to and cooperative with the consultants, did not appear to be impressed by their work and their results. The general feeling was that the U.S. consultants were merely confirming that investment in energy savings can have a payback. Finally, the plant did not feel that the time invested by their own staff to participate in the audit was worthwhile given the results.

It is clear that the plant management was also single-mindedly fixed on the high inefficiency of the electric porcelain line, and to them, all the other recommendations were insignificant. In addition, plant management seemed to have such a positive view of the good communication and relations among workers and between management and production staff, that all the consultants' talk of energy management, energy committees, management commitment to efficiency, and energy accounting seemed to fall on rather deaf ears.

Nevertheless, several of the audit recommendations were implemented; these were primarily related to equipment purchased by USAID after the audit (see Exhibit 5). The renovation of the condensate system and the installation of steam traps were completed. A pressure reducing valve for gas was installed in the furnace. Some portable measuring instruments and other equipment were put into use, including a calibrator for thermocouples.

However, the suggested mounting of a differential flowmeter for compressed air had not been done. Similarly, the recommended centrifugal meter had not been installed. From company reports, it appeared that very few additional energy efficiency actions had been taken, except in the area of the steam and condensate system, where additional steam traps were purchased from the local representative, and lines were insulated. Most of the no-cost measures were not considered to be serious. A project for the utilization of waste heat was in the planning stage. Only the company's own working capital had been used for these measures, and managers blamed the state of the economy for the fact that no "credits" were available for further implementation.

When asked two years later what the greatest benefit of the audit had been, plant staff immediately pointed to their ongoing relationship with Ecotech Products. The Ecotech representative, who had accompanied the U.S. consultants on the audit as a subcontractor, eventually became the principal supplier of steam specialty products to the plant. The steam traps that were installed under the USAID program gave plant staff a chance to see how they worked, helping them to make better purchasing decisions subsequently. Gradually, the plant continued the replacement of steam traps, beyond those identified in the original audit. Perhaps more importantly, the Ecotech representative became a sort of de facto energy advisor to the ceramics plant, especially with regard to the steam system installations. The pipe insulation project may well have been his recommendation. U.S.-made steam traps supplied by Ecotech continue to be installed in 1994.

THE CERAMICS PLANT IN 1994

Three years after the audit, the operation of the Ceramics Plant has not changed much. Production levels have been maintained, and the company feels it is in a good market position. Bulgaria's liberal currency regulations have helped boost exports. There have been no layoffs in the work force since well before the audit. The plant is looking forward to the privatization process organized by the government, and hopes to be able to attract a foreign investor to help them finance a new porcelain line.

Meanwhile, the plant has just put into test production a new product line of sanitaryware. A small batch furnace is being used initially to fire 30-40 pieces at a time. This very limited production will slowly be built up, probably in small stages with additional batch furnaces, as the Ceramics Plant establishes its market for these products. It seems that decision to enter the sanitaryware market was

23

based not on detailed market knowledge, but on enquiries received at trade shows and the fact that there was only one other producer in Bulgaria. The plant also felt that their brand name was valuable and that it should be used on all product lines including tableware and sanitaryware, without regard to possible perception problems. Still, it will be a long time before the plant will be willing or able to upgrade this production to a continuous automated production line. This project is financed from internal funds, based on internal plans and financial analysis. It shows at once the Ceramics Plant's capacity to develop profitable new products and its inability to attract financing for its necessities.

The USAID energy audit is all but forgotten. The plant is still waiting for an outside investor to take more than a passing interest in them. They claim now that they never really needed the small-time equipment donations offered by USAID; what they wanted then and still do now, is a joint-venture partner.

The plant continues to install quality equipment to ensure the optimum efficiency of its steam system. The new production area is also being heated with steam, using efficient steam traps and insulation, designed by the supplier originally contracted through the USAID audit.

DISCUSSION AND CONCLUSIONS

From the previous section, it appears that while plant staff were disappointed with the USAID program, the actual plant data show that significant energy savings were achieved in the period beginning after the USAID energy audit was completed. Although USAID may not be able to claim direct responsibility for all of these savings, it is clear that the audit recommendations, equipment donations and the connection with the local supplier were catalysts for putting the plant on the road to efficiency improvement. In fact, the plant's technical director admitted that the link with the local steam system equipment supply and consulting company was the best thing that came out of the USAID audit program. Thus, despite seeming dissatisfaction by the plant, the overall goals of energy efficiency improvement were achieved.

Nevertheless, this case is missing an important element which could have resulted in a broader success, and which was one of the original goals of the USAID program: the implementation of an energy management system or structure in the plant. While savings were achieved, there was little penetration of basic energy management concepts to the plant's management and administration. Even years after the audit, a regular measurement and reporting structure for energy use has not been put in place. The management still speaks of large process technology changes as the basis for energy efficiency improvements. (On the other hand, there is no evidence that a concerted energy management program would have resulted in sufficient savings to allow investment in the process any sooner.)

The discussions above lead to the following general conclusions regarding the USAID program in the Ceramics Plant.

1. ***Management commitment is the key to long-term program success, but the hardest to achieve.*** While developing plant energy management was part of the original goal of the USAID program, energy is only a small part of plant management's concern. Furthermore, it was extremely difficult to get through to management in the short one-week period of the audit. In the Ceramics Plant, given the personalities and attitudes of the technical manager and his staff, however, even a longer stay in the plant may not have yielded positive results in this area.

2. ***Process expertise would have better served USAID's goals at the Ceramic Plant.*** The USAID program had to make a difficult decision between providing process expertise at extremely high cost, and providing more basic energy efficiency support, using the same generalists at all plants and resulting in a much lower cost. Given the technical capabilities of the Ceramic Plant staff, and their expectations, a ceramics process expert clearly could have provided a better image and a better result of the audit. Knowledge of the process may have provided the respect or connection with the plant staff, and possibly have led to more readily accepted recommendations for changes in the management structure.

3. ***USAID equipment donations were key to getting at least some measures implemented.*** Without the purchases of equipment, it is doubtful that there would have been any implementation of measures in the plant. No-cost measures were not taken seriously, and the plant had little budget for or interest in implementing low-cost measures. The equipment purchased ensured some savings, and in the case of steam traps, led to an ongoing relationship with a consultant and equipment supplier.

4. ***The plant's frustration and focus on capital investments blinds them to low-cost savings.*** Even after seeing the results of the USAID equipment, plant staff remain single-minded in their focus on process change as the primary agent for energy efficiency.

5. ***The involvement of plant staff was important in developing commonly accepted recommendations.*** From USAID's viewpoint, it was also useful in showing a broader audience in the plant the benefits of energy efficiency.

6. ***Despite everything, the USAID program at the Ceramics Plant was successful.*** The plant did install most of the equipment provided by USAID. Energy savings clearly occurred, and according to the data trends, efficiency is still increasing. Specifically, steam system efficiency continues to improve, using high-quality components from a U.S. company.

Emergency Energy Project for Central and Eastern Europe
U.S. Agency for International Development

RESEARCH CASE STUDY: ENERGY EFFICIENCY AT A HUNGARIAN CHEMICAL PLANT

by
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October 20, 1994

SUMMARY

The U.S. Agency for International Development (USAID) sponsored an energy management program at the main plant of a Hungarian Chemical Company from April-September 1991. The program began with an energy audit that focused on the boilerhouse and steam system. Following the audit, USAID provided a boiler combustion analyzer and steam meters. The Plant installed these, and also invested in low-cost projects to reduce losses in the steam system and to block off the steam distribution system from certain areas that no longer needed steam.

The Chemical Company has suffered a steady decline in the demand for its products, and in 1993 was running at one-third of its capacity. Management attributes this decline to Hungarian agricultural market conditions, the economic recession, and competition from imported fertilizers and pesticides. The Company had to stop production of some uncompetitive products. Employment has fallen 45% since 1991; 900 jobs have been lost. Management's first priority is now the survival of the enterprise, and it has launched an ISO 9000 quality assurance program, in an effort to meet European standards.

After a protracted privatization process, the Company's ownership changed in 1994, with management buying 5% of the Company, other employees 47%, and the rest split between the local government and the Hungarian State Property Agency. No foreign investors could be attracted; management cited hazardous waste disposal as a key issue that deterred investors.

During the period since the audit, the Chemical Plant has reduced its energy consumption, mainly due to reduced production. However, some efficiency improvements have been made. In particular, the efficiency of steam generation in the boilers has increased 4% since the time of the audit. Natural gas consumption in 1992 was 19% less than in 1991, because of reduced production, increased boiler efficiency, and the steam rationalization project cited above.

Electric energy consumption was reduced by 30%, also mainly from the decline in production. Based on the audit recommendations, the Chemical Plant made some electricity efficiency improvements by installing new pumps better sized for the reduced load, by converting to a closed-loop cooling water system, and by maximizing production during off-peak hours.

We estimate that the Plant's energy efficiency program has achieved energy cost savings of $180,000 per year, or 2.8% of the Plant's energy costs at the time of the audit. These savings do not include the energy savings from the significant reduction in production, nor from other improvements, such as the modernization of the electrolysis cells,

PROJECT BACKGROUND

On February 15, 1991, USAID launched the 1991 U.S. Emergency Energy Assistance Program for Hungary. The major focus of this program was improving industrial energy efficiency. Its primary objective was to achieve immediate and lasting energy savings at low cost, particularly for oil and gas. RCG/Hagler Bailly, Inc. of Arlington, Virginia served as the program's prime contractor and EGI Engineering and Contracting of Budapest was its subcontractor.

Hagler Bailly carried out the following activities:

1. Screened the Hungarian industrial sector to identify eight representative and appropriate plants for the energy management projects. The eight plants selected were: food processing, nonferrous metals, alumina, paper, chemicals, bakery, district heating, and glass containers.

2. Conducted energy audits and training in each of the eight plants, focusing on the identification of short-term measures to be implemented at no cost, or at low cost with quick payback.

3. Identified low-cost equipment packages (such as energy monitoring instruments) to be procured for each of the eight plants under the program, up to about $30,000 per plant.

4. Procured equipment and delivered it to the plants.

5. Returned to each of the plants to monitor the results of the project and assist in resolving any problems related to the equipment.

6. Disseminated information and encouraged follow-up, through:

    - formal presentations by energy managers from the eight plants at the annual meeting of the Hungarian Energy Managers Association in September 1991

27

- a one-day wrap-up conference with USAID, the management and technical staff of the eight plants, and the Ministry of Industry and Trade, with a press conference in January 1992
- a professional conference for 200 energy managers to present results and an exhibition by U.S. energy efficiency equipment manufacturers in January 1992
- a 1993-94 follow-up program of local energy auditor training, local private energy service company development, and *industrial* audits by local energy auditors *supported by U.S. engineers and energy efficiency equipment.*
- case studies of selected plants in 1994.

CASE STUDY OBJECTIVES

The goals of this case study are 1) to describe the effects of USAID's 1991 equipment and training interventions on energy efficiency and plant management in this Hungarian Chemical Plant, and 2) to highlight the technical and management improvements achieved and the reasons for them, *including such factors as macroeconomic reform (e.g., pricing, privatization, competition), management and organizational changes, and external influences.* It is intended for plant managers, local energy service consultants, energy efficiency equipment manufacturers, and policy officials concerned with energy efficiency. The case study covers the period 1990-1994.

THE CHEMICAL COMPANY

Introduction

The Chemical Company is a major Hungarian producer of chemicals and chemical products. It manufactures some 50 different products including pesticides and fertilizer. Over the last few years, the Company has made significant changes in its product mix. In 1990, 60% of the Company's revenues came from pesticides; this figure was reduced to 10% in 1993 because the Company dropped some uncompetitive products from its line.

The Chemical Company has suffered a steady decline in the demand for its products, and in 1993 was operating at just one-third of its 1990 production level. The decline resulted from falling Hungarian agricultural output, the national economic recession, and competition from imported fertilizers and pesticides. Aggravating this problem was a liquidity crisis: the agricultural season

is just three months long, but the Company has historically extended 90-180 days credit to farmers, and management feels obliged to continue this practice to maintain market share.

These are difficult times for the Company. Declining sales, corresponding production cutbacks, pressures from environmental regulations, a financial crunch, and pending organizational changes have combined to create a highly uncertain environment for the organization and its employees. Despite these conditions, the Company made a small operating profit in 1993.

Over the past few years, the Company participated along with other Hungarian companies in a privatization process. The resulting ownership changes came in 1994, with local ownership. Management bought 5% of the Company, other employees now own 47%, and the rest is owned by the local government and the Hungarian State Property Agency. As part of a privatization drive, the Company made efforts to attract foreign investors, but these efforts were not successful. According to management, the difficult issue of hazardous waste disposal and the condition of the sites on which the plants were located deterred potential investors. The government retained a large share of ownership because of these environmental issues.

Although the employees are now the Company's owners, apprehensions remain about the future of the Company. Employment has been dropping steadily, from a high of 1,920 in 1981 to 1,049 in 1993. To add to their worries, the employees must service the 7% interest loan that financed their purchase of the Company.

Management's first priority for 1994 is the survival of the enterprise. Their exposure to foreign competition in their local market and international chemical industry exhibitions has convinced management that improving quality is the key to competitiveness. The Chemical Company hired a Hungarian quality consulting firm to help establish a quality assurance program based on ISO 9000 (the international quality standard established by the International Standards Organization).

Company management wants to reduce costs by improving both the production process and methods of accounting for production costs. Responding to growing environmental regulation in Hungary (and corresponding fines for emissions), the Company also entered into a self-financed joint venture with a French company to install a new incinerator. With this equipment, the Company can now meet the Government's requirements for hazardous waste disposal, avoiding these fines.

The Main Plant

The Chemical Company has several plants. The 1991 USAID-sponsored energy efficiency program was conducted at the Main Plant (described in Exhibit 1), which accounts for 60% of the Company's production. The Plant was built several years ago in a remote area, but the town has grown up around it. In recent years, there has been strong pressure from neighbors to move

the Plant outside of town because of environmental concerns. The recent privatization report prepared by outside consultants showed that the plant's premises were polluted and clean up would be prohibitively expensive.

A managing director is responsible for the plant. Three directors report to him: the technical director (production), the commercial director (marketing and purchasing), and the director of finance. Functionally, the technical director is in charge of production, R&D, and energy, with an energy manager having the primary responsibility for energy management within the plant.

Exhibit 1
Description of the Chemical Plant

Process Technologies:
Electrolysis, chlorination, nitration, reduction, disassociation
Pumping, heating, mixing
Drying, packaging

Energy Systems:
Boilerhouse:
(2) 20 bar boilers, 20 ton/hr each
(1) 12 bar boiler, 12 ton/hr
Low-pressure steam distribution system:
at 11, 6 and 3 bar

Energy Consumption and Cost Before the Program: 1990 Base Year
Fuels: 362 TJ natural gas
Electric: 105 GWh
Cost: $6.3 million/year

Energy is an important issue at the Chemical Company, primarily for safety and cost reasons. Their concern is with the reliability of energy supply, in order to maintain a safe chemical production process. This need for reliability makes energy consumption higher than it might be in a less risky industry. Energy costs represent about 13% of total costs, making energy cost reduction important to competitiveness. Further, with the production declines in the Plant, energy costs per unit of production are rising. Another impetus for an energy efficiency initiative is provided by the current ISO 9000 certification drive. The ISO 9000 sets standards for energy consumption, which the Company is trying to meet.

ENERGY MANAGEMENT PROGRAM

The Energy Initiative

In 1991, the Ministry of Industry and Trade presented a list of more than 100 candidate plants for assistance under the USAID program. This list was reduced to 20 by Hagler Bailly and EGI, based on a review of Hungary's industrial sector and the plants' willingness to participate. Following screening visits to these 20 plants by Hagler Bailly and EGI, 8 were selected and submitted to USAID for approval. The eight plants were selected based on representing the diversity of the industrial sector, prospects for plant survival, potential for energy conservation, replicability, and plant management commitment to energy efficiency. The Ministry of Industry and Trade, EGI, Hagler Bailly, and USAID chose the Chemical Company's main plant as a site for USAID assistance, which would serve as a "model" site for other plants in Hungary.

The USAID assistance program was attractive to the Chemical Plant because it offered free equipment and contact with Western energy experts, and so the Plant was committed to install the equipment donated by USAID. Energy represented about 13% of the Plant's costs, and the dramatic increases in Hungarian energy prices, more than doubling from 1989-1991, gave the Chemical Plant strong motivation for action. The Plant's energy manager was a leader in the Hungarian energy managers association, and his leadership provided further impetus to the Plant's participation.

The Energy Audit and Its Results

The energy audit was carried out by two energy efficiency engineers from RCG/Hagler Bailly and EGI, with the Chemical Plant's energy department professionals. The audit is described in Exhibit 2. The audit included interviews with the technical director, energy managers, and operating personnel for energy systems. The audit focused on the energy department, including its reporting systems and its technical equipment, and included measurements of the efficiency of boilers and steam systems. The audit's recommendations were grouped into three categories: general and energy management actions, low-cost actions, and capital improvements.

General and energy management actions. These actions require little or no expenditure and affect management systems and techniques, rather than process equipment. They were the primary focus of the USAID program. The specific steps recommended are listed in Exhibit 3.

Exhibit 2
The Energy Audit

Energy Auditor Firms:
RCG/Hagler Bailly (U.S.), with
EGI Engineering (Hungary)

Date of Audit:
April-May 1991

Date of Implementation:
June-September 1991

Audit Level of Effort:
2 auditors (1 Hagler Bailly, 1 EGI) in-plant one week
3 person-weeks report write-up
5 person-weeks total

Focus:
energy department
energy management
boilerhouse
steam system

Follow-Up Effort:
6 person-weeks for equipment specifications, procurement, assistance during installation, follow-up visits

Exhibit 3
Audit Recommendations:
General and Energy Management

1. Institute an energy management information and control system
2. Optimize boiler efficiency and dispatch boilers to operate the most efficient boilers in priority order
3. Institute a steam management task force
4. Try to modulate production to reduce the electrical load during peak hours
5. Institute an industrial water management task force

Low-cost, short-term actions. These actions, which typically have a payback of less than one year, were recommended for implementation in 1991, to be funded from the Plant's maintenance budget. The specific measures recommended are listed in Exhibit 4.

Capital improvements. These activities require planning and justification for funding from the Company's capital budget. The specific measures identified in the audit are listed in Exhibit 5.

Exhibit 4
Audit Recommendations:
Low-Cost Actions

1. Return hot condensate straight to the deaerator
2. Replace high-pressure boiler feedwater pumps
3. Install a pressure control valve on the steam line to the boiler feedwater preheater and deaerator

Exhibit 5
Audit Recommendations:
Capital Improvements

1. Revise the existing building heating system, converting from steam heating to hot water
2. Improve the instrument and control systems of the boiler
3. Install an auxiliary steam turbine to run one or more cooling water pumps
4. Convert cooling water system from open-loop system to closed-loop system, with recirculation

Energy Management Actions Taken

The actions taken by the Plant's management are listed below.

General and energy management actions. The Chemical Company was able to undertake many of the management actions recommended by the audit, as summarized in Exhibit 6 and described below.

1. *Information system on energy - not implemented.* Because the Plant has so many different products and so few steam meters, the energy use of individual products or other uses could not be determined. The Plant plans to install a computerized energy management system in order to process data, perform control, and generate meaningful reports. Although the Plant started the project (buying one controller), it was not finished due to lack of funds. Monthly reports are prepared by the Energy Department using a PC, but these are not very useful in controlling energy consumption. The Energy Dept. does not prepare a daily energy report, citing staff limitations.

2. *Boiler efficiency improvement - implemented.* USAID supplied a combustion efficiency analyzer, which is now used to test and adjust boilers monthly. The managers completed a project for automatic draft regulation of the boilers that yielded a small amount of energy savings. The Chemical Plant started to use different boilers in different seasons, dispatching boilers according to steam demand and boiler efficiency.

32

3. *Steam management task force - partially implemented.* Following the recommendations of the USAID-funded audit, the Company began a steam saving project. USAID supplied steam meters, which were installed at the Plant's expense. The Plant Energy Department monitored these meters, which helped identify steam waste, and led to better control and steam savings. The Company themselves funded a detailed audit of the steam system by Hungarian consultants and formed a steam cost reduction committee to implement the detailed audit findings. The committee took emergency actions, such as repairing leaks, and began conservation actions, such as reducing heating supply to areas where possible. More projects were identified, but few were implemented, for lack of funds.

Exhibit 6
Energy Management Actions Taken

1. Optimize boiler efficiency:
   -- combustion analyzer used for tune-ups, saved 1%
   -- automated draft controls on boilers were repaired

2. Steam management task force:
   -- obtained steam meters with USAID funds, which helped identify losses
   -- funded a detailed audit of the steam system
   -- carried out leak repairs on the steam system
   -- reduced heating supply in certain areas
   -- began a heating conservation program
   -- formed a cost reduction committee
   -- converted to separate winter and summer boiler operations to cut losses

3. Electrical load management
   -- shifted electrolysis production time to take advantage of off-peak electricity tariffs

4. Water management
   -- implemented water conservation program

4. *Electric load management - implemented.* Management reduced energy usage in peak periods by reorganizing the production lines. All possible production was shifted to periods with low energy costs. Electrolysis production has been maximized during the night shift, when electric energy costs are lower.[1] Also, to minimize production costs, the energy manager now participates in the production scheduling decisions.

5. *Water management task force - implemented.* Management formed a water conservation task force in 1992, after substantial increases in water tariffs.

Low-cost, short-term actions. Chemical Company managers also implemented several of the low-cost actions recommended by the audit, which are summarized in Exhibit 7 and described below.

1. *Replace boiler feedwater pumps - implemented.* The Chemical Company bought new pumps for two of the Plant's boilers, at a total cost of $20,000. The old 90 kW motor pump sets were

[1] The electricity tariff has different prices depending on the time of use. Tariffs are approximately 4.5¢/kWh during peak periods, 3.5¢/kWh in the daytime, and 2.7¢/kWh at night.

sized for much higher pressure and flow (back when the Plant had a cogeneration station). The new pumps are 37 kW, and Plant management estimate the savings at 40% and the payback to be 1-2 years. However, the Plant had corrosion problems with the German pumps they bought. The Chemical Company engineers suspect that the pumps were not designed for this application (i.e., they may be cold water pumps). They changed them once under the warranty, and have had a dispute with the manufacturer, who said that the Chemical Company was not using the pumps correctly. They bought a new housing to correct the problem, and intend to replace some other pumps.

Exhibit 7
Low-Cost Actions Taken

1. Installed new boiler feedwater pumps, saving 40% compared to old, oversized pumps
2. Installed variable-frequency drive on boiler feedwater pump, saving 25%
3. Installed new cooling water pumps, together with closed cooling loop system, reducing water usage by 40%
4. Reconstructed boiler feedwater preheating system and steam pressure control valve

2. *Install variable-frequency drive - implemented.* The Chemical Company also bought a variable speed drive for the pump on their third boiler, at a cost of $5,000. They estimate this change is saving 25-30%, giving a payback of six months. The variable speed drive also enables boiler feedwater to be continuous rather than intermittent, which they regard as a safer system. Monitoring of the steam meters supplied by USAID enabled the Plant staff to identify the need for this system.

3. *Conversion of steam pressure control to deaerator and feedwater heater implemented.* Here the company did more than was suggested by the audit. Management reconstructed the deaerator, added an automatic pressure control, and eliminated the steam feedwater heater. The Plant maintenance staff implemented this recommendation by hiring a Hungarian engineering company to provide the system design. Plant staff are very pleased with this project, which improved boiler efficiency by about 2-3%, at a total cost of less than $10,000.

4. *Return condensate directly to the steam degassing (deaerator), rather than letting heat dissipate in the water treatment system - not implemented.* The Chemical Company engineers did not agree to implement this suggestion for safety reasons. They felt that the returning condensate might be polluted by chemicals, and they do not believe that the present manual system of testing boiler water chemistry every 8 hours would be safe enough in that case. The managers felt that they could not make this change with their present staff, and that automated water quality monitoring would be too expensive.

Capital Improvements

In 1992, the Plant implemented the audit recommended conversion of the cooling system to a recirculating system. The new closed-loop system recycles cooling water, instead of the old open-loop system that sent water to the sewer. Since 1991, water tariffs have increased ten-fold, making the cost of water the key motivation for change. The Plant also installed new pumps, which led to a $25,000 annual savings on electricity. In 1992, the Plant achieved a 40% reduction in water usage. The investment was paid back in 1½ years.

The Company has not funded the other capital improvements suggested in the audit.

However, the Plant has been undertaking a program to modernize its electrolysis cells on a cell-by-cell basis over the years, thereby obtaining multiple benefits, including quality, and energy savings. Electrolysis energy efficiency, measured by kWh/ton, has improved by 9% since 1990, indicating that this program has been a success.

Equipment Received from USAID

The Chemical Company believes that the equipment received as part of the USAID project has helped improve its operations. Company representatives stated that the steam meters are good of quality, are reliable, and have helped them improve steam management. They said that the combustion analyzer has been used at least monthly, to optimize boiler efficiency and to dispatch the most efficient boiler in priority for the load conditions.

Results Achieved

It is difficult to evaluate the results of this energy savings program because there are 50 different products produced at this plant and because there were large changes in the levels of production of these products over the years.

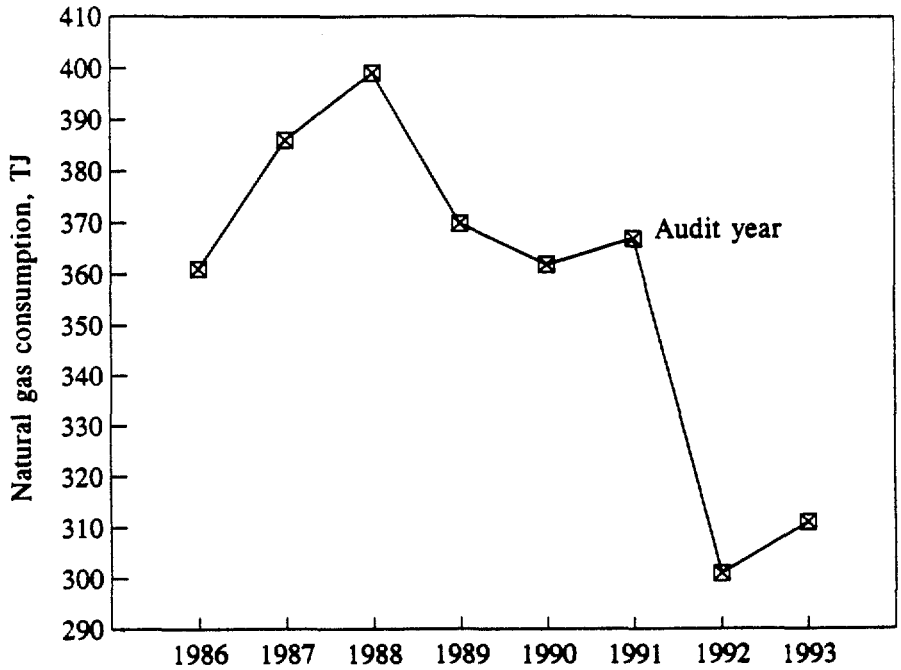
In this sprawling industrial plant, there is a component of energy consumption which is independent of production. The Plant's product slate is mostly low temperature, and gas consumption at the Plant has historically been poorly correlated with production.

This can be explained because much of the gas energy usage at the Plant is used for so-called "production-independent" heating (to keep steam lines hot, to heat up process equipment hot and to heat buildings in the winter). Thus a simple efficiency ratio (such as GJ/ton) can be misleading because it the "fixed" component of energy use will cause the ratio to increase as production (tons) decreases.

Over the four years 1989-1992, production declined continuously (10-20% per year). Yet during the first three years of this period, the Plant's natural gas consumption was constant within 3%, as shown in Exhibit 8. Immediately following the audit and the improvements cited above, the Plant's natural gas consumption in 1992 dropped 18%. In 1993, production stabilized and gas consumption was held at the new level.

Because the Plant's product slate is mostly low temperature, gas consumption at the Plant has historically been poorly correlated with production. The 18% reduction in gas use in 1992, indicates that the Plant's boiler efficiency and steam task force projects had their effect.

Exhibit 8
Natural Gas Consumption



Chemical Company's Opinion of the Project

Overall, the Chemical Company managers felt that the USAID project was a good one and had produced results. The Chemical Company's energy manager was enthusiastic about the project, and felt the relationship with Hagler Bailly was productive. Management thought the audit recommendations were worthwhile, but did not have the resources to implement all of them. They wished that the project could have provided the resources to implement more of the recommendations made.

36

Program Costs and Benefits

The program costs are listed in Exhibit 9. It shows all costs, for consultants, equipment, and installation. As indicated, USAID funded the energy audit. Most of the equipment costs and all of the installation costs were paid by the Chemical Plant.

We estimated energy cost savings of $180,000 per year from the data shown below:

Exhibit 9
Energy Management Program Economics

Costs:		
Consulting services (U.S. and local)		
Energy audit, equipment design, specification, procurement support, installation support, monitoring, follow-up support, international travel		60,000
Equipment		
USAID-funded		$30,000
Plant-funded		80,000
Total Costs		$170,000
Benefits:		
Energy cost savings of	$180,000 per year	
Payback:		
$170,000 costs / $180,000/year benefits	= 1 year	

- Optimizing the production schedule shifted 5% of electricity from day or peak hours to night hours:
  - no cost and a savings of $60,000 per year
- Improving boiler efficiency by 4% saved 12 TJ per year of natural gas:
  - cost $15,000, with savings of $36,000 per year.
- Reducing steam leaks, rationalizing steam supply, steam metering and monitoring, converting the boiler feedwater preheating system, and other thermal energy conservation improved thermal efficiency by 5% and saved 15 TJ per year of natural gas:
  - cost $30,000, with savings of $45,000 per year
- New feedwater pumps and variable-speed drives saved 300,000 kWh
  - cost $25,000, with savings of $15,000 per year
- Water management, including closed loop cooling water system
  - cost $40,000, with savings of $25,000 per year.

MANAGEMENT IMPACT

The energy audit at the Chemical Company was focused on the boilers and steam systems and has not had much impact on the system of management. Daily reports on production still do not include data on energy consumption, perhaps because management does not ask for the

information. Even though the head of production is responsible for keeping costs down, only monthly reports contain energy cost data. The reason given was that management could not cope with the volume of data. Plant representatives say they do not have the people to collect data and write reports. Someone is reading the meters every eight hours, so at least the raw data exist, but the Plant staff are not able to process the data.

Yet, some progress was made in using data. For example, upon reading the reports given to him, the managing director noticed that water consumption was rising, and asked the energy manager to try to find out why they were using so much water and to fix the problem.

Every two weeks financial directors meet with managers from all of the plants in the Company. Also, they collect quarterly data on energy. The managing director reads reports on energy and then asks questions and solicits ideas for improvement.

Decision-Making Process

The Chemical Company energy managers did not seem to distinguish between capital and operating budgets. For the past two years, however, they seemed to have capital budgets but were not able to fully fund them. Because the Company is in such poor financial shape, the Plant must ask the directors for permission for every purchase order, even if the item was in the capital and operating budget.

All orders must now be routed through top managers. Once an order is made, it is sent to the commercial managers for execution. The Company's directors have a cost savings committee that monitors all major purchases. 1990 was the last year managers were asked to justify projects with payback periods; since then, they have only been able to do "essential" projects. Company expenditures go mostly for urgent maintenance, and not investments in new systems or energy saving devices.

Following the USAID-funded audit, the Company issued a contract in 1992 to a consulting company for a detailed audit of the steam system. Since 1992, there has been no funding available for further projects. Currently, there is an urgent need for about $100,000 just to repair steam leaks. The 1994 budget is $60,000 for this purpose, but the energy managers expect to be allowed only $10,000, because of there are not even sufficient funds for a project as necessary as this.

One clear decision rule being followed is that the Plant must produce its products regardless of the cost. The emphasis is on bringing products to customers and maintaining market share. Plant managers do not know if they are making profits on each of these products because they have so many different products and cannot disaggregate costs. Furthermore, the products are not really independent because some are intermediate chemicals or byproducts of a chemical reaction.

Management has information to differentiate products according to their profit margins, and could thus abandon more products, but managers have decided to try to maintain the full complement of products, for now. With the revised ownership structure, management is also concerned about maintaining employment at current levels. Management is now investing in a drive for improved product quality, but the quality improvement project is still at a very early stage.

Over the years, the Company has invested in improving electrolysis cells. The Company provided financing for this work, yet considered it minor compared to other projects because the cells could be replaced in steps (a few cells each year) and thus it did not imply an investment project. Although productivity and quality were the primary reasons for the decision to modernize the cells, energy savings also resulted.

Environmental regulation has more to do with recent improvements than energy efficiency. The Company is coming under increasing pressure because of new Hungarian environmental laws and environmental audits being conducted on their plants. These laws and government-mandated audits are pushing the changes.

The managers also attempt to develop new relationships with vendors, funding sources and customers. The Plant obtains information on new technologies from vendors, particularly German manufacturers. The Company also attend conferences, where they exhibit some of their agricultural products, and the Company is a member of many international chemical manufacturers associations.

Current Needs

The Chemical Company wants to complete its electrical peak demand monitoring and control system. They bought an 8-point system, but have been unable to complete its installation. They need a minimum of 15 points of control, with remote sensors to be fed into the central computer. In the past two years, the pace of energy-related improvements has been held back by the lack of an effective information system, and the necessary funds to make improvements in energy saving equipment.

In summary, while some progress has been made, many more energy improvements are needed, and great difficulties are posed by capacity underutilization *and funding*, now that the demand for chemicals is reduced. For example, in the summer of 1994, the Plant had to operate a boiler with a capacity of 20 tons per hour at a steam rate of just 3 tons per hour. One of the managers summarized this situation by concluding, "We have made all the changes in the boilerhouse we can afford, but production continues to decrease so we don't know what to do."

CONCLUSIONS

The Chemical Company has benefited from the USAID program, as evidenced by the number of activities implemented, the decisions made to invest scarce funds in energy efficiency, and the savings that have been achieved. The following represents an attempt to draw some general conclusions from this case.

1. ***Energy efficiency is a relatively modest priority because of other pressing concerns. The survival of the Chemical Company is in jeopardy.*** Their priorities have evolved in the past few years as the market for chemical products has been severely reduced. The responsibilities and activities of the managers reflect these changes.

2. ***Higher energy prices made energy efficiency a priority because of the demands on the company to sell its products and become more competitive in the emerging market economy.*** Energy costs represent about 13% of the Chemical Plant's total costs today. From 1989-1991, energy prices more than doubled. Energy costs are one of the forces driving an apparent concern for energy efficiency.

3. ***The Chemical Plant used the energy savings technology and realized cost savings in its energy use.*** The Chemical Plant demonstrated energy savings results of about 10% of gas energy. Many of the audit's low-cost recommendations have been implemented. The plant adapted its energy management to suit the decline in production, by dispatching the most efficient equipment in priority, by forming a steam task force, by downsizing pumps, and taking other low-cost actions.

4. ***Ownership and market changes have not led to effective organizational changes.*** The Chemical Company was slow to reach privatization, and was sold to its employees in late 1993/early 1994. The same management remains in place, and the same systems of management are in use. Although employees own about 50% of the shares, it is not clear how much voice they have in the management of the firm. The effect of the new ownership is not felt in the Company's response to its declining market.

5. ***The audit, focused on the boilerhouse and steam systems, has had little impact on management practices.*** The audit's focused approach did not affect the Company's management very much. There is a great deal of manually recorded data available, but in the absence of effective data processing, it was not turned into meaningful and specific information. The daily production reports do not mention energy costs, and energy efficiency was not incorporated into managerial evaluation systems.

6. ***The degree of success of the project was related to the broader conditions of the Plant.*** The case of the Chemical Company clearly illustrates that the initial conditions at the Plant are crucial to the outcome of the intervention. The energy intervention took place at

40

a difficult point in the Company's history, with a great deal of uncertainty, pressure from environmental regulations, and financial stress. In such a period of crisis, energy interventions may have received a low priority from both managers and employees. Several of the suggested low-cost improvements appear to be partially implemented, simply because funds available were exhausted. Although these low-cost projects remained viable, the overall crisis at the Company may have directed attention away from these actions.

The Chemical Company must deal with problems related to safety and hazardous waste disposal. It deals with these hazards with a rigid security system and strong command-and-control structure. Yet this culture prevented the energy manager from convincing others about his ideas. The USAID project gave him a forum to be heard, and enabled him to obtain funding for some projects.

Given their other urgent concerns (declining production, market competition from higher quality products, layoffs of half their workforce, an attempted privatization, environmental pressure, plant safety), top management was unable to give as much support to the energy initiative as might have been expected in a more stable situation.

Emergency Energy Project for Central and Eastern Europe
U.S. Agency for International Development

RESEARCH CASE STUDY: ENERGY EFFICIENCY AT A HUNGARIAN FOOD PROCESSING PLANT

by
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October 20, 1994

SUMMARY

The U.S. Agency for International Development (USAID) sponsored an energy management program at a Budapest-area Food Plant from April-September 1991. The program began with a comprehensive audit of the plant's energy management system (including organization, reporting, accounting), boilers, steam systems, steam turbine-generator, electric systems, and process energy. During the audit phase, gas savings of 1% and electricity savings of 100 kW were achieved by boiler tune-ups, changing over to a spare feedwater pump (better sized for the load), and by repairing a power factor correction capacitor bank.

Based on the audit recommendations, the Food Plant reorganized some of its operations. The energy department was set up as an autonomous cost center, selling steam to the production departments and outside customers. This action gave the production departments and the energy department new incentives to conserve energy. USAID followed up the audit by providing a boiler combustion analyzer and steam meters. In addition, the Food Plant established teams that identified energy efficiency projects beyond those found by the auditors, many of which have been implemented.

A key change made at the Food Plant was the establishment of an energy management system. The production and energy managers devised an energy performance index (the ratio of natural gas consumption to total Plant food production) that is reviewed daily, and actions are taken if the index exceeds norms. The results were clear: the average quarterly index value in the two years since the system was initiated was 21% below the average for the two years before the audit. In addition, based on projects undertaken by the energy department, boiler efficiency has been improved by 5%, and the combined heat and power station's use of electricity has been reduced by 34%. Normalizing the Food Plant's energy cost for variations in production, the plant achieved energy cost savings estimated at $400,000 per year. These savings represent 18.2% of energy costs at the time of the audit.

42

The Food Plant is part of a larger Hungarian Group of food processing companies that was privatized later in 1991. 85% of the Group was sold to a Western European company in a similar line of business and 15% to Group employees. The plant's management changed its focus over the last four years, from survival to privatization to marketing, and now includes capital development projects for process modernization or environmental protection.

This case study found that privatization has been a major stimulus in making energy efficiency a priority at the Food Plant. The energy audit contributed to this change by inspiring organizational changes, introducing technology, and altering management practices. In addition, the success of the activities was related to the plant management's adaptability to market conditions and the motivation of the plant's General Manager. The comprehensive changes made at the plant and the active involvement of operations and management personnel in these changes led to the substantial impact.

PROJECT BACKGROUND

On February 15, 1991, USAID launched the 1991 U.S. Emergency Energy Assistance Program for Hungary. The major focus of this program was improving industrial energy efficiency. Its primary objective was to achieve immediate and lasting energy savings at low cost, particularly for oil and gas. RCG/Hagler Bailly, Inc. of Arlington, Virginia served as the program's prime contractor and EGI Engineering and Contracting of Budapest was its subcontractor.

Hagler Bailly carried out the following activities:

1. Screened the Hungarian industrial sector to identify eight representative and appropriate plants for the energy management projects. The eight plants selected were: food processing, nonferrous metals, alumina, paper, chemicals, bakery, district heating, and glass containers.

2. Conducted one-week energy audits and training in each of the eight plants, focusing on the identification of short-term measures to be implemented at no cost, or at low cost with quick payback.

3. Identified low-cost equipment packages (such as energy monitoring instruments) to be procured for each of the eight plants under the program, up to about $30,000 per plant.

4. Procured equipment and delivered it to the plants.

5. Returned to each of the plants to monitor the results of the project and assist in resolving any problems related to the equipment.

6. Disseminated information and encouraged follow-up, through:

- formal presentations by energy managers from the eight plants at the annual meeting of the Hungarian Energy Managers Association in September 1991
- a one-day wrap-up conference with USAID, the management and technical staff of the eight plants, and the Ministry of Industry and Trade, with a press conference in January 1992
- a professional conference for 200 energy managers to present results and an exhibition by U.S. energy efficiency equipment manufacturers in January 1992
- a 1993-94 follow-up program of local energy auditor training, local private energy service company development, and industrial audits by local energy auditors supported by U.S. engineers and energy efficiency equipment.
- case studies of selected plants in 1994.

CASE STUDY OBJECTIVES

The goals of this case study are 1) to describe the effects of USAID's 1991 equipment and training interventions on energy efficiency and plant management in this Hungarian Food Plant, and 2) to highlight the technical and management improvements achieved and the reasons for them, including such factors as macroeconomic reform (e.g., pricing, privatization, competition), management and organizational changes, and external influences. It is intended for plant managers, local energy service consultants, energy efficiency equipment manufacturers, and policy officials concerned with energy efficiency.
The case study covers the period 1990-1994.

THE FOOD PLANT

The food processing plant (the Food Plant) is a medium-size enterprise with about 300 employees, located in the Budapest metropolitan area, and is part of a larger group of related food and beverage processing companies (the Group).

In 1991, as part of the privatization initiative in Hungary, the State Property Agency sold 85% of the Group to a medium-sized, Western European company, and 15% to Group employees. The Group's dominant market position in Hungary and generally modern production processes made the acquisition attractive to the foreign owner.

The Food Plant was a successful operation in 1991. It had strong local sales and its production technology was superior to that of comparable East European companies. The quality and distribution of its products were high with respect to its competitors. The plant also enjoyed a reasonably good export market throughout Central and Eastern Europe.

Exhibit 1 provides information on the Food Plant's process technology systems, energy systems, and energy consumption. The Food Plant has a cogeneration system: a combined heat and power plant (CHP). The electricity produced by the CHP meets about half of the Food Plant's needs; the rest is purchased from the grid. The CHP also provides steam for the Food Plant and for sale to neighboring factories. However, the plant has been losing steam customers (who are installing their own boilers), and expects to decrease steam sales from the current level of 30% of steam generation to 10% in the next few years. Steam sales to local industry have fallen by almost 60% since 1990, and the Food Plant's generation of electricity has correspondingly fallen by 18%.

Exhibit 1
Description of the Food Plant

Process Technologies:
Pumping, heating, mixing
fermentation, distillation, dehydration
drying, pressing

Energy Systems:
Combined heat and power (CHP) station:
(3) 40 bar boilers, 2x20 ton/hr, 1x30 ton/hr
(1) 4.5 MW backpressure turbine-generator
15 bar and 4.5 bar steam sales to neighboring industry

Low-pressure steam distribution systems at
15, 9, 4.5 and 1.8 bar

Energy Consumption and Cost
Before Program: 1990 Base Year
292,500 GJ natural gas
12,200 MWh purchased from grid
2.1 MW peak purchased from grid
$2.2 million/year

Relationship with Foreign Partner

The Food Plant's acquisition by the foreign partner has been beneficial. The partner's name helps to attract established and high-quality distributors, and has created an image, especially in export markets. The Westerners are also changing the way the company operates, instilling pressure for profitability. They have supplied resources for upgrading factory equipment, and for housekeeping and painting. The new owners have taken a very "hands-on" approach to running the Food Plant and have created management systems throughout the organization.

The planning cycle for the Group begins in August of each year, when all the plants prepare their annual plans. At the Food Plant, the operating managers give the general manager (GM) basic operating information. The GM analyzes the information and prepares a plan which he sends to the Group's Budapest office. The Group executives review the plant-level plans and then give them to the Western European owners. The owners then communicate, via the Group, the plant

45

budgets for the year. All major decisions are made by two Western directors and one Hungarian director. The key marketing, advertising, and finance functions are handled by the Westerners, leaving production to the Hungarian managers.

Since the Food Plant's privatization, its managers have lost some decision-making autonomy. In running the plant both before and after privatization, the managers have become very familiar with the cycles of centralized and decentralized decision making. Years ago, the plant was decentralized. Before privatization, it underwent an organizational change that centralized decision making as part of a Government-owned food industry trust. After privatization, the plant initially became more autonomous, but when the foreign partners began to manage the Group, decision-making became more centralized again. Yet, the Western executives have shown a greater willingness to listen if procedures do not make sense or if the Food Plant managers provide sufficient information for informed decisions.

Competition and Market Strategy

The demand for Hungarian food products began to drop in 1991 with the loss of the Soviet market, while foreign competition was beginning to enter the local market. However, the Group's business practices continued to be monopolistic. For example, the Group followed a pricing policy based on costs, including energy costs.

The plant's GM stressed that the plant uses West European companies as performance benchmarks. Because of the very real danger of losing market share to West Europeans, the Food Plant aimed to become competitive with them before competition intensified, believing that it had to focus on making high-quality products available at good prices.

The Group's general sense of competitive response still seems to be that it might change its product mix or let go of some market share to "accommodate" competition. The GM appears to anticipate a "cooperative" solution to the problem of heightened competition--a process where the Group and its new competition would agree to "allocate" certain customers or customer groups to each other. If the competition becomes too intense, he felt, the Group could change the products it markets.

Certain of the plant's management practices do not reflect a modern approach or are in transition. For example, its management seem to believe that the main method to provide incentives for workers is the threat of unemployment. Because many staff had already been let go, people are worried about their jobs. On the other hand, managers have invested some effort in designing an incentive system that would result in superior performance. A performance bonus incentive system is now in place, but only for directors and managers. Bonuses are based on achievement of results, including special projects (examples cited were energy savings and safety improvement).

46

ENERGY MANAGEMENT PROGRAM

The Energy Initiative

In 1991, the Ministry of Industry and Trade presented a list of more than 100 candidate plants for assistance under the USAID program. This list was reduced to 20 by Hagler Bailly and EGI, based on a review of Hungary's industrial sector and the plants' willingness to participate. Following screening visits to these 20 plants by Hagler Bailly and EGI, 8 plants were selected and submitted to USAID for approval. The eight were selected based on representing the diversity of the industrial sector, prospects for plant survival, potential for energy conservation, replicability, and plant management commitment to energy efficiency. The Ministry of Industry and Trade, EGI, Hagler Bailly, and USAID chose the Food Plant as a site for USAID assistance, which would serve as a "model" site for other plants in Hungary.

The USAID assistance program was attractive to the Food Plant because it offered free equipment and contact with Western energy experts. Energy represented about 15% of the plant's costs. The dramatic increases in energy prices occurring in 1989-1991 in Hungary also gave the Food Plant strong motivation for action.

The Energy Management Program and its Results

The program began with an audit of the plant's organization, energy management, accounting, boilers, steam systems, steam turbine-generator, electric systems, and process energy. The audit was carried out by a team of four energy efficiency engineers, two from RCG/Hagler Bailly and two from EGI Engineering of Hungary. The audit is summarized in Exhibit 2. The Food Plant managers and energy department professionals worked very closely with the consultants.

The audit included interviews with the directors, production managers, accounting managers, energy managers, and operating personnel for energy systems. The audit focused on the energy department, particularly its organization, reporting

Exhibit 2
The Energy Audit

Energy Auditor Firms:
RCG/Hagler Bailly (U.S.), with
EGI Engineering (Hungary)

Date of Audit:
April-May 1991

Implementation and Follow-up:
April-September 1991

Audit Level of Effort:
4 auditors (2 Hagler Bailly, 2 EGI) in-plant one week
4 person-weeks report write-up
8 person-weeks total

Focus of Audit:
Energy management system
Combined heat and power station

Follow-Up Effort:
6 person-weeks for equipment specifications, procurement, assistance during installation, follow-up visits

47

systems, and technical equipment. The audit included measurements of the efficiency of thermal and electrical equipment (boilers, motors, power factor, steam systems).

At the conclusion of the site visit, a draft report was presented by the lead audit consultant in a meeting with the Food Plant management, which was attended by the project director of USAID. The recommendations were grouped in three categories:

Exhibit 3
Audit Recommendations:
General and Energy Management

1. Improve plant organization and management information and control system
2. Establish electric motor team
3. Establish steam management task force
4. Dispatch boilers to operate the most efficient boilers in priority
5. Operate the most efficient boiler feed water pump in priority
6. Optimize time of steam and electricity use

General and energy management actions. These actions require little or no expenditure and affect management systems and techniques, rather than process equipment. They were the primary focus of the USAID program. The specific steps recommended are listed in Exhibit 3.

Low-cost, short-term actions. These actions, which typically have a payback of less than one year, were recommended for immediate implementation, to be funded from the plant's maintenance budget some of these were financed by USAID. The specific measures recommended are listed in Exhibit 4.

Capital improvements. These activities require planning and justification for funding from the plant's capital budget. The specific measures identified in the audit are listed in Exhibit 5.

Exhibit 4
Audit Recommendations:
Low-Cost, Short-Term Actions

1. Automate boiler draft control and air/fuel ratio
2. Install desuperheaters on steam letdown valves
3. Improve boiler feedwater pump efficiency
4. Rehabilitate power factor correction system

No-Cost Energy Management Actions Taken

During the course of the audit, the Food Plant GM immediately began to take action and implement the recommendations, even before the audit report was written.

First, the Food Plant reorganized some of its operations, establishing the energy department as a separate accounting cost center, selling steam to the production centers (and to outside customers). As part of the reorganization, greater autonomy was delegated to the manager levels. The reorganization encouraged the production department to begin taking more responsibility for

48

their energy consumption, because it was more clearly shown as a cost of production. At the same time, a bonus inventive system was introduced, based on the cost center financial results. This gave the production department a direct incentive for saving energy, for the first time. It also gave a better incentive to the energy department to reduce steam line losses and to minimize the self-consumption of steam and electricity in the combined heat and power station, because they now had their own direct profit and loss responsibility.

Exhibit 5
Audit Recommendations:
Possible Capital Improvements

1. Automate boiler controls
2. Refurbish or replace steam turbine
3. Improve steam pressure control system
4. Rebuild or replace boilers 1 and 2
5. Repower with gas turbine combined cycle
6. Expand recovery of unpolluted condensate
7. Install additional steam sub-metering
8. Improve energy efficiency in process plant
9. Utilize waste to produce biogas
10. Reduce heat loss from steam pipelines
11. Reduce steam demand in process plant
12. Improve pumping of viscous fluid

Second, the energy department established a new energy accounting and evaluation system. USAID provided a computer that was used for this system. The GM and the production managers agreed upon a method for calculating an energy performance index. In this index, the production of different products is normalized based on coefficients for each product's expected energy (natural gas) consumption. The index is now used daily to track performance. During daily management meetings, the index is reviewed and actions are taken if the index exceeds norms. If energy performance is seen to deteriorate, a management review is begun the very same day to find out why. The calculation of the index uses only simple tools, such as manual readings and a calculator or personal computer, but it enables plant managers to take quick action.

Third, production managers determined that they could optimize production in order to save energy. The changes involved production scheduling and process loading. Formerly, managers started and stopped the thermal processes every day. By letting production runs last one or two weeks and then shutting down for several days, they were able to reduce peak demand and startup/shutdown losses. Also, they were able to optimize the production process to reduce cycle time by optimizing process conditions and equipment loading.

Fourth, the energy department continued the system of measuring efficiency that was begun during the audit. The plant managers employed these measurements to dispatch the boilers and feedwater pumps, using the most efficient equipment.

Fifth, the energy department renegotiated subscription charges with its energy suppliers. They reduced the difference between the maximum allowable demand and the maximum actual recorded demand, and began to optimize their energy supply contracts for least-cost supply.

Sixth, the Food Plant established energy efficiency teams that identified energy efficiency projects and made proposals to management. These teams included key staff from the production and energy departments who identified many projects beyond those found by the energy auditors. For example, budgets were established for energy efficiency, and many projects were funded and completed.

In summary, although energy prices have been fairly stable (in nominal terms) since 1991, the Food Plant managers have nevertheless continued to focus on energy efficiency since the audit. One measure of the Food Plant's commitment to energy management is the plant management's designation of 1991 as the "Year of Energy."

Low-Cost Actions Taken

The projects were funded by an initial USAID contribution of about $30,000. In the three years since the audit, the Food Plant has funded many measures using its own resources. Most of these had a payback of one year or less. Subsequent investments were made from the Food Plant's annual budgets of about $200,000 (through 1993, with another $100,000 in 1994). Exhibit 6 lists the history of the funding and implementation of these projects.

Results Achieved

The results of an energy savings program are difficult to measure because of the various direct and indirect effects of different levels of production on energy usage. Compared to production, there appear to be "fixed" and "variable" components of energy consumption; thus, a simple ratio (such as GJ/ton) can be misleading because it does not capture the fixed component of energy use.

At the Food Plant, the annual level of production has been fairly stable through the years (with seasonal variations). In these circumstances, a ratio such as GJ/ton can be used to make comparisons. Based on the audit, an index was developed by the Food Plant managers. This index is appropriate for evaluation purposes.

Exhibit 6
Funding and Implementation of Food Plant Projects

1991: USAID granted $30,000 and the Food Plant invested $30,000
Installed additional steam submetering for food process
Automated control at steam pressure reducing station
Installed personal computer for energy management system

1992: The Food Plant invested $70,000
Rehabilitated the power factor correction system
Installed two heat exchangers to recover waste heat in food process
Installed new high-pressure pump to avoid preheating high-viscosity fluid
Recovered flash steam and automated steam deaerator level control
Automated control of boiler water level and steam pressure
Installed additional steam submetering for building heating
Repaired damaged or missing steam line insulation
Consultants were hired to evaluate power station rehabilitation

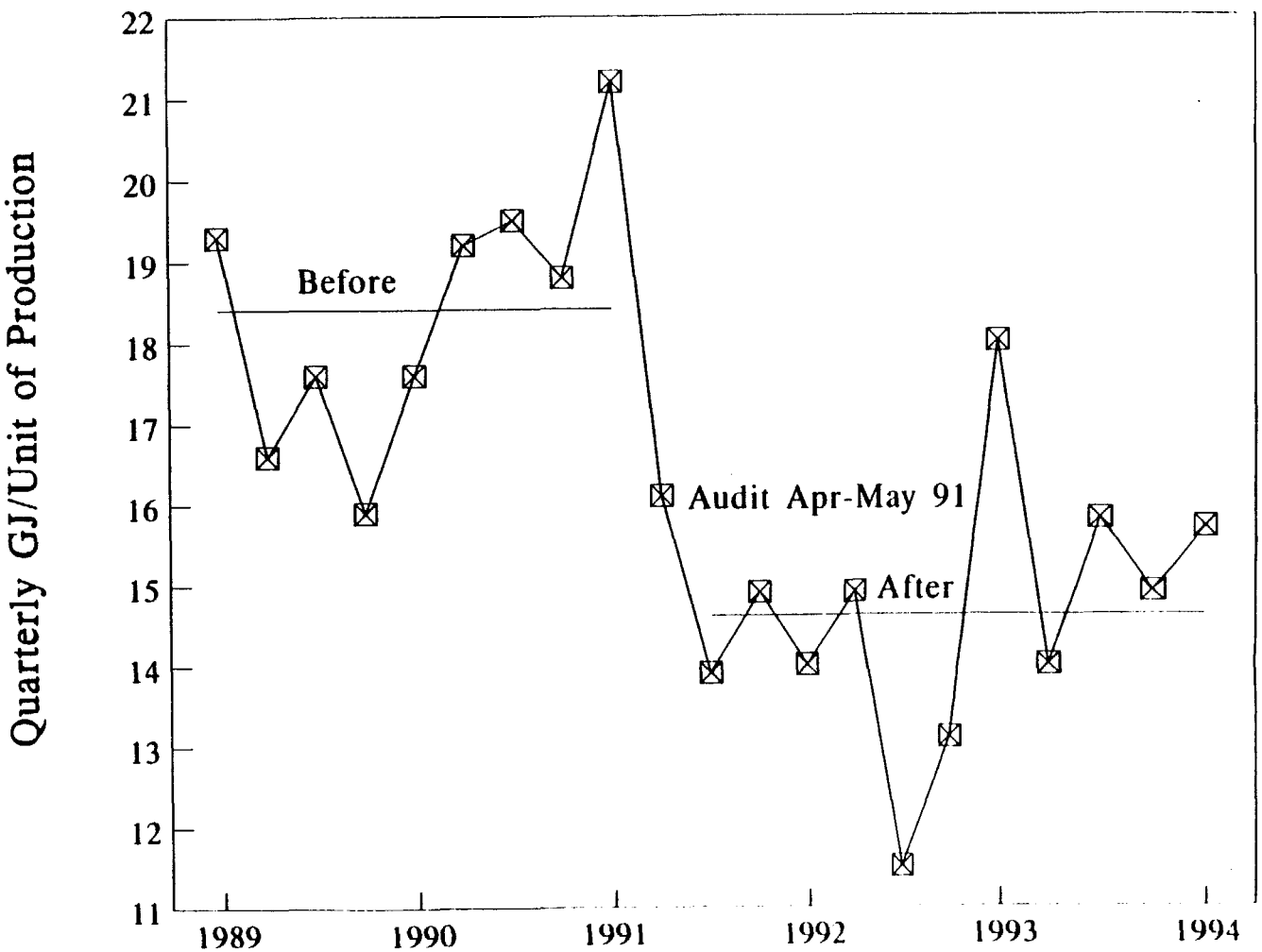
1993: The Food Plant invested $100,000
Installed new pumps in boiler water treatment and condensate return systems
Installed automatic boiler draft control
Repaired damaged or missing steam line insulation

1994: The Food Plant invested $100,000
Installed new ammonia refrigeration system
Converted to closed steam condensate return system, and increased recovery
Installed new steam traps in building heating systems
Installed new boiler feedwater pump

Exhibit 7 shows the quarterly history of the Food Plant's energy performance index, gas energy usage per unit of production. We note that:

- The index varied substantially from quarter to quarter (before and after the audit) due to seasonal variations in the availability of raw material, corresponding food production, changing ambient temperature, energy waste, and energy conservation measures.
- The quarter immediately before the audit had the highest level of energy consumption during the entire five-year period;
- Changes made during the audit had an immediate impact;
- Improvements made have achieved a significant reduction, which has persisted over time;

Exhibit 7
Energy Peformance Index Reduced 21%

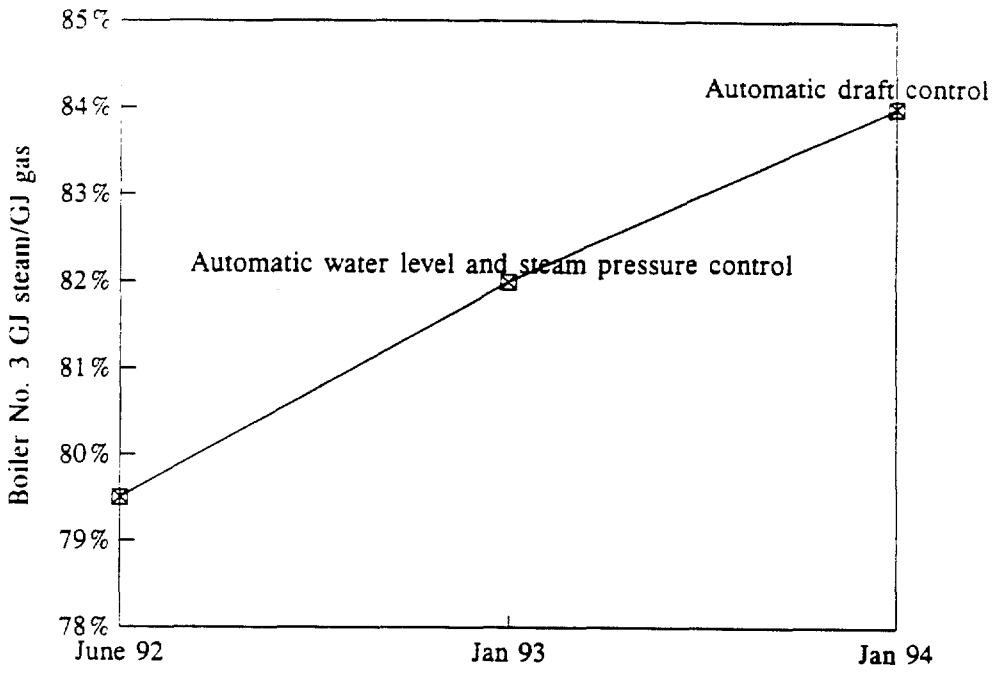


52

In an effort to eliminate some of these variations, we calculated an average of the quarterly data for the period before and after the audit. The result shows that the energy index fell an average of 21% since the audit. Many of the process- and steam-related measures listed above contributed to this success. Also, the organization and management changes that were undertaken by the GM shortly after the audit was completed contributed to these energy savings.

Several measures were carried out to improve boiler efficiency. As shown in Exhibit 8, these actions have also been successful: boiler fuel efficiency has improved more than 5% since the audit was conducted.

Exhibit 8
Boiler Fuel Efficiency Improved 5.4%

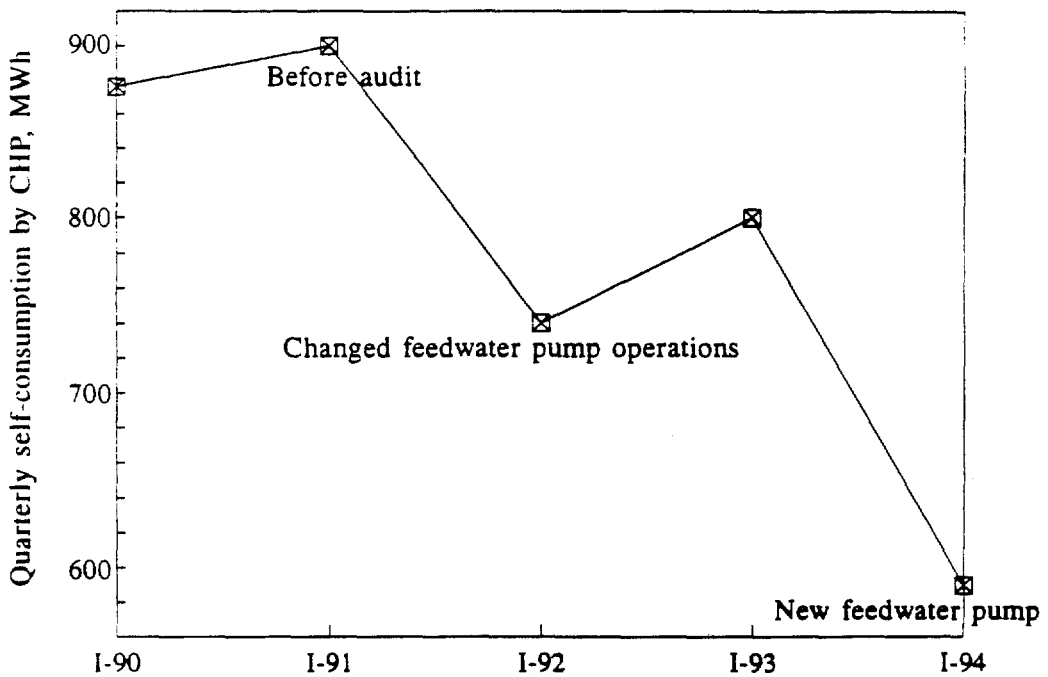


The audit recommended making changes to the boiler feedwater pumps. When the Food Plant ordered a new feedwater pump in the early 1980s, managers were forced to accept a pump that was twice the capacity required. Efficiency testing during the audit, using a portable power meter with a strip-chart recorder, proved that using the old pumps would save 100 kW. Changes to the pump operations began immediately and the 30-year old pumps were brought back into regular use. The Food Plant began procedures to acquire a new, properly sized pump, which was obtained in 1993. Through this and other more minor changes, electricity consumption in the CHP station itself was reduced 34%, as shown in Exhibit 9.

53

Purchased electric peak power demand has been reduced by 19%, through various measures, including the new pumps and optimization of the time of electrical usage.

Exhibit 9
CHP's Use of Electricity Reduced 34%



Summary of Savings

Form of energy	Savings	Percent	Value
Process steam efficiency	50,000 GJ/year	17%	$200,000/year
Boiler efficiency	12,000 GJ/year	4%	$40,000/year
Electric peak demand 300 kW		19%	$100,000/year
Electric energy	1,200 MWh/year	10%	$60,000/year
Total			$400,000/year

54

Program Costs and Benefits

Exhibit 10 lists all of the program costs for consultants, equipment, and installation. As indicated, USAID funded the energy audit. The Food Plant paid for most of the equipment costs and all of the installation costs.

Energy cost savings of $400,000/year are estimated by the authors of this case study, from the data in Exhibits 7, 8 and 9, representing a savings of 18% of overall plant energy costs.

Exhibit 10
Energy Management Program Economics

Costs:	
Consulting services (includes U.S. and local)	
Energy audit, equipment specification, procurement, installation support, monitoring, follow-up, international travel	$60,000
Equipment	
USAID-funded	30,000
Plant-funded (through 1993)	$200,000
Total Costs	$290,000
Benefits:	
Energy cost savings of $400,000/year	
Payback:	
$290,000 costs / $400,000/year benefits	= 0.7 year

DISCUSSION

The Food Plant's experience demonstrated that organizational change comes when the plant managers and operators themselves become involved in changing the management process. The plant managers were very much a part of the changes. The GM himself appeared to have treated energy as a key area, and made use of ideas provided by the audit that would save energy and have large impacts on the plant's costs. For example, before he took over as GM, the Food Plant did not provide energy consumption data to the operating managers. The GM changed that, and made the data available to managers. These data are now analyzed very closely and discussed in the daily production meetings; actions are taken to improve performance.

Institutionalizing Energy Management

Before the USAID project, the Food Plant did not have steam meters for measuring steam usage at different points in the plant. Four steam meters were supplied by USAID. The Food Plant paid for the installation of these meters, and purchased and installed over five more meters. The steam metering system is being used to monitor and control steam consumption.

By now, the Food Plant has a relatively sophisticated production planning and control system. A computer network enables the managers to share data on inventory, production, and other related issues. The steam meters installed as part of the energy initiative spurred many changes in the Food Plant's energy management practices. Plant managers appear to have internalized the discipline of monitoring energy consumption, thus underscoring the perceived need for accurate

55

data. They have also developed a performance index that computes the ratio of natural gas use to production, factoring out the steam sold or used for building heating.

The plant reorganized to encourage effective energy management. The energy department was set up as an autonomous cost center. Energy is now "sold" by the energy department to the production departments, so energy costs come from the budget of the production manager. The energy managers now work more closely with the production managers because both groups are now interested in efficient energy use. Thus, the relationship of energy to total cost is clearly reflected in the new budgeting system (the Food Plant managers had budgets before the energy audit, but they were not as important to their daily activities, especially in monitoring energy costs). Also, the managers at the plant have quarterly correction meetings. These meetings seem to serve the organization well and act as an excellent communication vehicle for innovative energy management projects.

Another indication of the success of the energy audit was that the Food Plant's technical manager, who was the main advocate of the energy project and led the resulting performance management system, was promoted to general manager in 1992.

Another change has been in the way the Food Plant handles the maintenance function. Formerly, the plant had people on staff to perform maintenance. Now, plant management contracts out many maintenance tasks. This change appears to have released some resources for investing in medium-scale energy improvements.

The management team at the Food Plant feel they have learned a great deal from the consultants involved in the USAID initiative. And they have continued on the course set by obtaining energy-related technical information from two sources: literature from vendors of energy management products, and from other plants through meetings of food industry associations and their partners. In order to learn from the experience of others, the GM travels three times a year to other plants, both within and outside the parent corporation. Now that the Food Plant has benefitted from the USAID project, they are better able to articulate what they need and ways to solve their problems.

Although the Food Plant used many consultants in the past, the GM now prefers turn-key contracts with equipment vendors. For example, a Hungarian firm is now doing work related to the reconstruction of one line of the food processing plant.

The GM's experience with U.S. firms has been limited and had mixed results. At the same time as USAID supplied steam meters, the Food Plant purchased steam meters with their own funds from a newly formed small joint venture. The quality of the locally-supplied joint venture steam meters was not as high as the USAID-supplied meters. When the locally supplied meters failed, the Food Plant tried to contact the joint venture for service, but the company was bankrupt and had ceased operations. Then, the Food Plant had to buy new steam meters from a Hungarian

firm. Based on this experience, the GM has concluded that small firms, especially from overseas or that are joint ventures, present a too high a business risk.

Current Needs

The Food Plant's management changed its focus over the last four years from survival to privatization to marketing, and now to capital development projects for process modernization or environmental protection. These projects will be funded by the Food Plant and its foreign partner. While energy savings is now a lower priority, the Food Plant has ideas for capital energy projects it would pursue if favorable financing could be obtained. In particular, the GM wants help to identify soft funding sources for the rehabilitation of the combined heat and power station and a computerized energy management system. The GM stated that before privatization, the Ministry of Industry used to help them search for energy efficiency funding opportunities and alert the Food Plant when an opportunity arose. But now that the Food Plant is a private company and the government's policies have changed, the plant must fend for itself.

CONCLUSIONS

The Food Plant has made good use of the USAID program, as evidenced by the large number of activities implemented, the decisions made to invest scarce funds in energy efficiency, and the significant savings that have been achieved. An analysis of the management systems also supports the conclusion that the project at the Food Plant has had spin-off benefits on the management of the manufacturing process itself. The following represents an attempt to draw some general conclusions from this case.

1. ***Privatization and market forces gave strong motivation for change.*** The Food Plant was bought by a Western company in the same business. Even beforehand, the anticipation of privatization motivated decision-making at the Food Plant. The recommendations of the energy audit and the inspiration of the GM led to substantial organizational changes and incentives which gave greater authority and responsibility to managers of the production an energy departments. The incentive system gave bonuses based on achievement of results.

2. ***Higher energy prices made energy efficiency a priority because of the demands on the company to sell its products and become more competitive in the emerging market economy.*** Energy costs represent about 15% of the Food Plant's total costs today. From 1989-1991, energy prices more than doubled, and the managers at the plant had the opportunity to make decisions on their own. So, energy management took on a high priority: 1991/92 was the "year of energy," and the responsibilities and activities of the managers reflect these changes.

57

3. ***The Food Plant took full advantage of the energy savings technologies and management and organizational changes prescribed in the USAID audit and realized cost savings in its energy use.*** The Food Plant demonstrated energy savings results of more than 20%.

4. ***The new energy efficiency approaches and technologies provided by USAID have altered the practices of the managers in charge of energy efficiency.*** The energy management suggestions provided to the Food Plant were new to its managers. The Food Plant had the expertise to quickly absorb the technical aspects of the energy savings recommendations. Without doubt, energy practices in the Food Plant have been altered because of the USAID project. Several reasons seem to account for these changes. First, the project was a concrete effort that involved plant management, and the work contributed to broader management and organizational changes. The fact that foreign experts were involved at this historic time (early 1991) was an influence in itself. Also, the fact that the project spanned a number of years was important--USAID personnel returned to examine the project to learn of its successes or failures. In addition, the use of meters gave managers tools to manage operations more effectively (formerly, they used theoretical standards and calculations rather than actual measurements). They were able to collect and analyze data, and use the data to influence decisions. Last, the questions asked by the USAID project personnel influenced the plant managers to think differently. For example, by requiring payback information, the managers were required to consider the economic benefits of innovations. Fundamental questions were being asked about the objectives and tasks of the energy department, which made them realize that they needed to treat energy efficiency more seriously.

5. ***The more comprehensive the changes, the greater the impact on management practices.*** The Food Plant has been privatized and many changes have occurred simultaneously. For example, the plant has changed its methods for purchasing raw materials (done through the Western European owners), the means of communicating data, the updating of the plant, and several other aspects of operation. These varied changes have had a profound impact on management practices, including those for energy.

6. ***The more the changes involved operations and management personnel, the greater the impact.*** The GM at the Food Plant seems to be a person who involves his managers in decisions and gets them to take responsibility for their actions. The energy management system (which involves the use of daily reports, task forces, employing data in decisionmaking, etc.) was directed by the energy managers, and the GM cared about its results. The production manager has become involved in energy management because his budget reflects energy costs.

7. ***The success of the changes was related to the initial conditions of the plant and the personality of the general manager.*** When the USAID project was initiated, the Food Plant had relatively good management and was an attractive take-over target. The Food Plant's strong local market in Hungary had important implications for the USAID project's success. The plant manager knew about energy management and had been performing some techniques indicative of good energy management practices. The GM is a highly-motivated, hard-working, future-oriented person, who supports the change to the market economy. His decision to allow the department managers greater autonomy, and to create a system of financial incentives, put him among the leaders in introducing market-oriented industrial management in Hungary.

8. ***The advice-plus-equipment approach produced large savings.*** The amount of money invested at the Food Plant was relatively small, yet the savings were surprisingly large. The advice-plus-equipment approach gained more attention from management than an energy audit alone. The commitment of USAID to provide equipment at no cost led the Food Plant to making other changes using their own funds. A "commitment" was obtained before the audit to install USAID equipment at the Food Plant's expense. The energy audit-with-equipment approach, while more than justified by the short paybacks achieved, served as a means of introducing market-oriented management and organizational practices that had applicability in the plant beyond energy management.

Emergency Energy Project for Central and Eastern Europe
U.S. Agency for International

RESEARCH CASE STUDY: ENERGY EFFICIENCY AT A ROMANIAN COMBINED HEAT AND POWER STATION

by
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January 1995

1.0 SUMMARY

USAID sponsored an energy management program at a Romanian Combined Heat and Power Station (CET) in April/May 1991. The program began with an energy audit, which focused on the power boilers and district water heating boilers. As a part of the program, USAID provided the plant with boiler combustion analyzers, infrared pyrometers, ultrasonic flowmeters, a computer, and an electric power analyzer. Following the audit, the Station sought to increase overall efficiency through improving combustion efficiency, reducing thermal losses, and increasing electrical efficiency of station equipment.

The Energy Efficiency program has helped the Station to increase the efficiency of the combustion boilers, reduce downtime for unpredictable repairs, institute a predictive maintenance program, and reduce thermal loses throughout the facility.

At the time of the initial energy audit, boiler efficiencies were tested and found to range from 81% to 85%, with a design efficiency rating of 92%. Oxygen content in the stack gas ranged from 5.4% to 13%. It was estimated that efficiency could be improved to 88% by simple oxygen trimming, and reducing stack gas oxygen content to approximately 2%. This has been achieved and the case study team observed several power boilers operating at exactly the correct oxygen setting.

Other energy conservation measures have been introduced as recommended by the emergency energy program audit report:

- Electric load reduction through the use of electric motor power analyzers and ultrasonic flowmeters.

- Thermal losses have been reduced through the use of infrared pyrometers and conventional electronic thermometers.

- Energy accounting has been improved through the use of the computer and portable measuring equipment, thus enabling plant management to set more accurate standards performance and evaluate the effectiveness of energy conservation measures.

Not all recommendations were implemented, specifically, the improvements in water treatment, automated combustion control, and variable speed drives. In each case, the cost of the measure did not justify the modification. However, the fact that plant staff are now performing economic analysis is encouraging.

In summary, the SUD CET plant appears to have used the results of the emergency energy program and the portable equipment to reduce energy consumption, thus increasing station efficiency, but the hard data to accurately quantify the extent of the savings, is difficult to obtain with confidence.

2.0 CASE STUDY OBJECTIVES

The goals of this case study are to (1) describe the effects of USAID's equipment and training intervention in 1991 at Romania's SUD CET Plant, and (2) evaluate the technical and managerial improvements achieved as a result of this intervention. The case study is intended for plant managers, local energy service consultants, energy efficiency equipment manufacturers, and public officials concerned with energy efficiency.

Covering the period 1990 to 1994 the case study also investigates SUD CET's current energy efficiency options.

3.0 THE COMBINED HEAT AND POWER STATION

3.1 Introduction

The station is one of five combined heat and power stations that serve the greater municipality of Bucharest. The plant was built in 1967, and is the largest and newest of the five plants that make up the Bucharest Electricity Generation Company (F.E.B.), which is a generation subsidiary of the generation division of RENEL, the national electricity company.

The station has a rated installed electrical generation capacity of 550 MW, but is operated at a reduced level of 450 MW due to the aging condition of the power boilers and steam turbines. The

installed thermal capacity is 2,400 Gcal/hr is available due to aging equipment, poor fuel combustion, and continuous maintenance. The plant is unable to meet the thermal demands of the municipality for hot water, but is able to produce enough electricity. A small portion of the thermal output is sold as low pressure steam to nearby industrial customers.

Historically, energy efficiency and conservation have not been high priorities with the Plant management. There were no incentives for increasing station efficiency and great risks associated with innovative energy efficiency measures. Thus, the priority was to operate the plant at maximum capacity without regard to efficiency and/or long term maintenance.

3.2 Station Description

The Bucharest SUB CET is one of the newer CET plants in the RENEL generation system, and the largest in Bucharest. SUD consumes approximately 10% of RENEL's total oil/gas fuel requirements. The plant has six power boilers and six steam turbines rated at 50 MW to 125 MW each. Four of the power boilers are extraction type which furnish low pressure steam for industrial use and district heating. Sixteen hot water boilers are installed to supplement the heat capacity for the district heating system. Ancillary equipment include water treatment facilities, condensers, high voltage transmission and distribution transformers, fuel storage, district heating primary pumps, condensate collection, and district heating controls.

Exhibit 1 – Bucharest SUD CET Power Plant

Year Built	1967
Electrical Capacity	550 MW Design 450 MW Actual
Thermal Capacity	2,400 Gcal/hr Design 950 Gcal/hr Actual

3.3 Organization

The plant is organized into five technical departments, each one headed by a section chief: water treatment, steam boilers, steam turbines, electrical measurement, and thermal measurement. Each department is further organized into four functional groupings: operations, maintenance, engineering, and administration. The overall plant director is Mr. Sofran. While there is no official assistant director, the boiler or steam section chief usually acts as assistant director.

This organization is similar for all generation facilities under the Bucharest Electric Generation Company (F.E.B.) which in turn is one of many electric generation companies that make up the electric power plants branch of RENEL, the national power entity. The staff at SUD CET are primarily concerned with operations and maintenance of the physical facilities. They have little or no authority to make capital improvements, modify the organizational structure, procure materials, or plan for replacement equipment.

Romania has a vertically integrated utility structure. Exhibit 2 illustrates the organization structure of RENEL, while Exhibit 3 illustrates the electricity structure of Romania in general.

4.0 ENERGY MANAGEMENT PROGRAM

4.1 The Energy Initiative

In 1991, the Ministry of Industry, through the Romanian Agency for Energy Conservation (ARCE), presented a list of sixteen candidate plants for assistance under the USAID program. This list was further narrowed down based on the criteria established by the Consultant and USAID. Following screening visits to the facilities by the Consultant and ARCE, eight plants were selected based on representing the diversity of Romania's industrial sectors, prospects for plant survival, potential for energy conservation, replicability, and plant management's commitment to energy efficiency. The power station was not a classic example of an industrial site, it was chosen because of its critical importance to district heating and its high potential for combustion efficiency improvement.

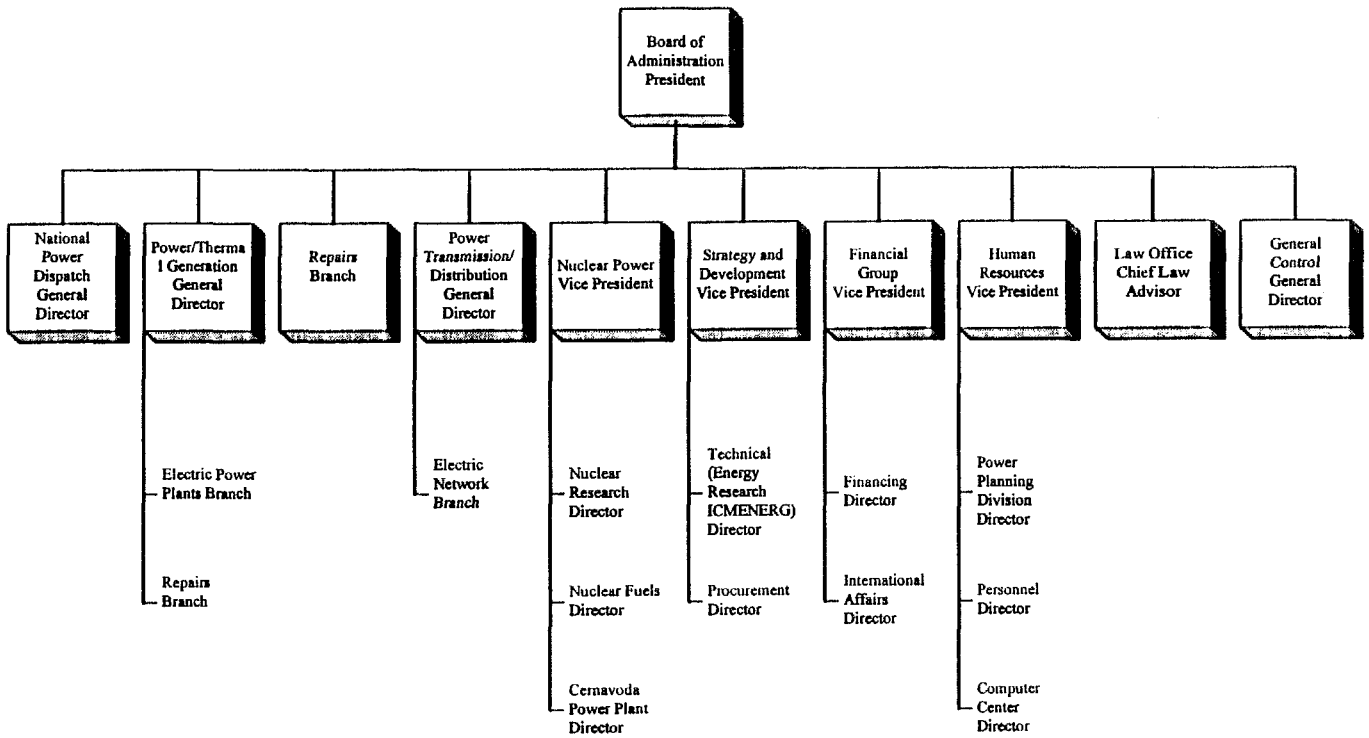
It was anticipated that the energy efficiency improvements at the Station would serve as a model for other combined heat and power stations in Bucharest, and the country at large. The USAID assistance program was attractive to the Station as it offered free equipment and consultancy from western experts. F.E.B. is under considerable pressure to improve the district heating supply in Bucharest, and was intended to give them some direction to adopt energy efficiency measures, while demonstrating western technology and methods.

4.2 The Energy Audit and Its Results

The energy audit was carried out by Resource Management Associates (RMA) of Madison, Wisconsin, prime contractor for the Emergency Energy Assistance Program in Romania. Two engineers from RMA spent one week in the plant, working directly with the Station manager and his senior staff in the boiler and turbine departments, and representatives from ARCE. The audit focused on combustion systems, and included measurements of the efficiency of the power boilers and hot water boilers, district heating system flows, thermal efficiency of heat transfer devices, and electrical equipment performance. At the conclusion of the site visit phase, a draft report was presented to Station management. Recommendations for energy conservation measures were grouped as follows:

RENEL ORGANIZATION STRUCTURE

Exhibit 2



RCG/Hagler, Bailly

Exhibit 3
ROMANIA - ELECTRICITY INDUSTRY STRUCTURE

NATIONAL LEVEL

GENERATION COMPANY

- Fuel Procurement
- Administration
- Generation Cost Determination
- Procure Spare Parts
- Budgets
- Power System Planning

TRANSMISSION COMPANY

- Administration
- Transmission Cost Determination
- Procure Spare Parts
- Budgets
- Power System Planning

DISTRIBUTION COMPANY

- Administration
- Distribution Cost Determination
- Capital Investment
- Budgets
- Planning

REGIONAL GENCOS

- Local Limited Procurement
- Budgets
- Operations/Maintenance/Capital

REGIONAL TRANSCOS

- Local Limited Procurement
- Budgets
- Operations/Maintenance/Capital

MUNICIPAL UTILITIES

- Local Limited Procurement
- Billing
- Operations/Maintenance/Capital

LOCAL LEVEL (e.g. BUCHAREST)

Bucharest Electricity Generation Company

RADET - Bucharest:
- Billing/Payments
- Submit Rate Case
- Operations/Maintenance

South Bucharest Power Plant
- Operations
- Maintenance

Other Power Plants
- Operations
- Maintenance

General Short-Term Measures:

These actions required minimal capital expenditure and focused on optimizing plant operations and maintenance. These actions were the primary focus of the USAID program and often involved in the use of measurement and analysis equipment. Exhibit 4 lists the general short-term measures identified during the energy audit.

Exhibit 4
General Short-Term Measures

1. Combustion Analysis
2. Fluid Flow Measurement
3. Electric Load Reduction
4. District Heating Flow Measurement

Exhibit 5
Recommended Long-Term Measures

1. Reduce sulphur and vanadium levels in fuel oil.
2. Reduce water treatment requirements.
3. Automatic combustion controls.
4. Improve burners.

Recommended Long-Term Measures:

Long-term measures generally involved higher capital investment, procurement of engineered equipment, and the application of more detailed technical evaluation and economic analysis. The long-term measures recommended for the south Bucharest facility are noted in Exhibit 5.

4.3 Energy Management Actions Taken

All of the short-term measures were adopted by the facility, but none of the recommended long-term measures have been implemented as yet. The specific actions and results are summarized below:

General Short-Term Measures:

The staff at the Bucharest SUD CET has been successful in implementing all the general short-term measures recommended in the audit report.

1. Combustion Analysis: The plant utilizes both electronic combustion analyzers to tune the power boilers and district heating boilers. This has led to a reduction in excess air and corresponding increased energy efficiency of both primary heating systems. Power boilers are now maintained at 2% excess oxygen as against a pre-audit measurement of 5.4% to 13%. The hot water auxiliary boilers are also maintained at 2% excess oxygen.

Combustion Analysis

Excess oxygen has been reduced from pre-audit levels of 5.4% to 13%, to a nominal 2%, thus reducing air preheating requirements, increasing boiler efficiency, and reducing forced air fan motor electrical consumption.

66

2. *Fluid Flow Measurement:* Accurate measurement of fluid flows has enabled the plant to achieve efficiency improvements in several areas:

a. Burner maintenance -- By measuring the flow of fuel oil to each burner, maintenance staff can predict burner fouling and erosion. This allows the burner to be repaired or replaced soon after the problem is identified, thus ensuring all burners are operating at or near rated capacity. Predictive maintenance programs have also been established.

b. Fluid systems -- Measurement of actual fluid flows enables plant staff to optimize fluid flow system and predict problems. In one example, a three-pump boiler fuel oil system was found to be operating at significant excess capacity. This enabled the staff to decommission one pump, without loss of performance, and save ⅓ the energy. Plant staff estimate the savings at 324,000 kWH per year, equivalent to US $8,748 at the current cost of electricity. This measure alone yields a payback on the portable ultrasonic flowmeter of approximately 6 months.

Fluid Flow Measurement

Optimizing one pumping system alone is estimated to save $ 8,748 per year (equivalent US cost of energy) thus paying back the cost of the instrument twice.

c. Pipe Insulation -- Plant staff regularly conduct pipe insulation and other thermal insulation surveys using both the infrared thermometer and conventional thermometer kit. This has enabled the maintenance staff to develop a coordinated program of insulation maintenance.

d. Electric Load Reduction -- Using the AC motor analyzer, plant staff have developed a regular program of electric motor monitoring, repair, and predictive maintenance. This has enabled the maintenance staff to promptly take efficient motors out of service for repair, and maintain a regular maintenance program.

e. District Heating Flow Measurement -- The municipal district heating authority (RADAT) has used the ultrasonic flowmeter to detect scaling on heat exchange equipment, pipe scaling, thermal unbalance, and hydraulic unbalance in the Bucharest district heating system. The information has enabled them to establish a predictive maintenance program for heat exchangers, and optimize the thermal and hydraulic balancing of the system, within the equipment's capabilities.

Recommended Long-Term Measures:

The four recommended long-term measures from the audit report have not been adopted as yet by the facility. The reasons are cited as follows:

a. Reduce sulphur and vanadium levels in fuel oil -- The plant has not looked seriously at this recommendation due to the high cost and need for imported equipment and technologies. Fuel oil treatment is best done at the refineries, so RENEL has largely deferred this problem to the Romania's petroleum company.

b. Reduce water treatment requirements -- The Bucharest plant, like all government-owned facilities in Romania, must have a study of major capital investment performed by a government institute before any funds can be allocated for capital investment. In this case, the plant requested a study from the state Institute for Power Studies and Design (ISPE). The study recommended an expansion of water treatment capacity by an additional 900 tonne/hour. However, lack of funding has prevented the project from moving ahead. As noted previously, the Bucharest staff have little decision making authority here and can only submit the request to F.E.B. management.

c. Automatic combustion controls -- The cost of these improvements were evaluated against the useful life of the boilers and it was decided to defer the investment. Plant staff did not know if the project would have recovered the investment cost.

d. Improve burners -- The same evaluation and conclusions (as for automated combustion controls) were reached.

4.4 Equipment Received from USAID

The SUD staff have been very pleased with the equipment that was received through the USAID program and they have made good use of it for the intended purpose. A specific program of utilization, monitoring, and preventative/predictive maintenance has been established with the use of each piece of equipment. For the most part, the equipment has performed satisfactorily and has operated without any serious problems. Some deficiencies were noted in the data downloading capability of both the combustion analyzer and the AC motor analyzer, and the combustion analyzer will soon need replacement oxygen sensors. Based on their experience with this program, the plant staff have identified additional equipment and accessories as necessary to fully implement the energy efficiency program.

4.5 Results Achieved

Establishing definitive benchmarks for evaluating energy savings is difficult at a facility because of the lack of reliable historical data, varying process conditions, and lack of reliable metering and monitoring equipment and methods. The best measure of energy savings would be a reduction in overall fuel and energy consumption, for each unit of energy produced. Lacking this information, the next best indicator would be to evaluate the actions taken to improve efficiency under current conditions.

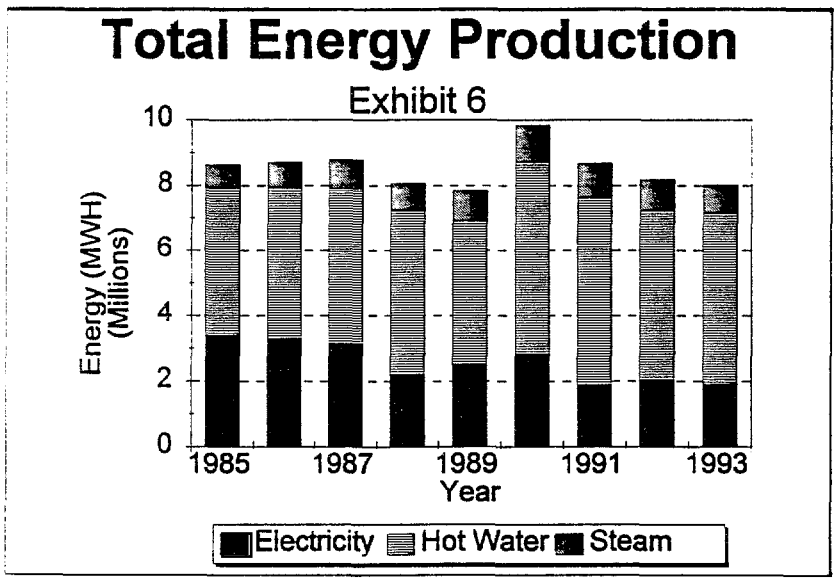
Historical Energy Consumption and Production:

The consumption and production of energy at SUD has changed significantly over the past nine years. Exhibit 6 illustrates the changing profile of energy produced from the SUD facility, specifically:

- Electricity output has been reduced by almost 50% over 1985 production levels. This is probably a reflection of the general trend in reduced industrial production and output, over 40% for the country as a whole.

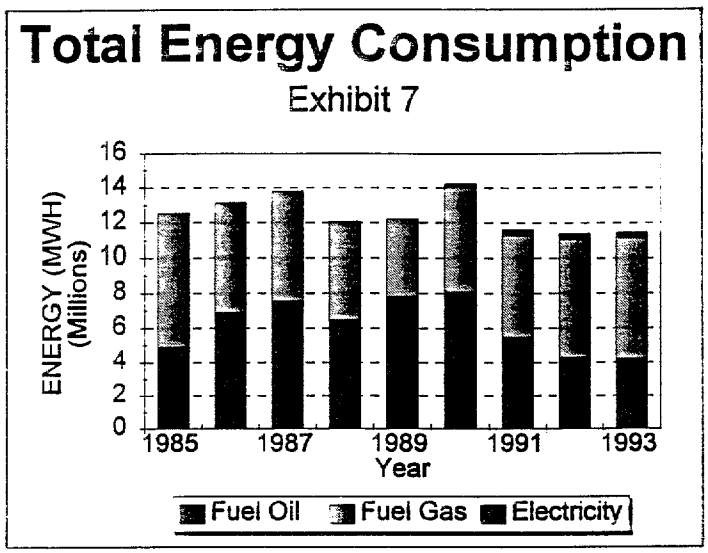
- Hot water output is much higher due to the shifting priorities to supply the general population with hot water for heating in the winter.

- Steam production is also somewhat higher for the same reason.

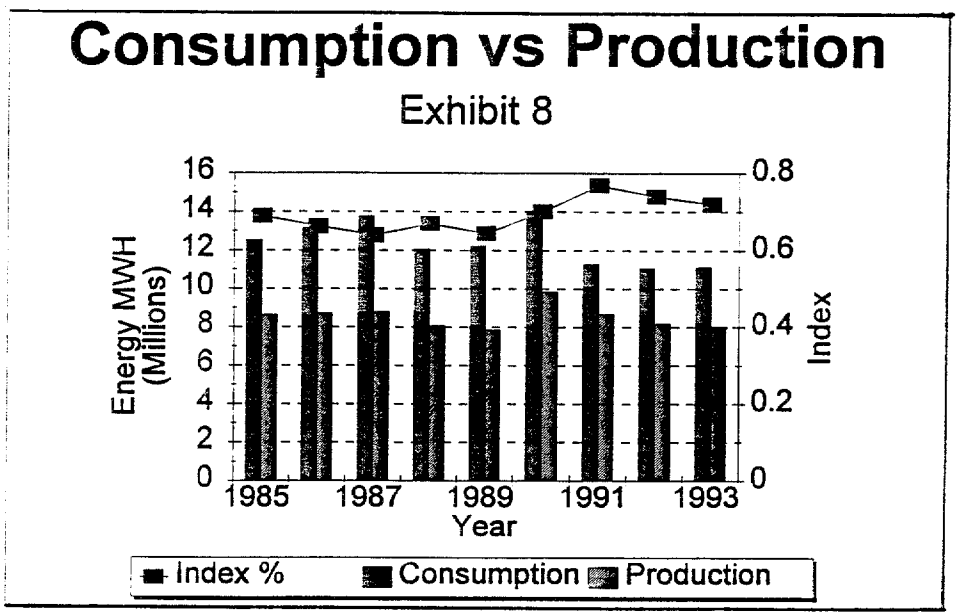


On the consumption side, there has been a steady move away from fuel oil to increased consumption of natural gas in the facility. Economic, environmental, and fuel availability considerations have driven this shift in fuel mix. Exhibit 7 illustrates the historical fuel mix at the plant.

69



A look at the comparison between production and consumption is illustrated in Exhibit 8, which also indicates the energy production index (ratio of production to consumption). The graph indicates a steadily increasing index since 1989, and a generally high index for the period 1989-1993 than for preceding years. Some of this apparent efficiency gain may be attributable to the energy efficiency measures adopted at the plant, but the records and historical data are not verifiable at this point.



70

Energy Efficiency Measures:

A more practical measure of results of the program would be to look at the specific energy efficiency measures that were adopted, and the current effect on specific energy consumption at the plant:

1. Combustion efficiency has been improved through the reduction of excess air in the power boilers and the hot water boilers. The measurable difference in excess oxygen has reduced heating requirements and improved overall thermal and electrical efficiency of the boilers. Based on the initial audit measurement of boiler efficiencies in the 81% to 85% range, the plant now regularly maintains boilers at 90+% efficiency. This efficiency gain is reflected directly in reduced fuel consumption.

2. Thermal savings have been achieved through repair and maintenance of thermal insulation systems and equipment. The plant estimates annual savings from utilization of the infrared pyrometer and conventional electronic thermometer at approximately $8,000, which yields a six-month pay back of the equipment.

4. Fluid flow measurement has resulted in the establishment of a regular program of boiler burner maintenance, improved combustion efficiency, and reduced downtime for unscheduled burner maintenance.

4.6 SUD CET Opinion of the Project

The plant management at SUD were very pleased with the USAID program. They were particularly impressed with the state-of-the-art electronic combustion analysis equipment that was demonstrated and turned over to the plant. Other factors which influenced their opinion of the program were:

- The economic analysis techniques presented by the audit team demonstrated how energy efficiency projects could be justified on the cost of energy saved.
- The way in which the project was managed: from initial project inception to the final turnover of equipment, demonstrated how a goal oriented team effort could produce quick and effective results.

The plant staff were very appreciative of the USAID technical assistance and would have wished the program to continue longer and address other efficiency improvements.

71

4.7 Program Costs and Benefits

An estimate of program costs are illustrated in Exhibit 9. The actual costs are well documented, but the actual benefits are difficult to estimate since the plant does not keep accurate records and monitoring equipment of fuel consumption, the primary beneficiary of the program. However, the following numbers are known to be accurate:

- Combustion efficiency improvement ranges from 9% to 5%. Since this overall improvement is based primarily on the ratio of thermal energy produced to thermal energy consumed, a conservative estimate is that 5% reduction in overall fuel consumption would be attainable.

- The average energy index for the plant (total energy produced vs. total fuel energy consumed) has increased at an annual average of 8% for the years 1991-1993 following the implementation of improved combustion efficiency. It can be assumed that this is made up of increased boiler efficiency (5%) and other energy efficiency measures. The improvement for the year 1993 was 5.23%.

Using a conservative estimate of 5%, and the average fuel consumption and costs for 1993, the equivalent fuel savings would be on the order of $2 million per year for all energy efficiency improvements. While this appears to be a high number when compared to the program costs of approximately $100,000, we must consider the large scale of fuel consumption in this type of facility. A similar energy audit program would incur essentially the same costs regardless of the selected plant fuel consumption. This illustrates the high cost/benefit ratio of conducting such programs at major fuel consuming plants.

Exhibit 9
Recommended Long-Term Measures

Costs:	
Consulting Services (U.S. and Local)	
Energy audit labor	$30,000
Equipment design & specification	10,000
Procurement support	5,000
Installation support	5,000
Monitoring and Follow-up support	10,000
International travel expenses	10,000
Equipment	
USAID	$30,000
Total Costs	$100,000
Benefits:	
Energy cost savings of $2,000,000 per year	
Payback:	
$ 100,000 costs / $ 2,000,000 benefits	= 0.05 year

72

5.0 DISCUSSION

This section includes some comments based on the interviews held as a part of the case study research.

5.1 Institutionalizing Energy Efficiency Improvements

The plant manager at SUD-CET was quite open and frank about the emphasis he places on energy efficiency and improving the overall efficiency of the plant. In fact, SUD has disseminated information about their program to other CETs in the Bucharest area through their parent organization, Bucharest Electricity Generating Company (F.E.B.) However, the plant manager was also quite possessive about the equipment he received and does not loan it out to other plants. The institutionalization of energy efficiency within the confines of the SUD-CET, and within the administrative authority of the plant manager, can be described as a success. However, institutionalizing energy efficiency throughout F.E.B., and beyond, has not really progressed, and the expansion of the SUD-CET plant manager's ability to expand energy efficiency efforts beyond his current authority has also not occurred.

5.2 Decision Making Process

Decision making authority and processes were identified as one of the largest barriers to expansion and continuation of energy efficiency programs at SUD-CET. The plant manager has virtually no capital improvement budget, no authority over procurement, no authority to establish an incentive based system of rewards and benefits for efficiency gains, and little personal incentive to improve efficiency. The decision making process can be categorized as centrally-located at a very high level with little input from downstream organizational units. This top-heavy decision making process was clearly a source of frustration at the plant management level.

The energy management program would greatly benefit from a loosening of the decision making process and making plant management more responsible for controlling their own costs and efficiencies.

5.3 Current Needs

The SUD-CET needs a variety of upgraded and new equipment. One commonly cited reason for the lack of investment in the plant is that the major plant components (boilers and steam turbines) have exceeded their rated life, and that the entire plant should be replaced. This is certainly true, while there are many efficiency improvements that could be made and still yield a positive economic payback within the practical remaining life of the plant. Potential improvements call for the following

- high efficiency burners

73

- high-pressure water cleaning equipment
- expanded water treatment facilities
- on-line combustion control upgrades and equipment
- variable speed drives for high capacity motors
- fuel treatment facilities
- fuel metering.

Most of these measures involve the procurement of foreign equipment, and are thus hard to implement given the shortage of hard currency and relative high cost to the plant. Foreign procurement is also entirely out of the control of plant management.

6.0 CONCLUSIONS

The Bucharest SUD-CET has benefitted greatly from the USAID-sponsored program: both in direct fuel savings, and in the implementation of a plant-wide energy monitoring and efficiency improvement program. The following general conclusions can be drawn from this case:

1. ***The SUD-CET has used the energy savings technologies and realized cost savings in its energy use.*** The equipment is being well utilized, major fuel savings have been realized, and continuing implementation of low-cost/no-cost energy efficiency measures is being accomplished.

2. ***Energy efficiency is identified as a high priority, but capital investments are non-existing.*** This anomaly is based on the plant manager's personal commitment to energy efficiency, in the absence of support and financial backing from the parent company. Most of the energy efficiency gains of the plant have come from the plant manager's personal commitment to improving efficiency.

3. ***Bucharest SUD-CET is a state-owned public facility and therefore is not under market pressure to become more efficient.*** While energy efficiency receives considerable discussion, there are no market and/or competitive forces driving efficiency improvements. RENEL has no near term plans to privatize, so this will be a continuing problem.

4. ***The new energy technologies provided by USAID have altered the practices of the plant staff.*** The energy management suggestions provided to SUD were new to its managers. The SUD staff had the expertise to quickly absorb the technical aspects of energy savings recommendations. Without doubt, energy practices at SUD have ben altered because of the USAID project. Several reasons seem to account for these changes, First, the project was a concrete effort that involved plant management, and the work contributed to managements's commitment to energy efficiency. The fact that foreign experts were involved at this historic time (early 1991) was an influence in itself. Also, the fact that the

74

project spanned a number of years was important - USAID personnel returned to examine the project to learn of its successes and failures. In addition, the use of meters gave plant staff tools to manage operations more effectively (formerly, they used theoretical standards and calculations rather than actual measurements. They were able to collect and analyze data, and use the data to influence decisions. Last, the questions asked by the USAID project personnel influenced the plant staff to think differently.

5. ***The audit focused on technological improvements, but has had little effect on the plant management practices and relations with parent organization.*** The audit demonstrated how practical and effective energy efficiency measures could be conceived, justified, and implemented at the plant level. However, the parent organization, F.E.B., has not given the plant management any authority or funding to continue with the program.

6. ***Involvement of plant operating personnel enhanced the implementation and acceptance of the program.*** Initially, plant management had difficulty in convincing plant operating staff to adopt the recommended measures. However, by establishing a program of training and information dissemination, they quickly became a part of the program and became willing supporters.

7. ***The major proponent of energy efficiency, the plant manager, was instrumental in a successful program.*** As indicated earlier, with little or no incentives in place for staff to promote energy efficiency, the responsibility fell solely on the plant manager. Without his personal commitment the program would have never succeeded.

7.0 FACTORS THAT WILL INFLUENCE ENERGY SERVICE COMPANY SUCCESS

Energy service companies (ESCOs) are just beginning to penetrate the emerging market in Romania, and the following observations on this case study pertain to their potential market:

Incentives for energy efficiency are largely non-existent at the plant operating level. The ESCOs will need to target customers who have a vested interest in adopting energy efficiency measures, and will probably need to identify high-level managers who can understand the economic benefits, and who have authority over procurement.

Technology will not sell itself. The energy efficiency technologies that ESCOs will promote cannot exist in a vacuum. The ESCOs will need to educate their customers on economic evaluation, assist them with 'selling' their ideas to management, and generally assist the customer with overcoming the multitude of barriers.

75

The market is not fully developed. The ESCOs are likely to encounter many situations where the need for their services exists, but potential customers do not fully recognize this need or place a high value on their services.

Procurement of offshore equipment and technologies is difficult. Romania has many barriers in place to discourage the procurement of offshore products and services, even where this procurement would benefit the country as a whole. ESCOs will need to address these barriers not only with their direct customers, but potentially through advocacy groups and government representatives.

RESULTS OF THE EMERGENCY ENERGY PROJECT EQUIPMENT SURVEY & FOLLOW-UP

Final Report

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77

CONTENTS

1. Introduction 1

2. Response to the Survey 2

3. Equipment Status at the Time of the Survey 2

4. Follow-Up Actions 2

5. Maintenance by the Plants - Manufacturers' Response 4

6. Usage and Energy Efficiency Results 5
   - 6.1 Overall Project Results 5
   - 6.2 Results by Type of Equipment 5
   - 6.3 Results by Purchasing Method 7

7. Conclusions 8

8. Recommendations 9

Appendices

- Equipment and survey database . . . . . A
- Summary of equipment listed as initially not working or not installed . . . . . B
- Summary of equipment repaired through the follow-up program C
- Summary of contacts made by plants . . . . . D
- Major survey results by equipment type . . . . . E
- Summary of database statistics and survey results . . . . . F
- Results expressed in percent of line items . . . . . G
- Results expressed in percent of dollar value . . . . . H
- Results expressed in terms of line items I
- Results expressed in terms of dollar value . . . . . J
- Contact information for the organizations that received equipment . . . . . K
- Contact information for U.S. Equipment Manufacturers L

RESULTS OF THE EMERGENCY ENERGY PROJECT EQUIPMENT SURVEY & FOLLOW-UP

May 15, 1995

Final Report

1. INTRODUCTION

Under the 1991-1992 Emergency Energy Project for Eastern and Central Europe, U.S. engineers worked with local engineers and consultants to introduce Western-style energy management techniques to representative industrial plants. A tailor-made program was developed for each plant, including training, audits, specifications, and procurement of an appropriate package of U.S. energy efficiency equipment. A total of over $1.5 million was procured.

In 1993 USAID contracted with Scientech to conduct an evaluation of the impact of the industrial energy component of the Emergency Energy Project. An evaluation team visited Bulgaria, the Czech Republic, Hungary, and Romania in the summer of 1993. Among its findings, the team noted that some USAID-funded equipment needed maintenance or spare parts[1], and recommended that USAID assist the recipients of the equipment by providing spare parts and repair services.

Under the East European Regional Energy Efficiency Project, USAID subsequently asked Hagler Bailly to conduct a survey of all the organizations that received equipment under the industrial component of the Emergency Energy Project to: 1) find out what the status of all the equipment was; 2) analyze the results obtained with the equipment; 3) investigate how the recipients perceived the support they received from the U.S. suppliers; and 4) to coordinate with vendors and manufacturers to troubleshoot the equipment and insure that the equipment continues to be used in the future.

The objective of this report is to present the main results of the equipment survey and follow-up, and to assemble in a single document all the data that was collected and compiled.

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[1] *A Project Evaluation of the Impact of the Industrial Energy Component of the Emergency Energy Project*, draft report prepared by Scientech, Inc. for AID/ENI/EEUD/EI.

2. RESPONSE TO THE SURVEY

Statistics are as follows:

Surveys sent:	60
Surveys received:	49 (82% response rate)

The surveys received cover 81% of the total value of the equipment that was procured.

Please refer to Appendix A for a printout of the database of equipment and survey responses. Actual responses to the survey were compiled into a separate volume.

3. EQUIPMENT STATUS AT THE TIME OF THE SURVEY

At the time of the survey 88% of the equipment[2] provided was functioning properly. 11% of the equipment was not functioning and 1% was still not installed.

The table below summarizes the status of the equipment at the time of the survey:

	Line items		Value	
No problems	276	87.9%	$1,147,304	80.3%
Lack of supplies	17	5.4%	$87,713	6.1%
Lack of parts	4	1.3%	$44,369	3.1%
Lack of repairs	8	2.5%	$84,526	5.9%
Mis-specified	4	1.3%	$19,093	1.3%
Other problems	5	1.6%	$45,549	3.2%
TOTAL	314	100.0%	$1,428,554	100.0%

Appendix B shows the equipment listed as initially not working or not installed.

4. FOLLOW-UP ACTIONS

After receipt of the responses to the survey, we made follow-up contact with all the plants that had indicated in their response that they were experiencing some problems or that some of their equipment was still not installed. A majority of the plants responded to our requests for additional information, so that we managed to provide remedial support for 62% of the equipment

[2] These numbers correspond to the number of 'line items' that included some equipment with problems, as a percentage of the number of 'line items' for which we received a survey response. The actual percentage of pieces of equipment that were not functioning properly was actually lower. In the rest of this write-up, we will use 'equipment' in the sense of 'line items'.

that was not functioning. After completion of the follow-up actions, 95% of the equipment will be functioning properly.

A total of $19,000 of equipment and repairs has been provided to the plants as part of this follow-up effort. These parts, supplies, and repairs have enabled the plants to make again full use of equipment worth over $135,000.

The following was provided:

- Replacement natural gas flowmeter
- New fixed probe for an in-situ oxygen analyzer
- Repairs on electronic boards for a combustion analyzer and an ultrasonic flowmeter
- Two rechargeable batteries for a computer and a power analyzer.
- Sensors and consumables for 17 portable combustion analyzers.

Details are provided in the table below and in Appendix C ('Summary of equipment repaired through follow-up program').

Country	Organization name	Equipment type	Manufacturer	Problem	
Bulgaria	Chimco Fertilizer Works	Combustion Analyzer	Energy Eff. Systems	s	SO2, O2, and CO sensors
Bulgaria	Chimco Fertilizer Works	Infrared Thermometer	Davis	m	Incorrect readings, lack of instructions
Bulgaria	Izida Ceramics	Combustion Analyzer	Energy Eff. Systems	s	O2 sensor
Bulgaria	Ministry of Industry	Combustion Analyzer	Energy Eff. Systems	s	O2,CO,SO2,NOx sensors and battery
Bulgaria	"Galatex Ltd." Cotton	Oxygen Analyzer	Davis	s	O2 sensor
Czech Rep	Inorga	Ultrasonic Flowmeter	Controlotron	s	Coupling compound
Estonia	Pussi Puitlaastplaastide	Combustion Analyzer	Bacharach	s	O2 sensor
Latvia	Riga Technical University	Combustion Analyzer	Bacharach	s	O2 liquid
Latvia	Riga Technical University	Combustion Analyzer	Bacharach	s	O2 sensor
Lithuania	Alytus Wood Products Plant	Combustion Analyzer	Energy Eff. Systems	s	O2 sensor
Lithuania	Lithuanian Power Board	AC Power Recorder	Dranetz	P	Battery and data transfer problems
Lithuania	Lithuanian Power Board	Combustion Analyzer	Bacharach	s	O2 sensor
Lithuania	Vilnius Sweets Plant "Pergale"	Combustion Analyzer	Energy Eff. Systems	s	O2, CO, NOx, SO2 sensors and filters
Lithuania	Vilnius Sweets Plant "Pergale"	Natural Gas Flow Meter	Emco	r	Moisture problems + Oversized
Poland	Elektrocieplownia Krakow-Leg	Oxygen Analyzer	Davis	s	O2 sensor / incorrect readings
Poland	Huta "Ostrowiec"	In-Situ Oxygen Analyzer	Johnson-Yokogawa	p	Zirconia cell damaged
Romania	SC Cimus SA	Combustion Analyzer	Energy Eff. Systems	r	Misc. problems
Romania	SC Doljchim SA	Combustion Analyzer	Energy Eff. Systems	s	O2 sensor
Romania	SC Doljchim SA	Laptop computer	Epson	P	Rechargeable battery out of order
Romania	SC Griro SA	Combustion Analyzer	Bacharach	s	O2 sensor
Romania	SC Griro SA	Combustion Analyzer	Energy Eff. Systems	r	The printer was not working. Now OK
Slovakia	Biotika Pharmaceutical	Ultrasonic Flowmeter	Controlotron	r	display of hand console
Slovakia	Mostaren Brezno	Combustion Analyzer	Energy Eff. Systems	s	O2 sensors + calibration

M Mis-specified / not adapted to plant
P Lack of parts
S Lack of supplies
R Lack of repairs

81

In addition to the above actions, further detailed information was sent to several plants (instructions, manuals), and all the plants received a listing of updated contact information for the U.S. manufacturers and their local agents in Eastern Europe (included in Appendix L).

5. MAINTENANCE BY THE PLANTS - MANUFACTURERS' RESPONSE

At the time of the survey, the plants had taken maintenance actions on 37% of the line items (By primary type of maintenance: calibration: 18%, supplies: 4%, parts: 6%, repairs: 9%, other: 1%). In terms of value of equipment, these maintenance actions had affected 51% of the value of the equipment, indicating that the less expensive types of equipment tend to receive less maintenance.

The plants had tried to contact the US manufacturers, their agents, or the USAID contractors regarding 19% of the line items (28% of the value). Half of these contacts were for supplies (mostly for combustion analyzers). Appendix D provides lists all the contacts that survey respondents reported as being made or attempted.

Among the contacts and attempts listed as 'not satisfactory', the primary problem seems to be the lack of response from the manufacturers or their agents. The problem was particularly acute for Energy Efficiency Systems (manufacturer of Enerac combustion analyzers), which is involved in half of the 'not satisfactory' cases. This explains in large part why half of the line items for which supplies or parts were provided under the follow-up program involve equipment from Energy Efficiency Systems.

By comparison, and for the same type of equipment, Bacharach provided satisfactory support to the plants. Among the differences between Bacharach and Energy Efficiency Systems:

- Bacharach has a headquarter office in Europe, while Energy Efficiency Systems does not.
- Exporting seems a true priority at Bacharach. By comparison, the staff at the export department of Energy Efficiency Systems is not responsive to requests from clients, and is apparently not supporting its fledgling network of agents.

This example supports the conclusion that, especially for equipment requiring the regular purchase of supplies, it is very important that the equipment manufacturers have a stable and reliable presence in Central and Eastern Europe. In addition, the recipients of equipment are even more likely to actually purchase spares and supplies if the manufacturer has a representative in the country itself.

Along the same lines, the cases that we know of plants buying additional pieces of equipment (for example: steam traps in Poland, flowmeters in Romania) seemed to have all happened in countries where the manufacturer had a representative.

82

Regarding repairs through local agents, the survey shows three examples (Lenze, Yokogawa, and Controlotron) where the presence of a local agent in Central and Eastern Europe did not really help solve technical problems or claims linked to the delivery of defective equipment shipped from the US. It would seem that the sale and delivery need to be done through the local agent for this agent to be an effective resource in cases requiring significant coordination, such a return of goods or a warranty claim.

6. USAGE AND ENERGY EFFICIENCY RESULTS

6.1 Overall Project Results

While the primary goal of the survey was to assess the operational status of the equipment and identify problems associated with maintenance, the recipient organizations were also asked to provide a basic rating of how frequently they use the equipment and what energy conservation results they have achieved with it. The responses showed the following results:

- Only 10% of the equipment surveyed (12% in value) was judged to have provided 'poor results' or 'no results'.
- 75% percent of the equipment (79% in value) was still used 'continuously', or 'often' at the time of the survey.

More details are provided in the following sections.

6.2 Results by Type of Equipment

At the time of the survey, the proportion of functioning equipment was approximately the same for fixed and portable equipment (both in terms of line items and value). Among the portable equipment, combustion analyzers had the highest rate of problems (supplies), but they also had a high rate of usage. Among the fixed equipment, there were a few problems with electrical equipment, instrumentation and control apparatus, boiler equipment, and steam traps, but the numbers are not significant.

The table in Appendix E has been extracted from the overall survey analysis to show frequency of use and energy conservation results by equipment type, both in percent value and percent line items.

At first glance the frequency of use would appear higher for fixed equipment than for portable, but this seems to be only because fixed equipment was logically said to be used 'continuously' while portable equipment does not tend to be used 'continuously'. When comparing the 'rarely' or 'never' responses, portable equipment seems to be used a bit more often than fixed equipment. This is particularly significant, as actually using portable equipment requires more 'effort' than letting a fixed piece of equipment operate or watching a dial on a meter.

There are no major differences in energy efficiency results between fixed and portable equipment, even though the portable equipment shows a smaller proportion of 'poor results' or 'no results' than the fixed equipment (9% versus 15% in line items, 4% versus 18% in value).

Looking at specific types of equipment, the following can be said:

- Energy management systems (essentially demand limiting systems) and computer systems have the highest rates of 'continuous' or 'often' usage (together with specialized process equipment). They also show the best energy conservation result ratings. In Poland, the locally-engineered demand limiting system from the Huta Ostrowiec plant was later successfully replicated to other plants.
- Maintenance equipment is also rated with very high results, but with less than average usage.
- The boiler equipment category (mostly fixed combustion controls, but also oil pumps and blowdown recovery systems) shows a big variety of answers regarding frequency of use and efficiency results. The fixed oxygen analyzers provide results, but generally not rated as 'excellent'. The one trim control system that was supplied was actually not installed due to a problem with the boiler's existing damper.
- The fixed instrumentation and controls category (pressure gages, pressure recorder, humidity recorder, fixed IR pyrometer, drive controller) shows very low usage. This confirms the previous comment on operating status but, again, the results are not very significant as this category only comprises 5 line items, with a total of $18,000.
- Portable electrical instrumentation (power analyzers, tachometers, motor testers...) has the lowest rate of utilization and results.

The results were not compiled to specifically differentiate between electrical and thermal equipment, but the following can be said:

- There were very few pieces of electrical end-use equipment. Lighting equipment was perceived as successful, even if not always cost-effective[3], but the statistical results of the 'fixed electrical equipment' category were skewed by operating problems on an expensive adjustable speed drive.
- As mentioned before, portable electrical instrumentation was not very successful.
- Energy management systems (essentially demand controllers) were extremely successful.

To try to analyze the influence of the value of the line item (value of the equipment, or number of similar items procured at the same time), we took the ratio of the results expressed

[3] Draft report by Scientech, paragraph 4.2.4.2, page 18.

in dollar value to the results in expressed in number of line items. For example, the percentage of portable equipment showing 'excellent' energy conservation results was 35% in terms of dollar value, but only 29% in terms of line items. The ratio of these two ratings is 1.22. The fact that this ratio is greater than 1 means that the 'excellent' results were achieved by items having a greater cost than average.

6.3 Results by Purchasing Method

The survey analysis considered both *where* the equipment had been purchased (in the U.S. vs. in-country) and *from whom* it had been purchased (manufacturer, independent vendor, and U.S. 'catalog' distributor). The overall conclusion seems to be that *where* and *from whom* a given piece of equipment was purchased did not affect the results of the equipment procured under the Emergency project. Details are as follows.

- The maintenance, usage, and efficiency results did not seem to depend on the *type* of vendor. Any small differences in the results by type of vendor can probably be better explained by the fact that the type of vendor is heavily correlated with the type of equipment (small off-the-shelf items from catalogs, flowmeters from independent system integrators...).

- Also, there are too few cases where the plants attempted to contact the vendor to draw meaningful lessons on how independent vendors and catalog companies respond to inquiries, compared to manufacturers.

- Regarding the location of the vendor, it can be noted that 100% of the equipment that had been purchased from vendors located in Central and Eastern Europe was functioning properly, and had been so since the beginning. But the location of the vendor is also very dependent on the type of equipment: all the equipment bought in-country was either computer systems, valves, or insulation. These are precisely among the categories that show no maintenance problems, and it should be noted that none of the equipment from these categories that was bought in the US has had any problem either.

Caution should be used in drawing conclusions regarding the influence of the type or location of the vendor. Any analysis of that type should take into account the conclusions from Section 5, which shows that a reliable local network of manufacturer's agents can be very important.

85

7. CONCLUSIONS

For the equipment supplied in the Emergency Energy Project, the following conclusions can be drawn regarding the various technologies provided:

- The difference in usage and results between portable and fixed equipment was small, with a slight advantage for portable equipment.
- Most portable equipment was used frequently by the plants and continues to provide good energy efficiency results.
- When providing portable equipment, investing in high quality equipment with wide operating capabilities seems to have paid off in efficiency results and long-term sustainability of the savings.
- Users noted a clear preference for combustion analyzers that accommodate European fuels and accept Lower Heating Values.
- Among portable equipment, electrical end-use instrumentation generally was the least successful.
- Computerized energy management systems were very successful and had no operating problems.
- The level of complexity of fixed equipment (including boiler instrumentation and automation) needs to be adapted to the level of sophistication of the plant, and be compatible with the technical level of the systems on which this fixed equipment is installed.

Regarding the support role of vendors and manufacturers, the following can be said:

- **Supplies** - For equipment requiring the regular purchase of supplies, it is important that the equipment manufacturers have a stable and reliable presence in Central and Eastern Europe, preferably with a representative in the country for which the equipment is purchased.
- **Major repairs** - Most local agents have not been very helpful in the few cases where major repairs where needed or where warranty claims were involved. It is probable that these agents would have felt more responsible for support if they had also been involved in the sale and delivery of the equipment. Buying the equipment from the local vendor, and therefore making the vendor responsible for equipment specification and direct shipping to the plant, can

86

possibly allow to avoid some subsequent problems; it is also a good way to insure that the plant and local agent get in touch with each other.

Overall the survey shows that most of the equipment was operating correctly. The follow-up program has contributed to making the equipment more maintainable over the long term, by providing short term help in the form of spare parts and by allowing a better dissemination of manufacturer's contact information. Continuing to work in close cooperation with the U.S. manufacturers will be the key to both sustainable savings and increased sales opportunities.

8. RECOMMENDATIONS

A few specific recommendations can be given:

1) Wherever applicable, include local support and manufacturer's commitment as part of the bid evaluation criteria. For example, include the following language in the request for quotation:

> *A principal consideration in selecting suppliers for Eastern Europe is the level and extent of commitment to provide follow-on support and assistance to the end user of the equipment. Vendor shall specifically describe the level and extent of manufacturer support that is available to the country of destination, including:*
>
> *a. Contact information for the nearest manufacturer, distributor, repair facility, and source of spare parts and consumables.*
>
> *b. Procedure for obtaining support from Eastern Europe (set-up assistance, technical support, spare parts, repairs...).*
>
> *c. Vendor's commitment to developing local or nearby support infrastructure.*
>
> *d. Willingness of the vendor to send a representative to Eastern Europe (at vendor's cost) to provide training, develop local support networks, and participate in conference and exhibitions organized by USAID.*
>
> *Vendor should provide a letter addressing the above issues. Quotations that do not address follow-on support may not be considered.*

2) Continue to establish long-term working relationships with U.S. manufacturers, so that these manufacturers have a clear incentive to collaborate with the USAID programs by providing additional support, participating in local conferences, and providing testimonies on the programs.

3) Buy several pieces of equipment, or systems, from the same manufacturer for a given country, so that the equipment reaches a 'critical mass' in that country, making it more worthwhile for the manufacturer to insure appropriate support structures, and creating a bigger momentum for repeat sales and the possible establishment of representatives.

4) As much as possible, buy the equipment from the export department of the manufacturer, not from local US vendors, to:

- insure optimal response to item 1) above
- build-up the working relationship with the manufacturer
- make the manufacturer more aware of the sales volumes generated by the Central and Eastern European markets

5) Include on purchase orders the necessary information to allow USAID to 'get out of the loop' by facilitating direct contact between the manufacturer and the recipient organization:

- Name and contact information for the recipient organization
- Name and contact information for the local engineering consultant, if applicable.
- Notification that ownership of the equipment will be transferred to the plant, and that the manufacturer should use its best efforts to provide follow-up assistance directly to the plant, including on matters related to warranty claims.

6) Transmit a copy of the purchase order to the recipient organization, to make sure that the recipient has all the required information for follow-up maintenance:

- full contact information for the vendor
- complete ordering information for the equipment and for the principal spare parts

7) At the end of the procurement process, send to all the recipients a listing of contacts for the US equipment, similar to the one showed in Appendix L, in order to:

- centralize the support contact information for all the equipment received by the plant
- leverage the demonstration and export development efforts by making the recipients aware of what other brands have been provided, and what other manufacturers are represented in the Central and Eastern Europe.

APPENDIX A

EQUIPMENT AND SURVEY DATABASE

KEY TO THE SURVEY DATABASE CODES

Note: The codes entered in capital letters correspond exactly to the response. Codes entered in small case have been deducted from the overall other answers for that specific piece of equipment

1A Did the equipment require any installation?
- Y Yes
- N No

1B If yes, was the installation done by:
- O By your own organization
- M By the local representative of the manufacturer
- S Local USAID subcontractor
- Z Other

2A Was the equipment initially functioning correctly?
- Y Yes
- N No
- NI Not installed

2B If no, please explain why

3A Is the equipment currently in working conditions?
- Y Yes
- YA Yes, after action (was NO at the time of the survey, but action was taken during the follow-up)
- NIC Not installed despite attempts at working with the plant
- NC Not working despite attempts at working with the plant
- N Plant can do it on its own

3B If no, what are the operational problems?
- M Mis-specified / not adapted to plant
- P Lack of parts
- S Lack of supplies
- R Lack of repairs
- T Lack of trained operators
- Z Other / Unknown

3C Please describe the current or past problems

3D How often have problems occurred?
- N No problems
- O Occasionally
- V Very often
- C Continuously

4A What maintenance actions were done on the equipment?
- N No maintenance
- C Calibration
- S Supplies
- P Parts (or parts and the above)
- R Repairs (or repairs and the above)
- Z Other (cleaning...)

KEY TO THE SURVEY DATABASE CODES

4B If repairs were done, were they done:
- O By the repair bank of your own organization
- I By an independent repair shop, locally
- M By the US manufacturer
- S By the US manufacturer, through USAID consultant
- Z Other

5A Have you contacted the US supplier of the equipment or his local representative yet?
- Y Yes
- N No

5A1 Added in the survey database:
- *y The contact was with the USAID contractor or local consultant*

5B If yes, what was the name of the company?

5C If yes, what was the objective of the contact?
- I Information
- C Calibration
- T Technical Support
- P Parts (or parts and the above)
- R Repairs (or repairs and the above)
- Z Other (cleaning...)

5D If yes, was the support from the US supplier satisfactory?
- Y Yes
- N No

5E If support not satisfactory, why?

6A How often does your organization currently use the equipment?
- C Continuously
- O Often
- R Rarely
- N Never

6B How often do other organizations currently use the equipment? (for the non-plants)
same

7A Overall, what energy conservation results have been achieved with the equipment?
- E Excellent
- S Some results
- P Poor results
- N No results
- na Not applicable (not available in the survey, but interpreted from the responses)

7B If "poor" or "no results", please explain why:

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
1	Latvia	Slokas Celulozes un Papira Fabrika	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$434	
2	Latvia	Slokas Celulozes un Papira Fabrika	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$2,511	
3	Latvia	Slokas Celulozes un Papira Fabrika	Ultrasonic Stethoscope	UE Systems	Ultraprobe 2000	1	UE Systems	$3,995	
4	Latvia	Slokas Celulozes un Papira Fabrika	Portable Thickness Gauge	UE Systems	EPD-621	1	UE Systems	$1,995	
5	Latvia	Slokas Celulozes un Papira Fabrika	Fixed Combustion Analyzer	Ametek	WDG-HPIIC + accessories	1	Flow-Tech	$8,515	
6	Latvia	Slokas Celulozes un Papira Fabrika	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$663	
7	Latvia	Slokas Celulozes un Papira Fabrika	Digital Dissolved Solids Meter		L-01489-02 + accessories	1	Cole Palmer	$366	
8	Latvia	Slokas Celulozes un Papira Fabrika	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
9	Latvia	Slokas Celulozes un Papira Fabrika	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,704	
10	Latvia	Slokas Celulozes un Papira Fabrika	Strobe Tachometer	Ametek	3156FST + case	1	Transcat	$560	
11	Latvia	Slokas Celulozes un Papira Fabrika	Steam Traps	Armstrong	882-CV-LV 3/4"	30	Allan T. Shepperd	$148	
12	Latvia	Slokas Celulozes un Papira Fabrika	Spreadsheet Software Package	Lotus	Lotus 123 v2.4	1	Egghead Software	$368	
13	Latvia	Slokas Celulozes un Papira Fabrika	Set of Books			1		$558	
14	Latvia	Jelgava District Heating Enterprise	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$434	
15	Latvia	Jelgava District Heating Enterprise	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$2,831	
16	Latvia	Jelgava District Heating Enterprise	Ultrasonic Stethoscope	UE Systems	Ultraprobe 500	1	UE Systems	$1,370	
17	Latvia	Jelgava District Heating Enterprise	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$663	
18	Latvia	Jelgava District Heating Enterprise	Digital Dissolved Solids Meter		L-01489-02 + accessories	2	Cole Palmer	$366	
19	Latvia	Jelgava District Heating Enterprise	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
20	Latvia	Jelgava District Heating Enterprise	Steam Flow Meters		Rupniecibas	2	Flow Media	$9,533	
21	Latvia	Jelgava District Heating Enterprise	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,445	
22	Latvia	Jelgava District Heating Enterprise	Set of Books			1		$558	
23	Latvia	Preili Cheese-Making Plant	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$434	
24	Latvia	Preili Cheese-Making Plant	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$2,598	
25	Latvia	Preili Cheese-Making Plant	Combustion Smoke Tester	Bacharach	True Spot Smoke Tester	1	Bacharach	$77	
26	Latvia	Preili Cheese-Making Plant	Ultrasonic Stethoscope	UE Systems	Ultraprobe 500	1	UE Systems	$1,370	
27	Latvia	Preili Cheese-Making Plant	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$663	
28	Latvia	Preili Cheese-Making Plant	Digital Dissolved Solids Meter		L-01489-02 + accessories	2	Cole Palmer	$366	
29	Latvia	Preili Cheese-Making Plant	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
30	Latvia	Preili Cheese-Making Plant	Strobe Tachometer	Ametek	3156FST + case	1	Transcat	$560	
31	Latvia	Preili Cheese-Making Plant	Oil Pumps	APV Crepaco	704835	2	APV Crepaco	$2,079	
32	Latvia	Preili Cheese-Making Plant	Oil Pumps	APV Crepaco	701655	2	APV Crepaco	$2,173	
33	Latvia	Preili Cheese-Making Plant	Perforated Boards for Cheese-Making	APV Crepaco	232714	10	APV Crepaco	$427	
34	Latvia	Preili Cheese-Making Plant	Perforated Boards for Cheese-Making	APV Crepaco	232713	10	APV Crepaco	$498	
35	Latvia	Preili Cheese-Making Plant	Set of Truck Tune-Up Tools			1	Snap-On Tools	$1,357	
36	Latvia	Preili Cheese-Making Plant	Personal Computer, with Printer	IBM	386/SX + 24 Pin Printer	1	Baltic Information Techn	$2,800	
37	Latvia	Preili Cheese-Making Plant	Spreadsheet Software Package	Lotus	Lotus 123 v2.4	1	Egghead Software	$330	
38	Latvia	Preili Cheese-Making Plant	Set of Books			1		$558	
39	Latvia	Saulkalne Lime Plant	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$434	
40	Latvia	Saulkalne Lime Plant	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$3,038	
41	Latvia	Saulkalne Lime Plant	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$1,326	
42	Latvia	Saulkalne Lime Plant	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
43	Latvia	Saulkalne Lime Plant	Infrared Pyrometer w/ Laser Sighting		OS2106LS	1	Omega	$2,395	
44	Latvia	Saulkalne Lime Plant	Fixed Infrared Pyrometers, with recorders		OS1200-HTC3 + accessories	4	Omega	$3,540	

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
1	Slokas Celulozes un Papira F	Combustion Analyzer	N		Y		Y				N		N						R		S		1	1
2	Slokas Celulozes un Papira F	Combustion Analyzer	N		Y		NC	s	O2 sensor		s	O	N						O		E		1	1
3	Slokas Celulozes un Papira F	Ultrasonic Stethoscope	N		Y		Y				N		N						O		S		1	1
4	Slokas Celulozes un Papira F	Portable Thickness Gauge	N		Y		Y				N		N						O		S		1	1
5	Slokas Celulozes un Papira F	Fixed Combustion Analyzer	y	n	NI	Lack of	I	p	Lack of connective		n		N						n		n		1	1
6	Slokas Celulozes un Papira F	Hand-Held Thermocouple Set	N		Y		Y				N		N						C		S		1	1
7	Slokas Celulozes un Papira F	Digital Dissolved Solids Meter	N		Y		Y				N		N						C		S		1	1
8	Slokas Celulozes un Papira F	Three-Phase Industrial Clamp-	N		Y		Y				N		N						C		S		1	1
9	Slokas Celulozes un Papira F	Infrared Pyrometer w/ Laser Si	N		Y		Y				N		N						C		E		1	1
10	Slokas Celulozes un Papira F	Strobe Tachometer	N		Y		Y				N		N						R		P		1	1
11	Slokas Celulozes un Papira F	Steam Traps	Y		Y		Y				N		N						C		E		1	1
12	Slokas Celulozes un Papira F	Spreadsheet Software Packag	N		Y		Y				N		N						R		S		1	1
13	Slokas Celulozes un Papira F	Set of Books																					0	0
14	Jelgava District Heating Enter	Combustion Analyzer	N		Y		NC	s	O2 sensor	O	s		N	y	BV Ekodoma	P	N		O		S		1	1
15	Jelgava District Heating Enter	Combustion Analyzer	N		Y		Y			N	N		N						R		S		1	1
16	Jelgava District Heating Enter	Ultrasonic Stethoscope	N		Y		Y			N	N		N						R		S		1	1
17	Jelgava District Heating Enter	Hand-Held Thermocouple Set	N		Y		Y			N	N		N						C		S		1	1
18	Jelgava District Heating Enter	Digital Dissolved Solids Meter	N		Y		Y			N	N		N						R		S		1	1
19	Jelgava District Heating Enter	Three-Phase Industrial Clamp-																					1	0
20	Jelgava District Heating Enter	Steam Flow Meters	y	n	NI		NIC				n		N						n		n		1	1
21	Jelgava District Heating Enter	Infrared Pyrometer w/ Laser Si	N		Y		Y			N	N		N						C		S		1	1
22	Jelgava District Heating Enter	Set of Books																					0	0
23	Preili Cheese-Making Plant	Combustion Analyzer	N		Y		Y				N		N						O		S		1	1
24	Preili Cheese-Making Plant	Combustion Analyzer	N		Y		Y				s	C	y		*Bacharach*	P	Y		O		S		1	1
25	Preili Cheese-Making Plant	Combustion Smoke Tester	N		Y		Y				s	C	y		*Bacharach*	P	Y		O		S		1	1
26	Preili Cheese-Making Plant	Ultrasonic Stethoscope	N		Y		Y			N	N		N						R		S		1	1
27	Preili Cheese-Making Plant	Hand-Held Thermocouple Set	N		Y		Y			N	N		N						O		S		1	1
28	Preili Cheese-Making Plant	Digital Dissolved Solids Meter	N		Y		Y				N		N						O		S		1	1
29	Preili Cheese-Making Plant	Three-Phase Industrial Clamp-	N		Y		Y				N		N						O		S		1	1
30	Preili Cheese-Making Plant	Strobe Tachometer	N		Y		Y			N	N		N						C		S		1	1
31	Preili Cheese-Making Plant	Oil Pumps	Y	O	Y		Y			N	N		N						C		E		1	1
32	Preili Cheese-Making Plant	Oil Pumps	Y	O	Y		Y			N	N		N						C		E		1	1
33	Preili Cheese-Making Plant	Perforated Boards for Cheese-	Y	O	Y		Y			N	N		N						C		E		1	1
34	Preili Cheese-Making Plant	Perforated Boards for Cheese-	Y	O	Y		Y			N	N		N						C		E		1	1
35	Preili Cheese-Making Plant	Set of Truck Tune-Up Tools	N		Y		Y			N	N		N						C		E		1	1
36	Preili Cheese-Making Plant	Personal Computer, with Print	Y	-	Y		Y				C		N						O		E		1	1
37	Preili Cheese-Making Plant	Spreadsheet Software Packag	N		Y		Y				N		N						O		S		1	1
38	Preili Cheese-Making Plant	Set of Books																					0	0
39	Saulkalne Lime Plant	Combustion Analyzer	N		Y		Y				N		N						R		S		1	1
40	Saulkalne Lime Plant	Combustion Analyzer	N		Y		NC	r	Needs repair		N		N								N	Out of order	1	1
41	Saulkalne Lime Plant	Hand-Held Thermocouple Set	N		Y		Y				N		N						C		S		1	1
42	Saulkalne Lime Plant	Three-Phase Industrial Clamp-	N		Y		Y				N		N						O		S		1	1
43	Saulkalne Lime Plant	Infrared Pyrometer w/ Laser Si	N		Y		Y				N		N						C		S		1	1
44	Saulkalne Lime Plant	Fixed Infrared Pyrometers, wit	Y	n	NI		NIC				n		N						n		n		1	1

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
45	Latvia	Saulkalne Lime Plant	Strobe Tachometer	Ametek	3156FST + case	1	Transcat	$560	
46	Latvia	Saulkalne Lime Plant	Personal Computer, with Printer	IBM	386/SX + 24 Pin Printer	1	Baltic Information Techn	$2,800	
47	Latvia	Saulkalne Lime Plant	Spreadsheet Software Package	Lotus	Lotus 123 v2.4	1	Egghead Software	$330	
48	Latvia	Saulkalne Lime Plant	Set of Books			1		$558	
49	Latvia	Riga Technical University	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$437	
50	Latvia	Riga Technical University	Combustion Smoke Tester	Bacharach	True Spot Smoke Tester	1	Bacharach	$77	
51	Latvia	Riga Technical University	Combustion Analyzer	Bacharach	300NSX + accessories	1	Bacharach	$4,449	
52	Latvia	Riga Technical University	Ultrasonic Stethoscope	UE Systems	Ultraprobe 2000	1	UE Systems	$3,995	
53	Latvia	Riga Technical University	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$771	
54	Latvia	Riga Technical University	Digital Dissolved Solids Meter		L-01489-02 + accessories	2	Cole Palmer	$366	
55	Latvia	Riga Technical University	Three-Phase Industrial Clamp-On Multimeter	ITT	MI400 + accessories	1	Davis	$1,341	
56	Latvia	Riga Technical University	Electric Motor Checker	SPM Instruments	SB07101	1	Davis	$797	
57	Latvia	Riga Technical University	AC Power Monitor	Esterline Angus	PMIIIB/S23290A	1	Hildenbrand Company	$4,139	
58	Latvia	Riga Technical University	AC Power Recorder	Esterline Angus	Miniservo III + accessories	1	Hildenbrand Company	$9,738	
59	Latvia	Riga Technical University	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,450	
60	Latvia	Riga Technical University	Strobe Tachometer	Ametek	3156FST + case	1	Transcat	$560	
61	Latvia	Riga Technical University	Audit Equipment Carrying Cases	Halliburton	Model 129	2	47th Street Photo	$280	
62	Bulgaria	"Sodi" Soda Ash Plant	Ultrasonic Level Transmitter	Scott Instruments	LL1101-2011K20	1	Scott Instruments	$1,270	
63	Bulgaria	"Sodi" Soda Ash Plant	P.I.D. Controller	Scott Instruments	M002000-230002	1	Scott Instruments	$425	
64	Bulgaria	"Sodi" Soda Ash Plant	Variable Frequency Drive	Lenze	6920 E.O.	1	Advent Electric	$44,310	
65	Bulgaria	Kremlkovtzi Steel Co. - Cold Rolling Mill	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Energy Efficiency Syste	$5,916	
66	Bulgaria	Kremlkovtzi Steel Co. - Cold Rolling Mill	Mass Flowmeter	Dieterich Standard		1	Associated Steam Speci	$5,981	
67	Bulgaria	Kremlkovtzi Steel Co. - Cold Rolling Mill	Portable Gas Velocity Meter	Kurtz	4440M	1	Kurtz	$2,800	
68	Bulgaria	Kremlkovtzi Steel Co. - Cold Rolling Mill	Ultrasonic Stethoscope	UE Systems	Davis UE25101	1	Davis	$451	
69	Bulgaria	Chimco Company Fertilizer Works	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	2	Energy Efficiency Syste	$5,849	
70	Bulgaria	Chimco Company Fertilizer Works	Infrared Thermometer	Dickson	IR-550 DK45	2	Davis	$446	
71	Bulgaria	Chimco Company Fertilizer Works	Portable Thermocouple Kit		1370MX meter + accessories	1	Wahl	$1,942	
72	Bulgaria	Izida Ceramics	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Energy Efficiency Syste	$5,916	
73	Bulgaria	Izida Ceramics	Air Flow Meter	Foxboro		1	Eastern Controls	$5,343	
74	Bulgaria	Izida Ceramics	Pressure Reducing Station	Fisher	regulator S202 + gauge	1	C.B. Ives	$512	
75	Bulgaria	Izida Ceramics	Natural Gas Flow Indicator/ Pressure Reducer	Foxboro/Ashcroft		1	Herman Goldner Co.	$2,403	
76	Bulgaria	Izida Ceramics	Slurry Analyzer/Centrifuge	Fisher	MDL 228	1	Fisher	$582	
77	Bulgaria	Izida Ceramics	Steam Traps	Armstrong		10	Associated Steam Speci	$559	
78	Bulgaria	Izida Ceramics	Portable Thermocouple Kit		1370MX meter + accessories	1	Wahl	$1,942	
79	Bulgaria	Izida Ceramics	Portable Temperature Checker		model 222	1	Davis	$461	
80	Bulgaria	Combinat Serdika	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$437	
81	Bulgaria	Combinat Serdika	Oxygen Analyzer	Kane-May	model C5A + spare sensors	1	Davis	$476	
82	Bulgaria	Combinat Serdika	Set of Fluorescent Lighting	Genlyte/Universal	KLP fixtures + lamps	1	W.S. Jenks & Son	$8,197	
83	Bulgaria	Combinat Serdika	Ultrasonic Stethoscope	UE Systems	Davis UE45	1	Davis	$451	
84	Bulgaria	Combinat Serdika	Set of Steam Traps	Yarway		1	Yarway	$8,435	
85	Bulgaria	Combinat Serdika	Set of Pipe Fittings, Check valves, Gate Valves	Power Hydraulics		1	Power Hydraulics	$5,148	
86	Bulgaria	Combinat Serdika	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,870	
87	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$437	
88	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Oxygen Analyzers	Kane-May	model C5A + spare sensors	3	Davis	$476	

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
45	Saulkalne Lime Plant	Strobe Tachometer	N		Y		Y				N		N						R		P		1	1
46	Saulkalne Lime Plant	Personal Computer, with Print	N		Y		Y				R	I	N						C		S		1	1
47	Saulkalne Lime Plant	Spreadsheet Software Packag	n		y		y				n		N						N		n	Not used	1	1
48	Saulkalne Lime Plant	Set of Books																					0	0
49	Riga Technical University	Combustion Analyzer	n		Y		YA	s	O2 liquid		N		Y		Bacharach US &	P	y	1st OK, then	O	R	S		1	1
50	Riga Technical University	Combustion Smoke Tester	n		Y		Y				N		N						O	O	S		1	1
51	Riga Technical University	Combustion Analyzer	n		Y		YA	s	O2 sensor		N		Y		Bacharach US &	P	y	1st OK, then	O	O	E		1	1
52	Riga Technical University	Ultrasonic Stethoscope	n		Y		Y				N		N						R	R	S		1	1
53	Riga Technical University	Hand-Held Thermocouple Set	n		Y		Y				N		N						O	O	E		1	1
54	Riga Technical University	Digital Dissolved Solids Meter	n		Y		Y				N		N						O	O	S		1	1
55	Riga Technical University	Three-Phase Industrial Clamp-	n		Y		Y				N		N						R	N	S		1	1
56	Riga Technical University	Electric Motor Checker	n		Y		Y				N		N						R	N	S		1	1
57	Riga Technical University	AC Power Monitor	n		Y		Y				N		N						R	N	S		1	1
58	Riga Technical University	AC Power Recorder	n		Y		Y				N		N						R	N	S		1	1
59	Riga Technical University	Infrared Pyrometer w/ Laser Si	n		Y		Y				N		N						c	O	E		1	1
60	Riga Technical University	Strobe Tachometer	n		Y		Y				N		y		*Ametek*				R	N	S		1	1
61	Riga Technical University	Audit Equipment Carrying Cas	n		Y		Y				N		N						O	O	na	Only carrying case	1	1
62	"Sodi" Soda Ash Plant	Ultrasonic Level Transmitter	Y	O	N		NC	z			n		y		*Scott Instruments*				n		n		1	1
63	"Sodi" Soda Ash Plant	P.I.D. Controller	Y	O	Y		Y				N		N						C		S		1	1
64	"Sodi" Soda Ash Plant	Variable Frequency Drive	Y	O	Y		NC	r			r	R	Y		Lenze, Austria	R	N	Warranty clai	R		S		1	1
65	Kremlkovtzi Steel Co. - Cold	Combustion Analyzer																					1	0
66	Kremlkovtzi Steel Co. - Cold	Mass Flowmeter																					1	0
67	Kremlkovtzi Steel Co. - Cold	Portable Gas Velocity Meter																					1	0
68	Kremlkovtzi Steel Co. - Cold	Ultrasonic Stethoscope																					1	0
69	Chimco Company Fertilizer	Combustion Analyzer	N		Y		YA	s	SO2, O2, and CO senso		s	O	N						O		E		1	1
70	Chimco Company Fertilizer	Infrared Thermometer	N		N	Lack of	YA	m	Incorrect readings, by la		N		Y		Dickson/Davis	TI	N	No answer	R		N	Incorrect readings	1	1
71	Chimco Company Fertilizer	Portable Thermocouple Kit	N		Y		Y				C		N						O		E		1	1
72	Izida Ceramics	Combustion Analyzer	N		Y		YA	s	O2 sensor		N		N						O		E		1	1
73	Izida Ceramics	Air Flow Meter	N		Y		Y				N		N						R		S		1	1
74	Izida Ceramics	Pressure Reducing Station	y		y		y			N	C	O	N						C		e		1	1
75	Izida Ceramics	Natural Gas Flow Indicator/ Pr	y		Y		Y				N		N						R		S		1	1
76	Izida Ceramics	Slurry Analyzer/Centrifuge	N		n	Mis-spe	nc	m			N		N						R		S	Not exactly needed specification	1	1
77	Izida Ceramics	Steam Traps	Y	O	Y		Y			N	C	O	Y		Ecotech	P	Y		C		E		1	1
78	Izida Ceramics	Portable Thermocouple Kit	n		Y		Y			N	N		N						O		S		1	1
79	Izida Ceramics	Portable Temperature Checker	N		Y		Y			N	N		N						O		S		1	1
80	Combinat Serdika	Infrared Thermometer																					1	0
81	Combinat Serdika	Oxygen Analyzer																					1	0
82	Combinat Serdika	Set of Fluorescent Lighting																					1	0
83	Combinat Serdika	Ultrasonic Stethoscope																					1	0
84	Combinat Serdika	Set of Steam Traps																					1	0
85	Combinat Serdika	Set of Pipe Fittings, Check valv																					1	0
86	Combinat Serdika	AC Power Recorder																					1	0
87	"Pharmacia" Chemical and P	Infrared Thermometer	N		Y		Y			N	N		N						C		E		1	1
88	"Pharmacia" Chemical and P	Oxygen Analyzers	N		Y		Y			N	N		N						C		E		1	1

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
89	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Set of Fluorescent Lighting	Genlyte/Universal	KLP fixtures + lamps	1	W.S. Jenks & Son	$8,197	
90	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Ultrasonic Stethoscope	UE Systems	Davis UE45	1	Davis	$451	
91	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Set of Steam Traps	Yarway		1	Yarway	$8,434	
92	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Set of Pipe Fittings	Power Hydraulics		1	Power Hydraulics	$5,148	
93	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,870	
94	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Centrifuge	Fisher	MDL 228	1	Fisher	$582	
95	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Differential Pressure Gauge			1	Davis	$187	
96	Bulgaria	"Pharmacia" Chemical and Pharmaceutical	Portable Thermocouple Kit		1370MX meter + accessories	1	Wahl	$1,516	
97	Bulgaria	Poultry Complex	Infrared Thermometer	Dickson	IR-550 DK45	2	Davis	$437	
98	Bulgaria	Poultry Complex	Oxygen Analyzers	Kane-May	model C5A + spare sensors	3	Davis	$476	
99	Bulgaria	Poultry Complex	Set of Fluorescent Lighting	Genlyte/Universal	KLP fixtures + lamps	1	W.S. Jenks & Son	$27,486	
100	Bulgaria	Poultry Complex	Pressure Recorder		Davis DK116502 + accessories	1	Davis	$501	
101	Bulgaria	Poultry Complex	Ultrasonic Stethoscopes	UE Systems	Davis UE45	3	Davis	$451	
102	Bulgaria	Poultry Complex	Set of Steam Traps	Yarway		1	Yarway	$8,434	
103	Bulgaria	Poultry Complex	Set of Pipe Fittings	Power Hydraulics		1	Power Hydraulics	$5,148	
104	Bulgaria	Poultry Complex	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,870	
105	Bulgaria	Poultry Complex	Portable Humidity/Temperature Meter/Logger		Davis DHM200	1	Davis	$557	
106	Bulgaria	"Galatex Ltd." Cotton Processing Plant	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$437	
107	Bulgaria	"Galatex Ltd." Cotton Processing Plant	Oxygen Analyzer	Kane-May	model C5A + spare sensors	1	Davis	$476	
108	Bulgaria	"Galatex Ltd." Cotton Processing Plant	Set of Fluorescent Lighting	Genlyte/Universal	KLP fixtures + lamps	1	W.S. Jenks & Son	$14,250	
109	Bulgaria	"Galatex Ltd." Cotton Processing Plant	Pressure Recorder		Davis DK116502 + accessories	1	Davis	$501	
110	Bulgaria	"Galatex Ltd." Cotton Processing Plant	Ultrasonic Stethoscope	UE Systems	Davis UE45	1	Davis	$451	
111	Bulgaria	"Galatex Ltd." Cotton Processing Plant	Portable Humidity/Temperature Meter/Logger			1	Davis	$1,297	
112	Bulgaria	Ministry of Industry	Videotapes	Armstrong		7	Armstrong	$85	
113	Bulgaria	Ministry of Industry	Overhead Projector System, with transparancy set	Buhl	26061	1	Anders Williams	$1,200	
114	Bulgaria	Ministry of Industry	Projector Screens	Deluxe	27-557	3	Anders Williams	$130	
115	Bulgaria	Ministry of Industry	Differential Pressure Gauge			2	Davis	$187	
116	Bulgaria	Ministry of Industry	Portable Thermocouple Kit		1370MX meter + accessories	2	Wahl	$1,516	
117	Bulgaria	Ministry of Industry	Multimeter	Fluke		2	W.S. Jenks & Son	$282	
118	Bulgaria	Ministry of Industry	Personal Computer & Accessories	Packard Bell		3	P.C. Rent & Lease	$2,845	
119	Bulgaria	Ministry of Industry	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	6	Energy Efficiency Syste	$5,477	
120	Bulgaria	Ministry of Industry	Infrared Thermometer	Dickson	IR-550 DK45	3	Davis	$437	
121	Bulgaria	Ministry of Industry	Oxygen Analyzers	Kane-May	model C5A + spare sensors	2	Davis	$476	
122	Bulgaria	Ministry of Industry	Envest Software	Alliance to Save Energy		2	Alliance to Save Energy	$85	
123	Bulgaria	Ministry of Industry	Combustion Analyzer Replacement Pump	Energy Efficiency Syst	for Enerac 2000	1	Energy Efficiency Syste	$125	
124	Bulgaria	Ministry of Industry	Set of Books	Fairmont Press		1	Fairmont Press	$722	
125	Czech Rep	Pragolaktos Milk Plant	Heating Control System	Johnson Controls	including (1) Central Station CS-	1		$35,536	
126	Czech Rep	Prazke Pivovary Branik	Low Pressure Valves	Danfoss	1/2" straight valves, with integrat	85	Danfoss	$24	
127	Czech Rep	Prazke Pivovary Branik	Low Pressure Valves	Danfoss	3/4" straight valves, with integrat	5	Danfoss	$24	
128	Czech Rep	Prazke Pivovary Branik	Water Valves	Danfoss	1/2" straight valves, with integrat	43	Danfoss	$24	
129	Czech Rep	Prazke Pivovary Branik	Water Valves	Danfoss	3/4" straight valves, with integrat	2	Danfoss	$24	
130	Czech Rep	Prazke Pivovary Branik	Piping Insulation		mineral felt & iron sheets	180 m2	Montaz (CSFR)	$2,425	
131	Czech Rep	Prazke Pivovary Branik	Boiler Blowdown Heat Recovery System		Sentry XC46C	1	Boiler Supply Corporatio	$4,000	
132	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	1/2" straight valves, with integrat	20	Danfoss	$24	

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
89	"Pharmacia" Chemical and P	Set of Fluorescent Lighting	Y	O	Y		Y			N	R	O	N						C		S		1	1
90	"Pharmacia" Chemical and P	Ultrasonic Stethoscope	N		Y		Y			N	N		N						C		S		1	1
91	"Pharmacia" Chemical and P	Set of Steam Traps	Y	O	Y		Y			N	R	O	Y		Armstrong	TZ	Y		C		E		1	1
92	"Pharmacia" Chemical and P	Set of Pipe Fittings	Y	O	Y		Y			N	N		N						C		E		1	1
93	"Pharmacia" Chemical and P	AC Power Recorder																					1	0
94	"Pharmacia" Chemical and P	Centrifuge	Y	O	Y		Y			N	c		N						c		S		1	1
95	"Pharmacia" Chemical and P	Differential Pressure Gauge																					1	0
96	"Pharmacia" Chemical and P	Portable Thermocouple Kit																					1	0
97	Poultry Complex	Infrared Thermometer	N		Y		Y			N	N		N						O		E		1	1
98	Poultry Complex	Oxygen Analyzers	N		Y		Y			N	N		N						O		E		1	1
99	Poultry Complex	Set of Fluorescent Lighting	Y	O	Y		Y			N	N		N						C		E		1	1
100	Poultry Complex	Pressure Recorder	N		Y		Y			N	N		N						N		N		1	1
101	Poultry Complex	Ultrasonic Stethoscopes	N		Y		Y			N	N		N						O		E		1	1
102	Poultry Complex	Set of Steam Traps	Y		NI		NIC				n		N						N		N		1	1
103	Poultry Complex	Set of Pipe Fittings	Y	O	Y		Y			N	N		N						C		E		1	1
104	Poultry Complex	AC Power Recorder	Y	n	Y		Y	m	Installation not feasi		N		N						N		N		1	1
105	Poultry Complex	Portable Humidity/Temperature																					1	0
106	"Galatex Ltd." Cotton Process	Infrared Thermometer	N		Y		Y				C		N						O		S		1	1
107	"Galatex Ltd." Cotton Process	Oxygen Analyzer	N		Y		YA	s	O2 sensor	N	n		N						O		S		1	1
108	"Galatex Ltd." Cotton Process	Set of Fluorescent Lighting	Y	O	Y		Y				s		N						C		S		1	1
109	"Galatex Ltd." Cotton Process	Pressure Recorder	Y	O	Y		Y				N		N						R		S		1	1
110	"Galatex Ltd." Cotton Process	Ultrasonic Stethoscope	N		Y		Y				N		N						O		S		1	1
111	"Galatex Ltd." Cotton Process	Portable Humidity/Temperature	N		Y		Y			N	N		N						O		S		1	1
112	Ministry of Industry	Videotapes	n																				0	0
113	Ministry of Industry	Overhead Projector System, wi	n																				1	0
114	Ministry of Industry	Projector Screens	n																				1	0
115	Ministry of Industry	Differential Pressure Gauge	n		Y		Y			N	N		N						N	N	N	Not adapted to portable use	1	1
116	Ministry of Industry	Portable Thermocouple Kit	n		Y		Y			N	C		N						O	R	S		1	1
117	Ministry of Industry	Multimeter	n		Y		Y			N	N		N						R	N	S		1	1
118	Ministry of Industry	Personal Computer & Accesso	n																				1	0
119	Ministry of Industry	Combustion Analyzer	n		Y		YA	s	O2,CO,SO2,NOx se	C	C		N						O	R	S		1	1
120	Ministry of Industry	Infrared Thermometer	n		Y		Y			N	N		N						O	R	S		1	1
121	Ministry of Industry	Oxygen Analyzers	n		Y		Y			N	c		N						R	N	S		1	1
122	Ministry of Industry	Envest Software	n		Y		Y			N	N		N						R	N	S		1	1
123	Ministry of Industry	Combustion Analyzer Replace	n																				1	0
124	Ministry of Industry	Set of Books	n																				0	0
125	Pragolaktos Milk Plant	Heating Control System	Y	SO	Y		Y			N	N		N						C		E		1	1
126	Prazke Pivovary Branik	Low Pressure Valves	Y	O	Y		Y			O	RC	O	N						R		S		1	1
127	Prazke Pivovary Branik	Low Pressure Valves	Y	O	Y		Y			O	RC	O	N						R		S		1	1
128	Prazke Pivovary Branik	Water Valves	Y	O	Y		Y			O	C		N						R		S		1	1
129	Prazke Pivovary Branik	Water Valves	Y	O	Y		Y			O	C		N						R		S		1	1
130	Prazke Pivovary Branik	Piping Insulation	Y	ZO	Y		Y			N	N		N						C		S		1	1
131	Prazke Pivovary Branik	Boiler Blowdown Heat Recover	Y	O	Y		Y			O	R	O	N						R		S		1	1
132	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
133	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	3/4" straight valves, with integrat	13	Danfoss	$24	
134	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	1" straight valves, with integrated	22	Danfoss	$30	
135	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	1/2" straight valves, with remote	65	Danfoss	$43	
136	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	3/4" straight valves, with remote	45	Danfoss	$43	
137	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	1" straight valves, with remote se	5	Danfoss	$49	
138	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	3/4" angled valves, with remote s	24	Danfoss	$43	
139	Czech Rep	TOFA Albrechtice	Low Pressure Valves	Danfoss	1" angled valves, with remote se	4	Danfoss	$49	
140	Czech Rep	TOFA Albrechtice	Piping Insulation		mineral felt, Al sheets and wire n	250 m2	Izolace Ustf	$3,458	
141	Czech Rep	Mileta Plant X, Cerny Dul	Oil Burner		SMH 560	1	CDK Dukla	$5,250	
142	Czech Rep	Mileta Plant X, Cerny Dul	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	
143	Czech Rep	Mileta Plant X, Cerny Dul	Infrared Thermometer		DHS-26	1	Wahl	$2,187	
144	Czech Rep	Mileta Plant X, Cerny Dul	Manometer & Pitot Tubes		EDM 2500M	1	Davis	$1,713	
145	Czech Rep	Autobrzdy	High Pressure Water Valves with Controller		50 mm	4	Trerice	$843	
146	Czech Rep	Autobrzdy	Low Pressure Valves	Danfoss	3/8" straight valves, with integrat	49	Danfoss	$14	
147	Czech Rep	Autobrzdy	Low Pressure Valve	Danfoss	3/8" angled valves, with integrate	1	Danfoss	$43	
148	Czech Rep	Autobrzdy	Water Valves	Danfoss	3/4" straight valves, with integrat	2	Danfoss	$24	
149	Czech Rep	Autobrzdy	Insulation		on 490 valves and some piping	1	LISTAV	$4,068	
150	Czech Rep	INORGA ITS s.r.o.	Ultrasonic Thickness Gauge	Stressel	T-Mike II	2		*$400*	x
151	Czech Rep	INORGA ITS s.r.o.	Multimeters	Fluke	85	2		*$374*	x
152	Czech Rep	INORGA ITS s.r.o.	Clamp-On AC/DC Current Probes	AEMC	MD500	2		*$150*	x
153	Czech Rep	INORGA ITS s.r.o.	AC Power Monitor	Esterline Angus	PMIIIB, with three-phase kit	2		*$4,139*	x
154	Czech Rep	INORGA ITS s.r.o.	Fuels Changing Software	Energy Efficiency Syst	Enercomp 2000	2		*$100*	x
155	Czech Rep	INORGA ITS s.r.o.	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	2		*$5,261*	x
156	Czech Rep	INORGA ITS s.r.o.	Combustion Analyzer Calibration Kit	Energy Efficiency Syst	for Enerac 2000	2		*$1,590*	x
157	Czech Rep	INORGA ITS s.r.o.	Power Factor Meter	TIF	2300	2		*$289*	x
158	Czech Rep	INORGA ITS s.r.o.	Clamp-On Wattmeter	TIF	Wattprobe 2000A	2		*$400*	x
159	Czech Rep	INORGA ITS s.r.o.	Thermometer Kits, with Platinum Probes		81110-30 + probes	2	Cole Palmer	*$100*	x
160	Czech Rep	INORGA ITS s.r.o.	Ultrasonic Flowmeters	Controlotron	(2) flowmeters 194PGB3 + (2) t	2		*$2,000*	x
161	Czech Rep	INORGA ITS s.r.o.	Personal Computers (Laptop)	Epson	LT-286e E952OU, with printer a	2		*$3,000*	x
162	Czech Rep	INORGA ITS s.r.o.	Compact Tool Kit			2	Cole-Palmer	*$200*	x
163	Czech Rep	INORGA ITS s.r.o.	Infrared Thermometer		DHS-26	1	Wahl	*$2,187*	x
164	Czech Rep	INORGA ITS s.r.o.	Pressure Gauges	WIKA	400 psi stainless steel pressure	2		*$30*	x
165	Czech Rep	INORGA ITS s.r.o.	Pressure Gauges	WIKA	100 psi stainless steel pressure	2		*$30*	x
166	Czech Rep	INORGA ITS s.r.o.	Pressure Gauges	WIKA	1000 psi stainless steel pressure	2		*$30*	x
167	Czech Rep	INORGA ITS s.r.o.	Air Velocity & Temperature Meter		100-VT	1	Davis	*$750*	x
168	Czech Rep	INORGA ITS s.r.o.	Sling Psychrometer		L-03322-10	2	Cole-Palmer	*$100*	x
169	Czech Rep	INORGA ITS s.r.o.	Thermometers (-40/160 F)		08080-01	2		*$30*	x
170	Czech Rep	INORGA ITS s.r.o.	Pocket Thermometers (-45/50 C)	Taylor	21432-1	2		*$30*	x
171	Czech Rep	INORGA ITS s.r.o.	Pocket Thermometer (-15/105 C)	Taylor	21438-1	1		*$30*	x
172	Czech Rep	INORGA ITS s.r.o.	Printer (portable)	Canon	BJ	2		*$300*	x
173	Czech Rep	INORGA ITS s.r.o.	Pocket Computers	Sharp	Sharp 1600 - CE-161	2		*$100*	x
174	Czech Rep	SEVEn	Personal Computers (Desktop)	NEC		1		*$3,000*	x
175	Czech Rep	SEVEn	Personal Computers (Laptop)	Epson	286	2		*$3,000*	x
176	Czech Rep	SEVEn	Printer	Epson	LQ	1		*$300*	x

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
133	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1
134	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1
135	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1
136	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1
137	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1
138	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1
139	TOFA Albrechtice	Low Pressure Valves	y		Y		Y				C		N						C		S		1	1
140	TOFA Albrechtice	Piping Insulation	y		Y		Y				n		N						C		S		1	1
141	Mileta Plant X, Cerny Dul	Oil Burner																					1	0
142	Mileta Plant X, Cerny Dul	Combustion Analyzer																					1	0
143	Mileta Plant X, Cerny Dul	Infrared Thermometer																					1	0
144	Mileta Plant X, Cerny Dul	Manometer & Pitot Tubes																					1	0
145	Autobrzdy	High Pressure Water Valves wi	Y	O	Y		Y			N	N		N						C		E		1	1
146	Autobrzdy	Low Pressure Valves	Y	O	Y		Y			O	C		y		*Danfoss*				C		S		1	1
147	Autobrzdy	Low Pressure Valve	Y	O	Y		Y			O	C		y		*Danfoss*				C		S		1	1
148	Autobrzdy	Water Valves	Y	O	Y		Y			O	C		N						C		S		1	1
149	Autobrzdy	Insulation	Y	O	Y		Y			N	N		N						C		E		1	1
150	INORGA ITS s.r.o.	Ultrasonic Thickness Gauge																					1	0
151	INORGA ITS s.r.o.	Multimeters											N										1	0
152	INORGA ITS s.r.o.	Clamp-On AC/DC Current Pro																					1	0
153	INORGA ITS s.r.o.	AC Power Monitor																					1	0
154	INORGA ITS s.r.o.	Fuels Changing Software																					1	0
155	INORGA ITS s.r.o.	Combustion Analyzer																					1	0
156	INORGA ITS s.r.o.	Combustion Analyzer Calibrati																					1	0
157	INORGA ITS s.r.o.	Power Factor Meter																					1	0
158	INORGA ITS s.r.o.	Clamp-On Wattmeter																					1	0
159	INORGA ITS s.r.o.	Thermometer Kits, with Platinu																					1	0
160	INORGA ITS s.r.o.	Ultrasonic Flowmeters																					1	0
161	INORGA ITS s.r.o.	Personal Computers (Laptop)																					1	0
162	INORGA ITS s.r.o.	Compact Tool Kit											N										1	0
163	INORGA ITS s.r.o.	Infrared Thermometer																					1	0
164	INORGA ITS s.r.o.	Pressure Gauges																					1	0
165	INORGA ITS s.r.o.	Pressure Gauges																					1	0
166	INORGA ITS s.r.o.	Pressure Gauges											N										1	0
167	INORGA ITS s.r.o.	Air Velocity & Temperature Me																					1	0
168	INORGA ITS s.r.o.	Sling Psychrometer																					1	0
169	INORGA ITS s.r.o.	Thermometers (-40/160 F)																					1	0
170	INORGA ITS s.r.o.	Pocket Thermometers (-45/50																					1	0
171	INORGA ITS s.r.o.	Pocket Thermometer (-15/105																					1	0
172	INORGA ITS s.r.o.	Printer (portable)																					1	0
173	INORGA ITS s.r.o.	Pocket Computers																					1	0
174	SEVEn	Personal Computers (Desktop)																					0	0
175	SEVEn	Personal Computers (Laptop)																					0	0
176	SEVEn	Printer																					0	0

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
177	Czech Rep	SEVEn	External Modem	Epson		1		*$100*	x
178	Czech Rep	SEVEn	External Floppy Drive	Epson		1		*$200*	x
179	Czech Rep	SEVEn	Software: Wordperfect 5.1, PC Tools, Quattro Pro			1		*$300*	x
180	Czech Rep	SEVEn	Software: ENVEST, FASER			1		*$300*	x
181	Estonia	Baltic Ship Repairers Factory	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$557	
182	Estonia	Baltic Ship Repairers Factory	Combustion Smoke Tester	Bacharach	True Spot Smoke Tester	1	Bacharach	$77	
183	Estonia	Baltic Ship Repairers Factory	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$2,856	
184	Estonia	Baltic Ship Repairers Factory	Ultrasonic Stethoscope	UE Systems	Ultraprobe 2000	1	UE Systems	$4,000	
185	Estonia	Baltic Ship Repairers Factory	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$711	
186	Estonia	Baltic Ship Repairers Factory	Digital Dissolved Solids Meter		L-01489-02 + accessories	1	Cole Palmer	$393	
187	Estonia	Baltic Ship Repairers Factory	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
188	Estonia	Baltic Ship Repairers Factory	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,450	
189	Estonia	Baltic Ship Repairers Factory	Electric Infrared Space Heaters	Aitken Products	OH453+ accessories	50	Aitken Products	$199	
190	Estonia	Baltic Ship Repairers Factory	Personal Computer	Compaq	Deskpro 80386SX/16 w/ monitor	1	Advanced Computer Co	2085	
191	Estonia	Baltic Ship Repairers Factory	Printer	Epson	LQ-1070	1	AS Eltex	632	
192	Estonia	Baltic Ship Repairers Factory	Set of Books			1		$558	
193	Estonia	Tartu District Heating - Ropka Station	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$557	
194	Estonia	Tartu District Heating - Ropka Station	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$2,856	
195	Estonia	Tartu District Heating - Ropka Station	Ultrasonic Stethoscope	UE Systems	Ultraprobe 500C	1	UE Systems	$1,200	
196	Estonia	Tartu District Heating - Ropka Station	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$711	
197	Estonia	Tartu District Heating - Ropka Station	Digital Dissolved Solids Meter		L-01489-02 + accessories	2	Cole Palmer	$393	
198	Estonia	Tartu District Heating - Ropka Station	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
199	Estonia	Tartu District Heating - Ropka Station	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,450	
200	Estonia	Tartu District Heating - Ropka Station	Personal Computer	Compaq	Deskpro 80386SX/16 w/ monitor	1	Advanced Computer Co	2085	
201	Estonia	Tartu District Heating - Ropka Station	Printer	Epson	LQ-1070	1	AS Eltex	632	
202	Estonia	Tartu District Heating - Ropka Station	Set of Books			1		$558	
203	Estonia	Tartu District Heating - Ropka Station	Combustion Smoke Tester	Bacharach	True Spot Smoke Tester	1	Bacharach	$77	
204	Estonia	Tartu District Heating - Ropka Station	2" Thermal Energy Meter Package	Badger		2	Flow Media	3299	
205	Estonia	Tartu District Heating - Ropka Station	3" Thermal Energy Meter Package	Badger		2	Flow Media	2734	
206	Estonia	Pussi Puitlaastplaastide Kombinat	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$557	
207	Estonia	Pussi Puitlaastplaastide Kombinat	Combustion Smoke Tester	Bacharach	True Spot Smoke Tester	1	Bacharach	$77	
208	Estonia	Pussi Puitlaastplaastide Kombinat	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$2,856	
209	Estonia	Pussi Puitlaastplaastide Kombinat	Ultrasonic Stethoscope	UE Systems	Ultraprobe 2000	1	UE Systems	$1,200	
210	Estonia	Pussi Puitlaastplaastide Kombinat	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$711	
211	Estonia	Pussi Puitlaastplaastide Kombinat	Digital Dissolved Solids Meter		L-01489-02 + accessories	1	Cole Palmer	$393	
212	Estonia	Pussi Puitlaastplaastide Kombinat	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
213	Estonia	Pussi Puitlaastplaastide Kombinat	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,450	
214	Estonia	Pussi Puitlaastplaastide Kombinat	Strobe Tachometer	Ametek	3156FST + case	1	Transcat	$565	
215	Estonia	Eesti Fosforiit	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$557	
216	Estonia	Eesti Fosforiit	Combustion Smoke Tester	Bacharach	True Spot Smoke Tester	1	Bacharach	$77	
217	Estonia	Eesti Fosforiit	Combustion Analyzer	Bacharach	300 + accessories	1	Bacharach	$2,856	
218	Estonia	Eesti Fosforiit	Ultrasonic Stethoscope	UE Systems	Ultraprobe 2000	1	UE Systems	$4,000	
219	Estonia	Eesti Fosforiit	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$711	
220	Estonia	Eesti Fosforiit	Digital Dissolved Solids Meter		L-01489-02 + accessories	1	Cole Palmer	$393	

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
177	SEVEn	External Modem																					0	0
178	SEVEn	External Floppy Drive																					0	0
179	SEVEn	Software: Wordperfect 5.1, PC																					0	0
180	SEVEn	Software: ENVEST, FASER																					0	0
181	Baltic Ship Repairers Factory	Combustion Analyzer	N		Y		Y				N		N						R		S		1	1
182	Baltic Ship Repairers Factory	Combustion Smoke Tester																					1	0
183	Baltic Ship Repairers Factory	Combustion Analyzer	N		Y		Y				s		N						C		S		1	1
184	Baltic Ship Repairers Factory	Ultrasonic Stethoscope	N		N	Damag	Y			N	R	C: HB	N						R		S		1	1
185	Baltic Ship Repairers Factory	Hand-Held Thermocouple Set	N		Y		Y			N	N		N						O		E		1	1
186	Baltic Ship Repairers Factory	Digital Dissolved Solids Meter	N		Y		Y			N	N		N						R		S		1	1
187	Baltic Ship Repairers Factory	Three-Phase Industrial Clamp-	N		Y		Y			N	N		N						O		S		1	1
188	Baltic Ship Repairers Factory	Infrared Pyrometer w/ Laser Si	N		Y		y			N	N		N						C		E		1	1
189	Baltic Ship Repairers Factory	Electric Infrared Space Heater																					0	0
190	Baltic Ship Repairers Factory	Personal Computer																					0	0
191	Baltic Ship Repairers Factory	Printer																					0	0
192	Baltic Ship Repairers Factory	Set of Books																					0	0
193	Tartu District Heating - Ropk	Combustion Analyzer	N		Y		Y				s		N						O		S		1	1
194	Tartu District Heating - Ropk	Combustion Analyzer	N		Y		Y				s		y		*Bacharach*	P			O		E		1	1
195	Tartu District Heating - Ropk	Ultrasonic Stethoscope	N		Y		Y				N		N						R		S		1	1
196	Tartu District Heating - Ropk	Hand-Held Thermocouple Set	N		Y		Y				N		N						O		S		1	1
197	Tartu District Heating - Ropk	Digital Dissolved Solids Meter	N		Y		Y				N		N						R		S		1	1
198	Tartu District Heating - Ropk	Three-Phase Industrial Clamp-	N		Y		Y				N		N						O		E		1	1
199	Tartu District Heating - Ropk	Infrared Pyrometer w/ Laser Si	N		Y		Y				N		N						O		E		1	1
200	Tartu District Heating - Ropk	Personal Computer																					0	0
201	Tartu District Heating - Ropk	Printer																					0	0
202	Tartu District Heating - Ropk	Set of Books																					0	0
203	Tartu District Heating - Ropk	Combustion Smoke Tester																					0	0
204	Tartu District Heating - Ropk	2" Thermal Energy Meter Pack																					0	0
205	Tartu District Heating - Ropk	3" Thermal Energy Meter Pack																					0	0
206	Pussi Puitlaastplaastide Kom	Combustion Analyzer																					1	0
207	Pussi Puitlaastplaastide Kom	Combustion Smoke Tester	N		Y		Y			N	N		N						R		S		1	1
208	Pussi Puitlaastplaastide Kom	Combustion Analyzer	N		Y		YA	s	O2 sensor		N		N						O		E		1	1
209	Pussi Puitlaastplaastide Kom	Ultrasonic Stethoscope	N		Y		Y			N	N		N						C		E		1	1
210	Pussi Puitlaastplaastide Kom	Hand-Held Thermocouple Set	N		Y		Y			N	N		N						C		E		1	1
211	Pussi Puitlaastplaastide Kom	Digital Dissolved Solids Meter	N		Y		Y			N	N		N						O		E		1	1
212	Pussi Puitlaastplaastide Kom	Three-Phase Industrial Clamp-	N		Y		Y			N	N		N						C		E		1	1
213	Pussi Puitlaastplaastide Kom	Infrared Pyrometer w/ Laser Si	N		Y		Y			N	N		N						C		E		1	1
214	Pussi Puitlaastplaastide Kom	Strobe Tachometer	N		Y		Y			N	N		N						R		P	.	1	1
215	Eesti Fosforiit	Combustion Analyzer																					1	0
216	Eesti Fosforiit	Combustion Smoke Tester																					1	0
217	Eesti Fosforiit	Combustion Analyzer																					1	0
218	Eesti Fosforiit	Ultrasonic Stethoscope																					1	0
219	Eesti Fosforiit	Hand-Held Thermocouple Set																					1	0
220	Eesti Fosforiit	Digital Dissolved Solids Meter																					1	0

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
221	Estonia	Eesti Fosforiit	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,396	
222	Estonia	Eesti Fosforiit	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,450	
223	Estonia	Eesti Fosforiit	Personal Computer	Compaq	Deskpro 80386SX/16 w/ monitor	1	Advanced Computer Co	2085	
224	Estonia	Eesti Fosforiit	Printer	Epson	LQ-1070	1	AS Eltex	632	
225	Estonia	Eesti Fosforiit	Set of Books			1		$558	
226	Estonia	Eesti Fosforiit	Fixed Combustion Analyzer	Ametek	WDG-HPIIC + accessories	2	Flow-Tech	$8,515	
227	Estonia	Tallinn Technical University	Combustion Analyzer	Bacharach	Fyrite Duplex Kit + spare fluids a	1	Bacharach	$557	
228	Estonia	Tallinn Technical University	Combustion Smoke Tester	Bacharach	True Spot Smoke Tester	1	Bacharach	$77	
229	Estonia	Tallinn Technical University	Combustion Analyzer	Bacharach	300NSX + accessories	1	Bacharach	$4,390	
230	Estonia	Tallinn Technical University	Ultrasonic Stethoscope	UE Systems	Ultraprobe 2000	1	UE Systems	$4,000	
231	Estonia	Tallinn Technical University	Hand-Held Thermocouple Set		HH-22 + accessories	1	Omega	$711	
232	Estonia	Tallinn Technical University	Digital Dissolved Solids Meter		L-01489-02 + accessories	1	Cole Palmer	$393	
233	Estonia	Tallinn Technical University	Three-Phase Industrial Clamp-On Multimeter		MI400 + accessories	1	Davis	$1,434	
234	Estonia	Tallinn Technical University	Electric Motor Checker		EMC-11	1	Davis	$797	
235	Estonia	Tallinn Technical University	AC Power Monitor	Esterline Angus	PMIIIB/S23290A	1	Hildenbrand Company	$4,139	
236	Estonia	Tallinn Technical University	AC Power Recorder	Esterline Angus	Miniservo III + accessories	1	Hildenbrand Company	$11,690	
237	Estonia	Tallinn Technical University	Infrared Pyrometer w/ Laser Sighting		OS82-LS	1	Omega	$1,450	
238	Estonia	Tallinn Technical University	Strobe Tachometer	Ametek	3156FST + case	1	Transcat	$565	
239	Hungary	Magyarovari Timfold-es-Mukorundgyar	Steam Pressure Reducing Station	Jordan Valves		1	Cirkel-Kema	$10,753	
240	Hungary	Magyarovari Timfold-es-Mukorundgyar	Fixed Opacity Meter	Bailey Controls	Type Uc	1	Eastern Controls	$16,396	
241	Hungary	Magyarovari Timfold-es-Mukorundgyar	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Energy Efficiency Syste	$4,042	
242	Hungary	Fovarosi Tavfuto Muvek	Three-way Thermostatic Valves & Sensors	Danfoss	(650) valves #013G337-4, -5, -6	650	Danfoss	$24	
243	Hungary	Fovarosi Tavfuto Muvek	Evaporative Heat Allocation Meters			650	Brunata Holding	$7	
244	Hungary	Fovarosi Tavfuto Muvek	Cumulative Hot Water Meters			400	Multi-Monk KFT	$32	
245	Hungary	Buszesz Budafoki Elestzo es Szeszgyara	Steam Flow Meters	Taylor / Chessel Corp.	/ Kessler-Ellis Products Co.	4	Dynamation	$5,979	
246	Hungary	Buszesz Budafoki Elestzo es Szeszgyara	Personal Computer		80386 VGA + surge protector	1	Advanced Computer Co	$1,860	
247	Hungary	Buszesz Budafoki Elestzo es Szeszgyara	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Energy Efficiency Syste	$4,042	
248	Hungary	Buszesz Budafoki Elestzo es Szeszgyara	Combustion Analyzer	Bacharach	Fyrite II	1	H.M. Sweeney	$740	
249	Hungary	Csepel Muvek Femmu	Energy Management System Terminals for Micro V	Digital Equipment	(3) video terminals VT 340 + (3)	3	Duna Electronics	$18,669	
250	Hungary	Fovarosi Sutoipari Vallalat	AC Power Recorder	Esterline Angus	Miniservo III + accessories	1	Hildenbrand Company	$8,426	
251	Hungary	Fovarosi Sutoipari Vallalat	Three-Phase Industrial Clamp-On Multimeter		+accessories	1	Davis	$1,140	
252	Hungary	Fovarosi Sutoipari Vallalat	Ultrasonic Stethoscope	UE Systems	Ultraprobe 500	1	UE Systems	$1,380	
253	Hungary	Fovarosi Sutoipari Vallalat	Total Dissolved Solids Meter	Myron L.		1	Myron L.	$251	
254	Hungary	Budapesti Vegyimuvek	Steam Flow Meters & Recorders	Foxboro		4	Eastern Controls	$7,241	
255	Hungary	Budapesti Vegyimuvek	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Portable Electronic	$4,042	
256	Hungary	Budafoki Papirgyar	Inverted Bucket Steam Traps	Armstrong	3/4" to 1.25" + spare parts	115	Allan T. Shepperd	$184	
257	Hungary	Budafoki Papirgyar	Personal Computer		80386	1	Advanced Computer Co	$1,360	
258	Hungary	Budafoki Papirgyar	Ultrasonic Stethoscope	UE Systems	Ultraprobe 500	1	UE Systems	$1,380	
259	Hungary	Budafoki Papirgyar	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Energy Efficiency Syste	$4,042	
260	Hungary	Budafoki Papirgyar	Three-Phase Industrial Clamp-On Multimeter		+accessories	1	Davis	$1,199	
261	Hungary	Budafoki Papirgyar	Total Dissolved Solids Meter	Myron L.		1	Myron L.	$251	
262	Hungary	Oroshazi Uveggyar	Production Scheduling Optimization System	Honeywell	UDC-3000 System	1	Honeywell	$6,650	
263	Hungary	Oroshazi Uveggyar	Electro-Magnetic Interference Shielding Mats			2	Misco Supplies	$160	
264	Hungary	Oroshazi Uveggyar	Annubar Natural Gas Meters	Dietrich Standard		7	Eastern Controls	$3,082	

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
221	Eesti Fosforiit	Three-Phase Industrial Clamp-																					1	0
222	Eesti Fosforiit	Infrared Pyrometer w/ Laser Si																					1	0
223	Eesti Fosforiit	Personal Computer																					1	0
224	Eesti Fosforiit	Printer																					1	0
225	Eesti Fosforiit	Set of Books																					1	0
226	Eesti Fosforiit	Fixed Combustion Analyzer																					1	0
227	Tallinn Technical University	Combustion Analyzer	n		Y		Y	s	O2 liquid		C		Y		Bacharach	P	Y		C	O	E		1	1
228	Tallinn Technical University	Combustion Smoke Tester	n		Y		Y			N	N		Y		Bacharach	P	Y		C	O	E		1	1
229	Tallinn Technical University	Combustion Analyzer	n		Y		Y	s	O2 sensor		C		Y		Bacharach	P	Y		C	O	E		1	1
230	Tallinn Technical University	Ultrasonic Stethoscope	n		Y		Y			N	N		N						O	O	E		1	1
231	Tallinn Technical University	Hand-Held Thermocouple Set	n		Y		Y			N	C		N						C	O	E		1	1
232	Tallinn Technical University	Digital Dissolved Solids Meter	n		Y		y			N	C		N						C	R	E		1	1
233	Tallinn Technical University	Three-Phase Industrial Clamp-	y		N	Improp	Y				r	C	N										1	1
234	Tallinn Technical University	Electric Motor Checker	n		Y		Y			N	C		N						O	R	S		1	1
235	Tallinn Technical University	AC Power Monitor	n		Y		Y			N	C		N						O		S		1	1
236	Tallinn Technical University	AC Power Recorder	n		Y		Y			N	N		N						O		S		1	1
237	Tallinn Technical University	Infrared Pyrometer w/ Laser Si	n		Y		Y			N	N		N						C	O	E		1	1
238	Tallinn Technical University	Strobe Tachometer	n		Y		Y			N	N		N						C	O	S		1	1
239	Magyarovari Timfold-es-Muk	Steam Pressure Reducing Stat	Y	O	Y		Y			O	C	O	N						O		S		1	1
240	Magyarovari Timfold-es-Muk	Fixed Opacity Meter	Y	O	Y		Y			O	C	O	N						O		P	output cannot be used for direct	1	1
241	Magyarovari Timfold-es-Muk	Combustion Analyzer	Y	O	Y		Y			O	RC	O	Y		EES	T	Y		R		S		1	1
242	Fovarosi Tavfuto Muvek	Three-way Thermostatic Valve	Y	Z: lo	Y		Y				N		N						R		S		1	1
243	Fovarosi Tavfuto Muvek	Evaporative Heat Allocation Me	Y	Z: lo	Y		Y				N		N						N		s		1	1
244	Fovarosi Tavfuto Muvek	Cumulative Hot Water Meters	Y	Z: lo	Y		Y				N		N						R		S		1	1
245	Buszesz Budafoki Elestzo es	Steam Flow Meters	Y	ZO	Y		Y			N	Z: p	I	N						C		E		1	1
246	Buszesz Budafoki Elestzo es	Personal Computer	Y	O	Y		Y				N		N						C		S		1	1
247	Buszesz Budafoki Elestzo es	Combustion Analyzer	Y	O	Y		Y			N	N		N						O		E		1	1
248	Buszesz Budafoki Elestzo es	Combustion Analyzer	N		Y		y			N	n		N						N		N	Not used because Enerac is wor	1	1
249	Csepel Muvek Femmu	Energy Management System T	Y	Z: lo	Y		Y			N	N		N						C		E		1	1
250	Fovarosi Sutoipari Vallalat	AC Power Recorder																					1	0
251	Fovarosi Sutoipari Vallalat	Three-Phase Industrial Clamp-																					1	0
252	Fovarosi Sutoipari Vallalat	Ultrasonic Stethoscope																					1	0
253	Fovarosi Sutoipari Vallalat	Total Dissolved Solids Meter																					1	0
254	Budapesti Vegyimuvek	Steam Flow Meters & Recorde	Y	SO	Y		Y				PC		N	y	EGI	PT	Y		C		S		1	1
255	Budapesti Vegyimuvek	Combustion Analyzer	N		Y		Y	s	O2 sensor changed		P		N						O		S		1	1
256	Budafoki Papirgyar	Inverted Bucket Steam Traps	Y	O	Y		Y				R	O	N						C		S		1	1
257	Budafoki Papirgyar	Personal Computer	Y	O	Y		Y				R	M	N						C		E		1	1
258	Budafoki Papirgyar	Ultrasonic Stethoscope	N		Y		Y				N		N						O		E		1	1
259	Budafoki Papirgyar	Combustion Analyzer	N		Y		Y			O	P	I	N						O		E		1	1
260	Budafoki Papirgyar	Three-Phase Industrial Clamp-	N		Y		Y				N		N						O		S		1	1
261	Budafoki Papirgyar	Total Dissolved Solids Meter	N		Y		Y				N		N						O		S		1	1
262	Oroshazi Uveggyar	Production Scheduling Optimiz	Y	O	Y		Y			N	Z: C	O	y		*Honeywell*	PC	Y		C		S		1	1
263	Oroshazi Uveggyar	Electro-Magnetic Interference	N		Y		Y			N	Z: C	o	N						C		na	Does not produce savings by its!	1	1
264	Oroshazi Uveggyar	Annubar Natural Gas Meters	Y	O	Y		Y				C	I	y		*Dietrich / Eastern*	C	Y		C		S		1	1

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
265	Hungary	Oroshazi Uveggyar	Fixed Combustion Analyzer	Ametek	WDG-HPIIC + accessories	2	Flow-Tech	$16,360	
266	Hungary	Oroshazi Uveggyar	Temperature/Humidity Recorder			1	Omega	$545	
267	Hungary	EGI Contracting/Engineering	Thermocouple Set			1	Transcat	$474	
268	Hungary	EGI Contracting/Engineering	Strobe Tachometer	Ametek		1	Transcat	$495	
269	Hungary	EGI Contracting/Engineering	Ultrasonic Stethoscope	UE Systems		1	UE Systems	$1,386	
270	Hungary	EGI Contracting/Engineering	Audit Equipment Carrying Case	Halliburton	Model 129	1	47th Street Photo	$273	
271	Hungary	EGI Contracting/Engineering	AC Power Recorder	Esterline Angus	Miniservo III + accessories	1	Hildenbrand Company	$8,432	
272	Hungary	EGI Contracting/Engineering	Water Analysis Test Kit			1	Cole Palmer	$290	
273	Hungary	EGI Contracting/Engineering	Infrared Thermometer			1	Omega	$901	
274	Hungary	EGI Contracting/Engineering	Set of Miscellaneous Small Instruments			1	Mc Master-Carr / Transc	$179	
275	Hungary	EGI Contracting/Engineering	Total Dissolved Solids Meter	Myron L.		1	Myron L.	$249	
276	Hungary	EGI Contracting/Engineering	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Energy Efficiency Syste	$4,042	
277	Hungary	EGI Contracting/Engineering	Set of Safety Equipment			1	Mc Master-Carr	$575	
278	Hungary	EGI Contracting/Engineering	Three-Phase Industrial Clamp-On Multimeter	ITT	+accessories	1	Davis	$1,139	
279	Hungary	EGI Contracting/Engineering	Boiler Testing Kit	Bacharach	+accessories	1	H.M. Sweeney	$846	
280	Hungary	EGI Contracting/Engineering	AC Power Analyzer	Dranetz	Model 800 + accessories	1	Dranetz	$15,145	
281	Hungary	EGI Contracting/Engineering	Air Velocity Measuring Kit	Alnor		1	Transcat	$1,080	
282	Hungary	EGI Contracting/Engineering	Light Meter			1	Mc Master-Carr	$77	
283	Lithuania	Vilnius Furniture Plant	Baghouse - 10,900 cfm	Donaldson Company	100-PJD-10 Insert	2	Donaldson Company	$4,496	
284	Lithuania	Vilnius Furniture Plant	Strip Door Material Rolls	Randall Industries	12" x .12" x 150' rolls STDRIB12	11	Randall Industries	*$500*	x
285	Lithuania	Vilnius Furniture Plant	Strip Door Mounting Hardware	Randall Industries	SGU1	100 ft	Randall Industries	*$50*	x
286	Lithuania	Vilnius Furniture Plant	Steam Orifice Plate Flow Meters		Masstrol MFCBBL	2	Flow Inc.	$3,504	
287	Lithuania	Vilnius Sweets Plant "Pergale"	Boiler Combustion and Oxygen Trim Control Syste	Rosemount	SBC-6000	1	Combustion Systems of	*$6,000*	x
288	Lithuania	Vilnius Sweets Plant "Pergale"	Oxygen Analyzer Package	Rosemount	WC-3000	1	Combustion Systems of	*$6,000*	x
289	Lithuania	Vilnius Sweets Plant "Pergale"	Verilink Oxygen Trim Device	Rosemount	4510C60G25	1	Combustion Systems of	*$15,000*	x
290	Lithuania	Vilnius Sweets Plant "Pergale"	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	*$5,200*	x
291	Lithuania	Vilnius Sweets Plant "Pergale"	Steam Orifice Plate Flow Meter		Masstrol MFCBBL + recorder	1	Flow Inc.	*$3,504*	x
292	Lithuania	Vilnius Sweets Plant "Pergale"	Natural Gas Vortex Shedding Flow Meter	Emco	4" vortex meter, with Masstrol M	1	Flow, Inc.	*$3,765*	x
293	Lithuania	Alytus Wood Products Plant	Personal Computer (Notebook)	Everex	Tempo LX with Wordperfect 5.1	1	Computer Bay	*$3,000*	x
294	Lithuania	Alytus Wood Products Plant	Printer (portable)	Canon	BubbleJet 10EX	1	Computer Bay	*$300*	x
295	Lithuania	Alytus Wood Products Plant	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	*$5,200*	x
296	Lithuania	Alytus Wood Products Plant	Infrared Thermometer		DHS-26	1	Wahl	*$2,187*	x
297	Lithuania	Alytus Wood Products Plant	Infrared Thermometer		DHS-52C	1	Wahl	*$2,187*	x
298	Lithuania	Alytus Wood Products Plant	Baghouse - 10,900 cfm	Donaldson Company	100-PJD-10 Insert	1	Donaldson Company	$4,496	
299	Lithuania	Kaunas Ceramics Plant	Combustion Analyzer	Bacharach	300NSXEB + accessories	1	Bacharach	*$4,450*	x
300	Lithuania	Kaunas Ceramics Plant	Combustion Analyzer	Bacharach	Fyrite II	1	Bacharach	*$794*	x
301	Lithuania	Kaunas Ceramics Plant	Infrared Thermometer		DHS-26	1	Wahl	*$2,187*	x
302	Lithuania	Kaunas Ceramics Plant	Infrared Thermometer		DHS-52C	1	Wahl	*$2,400*	x
303	Lithuania	Kaunas Ceramics Plant	Steam Orifice Plate Flow Meters		Masstrol MFCBBL + recorder	5	Flow Inc.	*$3,504*	x
304	Lithuania	Kaunas Ceramics Plant	Steam Flow Control Valve System	Honeywell	4" cast steel body, w/ actuator co	3		*$2,000*	x
305	Lithuania	Kaunas Ceramics Plant	Power Factor Meter		TIF 2300	1	Grainger	*$289*	x
306	Lithuania	Kaunas Ceramics Plant	Clamp-On Wattmeter	TIF	Wattprobe 2000A	1	Grainger	*$400*	x
307	Lithuania	Lithuanian Power Board	AC Power Recorder	Dranetz	808A	1	Loren Green Associates	*$5,170*	x
308	Lithuania	Lithuanian Power Board	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	*$5,200*	x

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
265	Oroshazi Uveggyar	Fixed Combustion Analyzer	Y	O	Y		Y				RC	O	N						C		S		1	1
266	Oroshazi Uveggyar	Temperature/Humidity Record	N		Y		Y			N	s: c	O	N						C		S		1	1
267	EGI Contracting/Engineering	Thermocouple Set	n		Y		Y			N	N		N						O	R	S		1	1
268	EGI Contracting/Engineering	Strobe Tachometer	n		Y		Y			N	N		N						R	R	N	Inaccurate	1	1
269	EGI Contracting/Engineering	Ultrasonic Stethoscope	n		Y		Y			N	N		Y		UE systems	I: r	Y		O	O	E		1	1
270	EGI Contracting/Engineering	Audit Equipment Carrying Cas																					0	0
271	EGI Contracting/Engineering	AC Power Recorder	n		Y		Y				N		N						R	R	S	Drantez has more capabilities	1	1
272	EGI Contracting/Engineering	Water Analysis Test Kit	n		Y		y			N	N		N						R	R	S	US units have to be converted	1	1
273	EGI Contracting/Engineering	Infrared Thermometer	n		Y		Y			N	N		N						O	R	S		1	1
274	EGI Contracting/Engineering	Set of Miscellaneous Small Ins	n		Y		Y			N	N		N						O	O	na	Does not produce savings by itsl	1	1
275	EGI Contracting/Engineering	Total Dissolved Solids Meter	n		Y		Y			N	N		N						R	R	S		1	1
276	EGI Contracting/Engineering	Combustion Analyzer	n		Y		Y	r	Used a lot: had to b		RPs	C	Y		EES	P	Y		C	C	E		1	1
277	EGI Contracting/Engineering	Set of Safety Equipment																					0	0
278	EGI Contracting/Engineering	Three-Phase Industrial Clamp-	n		Y		Y				N		N						O	R	S		1	1
279	EGI Contracting/Engineering	Boiler Testing Kit	n		N	Damag	Y			N	RP	O	Y		Bacharach	T	Y		R	R	S	have more perf. equipment	1	1
280	EGI Contracting/Engineering	AC Power Analyzer	n		Y		Y				N		Y		Dranetz	T	Y		O	R	E		1	1
281	EGI Contracting/Engineering	Air Velocity Measuring Kit	n		N	Damag	Y			N	RP	C	N						R	R	S		1	1
282	EGI Contracting/Engineering	Light Meter	n		Y		y				N		N						R	R	S	US units have to be converted	1	1
283	Vilnius Furniture Plant	Baghouse - 10,900 cfm	Y	O	Y		Y			O	r	O	Y		Donaldson Comp	I	Y		C		S		1	1
284	Vilnius Furniture Plant	Strip Door Material Rolls	Y	O	Y		Y			N	R	O	N						C		E		1	1
285	Vilnius Furniture Plant	Strip Door Mounting Hardware	Y	O	Y		Y			N	R	O	N						C		E		1	1
286	Vilnius Furniture Plant	Steam Orifice Plate Flow Mete	Y	OS	N	Proble	Y			O	R	O	N	y	RMA				C		S		1	1
287	Vilnius Sweets Plant "Pergale	Boiler Combustion and Oxygen	Y	O	Y		Y			N	C		N						C		S		1	1
288	Vilnius Sweets Plant "Pergale	Oxygen Analyzer Package	Y	O	Y		Y			N	N		N						C		E		1	1
289	Vilnius Sweets Plant "Pergale	Verilink Oxygen Trim Device	Y	O	N	Proble	N	m	Existing damper sys	V	N		N						R		P	Damper has problems	1	1
290	Vilnius Sweets Plant "Pergale	Combustion Analyzer	N		Y		YA	s	O2 sensor		C		Y		EES	P	N	No answer	o		E		1	1
291	Vilnius Sweets Plant "Pergale	Steam Orifice Plate Flow Mete	Y	O	Y		Y			N	C		N						C		S		1	1
292	Vilnius Sweets Plant "Pergale	Natural Gas Vortex Shedding F	Y	Z: lo	N	Mis-spe	YA	r	1) Moisture in senso	V	PC		Y		EMCO	R	Y		C		P	Do not trust accuracy	1	1
293	Alytus Wood Products Plant	Personal Computer (Notebook)	N		Y		Y				N		N						C		S		1	1
294	Alytus Wood Products Plant	Printer (portable)	N		Y		Y				N		N						C		S		1	1
295	Alytus Wood Products Plant	Combustion Analyzer	N		Y		YA	s	O2 sensor	N	C		N						O		S		1	1
296	Alytus Wood Products Plant	Infrared Thermometer	N		Y		Y				C		N						C		E		1	1
297	Alytus Wood Products Plant	Infrared Thermometer	N		Y		Y				N		N						R		S		1	1
298	Alytus Wood Products Plant	Baghouse - 10,900 cfm	Y	O	Y		Y				N		Y		Donaldson Comp	P	-		C		E		1	1
299	Kaunas Ceramics Plant	Combustion Analyzer	N		Y		Y	s	O2 cell was replace		P	O	Y		Bacharach Denmark		Y		O		E		1	1
300	Kaunas Ceramics Plant	Combustion Analyzer	N		Y		Y				N		N						R		S		1	1
301	Kaunas Ceramics Plant	Infrared Thermometer	N		Y		Y				N		N						O		S		1	1
302	Kaunas Ceramics Plant	Infrared Thermometer	N		Y		Y				N		N						O		S		1	1
303	Kaunas Ceramics Plant	Steam Orifice Plate Flow Mete	Y	O	Y		Y				C		N						C		E	Would have wanted more inputs	1	1
304	Kaunas Ceramics Plant	Steam Flow Control Valve Syst	Y	O	Y		Y				C		N						C		E		1	1
305	Kaunas Ceramics Plant	Power Factor Meter	N		Y		Y				N		N						C		S		1	1
306	Kaunas Ceramics Plant	Clamp-On Wattmeter	N		Y		Y			N	N		N						O		S		1	1
307	Lithuanian Power Board	AC Power Recorder	n		Y		YA	P	Battery out of order:		N		N						O	O	S		1	1
308	Lithuanian Power Board	Combustion Analyzer	n		Y		NC	PS	need: flue gas filters	O	PC		N	y	HB	P	Y		c	C	E		1	1

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
309	Lithuania	Lithuanian Power Board	Infrared Thermometer		DHS-26	1	Wahl	*$2,187*	x
310	Lithuania	Lithuanian Power Board	Infrared Thermometer		DHS-52C	1	Wahl	*$2,400*	x
311	Lithuania	Lithuanian Power Board	Personal Computer (Notebook)	Epson	386/16 with Wordperfect 5.1 an	1	Computer Bay	*$3,000*	x
312	Lithuania	Lithuanian Power Board	Printer (portable)	Canon	BubbleJet 10E	1	Computer Bay	*$300*	x
313	Lithuania	Lithuanian Power Board	Hot Wire Anemometer	Kurz	KZ77405	1	Davis	*$500*	x
314	Lithuania	Lithuanian Power Board	Clamp-On Multimeter	Fluke	85	1	Davis	*$500*	x
315	Lithuania	Lithuanian Power Board	Combustion Analyzer	Bacharach	Fyrite II	1	Bacharach	*$794*	x
316	Lithuania	Lithuanian Power Board	Platinum RTD Thermometer		L-08110-30	2	Cole-Palmer	*$100*	x
317	Lithuania	Lithuanian Power Board	Sling Psychrometer		L-03322-10	2	Cole-Palmer	*$100*	x
318	Lithuania	Lithuanian Power Board	Thermometers (-10 to 100 C)		L-08080-10	2	Cole-Palmer	*$30*	x
319	Lithuania	Lithuanian Power Board	Pocket Thermometers (-15 to 105 C)		L-08119-36	2	Cole-Palmer	*$30*	x
320	Lithuania	Lithuanian Power Board	Pocket Thermometers (-40 to 50 C)		L-08119-38	2	Cole-Palmer	*$30*	x
321	Lithuania	Lithuanian Power Board	Compact Tool Kit		L-0990-50	2	Cole-Palmer	*$200*	x
322	Lithuania	Lithuanian Power Board	Power Factor Meter		TIF 2300	1	Grainger	*$289*	x
323	Lithuania	Lithuanian Power Board	Clamp-On Wattmeter	TIF	Wattprobe 2000A	1	Electric Motors Unlimite	*$400*	x
324	Lithuania	Lithuanian Power Board	Calculators	Sharp	EL-573	10	Wisconsin Office Supply	*$25*	x
325	Poland	Zaklady Azotowe "Kedzierzyn"	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
326	Poland	Zaklady Azotowe "Kedzierzyn"	Set of Steam Traps	Armstrong	3/4" model 1811 + 1" model 181	1	Associated Steam Speci	$2,619	
327	Poland	Zaklady Azotowe "Kedzierzyn"	In-Situ Oxygen Analyzer (8 probes)	Johnson-Yokogawa	averaging converter + Oxygen se	1	Johnson-Yokogawa	$25,484	
328	Poland	Zaklady Azotowe "Kedzierzyn"	Personal Computer, with Printer and Lotus 1-2-3	Asyst	Asyst-0120: 386-33MHz/2MB/1.	1	Fancy Electronics	$4,445	
329	Poland	Huta "Ostrowiec"	Infrared Thermometer	Dickson	IR-550 DK45	2	Davis	$427	
330	Poland	Huta "Ostrowiec"	Set of Steam Traps	Armstrong	3/4" model 1811 + 1" model 181	1	Associated Steam Speci	$1,009	
331	Poland	Huta "Ostrowiec"	In-Situ Oxygen Analyzer (1 probe)	Johnson-Yokogawa	averaging converter + Oxygen se	1	Johnson-Yokogawa	$25,484	
332	Poland	Huta "Ostrowiec"	Personal Computer, with Printer and Lotus 1-2-3	Asyst	Asyst-0120: 386-33MHz/2MB/1.	1	Fancy Electronics	$4,937	
333	Poland	Huta "Ostrowiec"	On-Line Load Optimization System			1	Ostrowiec Polytech Insti	$22,660	
334	Poland	Huta "Ostrowiec"	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Energy Efficiency Syste	$6,509	
335	Poland	Cementownia Wierzbica	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
336	Poland	Cementownia Wierzbica	In-Situ Oxygen Analyzer (4 probes)	Johnson-Yokogawa	averaging converter + Oxygen se	1	Johnson-Yokogawa	$12,184	
337	Poland	Cementownia Wierzbica	Personal Computer, with Printer and Lotus 1-2-3	Asyst	Asyst-0120: 386-33MHz/2MB/1.	1	Fancy Electronics	$4,445	
338	Poland	Zaklady Azotowe "Wloclawek"	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
339	Poland	Zaklady Azotowe "Wloclawek"	In-Situ Oxygen Analyzer (4 probes)	Johnson-Yokogawa	averaging converter + Oxygen se	1	Johnson-Yokogawa	$4,735	
340	Poland	Zaklady Azotowe "Wloclawek"	Set of Steam Traps	Armstrong	3/4" model 1811 + 1" model 181	1	Associated Steam Speci	$2,619	
341	Poland	Zaklady Azotowe "Wloclawek"	Dew Point Analyzer	Land Combustion	Model 410 + accessories	1	Land Combustion	$18,970	
342	Poland	Blachownia Steam Power Plant	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
343	Poland	Blachownia Steam Power Plant	In-Situ Oxygen Analyzer (4 probes)	Johnson-Yokogawa	averaging converter + Oxygen se	1	Johnson-Yokogawa	$8,435	
344	Poland	Blachownia Steam Power Plant	Set of Steam Traps	Armstrong	3/4" model 1811 + 1" model 181	1	Associated Steam Speci	$2,619	
345	Poland	Blachownia Steam Power Plant	Tube cleaning system	Conco Systems	pumps + nozzles + cleaner units	1	Conco Systems	$11,941	
346	Poland	Elektrocieplownia Krakow-Leg	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
347	Poland	Elektrocieplownia Krakow-Leg	In-Situ Oxygen Analyzer (8 probes)	Johnson-Yokogawa	averaging converter + Oxygen se	1	Johnson-Yokogawa	$27,161	
348	Poland	Elektrocieplownia Krakow-Leg	Set of Steam Traps	Armstrong	3/4" model 1811 + 1" model 181	1	Associated Steam Speci	$2,619	
349	Poland	Elektrocieplownia Krakow-Leg	Oxygen Analyzer	Kane-May	model C5A + spare sensors	1	Davis	$384	
350	Poland	Elektrocieplownia Krakow-Leg	Tube cleaning system	Conco Systems		1	Conco Systems	*$8,000*	x
351	Poland	Zespol Elektrocieplowni W Lodzi, No. 2	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
352	Poland	Zespol Elektrocieplowni W Lodzi, No. 2	In-Situ Oxygen Analyzers (1 probe)	Johnson-Yokogawa	averaging converter + Oxygen se	2	Johnson-Yokogawa	$9,553	

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
309	Lithuanian Power Board	Infrared Thermometer	n		Y		Y				C		N						O	O	E		1	1
310	Lithuanian Power Board	Infrared Thermometer	n		Y		Y			N	N		N						R	R	S		1	1
311	Lithuanian Power Board	Personal Computer (Notebook)	n		Y		Y			N	N		N						O	O	E		1	1
312	Lithuanian Power Board	Printer (portable)	n		Y		Y			N	P		N						O	O	E		1	1
313	Lithuanian Power Board	Hot Wire Anemometer	n		Y		Y			N	C		N						c	C	E		1	1
314	Lithuanian Power Board	Clamp-On Multimeter	n		Y		Y			N	N		N						O	O	E		1	1
315	Lithuanian Power Board	Combustion Analyzer	n		Y		YA	s	O2 sensor	O	PC		Y		Bacharach Denm	P	Y		R	R	S		1	1
316	Lithuanian Power Board	Platinum RTD Thermometer	n		Y		Y			N	N		N						R	R	P	Lack of trained operators	1	1
317	Lithuanian Power Board	Sling Psychrometer	n		Y		Y			N	N		N						R	R	S		1	1
318	Lithuanian Power Board	Thermometers (-10 to 100 C)																					0	0
319	Lithuanian Power Board	Pocket Thermometers (-15 to																					0	0
320	Lithuanian Power Board	Pocket Thermometers (-40 to																					0	0
321	Lithuanian Power Board	Compact Tool Kit																					0	0
322	Lithuanian Power Board	Power Factor Meter	n		Y		Y			N	C		N						O	O	S		1	1
323	Lithuanian Power Board	Clamp-On Wattmeter	n		Y		Y			N	C		N						O	O	S		1	1
324	Lithuanian Power Board	Calculators																					0	0
325	Zaklady Azotowe "Kedzierzyn	Infrared Thermometer	N		Y		Y				N		N						O		S		1	1
326	Zaklady Azotowe "Kedzierzyn	Set of Steam Traps	Y	O	Y		Y			N	n	O	N						C		E	Purchased over 200 other traps	1	1
327	Zaklady Azotowe "Kedzierzyn	In-Situ Oxygen Analyzer (8 pro	Y	O	Y		Y				RPC	O	Y		Yokogawa local r	P	Y		C		-		1	1
328	Zaklady Azotowe "Kedzierzyn	Personal Computer, with Print	N		Y		Y	s	Lack of ribbon cartri	N	N		N						O		S		1	1
329	Huta "Ostrowiec"	Infrared Thermometer	N		Y		Y			N	C		N						C		S		1	1
330	Huta "Ostrowiec"	Set of Steam Traps																					1	0
331	Huta "Ostrowiec"	In-Situ Oxygen Analyzer (1 pro	Y	O	N	Damag	YA	p	Zirconia cell damag	C	N		Y		Yokogawa Austria	P	N	Warranty clai	N		N		1	1
332	Huta "Ostrowiec"	Personal Computer, with Print	N		Y		Y				P		N						C		E		1	1
333	Huta "Ostrowiec"	On-Line Load Optimization Sys	Y		Y		Y				N		N						C		E		1	1
334	Huta "Ostrowiec"	Combustion Analyzer	Y	O	Y		Y			N	PC		y		*EES*	P	N	No answer	C		E		1	1
335	Cementownia Wierzbica	Infrared Thermometer	N		Y		Y			N	N		N						O		S		1	1
336	Cementownia Wierzbica	In-Situ Oxygen Analyzer (4 pro	Y	Z: E	Y		Y			N	C	O	N						C		S		1	1
337	Cementownia Wierzbica	Personal Computer, with Print	Y	O	Y		Y			N	N		N						O		S		1	1
338	Zaklady Azotowe "Wloclawek	Infrared Thermometer	N		Y		Y			N	N		N						O		S		1	1
339	Zaklady Azotowe "Wloclawek	In-Situ Oxygen Analyzer (4 pro	Y	O	Y		Y	s	Had broken the zirc	O	C	O	Y		Yokogawa Austria	P	Y		C		S		1	1
340	Zaklady Azotowe "Wloclawek	Set of Steam Traps	Y	O	N		NC	z		N	n		N						n		n		1	1
341	Zaklady Azotowe "Wloclawek	Dew Point Analyzer	Y	O	Y		Y			N	C		N						C		S		1	1
342	Blachownia Steam Power Pla	Infrared Thermometer																					*1*	0
343	Blachownia Steam Power Pla	In-Situ Oxygen Analyzer (4 pro																					*1*	0
344	Blachownia Steam Power Pla	Set of Steam Traps																					*1*	0
345	Blachownia Steam Power Pla	Tube cleaning system																					*1*	0
346	Elektrocieplownia Krakow-Le	Infrared Thermometer	N		Y		y			N	N		N						O		S		1	1
347	Elektrocieplownia Krakow-Le	In-Situ Oxygen Analyzer (8 pro	Y	O	Y		Y			N	PC:	O	N						c		S	lack of quick-response service	1	1
348	Elektrocieplownia Krakow-Le	Set of Steam Traps	Y	O	Y		Y			n	N		Y		Topol	Z:			O		S		1	1
349	Elektrocieplownia Krakow-Le	Oxygen Analyzer	N		Y		YA	s	O2 sensor / incorrec	V	N		N						R		P		1	1
350	Elektrocieplownia Krakow-Le	Tube cleaning system	N		Y		Y			N	N		N						O		E		1	1
351	Zespol Elektrocieplowni W Lo	Infrared Thermometer	N		Y		y			n	N		N						R		P	Limited application	1	1
352	Zespol Elektrocieplowni W Lo	In-Situ Oxygen Analyzers (1 pr	Y		Y	·	Y			n	C		N						C		S		1	1

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
353	Poland	Zespol Elektrocieplowni W Lodzi, No. 2	Set of Steam Traps	Armstrong	3/4" model 1811 + 1" model 181	1	Associated Steam Speci	$2,619	
354	Poland	Zespol Elektrocieplowni W Lodzi, No. 2	Personal Computer (Notebook)		386 SX-25MHz/80MB HD/4MB	1	Fancy Electronics	$2,000	
355	Poland	Wola Distric Heating Plant	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
356	Poland	Wola Distric Heating Plant	In-Situ Oxygen Analyzers (1 probe)	Johnson-Yokogawa	averaging converter + Oxygen se	2	Johnson-Yokogawa	$9,553	
357	Poland	Wola Distric Heating Plant	Set of Steam Traps	Armstrong	3/4" model 1811 + 1" model 181	1	Associated Steam Speci	$2,619	
358	Poland	Energopomiar	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
359	Poland	Energopomiar	Tube cleaning system	Conco Systems	including: (1) pump, (2) pressure	1	Conco Systems	$11,942	
360	Poland	Energopomiar	Combustion Analyzer Calibration Kit	Energy Efficiency Syst	for Enerac 2000	2	Energy Efficiency Syste	$1,590	
361	Poland	Energopomiar	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	2	Energy Efficiency Syste	$4,966	
362	Poland	Energopomiar	Clip-On Magnetic Thermometer	Fisher		1	Fisher	$186	
363	Poland	Energopomiar	Set of Thermometers/Tempilstiks	Fisher		1	Fisher	$165	
364	Poland	Polish Foundation for Energy Efficiency	Infrared Thermometer	Dickson	IR-550 DK45	1	Davis	$427	
365	Romania	SC Miorita SA	Natural Gas Vortex Flow Meter	Emco	4" vortex meter, with totalizers a	1	Flow, Inc.	$3,765	
366	Romania	SC Miorita SA	Saturated Steam Vortex Flow Meter	Emco	6" vortex meter, with totalizers a	1	Flow, Inc.	$5,051	
367	Romania	SC Miorita SA	Combustion Analyzer	Bacharach	Fyrite II	1	Bacharach	$794	
368	Romania	SC Miorita SA	Hand-Held Digital Thermocouple Set			1	Cole-Palmer	$542	
369	Romania	SC Combinatul Siderurgic SA	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	
370	Romania	SC Combinatul Siderurgic SA	Combustion Analyzer	Bacharach	Fyrite II	3	Bacharach	$794	
371	Romania	SC Combinatul Siderurgic SA	Infrared Thermometer		DHS-26	2	Wahl	$2,187	
372	Romania	SC Combinatul Siderurgic SA	Power Factor Meter		TIF-2300	1	Grainger	$289	
373	Romania	SC Combinatul Siderurgic SA	Ultrasonic Transit Time Flowmeter	Controlotron	Uniflow 990	1	Controlotron	$3,033	
374	Romania	SC Combinatul Siderurgic SA	Personal Computer (Laptop), with Printer	Epson	286	1	Computer Bay	$3,033	
375	Romania	SC Combinatul Siderurgic SA	Hand-Held Digital Thermometer, with Platinum RTD Probes			1	Cole-Palmer	$620	
376	Romania	SC Combinatul Siderurgic SA	Manometer & Pitot Tubes		EDM 2500M	1	Davis	$1,713	
377	Romania	SC Combinatul Siderurgic SA	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,170	
378	Romania	CET Bucharest SUD	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	
379	Romania	CET Bucharest SUD	Combustion Analyzer	Bacharach	Fyrite II	2	Bacharach	$794	
380	Romania	CET Bucharest SUD	Infrared Thermometer		DHS-26	1	Wahl	$2,187	
381	Romania	CET Bucharest SUD	Hand-Held Digital Thermometer, with Platinum RTD Probes			1	Cole-Palmer	$620	
382	Romania	CET Bucharest SUD	Ultrasonic Transit Time Flowmeters	Controlotron	Uniflow 990	2	Controlotron	$3,033	
383	Romania	CET Bucharest SUD	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,170	
384	Romania	CET Bucharest SUD	Personal Computer (Laptop) with printer	Epson	286	1	Computer Bay	$3,033	
385	Romania	SC Expur SA	Steam Vortex Flow Meter	Emco	4" vortex meter, with totalizers a	1	Flow, Inc.	$362	
386	Romania	SC Expur SA	Natural Gas Vortex Flow Meter	Emco	6" vortex meter, with totalizers a	1	Flow, Inc.	$5,194	
387	Romania	SC Expur SA	Water Vortex Flow Meter	Emco	8" vortex meter, with trasnmitters	1	Flow, Inc.	$3,290	
388	Romania	SC Expur SA	Combustion Analyzer	Bacharach	Fyrite II	1	Bacharach	$794	
389	Romania	SC Expur SA	Hand-Held Digital Thermometer, with Platinum RTD Probes			1	Cole-Palmer	$620	
390	Romania	SC Cimus SA	Fuel Oil Positive Displacement Flow Meter	Hersey		1	Flow, Inc.	$800	
391	Romania	SC Cimus SA	Saturated Steam Vortex Flow Meter	Emco	8" vortex meter, with totalizers a	1	Flow, Inc.	$5,660	
392	Romania	SC Cimus SA	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,260	
393	Romania	SC Cimus SA	Combustion Analyzer	Bacharach	Fyrite II	1	Bacharach	$794	
394	Romania	SC Cimus SA	Infrared Thermometer		DHS-52	1	Wahl	$2,352	
395	Romania	SC Cimus SA	Infrared Thermometer		DHS-26	1	Wahl	$2,187	
396	Romania	SC Cimus SA	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,170	

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
353	Zespol Elektrocieplowni W Lo	Set of Steam Traps	Y		N	Mis-spe	N	m	mis-specified		n		N						n		N	not used	1	1
354	Zespol Elektrocieplowni W Lo	Personal Computer (Notebook)																					1	0
355	Wola Distric Heating Plant	Infrared Thermometer	N		Y		Y			N	s: c	o	N						O		S		1	1
356	Wola Distric Heating Plant	In-Situ Oxygen Analyzers (1 pr	Y	O	Y		Y			N	C		N						C		S		1	1
357	Wola Distric Heating Plant	Set of Steam Traps	Y	O	Y		Y			N	N		N						C	.	S		1	1
358	Energopomiar	Infrared Thermometer	N		Y		Y			N	C		N						c	C	S		1	1
359	Energopomiar	Tube cleaning system	N		Y		Y			N	N		Y		Conco Rep.	P	Y		c	C	E		1	1
360	Energopomiar	Combustion Analyzer Calibrati	N		Y		NC	s	O2 sensors	N	N		N						N	N	S		1	1
361	Energopomiar	Combustion Analyzer	N		N	Improp	NC	r	Instable readings	V	C		Y		EES	P	N		N	N	S		1	1
362	Energopomiar	Clip-On Magnetic Thermomete	N		Y		Y			O	N		N						R	N	P	Poor accuracy	1	1
363	Energopomiar	Set of Thermometers/Tempilsti																					0	0
364	Polish Foundation for Energy	Infrared Thermometer																					0	0
365	SC Miorita SA	Natural Gas Vortex Flow Meter																					1	0
366	SC Miorita SA	Saturated Steam Vortex Flow																					1	0
367	SC Miorita SA	Combustion Analyzer																					1	0
368	SC Miorita SA	Hand-Held Digital Thermocoup																					1	0
369	SC Combinatul Siderurgic SA	Combustion Analyzer	N		Y		Y	p	Probe Damage	C	P		Y		EES	P	N	Delivered wro	O		S		1	1
370	SC Combinatul Siderurgic SA	Combustion Analyzer	N		y		y			C	N		N						R		P	Needs resetting	1	1
371	SC Combinatul Siderurgic SA	Infrared Thermometer	N		Y		Y			N	N		N						O		S		1	1
372	SC Combinatul Siderurgic SA	Power Factor Meter	N		Y		Y			N	N		N						O		S		1	1
373	SC Combinatul Siderurgic SA	Ultrasonic Transit Time Flowm	N		Y		Y			N	C		N						R		P	Doesn't operate on pilpes with d	1	1
374	SC Combinatul Siderurgic SA	Personal Computer (Laptop),	N		Y		Y				N		N						O		S		1	1
375	SC Combinatul Siderurgic SA	Hand-Held Digital Thermomete	N		Y		Y			N	C		N						O		S		1	1
376	SC Combinatul Siderurgic SA	Manometer & Pitot Tubes	N		Y		Y			N	C		N						O		S		1	1
377	SC Combinatul Siderurgic SA	AC Power Recorder	N		Y		Y				N		N						O		S		1	1
378	CET Bucharest SUD	Combustion Analyzer	n		Y		Y			N	P		y		*EES / Boiler Supp*	P	Y		O		E		1	1
379	CET Bucharest SUD	Combustion Analyzer	n		Y		Y			N	N		N						O		S		1	1
380	CET Bucharest SUD	Infrared Thermometer	n		Y		Y			N	N		N						O		S		1	1
381	CET Bucharest SUD	Hand-Held Digital Thermomete	n		Y		Y			N	N		N						O		S		1	1
382	CET Bucharest SUD	Ultrasonic Transit Time Flowm	n		Y	Doesn't	Y			N	N		N						O		S		1	1
383	CET Bucharest SUD	AC Power Recorder	n		Y		Y			N	N		N						O		S		1	1
384	CET Bucharest SUD	Personal Computer (Laptop) wi	n		Y		Y			N	N		N						O		S		1	1
385	SC Expur SA	Steam Vortex Flow Meter																					1	0
386	SC Expur SA	Natural Gas Vortex Flow Meter																					1	0
387	SC Expur SA	Water Vortex Flow Meter																					1	0
388	SC Expur SA	Combustion Analyzer																					1	0
389	SC Expur SA	Hand-Held Digital Thermomete																					1	0
390	SC Cimus SA	Fuel Oil Positive Displacement	Y	S	Y		Y				N		N	y	RMA	Z:	Y		C		S		1	1
391	SC Cimus SA	Saturated Steam Vortex Flow	ed																				1	0
392	SC Cimus SA	Combustion Analyzer	N		Y		YA	r	Misc. problems	O	P		Y		Intermark	P	Y		C		S		1	1
393	SC Cimus SA	Combustion Analyzer	N		Y		Y	s	O2 sensor	O	s		Y		Bacharach	P	Y		O		S		1	1
394	SC Cimus SA	Infrared Thermometer	N		Y		Y			N	N		N						O		S		1	1
395	SC Cimus SA	Infrared Thermometer	N		Y		Y			N	N		N						C		S		1	1
396	SC Cimus SA	AC Power Recorder	n	O	Y		Y			N	N		N						O		S		1	1

Line	Country	Organization name	Equipment type	Manufacturer	Model	Quantity	Vendor	Unit cost	Est. price
397	Romania	SC Cimus SA	Personal Computer (Laptop) with printer	Epson	386	1	Computer Bay	$3,033	
398	Romania	SC Doljchim SA	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	
399	Romania	SC Doljchim SA	Infrared Thermometer		DHS-26	1	Wahl	$2,187	
400	Romania	SC Doljchim SA	Hand-Held Digital Thermometer, with Platinum RTD Probes			1	Cole-Palmer	$620	
401	Romania	SC Doljchim SA	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,170	
402	Romania	SC Doljchim SA	Personal Computer (Laptop) with printer		286	1	Computer Bay	$3,033	
403	Romania	SC Doljchim SA	Natural Gas Orifice Plate Flow Meter		12" orifice plate meter, with trans	1	Flow Inc.	$2,149	
404	Romania	SC Doljchim SA	Steam Flanged Nozzle Flow Meter		12" flanged nozzle meter, with tr	1	Flow Inc.	$4,767	
405	Romania	SC Doljchim SA	Fuel Oil Helix Flow Meter	Emco	helix flow meter, with totalizer	1	Flow, Inc.	$5,035	
406	Romania	SC Doljchim SA	Multimeter	Fluke	85 + clamp-on accessory up to 4	1	Davis	$374	
407	Romania	SC Griro SA	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,260	
408	Romania	SC Griro SA	Combustion Analyzer	Bacharach	Fyrite II	1	Bacharach	$794	
409	Romania	SC Griro SA	Natural Gas Vortex Flow Meters	Emco	8" vortex meter, with totalizers a	2	Flow, Inc.	$5,803	
410	Romania	SC Griro SA	Infrared Thermometer		DHS-52	1	Wahl	$2,352	
411	Romania	SC Griro SA	Infrared Thermometer		DHS-26	1	Wahl	$2,187	
412	Romania	SC Griro SA	Hand-Held Digital Thermometer, with Platinum RTD Probes			1	Cole-Palmer	$620	
413	Romania	SC Griro SA	Ultrasonic Transit Time Flowmeter	Controlotron	Uniflow 990	1	Controlotron	$7,680	
414	Romania	SC Griro SA	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,170	
415	Romania	SC Celhart Donaris SA	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	
416	Romania	SC Celhart Donaris SA	In-situ Oxygen Sensor & Transmitter	Ametek		1	Ametek	$3,900	
417	Romania	SC Celhart Donaris SA	Infrared Thermometer		DHS-26	1	Wahl	$2,187	
418	Romania	SC Celhart Donaris SA	Hand-Held Digital Thermometer, with Platinum RTD Probes			1	Cole-Palmer	$620	
419	Romania	SC Celhart Donaris SA	Compensating Steam Flow Processor			1	Flow Inc.	$1,503	
420	Romania	SC Celhart Donaris SA	AC Power Recorder	Dranetz	808A	1	Dranetz	$5,170	
421	Romania	SC Celhart Donaris SA	High Power Current and Potential Transformers		for Dranetz 808A	3	Pearson	$1,100	
422	Romania	SC Celhart Donaris SA	Ultrasonic Transit Time Flowmeter	Controlotron	Uniflow 990	1	Controlotron	$7,680	
423	Romania	SC Celhart Donaris SA	Personal Computer (Laptop) with printer	Epson	286	1	Computer Bay	$3,033	
424	Romania	ARCE	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	2	Energy Efficiency Syste	*$5,261*	x
425	Romania	ARCE	Ultrasonic Flowmeter	Controlotron		1		*$7,700*	
426	Romania	ARCE	Personal Computer		386 SX	1		*$3,000*	x
427	Romania	ARCE	Infrared Thermometer		DHS-	1	Wahl	*$2,187*	x
428	Slovakia	Mostaren Brezno	High Pressure Water Valves		25 mm	27	Trerice	$515	
429	Slovakia	Mostaren Brezno	High Pressure Water Valve		32 mm	1	Trerice	$730	
430	Slovakia	Mostaren Brezno	High Pressure Water Valves		40 mm	63	Trerice	$504	
431	Slovakia	Mostaren Brezno	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	
432	Slovakia	Biotika Pharmaceutical	Energy Management System	Johnson Controls	(1) central station CS9100 + (2)	1		$22,107	
433	Slovakia	Biotika Pharmaceutical	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	
434	Slovakia	Biotika Pharmaceutical	Portable Ultrasonic Flowmeter	Controlotron	Uniflow 990	1	Williams Control Equip	$7,700	
435	Slovakia	Biotika Pharmaceutical	Infrared Thermometer		DHS-26	2	Wahl	$2,187	
436	Slovakia	Matador	Steam Traps			32	Sarco	$981	
437	Slovakia	Matador	Annubar Flowmeter with Flow Computer	Dietrich Standard		1	Dietrich Standard	$3,836	
438	Slovakia	Matador	Infrared Thermometer		DHS-26	1	Wahl	$2,187	
439	Slovakia	Matador	Hand-Held Ultrasonic Sensor		SC-16	1	Davis	$1,599	
440	Slovakia	Matador	Combustion Analyzer	Energy Efficiency Syst	Enerac 2000 + accessories	1	Boiler Supply Corporatio	$5,261	

110

Line	Organization name	Equipment type	Required installation?	Installation by:	Initially OK?	If not, why not?	Now OK?	If not, why not?	Problems:	Frequency of problems:	Maintenance done?	Maintenance by:	Contacted manufacturer?	Contacted consultant ?	Contact name:	Objective of contact:	Satisfactory response?	If not, why not?	Frequency of use:	Frequency of use by others:	Energy efficiency results:	If poor results, why?	Survey sent	Survey received
			1A	1B	2A	2B	3A	3B	3C	3D	4A	4B	5A	5A1	5B	5C	5D	5E	6	6A	7A	7B		
397	SC Cimus SA	Personal Computer (Laptop) wi	n	O	Y		Y			N	N		N						O		S		1	1
398	SC Doljchim SA	Combustion Analyzer	n	O	Y		YA	s	O2 sensor	O	N		y		*EES*				C		E		1	1
399	SC Doljchim SA	Infrared Thermometer	N		Y		Y			N	N		Y		Wahl International	I:	Y		O		S		1	1
400	SC Doljchim SA	Hand-Held Digital Thermomete	n	O	Y		Y				N		N						C		S		1	1
401	SC Doljchim SA	AC Power Recorder	N		Y		Y			N	N		Y		Dranetz	T	N	No answer	O		S	Caracteristics not top of the line	1	1
402	SC Doljchim SA	Personal Computer (Laptop) wi	N		Y		Y	p	battery capacity dec	N	P	O	Y		Epson America	I: t	Y		O		E		1	1
403	SC Doljchim SA	Natural Gas Orifice Plate Flow	Y	O	Y		Y				N		N						C		S		1	1
404	SC Doljchim SA	Steam Flanged Nozzle Flow M	Y	O	Y		Y				N		N						C		S		1	1
405	SC Doljchim SA	Fuel Oil Helix Flow Meter	Y	O	Y		Y				N		N						R		S		1	1
406	SC Doljchim SA	Multimeter	N		Y		Y	m	"incorrect in electric	O	N		Y		Fluke	I:c	Y		O		N	Equipment not adapted to applic	1	1
407	SC Griro SA	Combustion Analyzer	N		Y		YA	r	printer was not work	O	P		N	y	Mihai Maracinea	P	Y		O		E		1	1
408	SC Griro SA	Combustion Analyzer	N		Y		YA	s	O2 sensor	N	P		N	y	Mihai Maracinea	P	Y		O		P	Calibration is very difficult	1	1
409	SC Griro SA	Natural Gas Vortex Flow Meter	Y	O	n	Damag	Y	p	Part now replaced		N		N	y	Mihai Maracinea	R	Y		C		E		1	1
410	SC Griro SA	Infrared Thermometer	N		Y		Y			N	N		N	y	Mihai Maracinea	P	Y		O		E		1	1
411	SC Griro SA	Infrared Thermometer	N		Y		Y			N	N		N	y	Mihai Maracinea	C	Y		O		S		1	1
412	SC Griro SA	Hand-Held Digital Thermomete	N		Y		Y			N	N		N	y	Mihai Maracinea	C	Y		R		S		1	1
413	SC Griro SA	Ultrasonic Transit Time Flowm	N		Y		Y			N	N		N	y	Mihai Maracinea	T	Y		O		S	not many applications	1	1
414	SC Griro SA	AC Power Recorder	N		Y		Y			N	N		N	y	Mihai Maracinea	C	Y		R		S		1	1
415	SC Celhart Donaris SA	Combustion Analyzer	n		Y		N	r			N		Y		EES	R	N	No answer	O		E		1	1
416	SC Celhart Donaris SA	In-situ Oxygen Sensor & Trans																					1	0
417	SC Celhart Donaris SA	Infrared Thermometer																					1	0
418	SC Celhart Donaris SA	Hand-Held Digital Thermomete																					1	0
419	SC Celhart Donaris SA	Compensating Steam Flow Pro																					1	0
420	SC Celhart Donaris SA	AC Power Recorder																					1	0
421	SC Celhart Donaris SA	High Power Current and Poten																					1	0
422	SC Celhart Donaris SA	Ultrasonic Transit Time Flowm																					1	0
423	SC Celhart Donaris SA	Personal Computer (Laptop) wi	n		Y		Y			N	N		Y		Epson	T	Y		C		E		1	1
424	ARCE	Combustion Analyzer	n		Y		Y				RC	C: RMA	N	y	RMA	R	Y		O	-	S		1	1
425	ARCE	Ultrasonic Flowmeter	n		N		Y				RC	C: HB	Y		HB	R	Y		O	-	S		1	1
426	ARCE	Personal Computer	n		Y		Y			N	N		N						C	-	E		1	1
427	ARCE	Infrared Thermometer	n		Y		Y			N	C		N						O	N	E		1	1
428	Mostaren Brezno	High Pressure Water Valves	Y	O	Y		Y			N	R	O	N						C		P	System is OK, but not building in	1	1
429	Mostaren Brezno	High Pressure Water Valve	Y	O	Y		Y			N	R	O	N						C		P	System is OK, but not building in	1	1
430	Mostaren Brezno	High Pressure Water Valves	Y	O	Y		Y			N	R	O	N						C		P	System is OK, but not building in	1	1
431	Mostaren Brezno	Combustion Analyzer	N		Y		YA	s	O2 sensors + calibr	C	C		Y		Codea	C	Y		O		S		1	1
432	Biotika Pharmaceutical	Energy Management System	Y	MO	Y		Y			O	P	m	Y		Energocontrols, S	PT	Y		C		S		1	1
433	Biotika Pharmaceutical	Combustion Analyzer	N		Y		Y	s	fuel programming, s		RP	MC: R	Y		EES + Fusitronic,	PT	Y		C		E		1	1
434	Biotika Pharmaceutical	Portable Ultrasonic Flowmeter	N		Y		YA	r	display of hand con	C	N		Y		Schinzel Austria +	R	N	Coordination	roblem		S		1	1
435	Biotika Pharmaceutical	Infrared Thermometer	N		Y		Y			N	N		N						C		E		1	1
436	Matador	Steam Traps																					1	0
437	Matador	Annubar Flowmeter with Flow																					1	0
438	Matador	Infrared Thermometer																					1	0
439	Matador	Hand-Held Ultrasonic Sensor																					1	0
440	Matador	Combustion Analyzer																					1	0

APPENDIX B

SUMMARY OF EQUIPMENT LISTED AS INITIALLY NOT WORKING OR NOT INSTALLED

Summary of equipment listed as initially not working or not installed

Country	Organization name	Equipment type	Manufacturer	Initially OK?	Reason	Current Status	Action	Satisfactory direct support from manufacturer
Bulgaria	Chimco Company Fertilizer Works	Infrared Thermometer	Davis	N	Lack of complete instructions	YA	Manual sent by HB	No
Bulgaria	Poultry Complex	Set of Steam Traps	Yarway	N I		NIC		
Bulgaria	"Sodi" Soda Ash Plant	Ultrasonic Level Transmitter	Scott Instruments	N		NC		
Estonia	Baltic Ship Repairers Factory	Ultrasonic Stethoscope	UE Systems	N	Damaged on arrival	Y	Initial follow-up by HB	
Estonia	Tallinn Technical University	Clamp-On Multimeter	Davis	N	Improper calibration	Y	Initial follow-up by HB	
Hungary	EGI Contracting/Engineering	Air Velocity Measuring Kit	Alnor	N	Damaged on arrival	Y	Initial follow-up by HB	
Hungary	EGI Contracting/Engineering	Boiler Testing Kit	Bacharach	N	Damaged on arrival	Y	Through manufacturer	Yes
Latvia	Jelgava District Heating Enterprise	Steam Flow Meters	Flow Media	N I		NIC		
Latvia	Saulkalne Lime Plant	Fixed Infrared Pyrometers	Omega	N I		NIC		
Latvia	Slokas Celulozes un Papira Fabrika	Fixed Combustion Analyzer	Ametek	N I	Lack of connective cable	NIC		
Lithuania	Vilnius Furniture Plant	Steam Orifice Plate Flow Meters		N	Problem with plant power	Y	Initial follow-up by RMA	
Lithuania	Vilnius Sweets Plant "Pergale"	Natural Gas Flow Meter	Emco	N	Mis-specified: oversized	YA	New model bought by HB	Yes
Lithuania	Vilnius Sweets Plant "Pergale"	Verilink Oxygen Trim Device	Rosemount	N	Problem with plant damper	N	Plant will be able to correct	
Poland	Energopomiar	Combustion Analyzer	Energy Eff. Systems	N	Improper calibration	NC		No
Poland	Huta "Ostrowiec"	In-Situ Oxygen Analyzer	Johnson-Yokogawa	N	Damaged on arrival: oxygen probe	YA	New probe bought by HB	No
Poland	Zaklady Azotowe "Wloclawek"	Set of Steam Traps	Armstrong	N		NC		
Poland	Zespol Elektrocieplowni W Lodzi, No.	Set of Steam Traps	Armstrong	N	Mis-specified	NC		
Romania	ARCE	Ultrasonic Flowmeter	Controlotron	N		Y	Follow-up by HB	
Romania	SC Griro SA	Natural Gas Vortex Flow Meters	Emco	N	Damaged on arrival: one component	Y	Follow-up by Mr. Maracineanu	

N Not working
N I Not installed

Y working
YA working, after follow-up program
NIC Not installed despite attempts at contact
NC Not working, despite attempts at contact

APPENDIX C

SUMMARY OF EQUIPMENT REPAIRED THROUGH THE FOLLOW-UP PROGRAM

Summary of equipment repaired through follow-up program

Country	Organization name	Equipment type	Manufacturer	Problem	
Bulgaria	Chimco Company Fertilizer Work	Combustion Analyzer	Energy Eff. Systems	s	SO2, O2, and CO sensors
Bulgaria	Chimco Company Fertilizer Work	Infrared Thermometer	Davis	m	Incorrect readings, by lack of complete instructions
Bulgaria	Izida Ceramics	Combustion Analyzer	Energy Eff. Systems	s	O2 sensor
Bulgaria	Ministry of Industry	Combustion Analyzer	Energy Eff. Systems	s	O2,CO,SO2,NOx sensors and battery
Bulgaria	"Galatex Ltd." Cotton	Oxygen Analyzer	Davis	s	O2 sensor
Czech Re	Inorga	Ultrasonic Flowmeter	Controlotron	s	Coupling compound
Estonia	Pussi Puitlaastplaastide	Combustion Analyzer	Bacharach	s	O2 sensor
Latvia	Riga Technical University	Combustion Analyzer	Bacharach	s	O2 liquid
Latvia	Riga Technical University	Combustion Analyzer	Bacharach	s	O2 sensor
Lithuania	Alytus Wood Products Plant	Combustion Analyzer	Energy Eff. Systems	s	O2 sensor
Lithuania	Lithuanian Power Board	AC Power Recorder	Dranetz	P	Battery out of order: impossible to transfer data to PC
Lithuania	Lithuanian Power Board	Combustion Analyzer	Bacharach	s	O2 sensor
Lithuania	Vilnius Sweets Plant "Pergale"	Combustion Analyzer	Energy Eff. Systems	s	O2, CO, NOx, SO2 sensors and filters
Lithuania	Vilnius Sweets Plant "Pergale"	Natural Gas Flow Meter	Emco	r	1) Moisture in sensor casing; 2) Oversized
Poland	Elektrocieplownia Krakow-Leg	Oxygen Analyzer	Davis	s	O2 sensor / incorrect readings
Poland	Huta "Ostrowiec"	In-Situ Oxygen Analyzer	Johnson-Yokogawa	p	Zirconia cell damaged
Romania	SC Cimus SA	Combustion Analyzer	Energy Eff. Systems	r	Misc. problems
Romania	SC Doljchim SA	Combustion Analyzer	Energy Eff. Systems	s	O2 sensor
Romania	SC Doljchim SA	Laptop computer	Epson	P	Rechargeable battery out of order
Romania	SC Griro SA	Combustion Analyzer	Bacharach	s	O2 sensor
Romania	SC Griro SA	Combustion Analyzer	Energy Eff. Systems	r	The printer was not working. Now OK
Slovakia	Biotika Pharmaceutical	Portable Ultrasonic Flowmeter	Controlotron	r	display of hand console
Slovakia	Mostaren Brezno	Combustion Analyzer	Energy Eff. Systems	s	O2 sensors + calibration

M Mis-specified / not adapted to plant
P Lack of parts
S Lack of supplies
R Lack of repairs

APPENDIX D

SUMMARY OF CONTACTS MADE BY PLANTS

Summary of contacts made by plants

Country	Organization name	Equipment type	Manufacturer	Contact name:	Objective	Satisfactory?	If not, why not?
Through the manufacturer or its agents							
Latvia	Riga Technical University	Strobe Tachometer	Ametek	*Ametek*			
Bulgaria	"Pharmacia"	Set of Steam Traps	Yarway	Armstrong	SZ	Y	
Estonia	Tartu District Heating	Combustion Analyzer	Bacharach	*Bacharach*	P		
Latvia	Preili Cheese-Making Plant	Combustion Analyzer	Bacharach	*Bacharach*	P	Y	
Latvia	Preili Cheese-Making Plant	Combustion Smoke Tester	Bacharach	*Bacharach*	P	Y	
Estonia	Tallinn Technical University	Combustion Analyzer	Bacharach	Bacharach	P	Y	
Estonia	Tallinn Technical University	Combustion Smoke Tester	Bacharach	Bacharach	P	Y	
Estonia	Tallinn Technical University	Combustion Analyzer	Bacharach	Bacharach	P	Y	
Hungary	EGI Contracting/Engineering	Boiler Testing Kit	Bacharach	Bacharach	S	Y	
Romania	SC Cimus SA	Combustion Analyzer	Bacharach	Bacharach	P	Y	
Lithuania	Kaunas Ceramics Plant	Combustion Analyzer	Bacharach	Bacharach Denmark		Y	
Lithuania	Lithuanian Power Board	Combustion Analyzer	Bacharach	Bacharach Denmark	P	Y	
Latvia	Riga Technical University	Combustion Analyzer	Bacharach	Bacharach US & Denmark	P	y	yes on 1st, not on 2nd
Latvia	Riga Technical University	Combustion Analyzer	Bacharach	Bacharach US & Denmark	P	y	yes on 1st, not on 2nd
Slovakia	Mostaren Brezno	Combustion Analyzer	Energy Eff. Systems	Codea	C	Y	
Poland	Energopomiar	Tube cleaning system	Conco Systems	Conco Rep.	P	Y	
Czech Rep.	Autobrzdy	Low Pressure Valves	Danfoss	*Danfoss*			
Czech Rep.	Autobrzdy	Low Pressure Valve	Danfoss	*Danfoss*			
Bulgaria	Chimco	Infrared Thermometer	Dickson	Dickson Davis Instruments	SI	N	No answer
Hungary	Oroshazi Uveggyar	Annubar Natural Gas Meters	Dietrich Standard	*Dietrich / Eastern Controls*	C	Y	
Lithuania	Alytus Wood Products Plant	Baghouse - 10,900 cfm	Donaldson Company	Donaldson Company	P	-	
Lithuania	Vilnius Furniture Plant	Baghouse - 10,900 cfm	Donaldson Company	Donaldson Company	I	Y	
Romania	SC Doljchim SA	AC Power Recorder	Dranetz	Dranetz	S	N	No answer
Hungary	EGI Contracting/Engineering	AC Power Analyzer	Dranetz	Dranetz	S	Y	
Bulgaria	Izida Ceramics	Steam Traps	Armstrong	Ecotech (Armstrong)	P	Y	
Romania	SC Doljchim SA	Combustion Analyzer	Energy Eff. Systems	*Energy Eff. Systems*			
Lithuania	Vilnius Sweets Plant "Pergale"	Combustion Analyzer	Energy Eff. Systems	Energy Eff. Systems	P	N	No answer
Poland	Huta "Ostrowiec"	Combustion Analyzer	Energy Eff. Systems	*Energy Eff. Systems*	P	N	No answer
Poland	Energopomiar	Combustion Analyzer	Energy Eff. Systems	Energy Eff. Systems	PC	N	
Romania	SC Combinatul Siderurgic SA	Combustion Analyzer	Energy Eff. Systems	Energy Eff. Systems	P	N	Delivered wrong length
Romania	SC Celhart Donaris SA	Combustion Analyzer	Energy Eff. Systems	Energy Eff. Systems	R	N	No answer
Hungary	Motim	Combustion Analyzer	Energy Eff. Systems	Energy Eff. Systems	S	Y	
Hungary	EGI Contracting/Engineering	Combustion Analyzer	Energy Eff. Systems	Energy Eff. Systems	P	Y	
Slovakia	Biotika Pharmaceutical	Combustion Analyzer	Energy Eff. Systems	EES + Fusitronic, Italy	PSC	Y	
Romania	CET Bucharest SUD	Combustion Analyzer	Energy Eff. Systems	*EES / Boiler Supply Co.*	P	Y	
Lithuania	Vilnius Sweets Plant "Pergale"	Natural GasFlow Meter	Emco	EMCO	RPSZ	Y	
Slovakia	Biotika Pharmaceutical	Energy Management System	Johnson Controls	Energocontrols + Johnson	PS	Y	
Romania	SC Celhart Donaris SA	Personal Computer	Epson	Epson	S	Y	

Summary of contacts made by plants

Country	Organization name	Equipment type	Manufacturer	Contact name:	Objective	Satisfactory?	If not, why not?
Romania	SC Doljchim SA	Personal Computer		Epson America	I	Y	
Romania	SC Doljchim SA	Multimeter	Fluke	Fluke	I	Y	
Romania	ARCE	Ultrasonic Flowmeter	Controlotron	HB	RC	Y	
Hungary	Oroshazi Uveggyar	Production Scheduler	Honeywell	*Honeywell*	PC	Y	
Romania	SC Cimus SA	Combustion Analyzer	Energy Eff. Systems	Intermark	P	Y	
Bulgaria	"Sodi" Soda Ash Plant	Variable Frequency Drive	Lenze	Lenze, Austria	R	N	Warranty claim refused
Poland	Zaklady Azotowe "Kedzierzyn"	In-Situ Oxygen Analyzer	Johnson-Yokogawa	local rep of Yokogawa	P	Y	
Slovakia	Biotika Pharmaceutical	Ultrasonic Flowmeter	Controlotron	Schinzel Austria + Czech	R	N	Coordination problems
Bulgaria	"Sodi" Soda Ash Plant	Ultrasonic Level Transmitter	Scott Instruments	*Scott Instruments*			
Poland	Elektrocieplownia Krakow-Leg	Set of Steam Traps	Armstrong	Topol	Z		
Hungary	EGI Contracting/Engineering	Ultrasonic Stethoscope	UE Systems	UE systems	I	Y	
Romania	SC Doljchim SA	Infrared Thermometer		Wahl International Division	I	Y	
Poland	Huta "Ostrowiec"	In-Situ Oxygen Analyzer	Johnson-Yokogawa	Yokogawa Austria	P	N	Warranty claim refused
Poland	Zaklady Azotowe "Wloclawek"	In-Situ Oxygen Analyzer	Johnson-Yokogawa	Yokogawa Austria	P	Y	
Through USAID and its contractors							
Latvia	Jelgava District Heating	Combustion Analyzer	Bacharach	BV Ekodoma	P	N	
Hungary	Budapesti Vegyimuvek	Steam Flow Meters	Foxboro	EGI	PS	Y	
Lithuania	Lithuanian Power Board	Combustion Analyzer	Energy Eff. Systems	HB	P	Y	
Romania	SC Griro SA	Combustion Analyzer	Energy Eff. Systems	Mihai Maracineanu	PC	Y	
Romania	SC Griro SA	Combustion Analyzer	Bacharach	Mihai Maracineanu	PC	Y	
Romania	SC Griro SA	Natural Gas Flow Meters	Emco	Mihai Maracineanu	RCPC	Y	
Romania	SC Griro SA	Infrared Thermometer		Mihai Maracineanu	PC	Y	
Romania	SC Griro SA	Infrared Thermometer		Mihai Maracineanu	C	Y	
Romania	SC Griro SA	Hand-Held Digital Thermometer		Mihai Maracineanu	C	Y	
Romania	SC Griro SA	UltrasonicFlowmeter	Controlotron	Mihai Maracineanu	S	Y	
Romania	SC Griro SA	AC Power Recorder	Dranetz	Mihai Maracineanu	C	Y	
Lithuania	Vilnius Furniture Plant	SteamFlow Meters		RMA			
Romania	SC Cimus SA	Fuel Oil Flow Meter	Hersey	RMA	Z	Y	
Romania	ARCE	Combustion Analyzer	Energy Eff. Systems	RMA	RC	Y	

I Information
C Calibration
T Technical Support
P Parts (or parts and the above)
R Repairs (or repairs and the above)
Z Other (cleaning...)

Y yes
N no

168

APPENDIX E

MAJOR SURVEY RESULTS BY EQUIPMENT TYPE

	By Equipment Type															
	"Portable Equipment"						"Fixed Equipment"									
	educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and controls	fixed flowmeters	fixed boiler equipment (incl. comb)	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"

RESULTS EXPRESSED IN TERMS OF LINE ITEMS

Total in Survey Database	0	41	59	82	17	21	5	17	16	10	30	5	4	7	220	94
In percentage of database		*13%*	*19%*	*26%*	*5%*	*7%*	*2%*	*5%*	*5%*	*3%*	*10%*	*2%*	*1%*	*2%*	*70%*	*30%*
Frequency of use (Question 6)																
Continuously		12%	20%	27%	24%	38%	40%	65%	69%	60%	80%	100%	75%	86%	23%	72%
Often		51%	53%	51%	47%	48%			6%	10%	3%				51%	3%
Rarely		32%	20%	18%	29%	10%	20%	24%	13%		17%		25%	14%	21%	15%
Never		2%	5%	2%		5%	40%	12%	13%	30%					3%	10%
Other answers / no answer		2%	2%	1%											1%	
Energy conservation results (Question 7)																
Excellent		10%	39%	26%	47%	38%		18%	19%	40%	27%	60%	25%	43%	29%	27%
Some results		73%	53%	63%	47%	57%	60%	71%	50%	30%	63%	40%	75%	43%	60%	56%
Poor results		7%	5%	5%				6%	13%		10%				5%	6%
No results		7%	2%	4%		5%	40%	6%	13%	30%					4%	9%
Other answers / no answer		2%	2%	2%	6%				6%					14%	2%	2%

RESULTS EXPRESSED IN TERMS OF DOLLAR VALUE

Total in Survey Database	$0	$112,304	$227,870	$123,554	$47,629	$48,610	$16,132	$174,629	$230,394	$61,181	$124,826	$142,960	$84,243	$24,222	$559,967	$868,587
In percentage of database		*8%*	*16%*	*9%*	*3%*	*3%*	*1%*	*12%*	*16%*	*4%*	*9%*	*10%*	*7%*	*2%*	*39%*	*61%*
Frequency of use (Question 6)																
Continuously		4%	26%	22%	31%	42%	6%	72%	70%	73%	76%	100%	53%	98%	23%	74%
Often		60%	60%	59%	44%	56%			7%	4%	9%				58%	3%
Rarely		29%	6%	11%	25%	1%	3%	15%	8%		15%		47%	2%	13%	13%
Never		5%	6%	1%		1%	91%	13%	15%	22%					4%	10%
Other answers / no answer		1%	1%	6%											2%	
Energy conservation results (Question 7)																
Excellent		16%	43%	24%	64%	44%		30%	6%	34%	28%	80%	29%	57%	35%	32%
Some results		75%	54%	64%	35%	55%	9%	57%	54%	43%	35%	20%	71%	42%	59%	46%
Poor results		2%	2%	3%				2%	14%		37%				2%	9%
No results		6%	0%	2%		1%	91%	11%	15%	22%					2%	9%
Other answers / no answer		1%	1%	7%	0%				11%					1%	2%	3%

Relative value of the line item

(Ratio of the results expressed in percent-value to the results expressed in percent-line-item)

Frequency of use (Question 6)																
Continuously		0.31	1.29	0.84	1.33	1.10	0.15	1.11	1.02	1.22	0.96	1.00	0.71	1.14	0.98	1.03
Often		1.18	1.14	1.15	0.93	1.19			1.14	0.43	2.58				1.14	1.07
Rarely		0.93	0.31	0.61	0.85	0.12	0.16	0.63	0.66		0.90		1.88	0.17	0.62	0.84
Never		2.14	1.20	0.55		0.14	2.27	1.13	1.18	0.74					1.22	1.03
Other answers / no answer		0.52	0.79	5.11											1.59	
Energy conservation results (Question 7)																
Excellent		1.68	1.10	0.94	1.37	1.16		1.72	0.34	0.86	1.04	1.33	1.17	1.32	1.22	1.21
Some results		1.02	1.02	1.01	0.75	0.97	0.15	0.80	1.09	1.44	0.55	0.50	0.94	0.98	0.97	0.82
Poor results		0.21	0.31	0.64				0.37	1.09		3.72				0.36	1.47
No results		0.82	0.19	0.56		0.14	2.27	1.86	1.18	0.74					0.51	1.10
Other answers / no answer		0.52	0.79	2.74	0.06				1.77					0.09	1.01	1.40

APPENDIX F

SUMMARY OF DATABASE STATISTICS AND SURVEY RESULTS

Summary of results

	Code	Overall results			
		# of line items		value of line items	
		Absolute	Relative	Absolute	Relative
Total in Equipment Database		440		$1,756,541	
In percentage of database					
By country					
Latvia	A	61	14%	$142,680	8%
Bulgaria	B	63	14%	$279,595	16%
Czech Republic	C	56	13%	$129,347	7%
Estonia	E	58	13%	$120,180	7%
Hungary	H	44	10%	$321,419	18%
Lithuania	L	42	10%	$139,348	8%
Poland	P	40	9%	$272,811	16%
Romania	R	63	14%	$215,796	12%
Slovakia	S	13	3%	$135,365	8%
By organization type					
Plant	P	326	74%	$1,488,765	85%
Other (engineering)	X	114	26%	$267,776	15%
Results of the survey					
Survey received		314	71%	$1,428,554	81%
No response		90	20%	$259,914	15%
Not surveyed		36	8%	$68,073	4%

Summary of results

	Code	Overall results			
		# of line items		value of line items	
		Absolute	Relative	Absolute	Relative
Total in Survey Database		314		$1,428,554	
In percentage of database					
Initial Status (Question 2)					
Functioning properly	Y	294	94%	$1,282,542	90%
Not installed	NI	4	1%	$50,175	4%
Not functioning properly	N	16	5%	$95,837	7%
Status at the time of the survey (Question 3)					
Functioning properly	Y	276	88%	$1,147,304	80%
Not installed	NIC	4	1%	$50,175	4%
Not functioning properly	YA, N, NC	34	11%	$231,075	16%
Status after follow-up program					
Was functioning: no action	Y	276	88%	$1,147,304	80%
Remedial provided	YA	21	7%	$135,119	9%
Still not installed (plant not responding)	NIC	4	1%	$50,175	4%
Still not working (plant not responding)	NC	10	3%	$73,076	5%
Plant will fix it on its own	N	3	1%	$22,880	2%
Current and past problems					
Never any problem		262	83%	$1,088,445	76%
Mis-specified	M	6	2%	$25,337	2%
Lack of parts	P	7	2%	$64,269	4%
Lack of repairs	R	9	3%	$88,568	6%
Lack of supplies	S	25	8%	$116,387	8%
Lack of trained operators	T	0	0%	$0	0%
Other problems	Z, " "	5	2%	$45,549	3%
Maintenance actions at the time of the survey (Question 4)					
No maintenance	N	199	63%	$693,494	49%
Calibration	C	55	18%	$265,005	19%
Supplies	S	12	4%	$39,603	3%
Parts (or parts and the above)	P	18	6%	$137,141	10%
Repairs (or repairs and the above)	R	27	9%	$262,425	18%
Other (cleaning...)	Z	3	1%	$30,886	2%

Summary of results

	Code	Overall results			
		# of line items		value of line items	
		Absolute	Relative	Absolute	Relative
Reason for contact at the time of the survey (Question 5)					
Information	I	5	2%	$15,972	1%
Calibration	C	5	2%	$34,809	2%
Technical Support	S	8	3%	$45,242	3%
Parts, supplies (or parts and the above)	P	32	10%	$213,250	15%
Repairs (or repairs and the above)	R	7	2%	$90,864	6%
Other (cleaning...)	Z	2	1%	$3,419	0%
TOTAL		59	19%	$403,555	28%
Frequency of use (Question 6)					
Continuously	C	119	38%	$771,405	54%
Often	O	115	37%	$355,176	25%
Rarely	R	61	19%	$182,483	13%
Never	N	16	5%	$107,318	8%
Other answers / no answer		3	1%	$12,172	1%
Energy conservation results (Question 7)					
Excellent	E	89	28%	$476,982	33%
Some results	S	186	59%	$730,475	51%
Poor results	P	16	5%	$90,639	6%
No results	N	16	5%	$91,742	6%
Other answers / no answer		7	2%	$38,716	3%
Synthesis of Questions 6 and 7 (with % of valid answers)					
Excellent	E	89	29%	$476,982	34%
Some results, used continuously	S + C	59	19%	$338,857	24%
Some results, used often	S + O	75	24%	$216,482	16%
Some results, used rarely or never	S + R,N	52	17%	$175,136	13%
Poor results / Some results	P, S	32	10%	$182,381	13%
Total		307	100%	$1,389,838	100%

Summary of results

	Code	Overall results			
		# of line items		value of line items	
		Absolute	Relative	Absolute	Relative
Breakdown of problems by status after follow-up program					
Was functioning; no action	Y				
Never any problem		262	83.4%	$1,088,445	76.2%
Mis-specified	M	2	0.6%	$6,244	0.4%
Lack of parts	P	3	1.0%	$19,900	1.4%
Lack of repairs	R	1	0.3%	$4,042	0.3%
Lack of supplies	S	8	2.5%	$28,674	2.0%
Lack of trained operators	T	0	0.0%	$0	0.0%
Other problems	Z	0	0.0%	$0	0.0%
Remedial provided	YA				
Mis-specified	M	1	0.3%	$892	0.1%
Lack of parts	P	2	0.6%	$30,654	2.1%
Lack of repairs	R	4	1.3%	$21,985	1.5%
Lack of supplies	S	14	4.5%	$81,588	5.7%
Lack of trained operators	T	0	0.0%	$0	0.0%
Other problems	Z	0	0.0%	$0	0.0%
Still not installed (plant not responding)	NIC				
Other problems	" "	3	1.0%	$41,660	2.9%
Lack of parts	P	1	0.3%	$8,515	0.6%
Still not working (plant not responding)	NC				
Mis-specified	M	1	0.3%	$582	0.0%
Lack of parts	P	1	0.3%	$5,200	0.4%
Lack of repairs	R	3	1.0%	$57,280	4.0%
Lack of supplies	S	3	1.0%	$6,125	0.4%
Lack of trained operators	T	0	0.0%	$0	0.0%
Other problems	Z	2	0.6%	$3,889	0.3%
Plant will fix it on its own	N				
Mis-specified	M	2	0.6%	$17,619	1.2%
Lack of parts	P	0	0.0%	$0	0.0%
Lack of repairs	R	1	0.3%	$5,261	0.4%
Lack of supplies	S	0	0.0%	$0	0.0%
Lack of trained operators	T	0	0.0%	$0	0.0%
Other problems	Z	0	0.0%	$0	0.0%

Summary of results

	Code	Overall results			
		# of line items		value of line items	
		Absolute	Relative	Absolute	Relative
Breakdown of "frequency of use" by "conservation results"					
Continuously	**C**				
Excellent	E	54	17.2%	$356,591	25.0%
Some results	S	59	18.8%	$338,857	23.7%
Poor results	P	4	1.3%	$50,152	3.5%
No results	N	0	0.0%	$0	0.0%
Other answers / no answer		2	0.6%	$25,805	1.8%
Often	**O**				
Excellent	E	35	11.1%	$120,390	8.4%
Some results	S	75	23.9%	$216,482	15.2%
Poor results	P	2	0.6%	$17,190	1.2%
No results	N	1	0.3%	$374	0.0%
Other answers / no answer		2	0.6%	$739	0.1%
Rarely	**R**				
Excellent	E	0	0.0%	$0	0.0%
Some results	S	49	15.6%	$157,799	11.0%
Poor results	P	10	3.2%	$23,297	1.6%
No results	N	2	0.6%	$1,387	0.1%
Other answers / no answer		0	0.0%	$0	0.0%
Never	**N**				
Excellent	E	0	0.0%	$0	0.0%
Some results	S	3	1.0%	$17,337	1.2%
Poor results	P	0	0.0%	$0	0.0%
No results	N	13	4.1%	$89,981	6.3%
Other answers / no answer		0	0.0%	$0	0.0%

APPENDIX G

RESULTS EXPRESSED IN PERCENT OF LINE ITEMS

Results expressed in percent of line items

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contro	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Total in Equipment Database		440	11	54	75	116	25	40	8	28	20	14	31	5	6	7	321	119
In percentage of database		*100%*	*3%*	*12%*	*17%*	*26%*	*6%*	*9%*	*2%*	*6%*	*5%*	*3%*	*7%*	*1%*	*1%*	*2%*	*73%*	*27%*
By country			*The percent values below indicate the distribution by equipment type within a single country (horizontal percentages)*															
Latvia	A	61	*7%*	*20%*	*20%*	*25%*	*8%*	*8%*	*2%*	*2%*	*5%*	*2%*				*3%*	*87%*	*13%*
Bulgaria	B	63	*6%*	*6%*	*16%*	*27%*	*8%*	*3%*	*5%*	*5%*		*6%*	*6%*		*8%*	*3%*	*67%*	*33%*
Czech Republic	C	56		*9%*	*7%*	*20%*	*2%*	*18%*	*5%*		*4%*		*34%*	*2%*			*55%*	*45%*
Estonia	E	58	*5%*	*17%*	*26%*	*26%*	*9%*	*10%*		*3%*	*2%*				*2%*		*93%*	*7%*
Hungary	H	44		*18%*	*16%*	*18%*	*11%*	*5%*	*2%*	*11%*	*5%*	*2%*	*5%*	*5%*		*2%*	*68%*	*32%*
Lithuania	L	42		*14%*	*14%*	*29%*	*2%*	*12%*		*10%*	*7%*		*7%*			*5%*	*71%*	*29%*
Poland	P	40			*13%*	*30%*	*8%*	*10%*			*20%*	*18%*		*3%*			*60%*	*40%*
Romania	R	63		*14%*	*21%*	*35%*		*10%*		*19%*	*2%*						*79%*	*21%*
Slovakia	S	13			*23%*	*31%*				*8%*		*8%*	*23%*	*8%*			*54%*	*46%*
By organization type																		
Plant	P	74%	64%	54%	75%	66%	68%	60%	63%	100%	100%	100%	100%	100%	100%	100%	65%	97%
Other (engineering)	X	26%	36%	46%	25%	34%	32%	40%	38%								35%	3%
Results of the survey																		
Survey received		71%		76%	79%	71%	68%	53%	63%	61%	80%	71%	97%	100%	67%	100%	69%	79%
No response		20%	27%	24%	20%	23%	20%	18%	38%	32%	15%	21%	3%		17%		22%	17%
Not surveyed		8%	73%		1%	6%	12%	30%		7%	5%	7%			17%		10%	4%

Results expressed in percent of line items

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Equipment Database		61	63	56	58	44	42	40	63	13	326	114	145	111	146	38	373	19	48
In percentage of database		*14%*	*14%*	*13%*	*13%*	*10%*	*10%*	*9%*	*14%*	*3%*	*74%*	*26%*	*33%*	*25%*	*33%*	*9%*	*85%*	*4%*	*11%*
By country																			
Latvia	A	100%									15%	11%	17%	11%	16%		16%	11%	
Bulgaria	B		100%								15%	11%	15%	13%	18%		17%		
Czech Republic	C			100%							8%	27%	10%	2%	5%	82%	2%	26%	88%
Estonia	E				100%						14%	11%	17%	10%	16%		15%	16%	
Hungary	H					100%					9%	14%	10%	15%	8%		10%	26%	
Lithuania	L						100%				7%	16%	5%	15%	12%	3%	11%		2%
Poland	P							100%			10%	6%	12%	11%	8%		10%	5%	
Romania	R								100%		18%	4%	12%	20%	14%	5%	16%		6%
Slovakia	S									100%	4%		1%	4%	2%	11%	2%	16%	4%
By organization type																			
Plant	P	79%	79%	45%	79%	64%	57%	83%	94%	100%	100%		83%	82%	70%	32%	77%	100%	42%
Other (engineering)	X	21%	21%	55%	21%	36%	43%	18%	6%			100%	17%	18%	30%	68%	23%		58%
Results of the survey																			
Survey received		92%	67%	38%	59%	86%	88%	80%	73%	62%	75%	60%	75%	74%	77%	29%	75%	79%	42%
No response		2%	30%	50%	24%	9%		5%	27%	38%	19%	25%	16%	18%	18%	53%	18%	11%	44%
Not surveyed		7%	3%	13%	17%	5%	12%	15%			6%	16%	9%	8%	5%	18%	7%	11%	15%

Results expressed in percent of line items

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	Fixed instrumentation and contro	fixed flowmeters	Fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	Fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Total in Survey Database		314	0	41	59	82	17	21	5	17	16	10	30	5	4	7	220	94
In percentage of database		*100%*		*13%*	*19%*	*26%*	*5%*	*7%*	*2%*	*5%*	*5%*	*3%*	*10%*	*2%*	*1%*	*2%*	*70%*	*30%*
Initial Status (Question 2)																		
Functioning properly	Y	94%		98%	97%	95%	94%	100%	80%	76%	81%	70%	100%	100%	100%	86%	98%	87%
Not installed	NI	1%							20%	6%	6%	10%						4%
Not functioning properly	N	5%		2%	3%	5%	6%			18%	13%	20%				14%	4%	9%
Status at the time of the survey (Question 3)																		
Functioning properly	Y	88%		98%	61%	96%	100%	100%	80%	88%	81%	70%	100%	100%	75%	86%	88%	88%
Not installed	NIC	1%							20%	6%	6%	10%						4%
Not functioning properly	YA, N, NC	11%		2%	39%	4%				6%	13%	20%			25%	14%	12%	7%
Status after follow-up program																		
Was functioning: no action	Y	88%		98%	61%	96%	100%	100%	80%	88%	81%	70%	100%	100%	75%	86%	88%	88%
Remedial provided	YA	7%		2%	27%	2%				6%	6%						9%	2%
Still not installed (plant not responding)	NIC	1%							20%	6%	6%	10%						4%
Still not working (plant not responding)	NC	3%			10%	1%						10%			25%	14%	3%	3%
Plant will fix it on its own	N	1%			2%						6%	10%					0%	2%
Current and past problems																		
Never any problem		83%		93%	47%	96%	100%	90%	80%	82%	75%	70%	100%	100%	75%	86%	82%	86%
Mis-specified	M	2%		5%		1%					6%	10%				14%	1%	3%
Lack of parts	P	2%		2%	3%			5%		8%	13%						2%	3%
Lack of repairs	R	3%			10%	1%				8%					25%		3%	2%
Lack of supplies	S	8%			39%			5%			6%						11%	1%
Lack of trained operators	T																	
Other problems	Z, " "	2%				1%			20%	6%		20%					0%	4%
Maintenance actions at the time of the survey (Question 4)																		
No maintenance	N	63%		88%	42%	79%	94%	71%	80%	59%	38%	70%	23%	60%	25%	57%	71%	45%
Calibration	C	18%		10%	15%	17%		5%		18%	38%	10%	53%			14%	13%	29%
Supplies	S	4%			15%	1%			20%						25%		5%	2%
Parts (or parts and the above)	P	6%			19%			14%		12%	6%			20%			6%	4%
Repairs (or repairs and the above)	R	9%		2%	8%	2%	6%	10%		6%	19%	20%	23%		50%	14%	5%	17%
Other (cleaning...)	Z	1%								6%				20%		14%		3%
Reason for contact at the time of the survey (Question 5)																		
Information	I	2%		2%		1%	6%	5%								14%	2%	1%
Calibration	C	2%		2%	2%	2%				6%							2%	1%
Technical Support	S	3%		5%	3%	2%		5%				10%					3%	1%
Parts, supplies (or parts and the above)	P	10%			37%	1%	6%			6%	19%	10%		40%		14%	11%	9%
Repairs (or repairs and the above)	R	2%			3%	2%				12%					25%		2%	3%
Other (cleaning...)	Z	1%								6%		10%						2%
TOTAL		19%		10%	46%	10%	12%	10%		29%	19%	30%		40%	25%	29%	20%	17%
Frequency of use (Question 6)																		
Continuously	C	38%		12%	20%	27%	24%	38%	40%	65%	69%	60%	80%	100%	75%	86%	23%	72%
Often	O	37%		51%	53%	51%	47%	48%			6%	10%	3%				51%	3%
Rarely	R	19%		32%	20%	18%	29%	10%	20%	24%	13%		17%		25%	14%	21%	15%
Never	N	5%		2%	5%	2%		5%	40%	12%	13%	30%					3%	10%
Other answers / no answer		1%		2%	2%	1%											1%	
Energy conservation results (Question 7)																		
Excellent	E	28%		10%	39%	26%	47%	38%		18%	19%	40%	27%	60%	25%	43%	29%	27%
Some results	S	59%		73%	53%	63%	47%	57%	60%	71%	50%	30%	63%	40%	75%	43%	60%	56%
Poor results	P	5%		7%	5%	5%				6%	13%		10%				5%	6%
No results	N	5%		7%	2%	4%		5%	40%	6%	13%	30%					4%	9%
Other answers / no answer		2%		2%	2%	2%	6%				6%					14%	2%	2%
Synthesis of Questions 6 and 7 (with % of valid answers)		*Percentage of meaningful answers*																
Excellent	E	*29%*		*10%*	*40%*	*26%*	*50%*	*38%*		*18%*	*20%*	*40%*	*27%*	*60%*	*25%*	*50%*	*30%*	*27%*
Some results, used continuously	S + C	*19%*		*10%*	*5%*	*13%*	*6%*	*19%*	*40%*	*41%*	*47%*	*20%*	*43%*	*40%*	*50%*	*33%*	*10%*	*40%*
Some results, used often	S + O	*24%*		*43%*	*28%*	*40%*	*13%*	*29%*				*10%*	*3%*				*34%*	*2%*
Some results, used rarely or never	S + R,N	*17%*		*23%*	*21%*	*13%*	*31%*	*10%*	*20%*	*29%*	*7%*		*17%*		*25%*	*17%*	*18%*	*15%*
Poor results / Some results	P, S	*10%*		*15%*	*7%*	*9%*		*5%*	*40%*	*12%*	*27%*	*30%*	*10%*				*8%*	*15%*
Total		*100%*		*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Results expressed in percent of line items

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Survey Database		56	42	21	34	38	37	32	46	8	246	68	109	82	112	11	279	15	20
In percentage of database		*18%*	*13%*	*7%*	*11%*	*12%*	*12%*	*10%*	*15%*	*3%*	*78%*	*22%*	*35%*	*26%*	*36%*	*4%*	*89%*	*5%*	*6%*
Initial Status (Question 2)																			
Functioning properly	Y	95%	90%	100%	94%	95%	92%	88%	98%	100%	94%	93%	94%	89%	98%	100%	93%	100%	95%
Not installed	NI	5%	2%								2%		1%	2%	1%		1%		
Not functioning properly	N		7%		6%	5%	8%	13%	4%		4%	7%	5%	9%	4%		5%		5%
Status at the time of the survey (Question 3)																			
Functioning properly	Y	86%	79%	100%	97%	100%	81%	81%	89%	75%	88%	88%	84%	79%	98%	100%	86%	100%	100%
Not installed	NIC	5%	2%								2%		1%	2%	1%		1%		
Not functioning properly	YA, N, NC	9%	19%		3%		19%	19%	11%	25%	11%	12%	15%	18%	3%		12%		
Status after follow-up program																			
Was functioning: no action	Y	86%	79%	100%	97%	100%	81%	81%	89%	75%	88%	88%	84%	79%	98%	100%	86%	100%	100%
Remedial provided	YA	4%	12%		3%		14%	6%	9%	25%	7%	7%	8%	11%	3%		8%		
Still not installed (plant not responding)	NIC	5%	2%								2%		1%	2%	1%		1%		
Still not working (plant not responding)	NC	5%	7%				3%	9%			3%	4%	8%	4%			4%		
Plant will fix it on its own	N						3%	3%	2%		1%			4%			1%		
Current and past problems																			
Never any problem		86%	76%	100%	91%	95%	78%	75%	78%	63%	83%	84%	77%	74%	95%	100%	81%	100%	100%
Mis-specified	M		7%				3%	3%	2%		2%		2%	2%	2%		2%		
Lack of parts	P	2%					5%	3%	7%		2%	3%	1%	6%	1%		3%		
Lack of repairs	R	2%	2%			3%	3%	3%	7%	13%	3%	3%	3%	7%			3%		
Lack of supplies	S	7%	10%		9%	3%	11%	13%	7%	25%	7%	10%	16%	7%	2%		9%		
Lack of trained operators	T																		
Other problems	Z, ""	4%	5%					3%			2%		2%	2%	1%		2%		
Maintenance actions at the time of the survey (Question 4)																			
No maintenance	N	89%	69%	24%	68%	55%	46%	59%	72%	25%	63%	63%	52%	57%	79%	55%	68%	53%	10%
Calibration	C	2%	19%	62%	18%	8%	30%	25%	9%	13%	16%	24%	22%	17%	14%	9%	14%	13%	70%
Supplies	S	7%	5%		9%	3%		3%	2%		5%		8%	1%	2%		4%		
Parts (or parts and the above)	P					8%	14%	9%	13%	13%	6%	4%	6%	11%	1%	9%	6%		5%
Repairs (or repairs and the above)	R	2%	7%	14%	6%	18%	11%	3%	4%	50%	9%	9%	10%	12%	3%	27%	7%	27%	15%
Other (cleaning...)	Z					8%					1%		1%	1%	1%		1%	7%	
Reason for contact at the time of the survey (Question 5)																			
Information	I					3%	3%		7%		2%	1%	2%		3%		2%		
Calibration	C					3%			7%	13%	2%		1%	2%	2%		2%		
Technical Support	S		5%			8%			7%		2%	3%	5%	2%	1%		3%		
Parts, supplies (or parts and the above)	P	9%	2%		12%	8%	11%	19%	15%	25%	9%	15%	19%	11%	1%	9%	11%	7%	5%
Repairs (or repairs and the above)	R		2%				3%		9%	13%	2%	3%	1%	6%	1%		2%		5%
Other (cleaning...)	Z							3%	2%		1%			2%			1%		
TOTAL		9%	10%		12%	21%	16%	22%	46%	50%	18%	22%	28%	24%	7%	9%	20%	7%	10%
Frequency of use (Question 6)																			
Continuously	C	30%	31%	76%	38%	32%	46%	47%	22%	75%	43%	21%	37%	44%	29%	100%	33%	73%	75%
Often	O	34%	36%		38%	37%	35%	28%	67%	13%	35%	43%	33%	30%	48%		40%	13%	5%
Rarely	R	27%	21%	24%	21%	26%	19%	9%	11%		16%	31%	23%	17%	20%		20%	7%	20%
Never	N	7%	12%			5%		16%			5%	4%	6%	7%	3%		5%	7%	
Other answers / no answer		2%			3%					13%	1%	1%	1%	1%	1%		1%		
Energy conservation results (Question 7)																			
Excellent	E	21%	33%	14%	53%	24%	41%	19%	22%	25%	27%	32%	28%	29%	26%	45%	29%	33%	15%
Some results	S	64%	52%	86%	41%	63%	51%	59%	70%	25%	60%	57%	62%	57%	61%	27%	58%	47%	85%
Poor results	P	4%			3%	3%	8%	9%	7%	38%	6%	3%	4%	4%	5%	27%	5%	20%	
No results	N	7%	14%			5%		9%	2%		6%	3%	4%	7%	5%		6%		
Other answers / no answer		4%			3%	5%		3%		13%	2%	4%	2%	2%	3%		3%		
Synthesis of Questions 6 and 7 (with % of valid answers)																			
Excellent	E	*22%*	*33%*	*14%*	*55%*	*25%*	*41%*	*19%*	*22%*	*29%*	*28%*	*34%*	*29%*	*30%*	*27%*	*45%*	*30%*	*33%*	*15%*
Some results, used continuously	S + C	*17%*	*12%*	*62%*	*6%*	*19%*	*19%*	*29%*	*13%*	*14%*	*24%*	*3%*	*21%*	*23%*	*15%*	*27%*	*16%*	*27%*	*60%*
Some results, used often	S + O	*26%*	*21%*		*18%*	*19%*	*19%*	*26%*	*50%*	*14%*	*24%*	*26%*	*20%*	*20%*	*35%*		*27%*	*7%*	*5%*
Some results, used rarely or never	S + R,N	*24%*	*19%*	*24%*	*18%*	*28%*	*14%*	*6%*	*7%*		*13%*	*31%*	*23%*	*16%*	*13%*		*17%*	*13%*	*20%*
Poor results / Some results	P, S	*11%*	*14%*		*3%*	*8%*	*8%*	*19%*	*9%*	*43%*	*12%*	*6%*	*7%*	*11%*	*11%*	*27%*	*11%*	*20%*	
Total		*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Results expressed in percent of line items

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contro	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Breakdown of problems by status after follow-up program																		
Was functioning; no action	Y																	
Never any problem		83%		93%	47%	98%	100%	90%	80%	82%	75%	70%	100%	100%	75%	86%	82%	86%
Mis-specified	M	1%		5%													1%	
Lack of parts	P	1%			2%			5%		6%							1%	1%
Lack of repairs	R	0%			2%												0%	
Lack of supplies	S	3%			10%			5%			6%						3%	1%
Lack of trained operators	T																	
Other problems	Z																	
Remedial provided	YA																	
Mis-specified	M	0%				1%											0%	
Lack of parts	P	1%		2%							6%						0%	1%
Lack of repairs	R	1%			3%	1%				6%							1%	1%
Lack of supplies	S	4%			24%												6%	
Lack of trained operators	T																	
Other problems	Z																	
Still not installed (plant not responding)	NIC																	
Other problems	" "	1%							20%	6%		10%						3%
Lack of parts	P	0%									6%							1%
Still not working (plant not responding)	NC																	
Mis-specified	M	0%														14%		1%
Lack of parts	P	0%			2%												0%	
Lack of repairs	R	1%			3%										25%		1%	1%
Lack of supplies	S	1%			5%												1%	
Lack of trained operators	T																	
Other problems	Z	1%				1%						10%					0%	1%
Plant will fix it on its own	N																	
Mis-specified	M	1%									6%	10%						2%
Lack of parts	P																	
Lack of repairs	R	0%			2%												0%	
Lack of supplies	S																	
Lack of trained operators	T																	
Other problems	Z																	
Breakdown of "frequency of use" by "conservation results"																		
Continuously	C																	
Excellent	E	17%		2%	15%	15%	18%	19%		18%	19%	40%	27%	60%	25%	43%	13%	27%
Some results	S	19%		10%	5%	12%	6%	19%	40%	41%	44%	20%	43%	40%	50%	29%	10%	39%
Poor results	P	1%								6%			10%					4%
No results	N																	
Other answers / no answer		1%									6%					14%		2%
Often	O																	
Excellent	E	11%		7%	24%	11%	29%	19%									16%	
Some results	S	24%		41%	27%	39%	12%	29%				10%	3%				33%	2%
Poor results	P	1%			2%						6%						0%	1%
No results	N	0%		2%													0%	
Other answers / no answer		1%				1%	6%										1%	
Rarely	R																	
Excellent	E																	
Some results	S	16%		22%	17%	12%	29%	10%	20%	24%	6%		17%		25%	14%	16%	14%
Poor results	P	3%		7%	3%	5%					6%						4%	1%
No results	N	1%		2%		1%											1%	
Other answers / no answer																		
Never	N																	
Excellent	E																	
Some results	S	1%			3%					6%							1%	1%
Poor results	P																	
No results	N	4%		2%	2%	2%		5%	40%	6%	13%	30%					2%	9%
Other answers / no answer																		

Results expressed in percent of line items

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Breakdown of problems by status after follow-up program																			
Was functioning; no action	Y																		
Never any problem		86%	76%	100%	91%	95%	78%	75%	78%	63%	83%	84%	77%	74%	95%	100%	81%	100%	100%
Mis-specified	M		2%						2%		1%		1%		1%		1%		
Lack of parts	P								7%		1%			2%	1%		1%		
Lack of repairs	R					3%						1%	1%				0%		
Lack of supplies	S				6%	3%	3%	6%	2%	13%	2%	3%	6%	2%			3%		
Lack of trained operators	T																		
Other problems	Z																		
Remedial provided	YA																		
Mis-specified	M		2%								0%				1%		0%		
Lack of parts	P						3%	3%			0%	1%	1%	1%			1%		
Lack of repairs	R						3%		4%	13%	2%			5%			1%		
Lack of supplies	S	4%	10%		3%		8%	3%	4%	13%	4%	6%	7%	5%	2%		5%		
Lack of trained operators	T																		
Other problems	Z																		
Still not installed (plant not responding)	NIC																		
Other problems	" "	4%	2%								1%		1%	1%	1%		1%		
Lack of parts	P	2%									0%			1%			0%		
Still not working (plant not responding)	NC																		
Mis-specified	M		2%								0%		1%				0%		
Lack of parts	P						3%					1%		1%			0%		
Lack of repairs	R	2%	2%					3%			1%	1%	2%	1%			1%		
Lack of supplies	S	4%						3%			1%	1%	3%				1%		
Lack of trained operators	T																		
Other problems	Z		2%					3%			1%		1%	1%			1%		
Plant will fix it on its own	N																		
Mis-specified	M						3%	3%			1%			2%			1%		
Lack of parts	P																		
Lack of repairs	R								2%		0%			1%			0%		
Lack of supplies	S																		
Lack of trained operators	T																		
Other problems	Z																		
Breakdown of "frequency of use" by "conservation results"																			
Continuously	C																		
Excellent	E	14%	19%	14%	32%	11%	24%	16%	9%	25%	17%	18%	16%	21%	13%	45%	17%	27%	15%
Some results	S	16%	12%	62%	6%	18%	19%	28%	13%	13%	23%	3%	20%	22%	14%	27%	15%	27%	60%
Poor results	P						3%			38%	2%			1%		27%	0%	20%	
No results	N																		
Other answers / no answer						3%		3%			1%		1%		1%		1%		
Often	O																		
Excellent	E	7%	14%		21%	13%	16%	3%	13%		10%	15%	13%	9%	13%		12%	7%	
Some results	S	25%	21%		18%	18%	19%	25%	50%	13%	24%	25%	19%	20%	34%		26%	7%	5%
Poor results	P					3%			2%		1%		1%	1%			1%		
No results	N								2%		0%				1%		0%		
Other answers / no answer		2%				3%						3%		1%	1%		1%		
Rarely	R																		
Excellent	E																		
Some results	S	23%	19%	24%	18%	24%	14%		7%		13%	26%	20%	16%	13%		16%	7%	20%
Poor results	P	4%			3%		5%	9%	4%		3%	3%	3%	1%	5%		4%		
No results	N		2%			3%					0%	1%			2%		1%		
Other answers / no answer																			
Never	N																		
Excellent	E																		
Some results	S					3%		6%			0%	3%	3%				1%	7%	
Poor results	P																		
No results	N	7%	12%			3%		9%			5%	1%	4%	7%	3%		5%		
Other answers / no answer																			

APPENDIX H

RESULTS EXPRESSED IN PERCENT OF DOLLAR VALUE

Results expressed in percent of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and control	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Total in Equipment Database		$1,756,541	$8,814	$155,576	$264,600	$160,951	$67,227	$84,546	$16,312	$221,337	$265,008	$104,636	$129,974	$142,960	$112,379	$24,222	$739,713	$1,016,827
In percentage of database		*100%*	*0%*	*9%*	*15%*	*9%*	*4%*	*5%*	*1%*	*13%*	*15%*	*6%*	*7%*	*8%*	*6%*	*1%*	*42%*	*58%*
By country			*The percent values below indicate the distribution by equipment type within a single country (horizontal percentages)*															
Latvia	A	$142,680	*2%*	*17%*	*12%*	*11%*	*8%*	*5%*	*10%*	*13%*	*12%*	*3%*				*6%*	*55%*	*45%*
Bulgaria	B	$279,595	*1%*	*7%*	*22%*	*7%*	*1%*	*3%*	*1%*	*5%*		*11%*	*6%*		*37%*	*0%*	*41%*	*59%*
Czech Republic	C	$129,347		*8%*	*15%*	*9%*	*0%*	*13%*	*0%*		*7%*		*19%*	*27%*			*46%*	*54%*
Estonia	E	$120,180	*1%*	*21%*	*16%*	*11%*	*12%*	*7%*		*10%*	*14%*				*8%*		*68%*	*32%*
Hungary	H	$321,419		*11%*	*7%*	*1%*	*2%*	*1%*	*0%*	*29%*	*15%*	*7%*	*8%*	*19%*		*0%*	*22%*	*78%*
Lithuania	L	$139,348		*5%*	*16%*	*10%*	*0%*	*5%*		*23%*	*19%*		*12%*			*10%*	*36%*	*64%*
Poland	P	$272,811			*14%*	*2%*	*12%*	*6%*			*52%*	*6%*		*8%*			*34%*	*66%*
Romania	R	$215,796		*16%*	*23%*	*28%*		*8%*		*23%*	*2%*						*75%*	*25%*
Slovakia	S	$135,365			*12%*	*12%*				*3%*		*23%*	*34%*	*16%*			*23%*	*77%*
By organization type																		
Plant	P	85%	57%	50%	65%	76%	66%	62%	99%	100%	100%	100%	100%	100%	100%	100%	64%	100%
Other (engineering)	X	15%	43%	50%	35%	24%	34%	38%	1%								36%	0%
Results of the survey																		
Survey received		81%		72%	86%	77%	71%	57%	99%	79%	87%	58%	96%	100%	84%	100%	76%	85%
No response		15%	32%	28%	14%	22%	10%	24%	1%	16%	10%	39%	4%		7%		20%	11%
Not surveyed		4%	68%		0%	1%	19%	19%		5%	3%	3%			9%		5%	3%

Results expressed in percent of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought In...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Equipment Database		$142,680	$279,595	$129,347	$120,180	$321,419	$139,348	$272,811	$215,796	$135,365	$1,488,765	$287,776	$650,484	$755,688	$172,731	$177,638	$1,403,428	$185,737	$167,376
In percentage of database		*8%*	*16%*	*7%*	*7%*	*18%*	*8%*	*16%*	*12%*	*8%*	*85%*	*15%*	*37%*	*43%*	*10%*	*10%*	*80%*	*11%*	*10%*
By country																			
Latvia	A	100%									8%	11%	8%	7%	22%		10%	3%	
Bulgaria	B		100%								15%	19%	19%	18%	14%		20%		
Czech Republic	C			100%							5%	19%	2%	1%	7%	55%	1%	10%	56%
Estonia	E				100%						6%	11%	7%	7%	13%		8%	1%	
Hungary	H					100%					19%	13%	10%	33%	4%		16%	49%	
Lithuania	L						100%				8%	8%	5%	11%	10%	3%	10%		4%
Poland	P							100%			17%	10%	33%	7%	3%		18%	12%	
Romania	R								100%		13%	9%	12%	12%	23%	4%	14%		8%
Slovakia	S									100%	9%		5%	3%	5%	39%	3%	25%	32%
By organization type																			
Plant	P	80%	82%	61%	75%	89%	84%	90%	89%	100%	100%		83%	91%	74%	74%	85%	100%	66%
Other (engineering)	X	20%	18%	39%	25%	11%	16%	10%	11%			100%	17%	9%	26%	26%	15%		34%
Results of the survey																			
Survey received		97%	77%	50%	49%	96%	99%	90%	77%	67%	82%	76%	80%	85%	81%	71%	83%	96%	51%
No response		1%	22%	42%	27%	3%		1%	23%	33%	14%	19%	15%	12%	17%	23%	13%	3%	43%
Not surveyed		2%	0%	8%	24%	0%	1%	9%			4%	5%	5%	3%	1%	6%	4%	1%	6%

Results expressed in percent of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contro	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Total in Survey Database		$1,428,554	$0	$112,304	$227,870	$123,554	$47,629	$48,610	$16,132	$174,629	$230,394	$61,181	$124,826	$142,960	$94,243	$24,222	$559,967	$868,587
In percentage of database		*100%*		*8%*	*16%*	*9%*	*3%*	*3%*	*1%*	*12%*	*16%*	*4%*	*9%*	*10%*	*7%*	*2%*	*39%*	*61%*
Initial Status (Question 2)																		
Functioning properly	Y	90%		99%	95%	91%	92%	100%	12%	76%	79%	78%	100%	100%	100%	98%	95%	86%
Not installed	NI	4%							88%	11%	4%	14%						6%
Not functioning properly	N	7%		1%	5%	9%	8%			13%	18%	9%				2%	5%	8%
Status at the time of the survey (Question 3)																		
Functioning properly	Y	80%		95%	47%	92%	100%	100%	12%	87%	79%	78%	100%	100%	53%	98%	76%	83%
Not installed	NIC	4%							88%	11%	4%	14%						6%
Not functioning properly	YA, N, NC	16%		5%	53%	8%				2%	18%	9%			47%	2%	24%	11%
Status after follow-up program																		
Was functioning: no action	Y	80%		95%	47%	92%	100%	100%	12%	87%	79%	78%	100%	100%	53%	98%	76%	83%
Remedial provided	YA	9%		5%	40%	7%				2%	11%						19%	3%
Still not installed (plant not responding)	NIC	4%							88%	11%	4%	14%						6%
Still not working (plant not responding)	NC	5%			11%	1%						4%			47%	2%	5%	5%
Plant will fix it on its own	N		0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	
Current and past problems																		
Never any problem		76%		90%	34%	92%	100%	85%	12%	80%	77%	78%	100%	100%	53%	98%	68%	81%
Mis-specified	M	2%		6%		1%					7%	4%				2%	1%	2%
Lack of parts	P	4%		5%	5%			6%		7%	15%						3%	5%
Lack of repairs	R	6%			14%	6%				2%					47%		7%	6%
Lack of supplies	S	8%			47%			9%			2%						20%	1%
Lack of trained operators	T																	
Other problems	Z, ""	3%				1%			88%	11%		18%					0%	5%
Maintenance actions at the time of the survey (Question 4)																		
No maintenance	N	49%		94%	21%	76%	92%	69%	97%	39%	28%	42%	31%	80%	29%	59%	58%	42%
Calibration	C	19%		5%	37%	16%		6%		24%	34%	9%	21%			2%	20%	18%
Supplies	S	3%			11%	0%			3%						15%		4%	2%
Parts (or parts and the above)	P	10%			21%			17%		19%	12%			15%			10%	9%
Repairs (or repairs and the above)	R	18%		1%	11%	7%	8%	9%		4%	27%	48%	47%		56%	37%	8%	25%
Other (cleaning...)	Z	2%								14%				5%		1%		4%
Reason for contact at the time of the survey (Question 5)																		
Information	I	1%		0%		2%	3%	6%								37%	1%	1%
Calibration	C	2%		5%	2%	2%				12%							2%	2%
Technical Support	S	3%		18%	2%	7%		6%				14%					7%	1%
Parts, supplies (or parts and the above)	P	15%			33%	2%	25%			17%	24%	9%		20%		19%	16%	14%
Repairs (or repairs and the above)	R	6%			7%	12%				9%					47%		6%	7%
Other (cleaning...)	Z	0%								0%		4%						0%
TOTAL		28%		23%	44%	25%	28%	12%		38%	24%	27%		20%	47%	56%	32%	28%
Frequency of use (Question 6)																		
Continuously	C	54%		4%	26%	22%	31%	42%	6%	72%	70%	73%	76%	100%	53%	98%	23%	74%
Often	O	25%		60%	60%	59%	44%	56%			7%	4%	9%				58%	3%
Rarely	R	13%		29%	6%	11%	25%	1%	3%	15%	8%		15%		47%	2%	13%	13%
Never	N	8%		5%	6%	1%		1%	91%	13%	15%	22%					4%	10%
Other answers / no answer		1%		1%	1%	6%											2%	
Energy conservation results (Question 7)																		
Excellent	E	33%		16%	43%	24%	64%	44%		30%	6%	34%	28%	80%	29%	57%	35%	32%
Some results	S	51%		75%	54%	64%	35%	55%	9%	57%	54%	43%	35%	20%	71%	42%	59%	46%
Poor results	P	6%		2%	2%	3%				2%	14%		37%				2%	9%
No results	N	6%		6%	0%	2%		1%	91%	11%	15%	22%					2%	9%
Other answers / no answer		3%		1%	1%	7%	0%				11%					1%	2%	3%
Synthesis of Questions 6 and 7 (with % of valid answers)		*Percentage of meaningful answers*																
Excellent	E	*34%*		*17%*	*44%*	*26%*	*65%*	*44%*		*30%*	*7%*	*34%*	*28%*	*80%*	*29%*	*58%*	*36%*	*33%*
Some results, used continuously	S + C	*24%*		*3%*	*12%*	*9%*	*1%*	*16%*	*6%*	*39%*	*59%*	*39%*	*11%*	*20%*	*24%*	*40%*	*9%*	*34%*
Some results, used often	S + O	*16%*		*45%*	*31%*	*51%*	*9%*	*38%*				*4%*	*9%*				*37%*	*2%*
Some results, used rarely or never	S + R,N	*13%*		*28%*	*11%*	*8%*	*25%*	*1%*	*3%*	*17%*	*2%*		*15%*		*47%*	*2%*	*14%*	*12%*
Poor results / Some results	P, S	*13%*		*8%*	*2%*	*6%*		*1%*	*91%*	*13%*	*32%*	*22%*	*37%*				*4%*	*19%*
Total		*100%*		*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Results expressed in percent of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Survey Database		$139,051	$215,736	$64,463	$59,170	$309,374	$138,518	$245,788	$165,364	$91,090	$1,225,088	$203,466	$517,218	$844,214	$140,769	$126,352	$1,164,015	$178,591	$85,948
In percentage of database		*10%*	*15%*	*5%*	*4%*	*22%*	*10%*	*17%*	*12%*	*6%*	*86%*	*14%*	*36%*	*45%*	*10%*	*9%*	*81%*	*13%*	*6%*
Initial Status (Question 2)																			
Functioning properly	Y	70%	95%	100%	91%	99%	81%	83%	88%	100%	90%	90%	90%	89%	82%	100%	88%	100%	91%
Not installed	NI	30%	4%								4%		2%	4%	10%		4%		
Not functioning properly	N		1%		9%	1%	19%	17%	12%		6%	10%	8%	7%	8%		8%		9%
Status at the time of the survey (Question 3)																			
Functioning properly	Y	62%	51%	100%	95%	100%	71%	82%	87%	86%	82%	70%	78%	77%	89%	100%	76%	100%	100%
Not installed	NIC	30%	4%								4%		2%	4%	10%		4%		
Not functioning properly	YA, N, NC	8%	45%		5%		29%	18%	13%	14%	14%	30%	21%	19%	1%		20%		
Status after follow-up program																			
Was functioning: no action	Y	62%	51%	100%	95%	100%	71%	82%	87%	86%	82%	70%	78%	77%	89%	100%	76%	100%	100%
Remedial provided	YA	4%	24%		5%		15%	11%	10%	14%	7%	21%	16%	7%	1%		12%		
Still not installed (plant not responding)	NIC	30%	4%								4%		2%	4%	10%		4%		
Still not working (plant not responding)	NC	4%	21%				4%	8%			4%	9%	4%	8%			6%		
Plant will fix it on its own	N	0%	0%	0%	0%	0%	0%	0%	0%		0%		0%	0%	0%		0%	0%	
Current and past problems																			
Never any problem		62%	48%	100%	87%	97%	68%	78%	74%	80%	78%	65%	72%	72%	86%	100%	71%	100%	100%
Mis-specified	M		3%				11%	1%	0%		2%		1%	3%	1%		2%		
Lack of parts	P	6%					7%	10%	12%		4%	5%	5%	6%	2%		6%		
Lack of repairs	R	2%	21%			1%	3%	4%	10%	8%	6%	7%	3%	11%			8%		
Lack of supplies	S	6%	24%		13%	1%	11%	5%	4%	12%	6%	23%	16%	5%	1%		10%		
Lack of trained operators	T																		
Other problems	Z, ""	24%	4%					1%			4%		2%	3%	10%		4%		
Maintenance actions at the time of the survey (Question 4)																			
No maintenance	N	92%	38%	76%	62%	41%	35%	39%	69%	13%	48%	53%	44%	48%	76%	41%	47%	61%	45%
Calibration	C	2%	21%	15%	19%	16%	35%	35%	5%	6%	16%	31%	26%	16%	14%	5%	20%	8%	18%
Supplies	S	4%	12%		11%	0%		0%	0%		3%		5%	2%	1%		3%		
Parts (or parts and the above)	P					12%	10%	16%	15%	24%	11%	3%	9%	10%	2%	17%	10%		26%
Repairs (or repairs and the above)	R	2%	28%	10%	9%	21%	19%	10%	11%	57%	19%	13%	15%	20%	7%	37%	17%	28%	11%
Other (cleaning...)	Z					10%					3%		1%	4%	0%		2%	4%	
Reason for contact at the time of the survey (Question 5)																			
Information	I					0%	6%		3%		1%	1%	2%		4%		1%		
Calibration	C					7%			5%	6%	3%		1%	4%	2%		3%		
Technical Support	S		4%			6%			10%		2%	8%	8%	1%	1%		4%		
Parts, supplies (or parts and the above)	P	6%	3%		13%	13%	11%	34%	15%	30%	14%	21%	23%	11%	2%	17%	16%	4%	26%
Repairs (or repairs and the above)	R		21%				3%		21%	8%	6%	9%	2%	11%	5%		7%		9%
Other (cleaning...)	Z							1%	0%		0%			1%			0%		
TOTAL		6%	27%		13%	27%	21%	35%	55%	44%	27%	38%	36%	28%	14%	17%	32%	4%	35%
Frequency of use (Question 6)																			
Continuously	C	28%	36%	89%	29%	64%	62%	73%	23%	86%	60%	17%	45%	58%	26%	100%	47%	83%	87%
Often	O	19%	30%		58%	20%	23%	9%	67%	6%	19%	57%	33%	18%	52%		29%	8%	9%
Rarely	R	21%	26%	11%	13%	14%	18%	0%	10%		12%	18%	10%	18%	11%		14%	7%	4%
Never	N	30%	8%			2%		18%			8%	7%	11%	5%	11%		9%	2%	
Other answers / no answer		2%			2%					8%	1%	1%	1%	1%	1%		1%		
Energy conservation results (Question 7)																			
Excellent	E	27%	36%	67%	46%	36%	49%	23%	28%	11%	33%	33%	30%	36%	30%	41%	30%	50%	52%
Some results	S	40%	56%	33%	50%	58%	37%	54%	68%	30%	49%	65%	56%	52%	55%	22%	55%	24%	48%
Poor results	P	1%			1%	5%	14%	0%	4%	51%	7%	0%	1%	5%	2%	37%	4%	26%	
No results	N	30%	8%			0%		12%	0%		7%	0%	8%	5%	12%		8%		
Other answers / no answer		3%			2%	0%		10%		8%	3%	1%	6%	1%	1%		3%		
Synthesis of Questions 6 and 7 (with % of valid answers)																			
Excellent	E	*27%*	*36%*	*67%*	*48%*	*36%*	*49%*	*26%*	*28%*	*12%*	*34%*	*34%*	*31%*	*36%*	*30%*	*41%*	*31%*	*50%*	*52%*
Some results, used continuously	S + C	*9%*	*11%*	*22%*	*6%*	*37%*	*21%*	*48%*	*10%*	*27%*	*28%*	*0%*	*26%*	*26%*	*11%*	*22%*	*26%*	*9%*	*36%*
Some results, used often	S + O	*11%*	*20%*		*33%*	*6%*	*12%*	*6%*	*52%*	*6%*	*11%*	*41%*	*19%*	*11%*	*37%*		*18%*	*6%*	*9%*
Some results, used rarely or never	S + R,N	*21%*	*25%*	*11%*	*12%*	*15%*	*5%*	*6%*	*7%*		*11%*	*25%*	*13%*	*16%*	*8%*		*14%*	*10%*	*4%*
Poor results / Some results	P, S	*32%*	*8%*		*1%*	*6%*	*14%*	*14%*	*4%*	*56%*	*15%*	*1%*	*10%*	*11%*	*14%*	*37%*	*12%*	*26%*	
Total		*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

Results expressed in percent of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contro	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Breakdown of problems by status after follow-up program																		
Was functioning: no action	Y																	
Never any problem		76%		90%	34%	92%	100%	85%	12%	80%	77%	78%	100%	100%	53%	98%	68%	81%
Mis-specified	M	0%		6%													1%	
Lack of parts	P	1%			2%			6%		7%							1%	1%
Lack of repairs	R	0%			2%												1%	
Lack of supplies	S	2%			8%			9%			2%						4%	1%
Lack of trained operators	T																	
Other problems	Z																	
Remedial provided	YA																	
Mis-specified	M	0%				1%											0%	
Lack of parts	P	2%		5%							11%						1%	3%
Lack of repairs	R	2%			5%	6%				2%							3%	0%
Lack of supplies	S	6%			36%												15%	
Lack of trained operators	T																	
Other problems	Z																	
Still not installed (plant not responding)	NIC																	
Other problems	" "	3%							88%	11%		14%						5%
Lack of parts	P	1%									4%							1%
Still not working (plant not responding)	NC																	
Mis-specified	M	0%														2%		0%
Lack of parts	P	0%			2%												1%	
Lack of repairs	R	4%			6%										47%		2%	5%
Lack of supplies	S	0%			3%												1%	
Lack of trained operators	T																	
Other problems	Z	0%				1%						4%					0%	0%
Plant will fix it on its own	N																	
Mis-specified	M	1%									7%	4%						2%
Lack of parts	P																	
Lack of repairs	R	0%			2%												1%	
Lack of supplies	S																	
Lack of trained operators	T																	
Other problems	Z																	
Breakdown of "frequency of use" by "conservation results"																		
Continuously	C																	
Excellent	E	25%		1%	14%	14%	30%	25%		30%	6%	34%	28%	80%	29%	57%	14%	32%
Some results	S	24%		3%	12%	9%	1%	18%	6%	39%	53%	39%	11%	20%	24%	40%	9%	33%
Poor results	P	4%								2%			37%					6%
No results	N																	
Other answers / no answer		2%									11%					1%		3%
Often	O																	
Excellent	E	8%		15%	29%	10%	34%	18%									21%	
Some results	S	15%		45%	31%	48%	9%	38%				4%	9%				36%	2%
Poor results	P	1%			0%						7%						0%	2%
No results	N	0%		0%													0%	
Other answers / no answer		0%				0%	0%										0%	
Rarely	R																	
Excellent	E																	
Some results	S	11%		27%	5%	7%	25%	1%	3%	15%	2%		15%		47%	2%	11%	11%
Poor results	P	2%		2%	1%	3%					7%						1%	2%
No results	N	0%		0%		1%											0%	
Other answers / no answer																		
Never	N																	
Excellent	E																	
Some results	S	1%			6%					2%							2%	0%
Poor results	P																	
No results	N	6%		5%	0%	1%		1%	91%	11%	15%	22%					2%	8%
Other answers / no answer																		

Results expressed in percent of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Breakdown of problems by status after follow-up program																			
Was functioning: no action	Y																		
Never any problem		62%	48%	100%	87%	97%	68%	78%	74%	80%	78%	65%	72%	72%	86%	100%	71%	100%	100%
Mis-specified	M		3%						0%		1%		1%		0%		1%		
Lack of parts	P								12%		2%			3%	2%		2%		
Lack of repairs	R					1%						2%	1%				0%		
Lack of supplies	S				8%	1%	3%	4%	0%	6%	2%	2%	4%	2%			2%		
Lack of trained operators	T																		
Other problems	Z																		
Remedial provided	YA																		
Mis-specified	M		0%								0%				1%		0%		
Lack of parts	P						4%	10%			2%	3%	5%	1%			3%		
Lack of repairs	R						3%		6%	8%	2%			3%			2%		
Lack of supplies	S	4%	24%		5%		8%	0%	4%	6%	4%	19%	12%	3%	1%		7%		
Lack of trained operators	T																		
Other problems	Z																		
Still not installed (plant not responding)	NIC																		
Other problems	" "	24%	4%								3%		2%	3%	10%		4%		
Lack of parts	P	6%									1%			1%			1%		
Still not working (plant not responding)	NC																		
Mis-specified	M		0%								0%		0%				0%		
Lack of parts	P						4%					3%		1%			0%		
Lack of repairs	R	2%	21%					4%			4%	5%	3%	7%			5%		
Lack of supplies	S	2%						1%			0%	2%	1%				1%		
Lack of trained operators	T																		
Other problems	Z		1%					1%			0%		0%	0%			0%		
Plant will fix it on its own	N																		
Mis-specified	M						11%	1%			1%			3%			2%		
Lack of parts	P																		
Lack of repairs	R								3%		0%			1%			0%		
Lack of supplies	S																		
Lack of trained operators	T																		
Other problems	Z																		
Breakdown of "frequency of use" by "conservation results"																			
Continuously	C																		
Excellent	E	19%	25%	67%	23%	28%	38%	20%	14%	11%	26%	17%	18%	32%	15%	41%	19%	48%	52%
Some results	S	8%	11%	22%	6%	37%	21%	43%	10%	24%	28%	0%	25%	28%	10%	22%	25%	9%	38%
Poor results	P						3%			51%	4%			1%		37%	0%	26%	
No results	N																		
Other answers / no answer						0%		10%			2%		5%		0%		2%		
Often	O																		
Excellent	E	8%	11%		23%	8%	11%	3%	14%		7%	17%	14%	4%	15%		10%	2%	
Some results	S	11%	20%		33%	6%	12%	6%	52%	8%	11%	40%	18%	11%	37%		17%	6%	9%
Poor results	P					5%			0%		1%		0%	3%			1%		
No results	N								0%		0%				0%		0%		
Other answers / no answer		0%				0%						0%		0%	0%		0%		
Rarely	R																		
Excellent	E																		
Some results	S	20%	25%	11%	12%	14%	5%		7%		10%	18%	9%	15%	8%		12%	7%	4%
Poor results	P	1%			1%		11%	0%	3%		2%	0%	1%	2%	2%		2%		
No results	N		0%			0%					0%	0%			1%		0%		
Other answers / no answer																			
Never	N																		
Excellent	E																		
Some results	S					1%		5%			0%	6%	3%				1%	2%	
Poor results	P																		
No results	N	30%	8%			0%		12%			7%	0%	8%	5%	11%		8%		
Other answers / no answer																			

APPENDIX I

RESULTS EXPRESSED IN TERMS OF LINE ITEMS

Results expressed in terms of line items

	Code	TOTAL	By Equipment Type: "Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contr	fixed flowmeters	fixed boiler equipment (incl. co	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Total in Equipment Database		440	11	54	75	116	25	40	8	28	20	14	31	5	6	7	321	119
In percentage of database		100%	3%	12%	17%	26%	6%	9%	2%	6%	5%	3%	7%	1%	1%	2%	73%	27%
By country																		
Latvia	A	61	4	12	12	15	5	5	1	1	3	1				2	53	8
Bulgaria	B	63	4	4	10	17	5	2	3	3		4	4		5	2	42	21
Czech Republic	C	56		5	4	11	1	10	3		2		19	1			31	25
Estonia	E	58	3	10	15	15	5	6		2	1				1		54	4
Hungary	H	44		8	7	8	5	2	1	5	2	1	2	2		1	30	14
Lithuania	L	42		6	6	12	1	5		4	3		3			2	30	12
Poland	P	40			5	12	3	4			8	7		1			24	16
Romania	R	63		9	13	22		6		12	1						50	13
Slovakia	S	13			3	4				1		1	3	1			7	6
By organization type																		
Plant	P	326	7	29	56	77	17	24	5	28	20	14	31	5	6	7	210	116
Other (engineering)	X	114	4	25	19	39	8	16	3								111	3
Results of the survey																		
Survey received		314		41	59	82	17	21	5	17	16	10	30	5	4	7	220	94
No response		90	3	13	15	27	5	7	3	9	3	3	1		1		70	20
Not surveyed		36	8		1	7	3	12		2	1	1			1		31	5

	By Country									Recipient Type		Bought from...				Bought in...		
	Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Equipment Database	61	63	56	58	44	42	40	63	13	326	114	145	111	146	38	373	19	48
In percentage of database	14%	14%	13%	13%	10%	10%	9%	14%	3%	74%	26%	33%	25%	33%	9%	85%	4%	11%
By country																		
Latvia	61									48	13	25	12	24		59	2	
Bulgaria		63								50	13	22	14	27		63		
Czech Republic			56							25	31	15	2	8	31	9	5	42
Estonia				58						46	12	24	11	23		55	3	
Hungary					44					28	16	15	17	12		39	5	
Lithuania						42				24	18	7	17	17	1	41		1
Poland							40			33	7	17	12	11		39	1	
Romania								63		59	4	18	22	21	2	60		3
Slovakia									13	13		2	4	3	4	8	3	2
By organization type																		
Plant	48	50	25	46	28	24	33	59	13	326		121	91	102	12	287	19	20
Other (engineering)	13	13	31	12	16	18	7	4			114	24	20	44	26	86		28
Results of the survey																		
Survey received	56	42	21	34	38	37	32	46	8	246	68	109	82	112	11	279	15	20
No response	1	19	28	14	4		2	17	5	62	28	23	20	27	20	67	2	21
Not surveyed	4	2	7	10	2	5	6			18	18	13	9	7	7	27	2	7

Results expressed in terms of line items

	Code	TOTAL	By Equipment Type: "Portable Equipment"						"Fixed Equipment"										By Country									Recipient Type		Bought from...				Bought in...		
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contr	fixed flowmeters	fixed boiler equipment (incl. co	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"	Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Survey Database		314	0	41	59	82	17	21	5	17	16	10	30	5	4	7	220	94	56	42	21	34	38	37	32	46	8	246	68	109	82	112	11	279	15	20
In percentage of database		*100%*		*13%*	*19%*	*26%*	*5%*	*7%*	*2%*	*5%*	*5%*	*3%*	*10%*	*2%*	*1%*	*2%*	*70%*	*30%*	*18%*	*13%*	*7%*	*11%*	*12%*	*12%*	*10%*	*15%*	*3%*	*78%*	*22%*	*35%*	*26%*	*36%*	*4%*	*89%*	*5%*	*6%*
Initial Status (Question 2)																																				
Functioning properly	Y	294		40	57	78	16	21	4	13	13	7	30	5	4	6	212	82	53	38	21	32	36	34	28	44	8	231	63	103	73	107	11	260	15	19
Not installed	NI	4							1	1	1	1						4	3	1								4		1	2	1		4		
Not functioning properly	N	16		1	2	4	1			3	2	2				1	8	8		3		2	2	3	4	2		11	5	5	7	4		15		1
Status at the time of the survey (Question 3)																																				
Functioning properly	Y	276		40	36	79	17	21	4	15	13	7	30	5	3	6	193	83	48	33	21	33	38	30	26	41	6	216	60	92	65	108	11	241	15	20
Not installed	NIC	4							1	1	1	1						4	3	1								4		1	2	1		4		
Not functioning properly	YA, N, NC	34		1	23	3				1	2	2			1	1	27	7	5	8		1		7	6	5	2	26	8	16	15	3		34		
Status after follow-up program																																				
Was functioning: no action	Y	276		40	36	79	17	21	4	15	13	7	30	5	3	6	193	83	48	33	21	33	38	30	26	41	6	216	60	92	65	108	11	241	15	20
Remedial provided	YA	21		1	16	2				1	1						19	2	2	5		1		5	2	4	2	16	5	9	9	3		21		
Still not installed (plant not responding)	NIC	4							1	1	1	1						4	3	1								4		1	2	1		4		
Still not working (plant not responding)	NC	10			6	1						1			1	1	7	3	3	3				1	3			7	3	7	3			10		
Plant will fix it on its own	N	3			1						1	1					1	2						1	1	1		3			3			3		
Current and past problems																																				
Never any problem		262		38	28	79	17	19	4	14	12	7	30	5	3	6	181	81	48	32	21	31	36	29	24	36	5	205	57	84	61	106	11	227	15	20
Mis-specified	M	6		2		1					1	1				1	3	3		3				1	1	1		6		2	2	2		6		
Lack of parts	P	7		1	2			1		1	2						4	3	1					2	1	3		5	2	1	5	1		7		
Lack of repairs	R	9			6	1				1					1		7	2	1	1			1	1	1	3	1	7	2	3	6			9		
Lack of supplies	S	25			23			1			1						24	1	4	4		3	1	4	4	3	2	18	7	17	6	2		25		
Lack of trained operators	T																																			
Other problems	Z, ""	5				1			1	1		2					1	4	2	2					1			5		2	2	1		5		
Maintenance actions at the time of the survey (Question 4)																																				
No maintenance	N	199		36	25	65	16	15	4	10	6	7	7	3	1	4	157	42	50	29	5	23	21	17	19	33	2	156	43	57	47	89	6	189	8	2
Calibration	C	55		4	9	14		1		3	6	1	16			1	28	27	1	8	13	6	3	11	8	4	1	39	16	24	14	16	1	39	2	14
Supplies	S	12			9	1			1						1		10	2	4	2		3	1		1	1		12		9	1	2		12		
Parts (or parts and the above)	P	18			11			3		2	1			1			14	4					3	5	3	6	1	15	3	7	9	1	1	17		1
Repairs (or repairs and the above)	R	27		1	5	2	1	2		1	3	2	7		2	1	11	16	1	3	3	2	7	4	1	2	4	21	6	11	10	3	3	20	4	3
Other (cleaning...)	Z	3								1				1		1		3					3					3		1	1	1		2	1	

Results expressed in terms of line items

	Code	TOTAL	By Equipment Type: "Portable Equipment"						"Fixed Equipment"										By Country									Recipient Type		Bought from...				Bought in...		
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contr	fixed flowmeters	fixed boiler equipment (incl. cor	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"	Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Reason for contact at the time of the survey (Question 5)																																				
Information	I	5		1		1	1	1								1	4	1					1	1		3		4	1	2		3		5		
Calibration	C	5		1	1	2				1							4	1					1			3	1	5		1	2	2		5		
Technical Support	S	8		2	2	2		1				1					7	1		2			3			3		6	2	5	2	1		8		
Parts, supplies (or parts and the above)	P	32			22	1	1			1	3	1		2		1	24	8	5	1		4	3	4	6	7	2	22	10	21	9	1	1	30	1	1
Repairs (or repairs and the above)	R	7			2	2				2					1		4	3		1				1		4	1	5	2	1	5	1		6		1
Other (cleaning...)	Z	2								1		1						2							1	1		2			2			2		
TOTAL		59		4	27	8	2	2		5	3	3		2	1	2	43	16	5	4		4	8	6	7	21	4	44	15	30	20	8	1	56	1	2
Frequency of use (Question 6)																																				
Continuously	C	119		5	12	22	4	8	2	11	11	6	24	5	3	6	51	68	17	13	16	13	12	17	15	10	6	105	14	40	36	32	11	93	11	15
Often	O	115		21	31	42	8	10			1	1	1				112	3	19	15		13	14	13	9	31	1	86	29	36	25	54		112	2	1
Rarely	R	61		13	12	15	5	2	1	4	2		5		1	1	47	14	15	9	5	7	10	7	3	5		40	21	25	14	22		56	1	4
Never	N	16		1	3	2		1	2	2	2	3					7	9	4	5			2		5			13	3	7	6	3		15	1	
Other answers / no answer		3		1	1	1											3		1			1					1	2	1	1	1	1		3		
Energy conservation results (Question 7)																																				
Excellent	E	89		4	23	21	8	8		3	3	4	8	3	1	3	64	25	12	14	3	18	9	15	6	10	2	67	22	31	24	29	5	81	5	3
Some results	S	186		30	31	52	8	12	3	12	8	3	19	2	3	3	133	53	36	22	18	14	24	19	19	32	2	147	39	68	47	68	3	162	7	17
Poor results	P	16		3	3	4				1	2		3				10	6	2			1	1	3	3	3	3	14	2	4	3	6	3	13	3	
No results	N	16		3	1	3		1	2	1	2	3					8	8	4	6			2		3	1		14	2	4	6	6		16		
Other answers / no answer		7		1	1	2	1				1					1	5	2	2			1	2		1		1	4	3	2	2	3		7		
Synthesis of Questions 6 and 7 (with % of valid answers)																																				
Excellent	E	89		4	23	21	8	8		3	3	4	8	3	1	3	64	25	12	14	3	18	9	15	6	10	2	67	22	31	24	29	5	81	5	3
Some results, used continuously	S + C	59		4	3	10	1	4	2	7	7	2	13	2	2	2	22	37	9	5	13	2	7	7	9	6	1	57	2	22	18	16	3	43	4	12
Some results, used often	S + O	75		17	16	32	2	6				1	1				73	2	14	9		6	7	7	8	23	1	58	17	21	16	38		73	1	1
Some results, used rarely or never	S + R,N	52		9	12	10	5	2	1	5	1		5		1	1	38	14	13	8	5	6	10	5	2	3		32	20	25	13	14		46	2	4
Poor results / Some results	P, S	32		6	4	7		1	2	2	4	3	3				18	14	6	6		1	3	3	6	4	3	28	4	8	9	12	3	29	3	
Total		307		40	58	80	16	21	5	17	15	10	30	5	4	6	215	92	54	42	21	33	36	37	31	46	7	242	65	107	80	109	11	272	15	20

Results expressed in terms of line items

			By Equipment Type															By Country									Recipient Type		Bought from...				Bought in...		
			"Portable Equipment"						"Fixed Equipment"																										
	Code	TOTAL	educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contr	fixed flowmeters	fixed boiler equipment (incl. co	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"	Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Breakdown of problems by status after follow-up program																																			
Was functioning; no action	Y																																		
Never any problem		262		38	26	79	17	19	4	14	12	7	30	5	3	6	181	81	48	32	21	31	36	29	24	36	5	205	57	84	61	106	11	227	15	20
Mis-specified	M	2		2													2			1						1		2		1		1		2		
Lack of parts	P	3			1			1		1							2	1								3		3			2	1		3		
Lack of repairs	R	1			1												1						1						1	1				1		
Lack of supplies	S	8			6			1			1						7	1				2	1	1	2	1	1	6	2	6	2			8		
Lack of trained operators	T																																		
Other problems	Z																																		
Remedial provided	YA																																		
Mis-specified	M	1				1											1			1								1				1		1		
Lack of parts	P	2		1							1						1	1						1	1			1	1	1	1			2		
Lack of repairs	R	4			2	1				1							3	1						1		2	1	4			4			4		
Lack of supplies	S	14			14												14		2	4		1		3	1	2	1	10	4	8	4	2		14		
Lack of trained operators	T																																		
Other problems	Z																																		
Still not installed (plant not responding)	NIC																																		
Other problems	" "	3							1	1		1						3	2	1								3		1	1	1		3		
Lack of parts	P	1									1							1	1									1			1			1		
Still not working (plant not responding)	NC																																		
Mis-specified	M	1														1		1		1								1		1				1		
Lack of parts	P	1			1												1							1					1		1			1		
Lack of repairs	R	3			2										1		2	1	1	1					1			2	1	2	1			3		
Lack of supplies	S	3			3												3		2						1			2	1	3				3		
Lack of trained operators	T																																		
Other problems	Z	2				1						1					1	1		1					1			2		1	1			2		
Plant will fix it on its own	N																																		
Mis-specified	M	2									1	1						2						1	1			2			2			2		
Lack of parts	P																																		
Lack of repairs	R	1			1												1									1		1			1			1		
Lack of supplies	S																																		
Lack of trained operators	T																																		
Other problems	Z																																		

Results expressed in terms of line items

			By Equipment Type																By Country									Recipient Type		Bought from...				Bought in...		
			"Portable Equipment"						"Fixed Equipment"																												
	Code	TOTAL	educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and contr	fixed flowmeters	fixed boiler equipment (incl. co	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"	Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Breakdown of "frequency of use" by "conservation results"																																					
Continuously	C																																				
Excellent	E	54		1	9	12	3	4		3	3	4	8	3	1	3	29	25	8	8	3	11	4	9	5	4	2	42	12	17	17	15	5	47	4	3
Some results	S	59		4	3	10	1	4	2	7	7	2	13	2	2	2	22	37	9	5	13	2	7	7	9	6	1	57	2	22	18	16	3	43	4	12
Poor results	P	4								1			3					4						1			3	4			1		3	1	3	
No results	N																																				
Other answers / no answer		2									1					1		2					1		1			2		1		1		2		
Often	O																																				
Excellent	E	35		3	14	9	5	4									35		4	6		7	5	6	1	6		25	10	14	7	14		34	1	
Some results	S	75		17	16	32	2	6				1	1				73	2	14	9		6	7	7	8	23	1	58	17	21	16	38		73	1	1
Poor results	P	2			1						1						1	1					1			1		2		1	1			2		
No results	N	1		1													1									1		1				1		1		
Other answers / no answer		2				1	1										2		1				1						2		1	1		2		
Rarely	R																																				
Excellent	E																																				
Some results	S	49		9	10	10	5	2	1	4	1		5		1	1	36	13	13	8	5	6	9	5		3		31	18	22	13	14		44	1	4
Poor results	P	10		3	2	4					1						9	1	2			1		2	3	2		8	2	3	1	6		10		
No results	N	2		1		1											2			1			1					1	1			2		2		
Other answers / no answer																																					
Never	N																																				
Excellent	E																																				
Some results	S	3			2					1							2	1					1		2			1	2	3				2	1	
Poor results	P																																				
No results	N	13		1	1	2		1	2	1	2	3					5	8	4	5			1		3			12	1	4	6	3		13		
Other answers / no answer																																					

APPENDIX J

RESULTS EXPRESSED IN TERMS OF DOLLAR VALUE

Results expressed in terms of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and control	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Total in Equipment Database		$1,756,541	$6,814	$155,576	$264,600	$160,951	$67,227	$84,546	$16,312	$221,337	$265,008	$104,636	$129,974	$142,960	$112,379	$24,222	$739,713	$1,016,827
In percentage of database		*100%*	*0%*	*9%*	*15%*	*9%*	*4%*	*5%*	*1%*	*13%*	*15%*	*6%*	*7%*	*8%*	*6%*	*1%*	*42%*	*58%*
By country																		
Latvia	A	$142,680	$2,233	$23,839	$17,753	$16,195	$12,087	$6,628	$14,160	$19,066	$17,018	$4,452				$9,250	$78,734	$63,946
Bulgaria	B	$279,595	$2,907	$18,174	$61,277	$19,766	$3,157	$8,705	$1,427	$13,727		$30,895	$15,956		$102,440	$1,164	$113,986	$165,609
Czech Republic	C	$129,347		$10,704	$19,163	$12,187	$400	$17,000	$180		$9,250		$24,927	$35,536			$59,454	$69,893
Estonia	E	$120,180	$1,674	$24,774	$18,984	$13,163	$14,400	$8,151		$12,066	$17,029				$9,939		$81,146	$39,034
Hungary	H	$321,419		$36,054	$21,795	$3,770	$4,900	$3,221	$545	$91,664	$49,116	$21,174	$26,204	$62,657		$321	$69,739	$251,680
Lithuania	L	$139,348		$7,048	$21,638	$14,628	$400	$6,850		$31,796	$27,000		$16,500			$13,488	$50,564	$88,784
Poland	P	$272,811			$38,975	$5,048	$31,883	$15,827			$141,695	$16,723		$22,660			$91,733	$181,078
Romania	R	$215,796		$34,983	$49,232	$60,334		$18,165		$49,182	$3,900						$162,714	$53,082
Slovakia	S	$135,365			$15,783	$15,860				$3,836		$31,392	$46,387	$22,107			$31,643	$103,722
By organization type																		
Plant	P	$1,488,765	$3,907	$77,460	$172,256	$121,854	$44,350	$52,291	$16,132	$221,337	$265,008	$104,636	$129,974	$142,960	$112,379	$24,222	$472,117	$1,016,647
Other (engineering)	X	$267,776	$2,907	$78,116	$92,344	$39,097	$22,877	$32,255	$180								$267,596	$180
Results of the survey																		
Survey received		$1,428,554		$112,304	$227,870	$123,554	$47,629	$48,610	$16,132	$174,629	$230,394	$61,181	$124,826	$142,960	$94,243	$24,222	$559,987	$868,587
No response		$259,914	$2,148	$43,272	$36,653	$35,924	$6,682	$20,052	$180	$34,642	$26,179	$40,836	$5,148		$8,197		$144,732	$115,182
Not surveyed		$68,073	$4,666		$77	$1,472	$12,916	$15,884		$12,066	$8,435	$2,619			$9,939		$35,015	$33,059

Results expressed in terms of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Equipment Database		$142,680	$279,595	$129,347	$120,180	$321,419	$139,348	$272,811	$215,796	$135,365	$1,488,765	$267,776	$650,484	$755,688	$172,731	$177,638	$1,403,428	$185,737	$167,376
In percentage of database		*8%*	*16%*	*7%*	*7%*	*18%*	*8%*	*16%*	*12%*	*8%*	*85%*	*15%*	*37%*	*43%*	*10%*	*10%*	*80%*	*11%*	*10%*
By country																			
Latvia	A	$142,680									$113,633	$29,046	$50,464	$54,438	$37,777		$137,080	$5,600	
Bulgaria	B		$279,595								$228,763	$50,832	$122,020	$132,960	$24,615		$279,595		
Czech Republic	C			$129,347							$78,874	$50,473	$11,605	$9,261	$11,637	$96,844	$16,898	$18,572	$93,877
Estonia	E				$120,180						$89,977	$30,203	$44,997	$53,075	$22,108		$118,284	$1,896	
Hungary	H					$321,419					$285,836	$35,583	$66,578	$247,566	$7,276		$230,797	$90,622	
Lithuania	L						$139,348				$117,378	$21,970	$30,026	$86,816	$16,506	$6,000	$133,348		$6,000
Poland	P							$272,811			$246,552	$26,259	$212,520	$55,210	$5,081		$250,151	$22,660	
Romania	R								$215,796		$192,387	$23,409	$77,047	$92,878	$39,571	$6,300	$201,796		$14,000
Slovakia	S									$135,365	$135,365		$35,228	$23,483	$8,160	$68,494	$35,479	$46,387	$53,499
By organization type																			
Plant	P	$113,633	$228,763	$78,874	$89,977	$285,836	$117,378	$246,552	$192,387	$135,365	$1,488,765		$540,485	$688,381	$127,997	$131,902	$1,193,088	$185,737	$109,940
Other (engineering)	X	$29,046	$50,832	$50,473	$30,203	$35,583	$21,970	$26,259	$23,409			$267,776	$109,999	$67,307	$44,734	$45,736	$210,340		$57,436
Results of the survey																			
Survey received		$139,051	$215,736	$64,463	$59,170	$309,374	$138,518	$245,788	$165,364	$91,090	$1,225,088	$203,466	$517,218	$644,214	$140,769	$126,352	$1,164,015	$178,591	$85,948
No response		$1,396	$62,542	$54,684	$32,378	$11,196		$3,009	$50,432	$44,275	$209,391	$50,523	$98,043	$90,831	$29,953	$41,086	$182,804	$5,882	$71,228
Not surveyed		$2,233	$1,317	$10,200	$28,632	$848	$830	$24,014			$54,287	$13,787	$35,223	$20,642	$2,009	$10,200	$56,609	$1,264	$10,200

Results expressed in terms of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and control	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Total in Survey Database		$1,428,554	$0	$112,304	$227,870	$123,554	$47,629	$48,610	$16,132	$174,629	$230,394	$61,181	$124,826	$142,960	$94,243	$24,222	$559,967	$868,587
In percentage of database		*100%*		*8%*	*16%*	*9%*	*3%*	*3%*	*1%*	*12%*	*16%*	*4%*	*9%*	*10%*	*7%*	*2%*	*39%*	*61%*
Initial Status (Question 2)																		
Functioning properly	Y	$1,282,542		$110,870	$217,092	$112,612	$43,629	$48,610	$1,972	$133,185	$181,395	$47,509	$124,826	$142,960	$94,243	$23,640	$532,812	$749,730
Not installed	NI	$50,175							$14,160	$19,066	$8,515	$8,434						$50,175
Not functioning properly	N	$95,837		$1,434	$10,778	$10,942	$4,000			$22,378	$40,484	$5,238				$582	$27,154	$68,682
Status at the time of the survey (Question 3)																		
Functioning properly	Y	$1,147,304		$107,134	$106,206	$113,892	$47,629	$48,610	$1,972	$151,798	$181,395	$47,509	$124,826	$142,960	$49,933	$23,640	$423,271	$724,033
Not installed	NIC	$50,175							$14,160	$19,066	$8,515	$8,434						$50,175
Not functioning properly	YA, N, NC	$231,075		$5,170	$121,664	$9,862				$3,765	$40,484	$5,238			$44,310	` $582	$136,696	$94,379
Status after follow-up program																		
Was functioning: no action	Y	$1,147,304		$107,134	$106,206	$113,892	$47,629	$48,610	$1,972	$151,798	$181,395	$47,509	$124,826	$142,960	$49,933	$23,640	$423,271	$724,033
Remedial provided	YA	$135,119		$5,170	$92,108	$8,592				$3,765	$25,484						$105,870	$29,249
Still not installed (plant not responding)	NIC	$50,175							$14,160	$19,066	$8,515	$8,434						$50,175
Still not working (plant not responding)	NC	$73,076			$24,295	$1,270						$2,619			$44,310	$582	$25,565	$47,511
Plant will fix it on its own	N	$22,880			$5,281						$15,000	$2,619					$5,261	$17,619
Current and past problems																		
Never any problem		$1,088,445		$100,890	$77,409	$113,692	$47,629	$41,132	$1,972	$140,192	$176,660	$47,509	$124,826	$142,960	$49,933	$23,640	$380,752	$707,692
Mis-specified	M	$25,337		$6,244		$892					$15,000	$2,619				$582	$7,136	$18,201
Lack of parts	P	$64,269		$5,170	$10,461			$3,033		$11,606	$33,999						$18,664	$45,605
Lack of repairs	R	$88,588			$32,793	$7,700				$3,765					$44,310		$40,493	$48,075
Lack of supplies	S	$116,387			$107,207			$4,445			$4,735						$111,652	$4,735
Lack of trained operators	T																	
Other problems	Z, ""	$45,549				$1,270			$14,160	$19,066		$11,053					$1,270	$44,279
Maintenance actions at the time of the survey (Question 4)																		
No maintenance	N	$693,494		$105,245	$48,580	$94,124	$43,629	$33,380	$15,587	$68,381	$63,502	$25,981	$39,069	$114,203	$27,486	$14,328	$324,957	$368,537
Calibration	C	$265,005		$5,625	$83,324	$20,223		$2,800		$42,595	$77,527	$5,592	$26,737			$582	$111,972	$153,033
Supplies	S	$39,603			$24,381	$427			$545						$14,250		$24,808	$14,795
Parts (or parts and the above)	P	$137,141			$46,873			$8,270		$32,730	$27,161			$22,107			$55,143	$81,998
Repairs (or repairs and the above)	R	$262,425		$1,434	$24,712	$8,780	$4,000	$4,160		$7,007	$62,204	$29,608	$59,020		$52,507	$8,992	$43,087	$219,338
Other (cleaning...)	Z	$30,886								$23,916				$6,650		$321		$30,886

Results expressed in terms of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Total in Survey Database		$139,051	$215,736	$64,463	$59,170	$309,374	$138,518	$245,788	$165,364	$91,090	$1,225,088	$203,466	$517,218	$644,214	$140,769	$126,352	$1,164,015	$178,591	$85,948
In percentage of database		*10%*	*15%*	*5%*	*4%*	*22%*	*10%*	*17%*	*12%*	*6%*	*86%*	*14%*	*36%*	*45%*	*10%*	*9%*	*81%*	*13%*	*6%*
Initial Status (Question 2)																			
Functioning properly	Y	$97,310	$204,558	$64,463	$53,736	$307,447	$112,746	$205,134	$146,058	$91,090	$1,100,089	$182,474	$467,516	$573,171	$115,503	$126,352	$1,025,703	$178,591	$78,248
Not installed	NI	$41,741	$8,434								$50,175		$8,434	$27,581	$14,160		$50,175		
Not functioning properly	N		$2,744		$5,434	$1,928	$25,772	$40,654	$19,306		$74,844	$20,992	$41,268	$43,462	$11,106		$88,137		$7,700
Status at the time of the survey (Question 3)																			
Functioning properly	Y	$86,441	$109,296	$64,463	$56,314	$309,374	$98,189	$201,570	$143,528	$78,129	$1,005,862	$141,442	$402,547	$493,548	$124,857	$126,352	$882,765	$178,591	$85,948
Not installed	NIC	$41,741	$8,434								$50,175		$8,434	$27,581	$14,160		$50,175		
Not functioning properly	YA, N, NC	$10,869	$98,006		$2,856		$40,329	$44,218	$21,836	$12,961	$169,051	$62,024	$106,237	$123,086	$1,752		$231,075		
Status after follow-up program																			
Was functioning: no action	Y	$86,441	$109,296	$64,463	$56,314	$309,374	$98,189	$201,570	$143,528	$78,129	$1,005,862	$141,442	$402,547	$493,548	$124,857	$126,352	$882,765	$178,591	$85,948
Remedial provided	YA	$4,886	$51,844		$2,856		$20,129	$25,868	$16,575	$12,961	$91,407	$43,712	$85,290	$48,077	$1,752		$135,119		
Still not installed (plant not responding)	NIC	$41,741	$8,434								$50,175		$8,434	$27,581	$14,160		$50,175		
Still not working (plant not responding)	NC	$5,983	$46,162				$5,200	$15,731			$54,764	$18,312	$20,947	$52,129			$73,076		
Plant will fix it on its own	N						$15,000	$2,619	$5,261		$22,880			$22,880			$22,880		
Current and past problems																			
Never any problem		$86,441	$103,426	$64,463	$51,367	$301,290	$93,739	$192,390	$122,460	$72,868	$955,992	$132,453	$373,668	$466,975	$121,450	$126,352	$823,906	$178,591	$85,948
Mis-specified	M		$7,344				$15,000	$2,619	$374		$25,337		$6,452	$17,619	$1,266		$25,337		
Lack of parts	P	$8,515					$10,370	$25,484	$19,900		$53,899	$10,370	$25,484	$35,752	$3,033		$64,269		
Lack of repairs	R	$3,038	$44,310			$4,042	$3,765	$9,932	$15,781	$7,700	$74,594	$13,974	$17,012	$71,556			$88,568		
Lack of supplies	S	$7,831	$50,952		$7,803	$4,042	$15,644	$12,744	$6,849	$10,522	$69,718	$46,669	$84,899	$30,628	$860		$116,387		
Lack of trained operators	T																		
Other problems	Z, **	$33,226	$9,704					$2,619			$45,549		$9,704	$21,885	$14,160		$45,549		
Maintenance actions at the time of the survey (Question 4)																			
No maintenance	N	$127,831	$82,936	$48,858	$36,480	$126,910	$48,523	$95,956	$113,926	$12,074	$585,701	$107,793	$225,319	$309,316	$107,001	$51,858	$545,757	$109,201	$38,536
Calibration	C	$2,800	$45,911	$9,472	$10,987	$48,720	$48,987	$85,314	$7,553	$5,261	$201,250	$63,755	$134,929	$104,848	$19,228	$6,000	$235,980	$13,553	$15,472
Supplies	S	$5,620	$25,948		$6,269	$545		$427	$794		$39,603		$24,381	$14,250	$972		$39,603		
Parts (or parts and the above)	P					$37,049	$14,509	$38,607	$24,869	$22,107	$130,847	$6,294	$47,792	$64,209	$3,033	$22,107	$115,034		$22,107
Repairs (or repairs and the above)	R	$2,800	$60,941	$6,133	$5,434	$65,264	$26,499	$25,484	$18,222	$51,648	$236,801	$25,624	$78,148	$127,678	$10,214	$46,367	$203,405	$49,187	$9,833
Other (cleaning...)	Z					$30,886					$30,886		$6,650	$23,916	$321		$24,236	$6,650	

Results expressed in terms of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and control	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Reason for contact at the time of the survey (Question 5)																		
Information	I	$15,972		$374		$2,187	$1,386	$3,033								$8,992	$6,980	$8,992
Calibration	C	$34,809		$5,170	$5,261	$2,807				$21,571							$13,238	$21,571
Technical Support	S	$45,242		$20,315	$4,888	$8,572		$3,033				$8,434					$36,808	$8,434
Parts, supplies (or parts and the above)	P	$213,250			$75,443	$2,352	$11,942			$28,965	$55,703	$5,592		$28,757		$4,496	$89,737	$123,513
Repairs (or repairs and the above)	R	$90,864			$15,783	$15,400				$15,371					$44,310		$31,183	$59,681
Other (cleaning...)	Z	$3,419								$800		$2,619						$3,419
TOTAL		$403,555		$25,859	$101,374	$31,318	$13,328	$6,066		$66,707	$55,703	$16,645		$28,757	$44,310	$13,488	$177,945	$225,610
Frequency of use (Question 6)																		
Continuously	C	$771,405		$4,206	$59,811	$27,762	$14,950	$20,291	$970	$125,570	$161,000	$44,890	$95,423	$142,960	$49,933	$23,640	$127,019	$644,386
Often	O	$355,176		$67,795	$138,643	$72,773	$20,744	$27,452			$18,396	$2,619	$10,753				$325,408	$29,768
Rarely	R	$182,483		$32,998	$14,526	$13,675	$11,935	$538	$501	$25,768	$19,000		$18,650		$44,310	$582	$73,672	$108,811
Never	N	$107,318		$5,870	$13,852	$1,644		$330	$14,661	$23,291	$33,999	$13,672					$21,696	$85,623
Other answers / no answer		$12,172		$1,434	$3,038	$7,700											$12,172	
Energy conservation results (Question 7)																		
Excellent	E	$476,982		$18,437	$97,955	$29,684	$30,618	$21,463		$53,042	$14,504	$21,097	$34,748	$114,203	$27,486	$13,746	$198,157	$278,825
Some results	S	$730,475		$84,009	$122,577	$79,228	$16,832	$26,817	$1,471	$98,757	$125,012	$26,412	$43,691	$28,757	$66,757	$10,156	$329,463	$401,012
Poor results	P	$90,639		$1,685	$3,560	$3,846				$3,765	$31,396		$46,387				$9,091	$81,548
No results	N	$91,742		$6,739	$740	$2,536		$330	$14,661	$19,066	$33,999	$13,672					$10,345	$81,398
Other answers / no answer		$38,716		$1,434	$3,038	$8,260	$179				$25,484					$321	$12,911	$25,805
Synthesis of Questions 6 and 7 (with % of valid answers)																		
Excellent	E	$476,982		$18,437	$97,955	$29,684	$30,618	$21,463		$53,042	$14,504	$21,097	$34,748	$114,203	$27,486	$13,746	$198,157	$278,825
Some results, used continuously	S + C	$338,857		$2,810	$27,086	$10,946	$451	$7,960	$970	$68,764	$121,012	$23,793	$14,288	$28,757	$22,447	$9,574	$49,253	$289,604
Some results, used often	S + O	$216,482		$50,380	$70,619	$59,346	$4,446	$18,319				$2,619	$10,753				$203,110	$13,372
Some results, used rarely or never	S + R,N	$175,136		$30,818	$24,872	$8,937	$11,935	$538	$501	$29,993	$4,000		$18,650		$44,310	$582	$77,100	$98,036
Poor results / Some results	P, S	$182,381		$8,424	$4,300	$6,382		$330	$14,661	$22,831	$65,394	$13,672	$46,387				$19,436	$162,945
Total		$1,389,838		$110,870	$224,832	$115,294	$47,450	$48,610	$16,132	$174,629	$204,910	$61,181	$124,826	$142,960	$94,243	$23,901	$547,056	$842,782

Results expressed in terms of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Reason for contact at the time of the survey (Question 5)																			
Information	I					$1,386	$8,992		$5,594		$14,586	$1,386	$10,378		$5,594		$15,972		
Calibration	C					$21,571			$7,977	$5,261	$34,809		$5,170	$26,832	$2,807		$34,809		
Technical Support	S		$9,326			$20,033			$15,883		$29,251	$15,991	$40,471	$3,879	$892		$45,242		
Parts, supplies (or parts and the above)	P	$7,995	$5,592		$7,880	$39,657	$15,690	$84,086	$24,982	$27,368	$171,430	$41,820	$117,531	$71,260	$2,352	$22,107	$184,493	$6,650	$22,107
Repairs (or repairs and the above)	R		$44,310				$3,765		$35,089	$7,700	$72,642	$18,222	$10,522	$72,642	$7,700		$83,164		$7,700
Other (cleaning...)	Z							$2,619	$800		$3,419			$3,419			$3,419		
TOTAL		$7,995	$59,228		$7,880	$82,647	$28,447	$86,705	$90,325	$40,329	$326,137	$77,419	$184,071	$178,032	$19,345	$22,107	$367,099	$6,650	$29,807
Frequency of use (Question 6)																			
Continuously	C	$38,329	$78,090	$57,264	$17,206	$199,131	$85,260	$179,313	$38,683	$78,129	$736,701	$34,704	$234,852	$374,131	$36,069	$126,352	$548,530	$147,826	$75,049
Often	O	$26,386	$65,480		$32,952	$61,329	$31,683	$21,644	$110,441	$5,261	$238,839	$116,336	$168,613	$113,989	$72,573		$333,922	$13,553	$7,700
Rarely	R	$29,228	$55,717	$7,199	$7,578	$43,949	$21,575	$997	$16,240		$144,977	$37,506	$52,319	$114,506	$15,658		$166,297	$12,987	$3,199
Never	N	$42,071	$16,449			$4,965		$43,834			$93,832	$13,486	$58,395	$33,888	$15,035		$103,093	$4,225	
Other answers / no answer		$3,038			$1,434					$7,700	$10,738	$1,434	$3,038	$7,700	$1,434		$12,172		
Energy conservation results (Question 7)																			
Excellent	E	$37,247	$77,396	$42,976	$27,447	$111,319	$68,040	$56,667	$46,254	$9,635	$409,344	$67,638	$152,927	$230,504	$41,575	$51,976	$343,539	$88,907	$44,536
Some results	S	$55,015	$120,999	$21,487	$29,724	$179,924	$51,513	$131,918	$112,527	$27,368	$598,075	$132,400	$288,316	$336,401	$77,768	$27,989	$645,766	$43,297	$41,412
Poor results	P	$1,120			$565	$16,396	$18,965	$997	$6,209	$46,387	$90,253	$386	$6,395	$35,161	$2,696	$46,387	$44,252	$46,387	
No results	N	$42,071	$17,341			$1,235		$30,722	$374		$90,873	$869	$41,058	$33,888	$16,796		$91,742		
Other answers / no answer		$3,598			$1,434	$500		$25,484		$7,700	$36,542	$2,173	$28,522	$8,260	$1,934		$38,716		
Synthesis of Questions 6 and 7 (with % of valid answers)																			
Excellent	E	$37,247	$77,396	$42,976	$27,447	$111,319	$68,040	$56,667	$46,254	$9,635	$409,344	$67,638	$152,927	$230,504	$41,575	$51,976	$343,539	$88,907	$44,536
Some results, used continuously	S + C	$11,613	$23,905	$14,288	$3,421	$113,485	$29,092	$105,162	$15,783	$22,107	$337,865	$992	$129,173	$166,944	$14,751	$27,989	$293,012	$15,332	$30,513
Some results, used often	S + O	$15,294	$42,269		$19,290	$18,759	$16,046	$13,644	$85,919	$5,261	$134,811	$81,671	$95,088	$69,951	$51,442		$198,029	$10,753	$7,700
Some results, used rarely or never	S + R,N	$28,108	$54,825	$7,199	$7,013	$47,679	$6,375	$13,112	$10,825		$125,399	$49,737	$64,055	$99,506	$11,575		$154,725	$17,212	$3,199
Poor results / Some results	P, S	$43,191	$17,341		$565	$17,630	$18,965	$31,719	$6,583	$46,387	$181,126	$1,255	$47,453	$69,049	$19,492	$46,387	$135,994	$46,387	
Total		$135,453	$215,736	$64,463	$57,736	$308,874	$138,518	$220,304	$165,364	$83,390	$1,188,545	$201,293	$488,696	$635,954	$138,835	$126,352	$1,125,299	$178,591	$85,948

Results expressed in terms of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and control	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Breakdown of problems by status after follow-up program																		
Was functioning; no action	Y																	
Never any problem		$1,088,445		$100,890	$77,409	$113,692	$47,629	$41,132	$1,972	$140,192	$176,660	$47,509	$124,826	$142,960	$49,933	$23,640	$380,752	$707,692
Mis-specified	M	$6,244		$6,244													$6,244	
Lack of parts	P	$19,900			$5,261			$3,033		$11,606							$8,294	$11,606
Lack of repairs	R	$4,042			$4,042												$4,042	
Lack of supplies	S	$28,674			$19,494			$4,445			$4,735						$23,939	$4,735
Lack of trained operators	T																	
Other problems	Z																	
Remedial provided	YA																	
Mis-specified	M	$892				$892											$892	
Lack of parts	P	$30,654		$5,170							$25,484						$5,170	$25,484
Lack of repairs	R	$21,985			$10,520	$7,700				$3,765							$18,220	$3,765
Lack of supplies	S	$81,588			$81,588												$81,588	
Lack of trained operators	T																	
Other problems	Z																	
Still not installed (plant not responding)	NIC																	
Other problems	" "	$41,660							$14,160	$19,066		$8,434						$41,660
Lack of parts	P	$8,515									$8,515							$8,515
Still not working (plant not responding)	NC																	
Mis-specified	M	$582														$582		$582
Lack of parts	P	$5,200			$5,200												$5,200	
Lack of repairs	R	$57,280			$12,970										$44,310		$12,970	$44,310
Lack of supplies	S	$6,125			$6,125												$6,125	
Lack of trained operators	T																	
Other problems	Z	$3,889				$1,270						$2,619					$1,270	$2,619
Plant will fix it on its own	N																	
Mis-specified	M	$17,619									$15,000	$2,619						$17,619
Lack of parts	P																	
Lack of repairs	R	$5,261			$5,261												$5,261	
Lack of supplies	S																	
Lack of trained operators	T																	
Other problems	Z																	

Results expressed in terms of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Breakdown of problems by status after follow-up program																			
Was functioning; no action	Y																		
Never any problem		$86,441	$103,426	$64,463	$51,367	$301,290	$93,739	$192,390	$122,460	$72,868	$955,992	$132,453	$373,668	$466,975	$121,450	$126,352	$823,906	$178,591	$85,948
Mis-specified	M		$5,870						$374		$6,244		$5,870		$374		$6,244		
Lack of parts	P								$19,900		$19,900			$16,867	$3,033		$19,900		
Lack of repairs	R					$4,042						$4,042	$4,042				$4,042		
Lack of supplies	S				$4,947	$4,042	$4,450	$9,180	$794	$5,261	$23,727	$4,947	$18,968	$9,706			$28,674		
Lack of trained operators	T																		
Other problems	Z																		
Remedial provided	YA																		
Mis-specified	M		$892								$892				$892		$892		
Lack of parts	P						$5,170	$25,484			$25,484	$5,170	$25,484	$5,170			$30,654		
Lack of repairs	R						$3,765		$10,520	$7,700	$21,985			$21,985			$21,985		
Lack of supplies	S	$4,886	$50,952		$2,856		$11,194	$384	$6,055	$5,261	$43,046	$38,542	$59,806	$20,922	$860		$81,588		
Lack of trained operators	T																		
Other problems	Z																		
Still not installed (plant not responding)	NIC																		
Other problems	" "	$33,226	$8,434								$41,660		$8,434	$19,066	$14,160		$41,660		
Lack of parts	P	$8,515									$8,515			$8,515			$8,515		
Still not working (plant not responding)	NC																		
Mis-specified	M		$582								$582		$582				$582		
Lack of parts	P						$5,200					$5,200		$5,200			$5,200		
Lack of repairs	R	$3,038	$44,310					$9,932			$47,348	$9,932	$12,970	$44,310			$57,280		
Lack of supplies	S	$2,945						$3,180			$2,945	$3,180	$6,125				$6,125		
Lack of trained operators	T																		
Other problems	Z		$1,270					$2,619			$3,889		$1,270	$2,619			$3,889		
Plant will fix it on its own	N																		
Mis-specified	M						$15,000	$2,619			$17,619			$17,619			$17,619		
Lack of parts	P																		
Lack of repairs	R								$5,261		$5,261			$5,261			$5,261		
Lack of supplies	S																		
Lack of trained operators	T																		
Other problems	Z																		

Results expressed in terms of dollar value

	Code	TOTAL	By Equipment Type															
			"Portable Equipment"						"Fixed Equipment"									
			educational	portable electrical instr.	portable combustion analyzers	other portable instr.	maintenance equipment	computers and data processing	fixed instrumentation and control	fixed flowmeters	fixed boiler equipment (incl. com	steam traps	valves, insulation	energy management systems	fixed electrical equipment	specialized process equipment	Total "portable"	Total "fixed"
Breakdown of "frequency of use" by "conservation results"																		
Continuously	C																	
Excellent	E	$356,591		$1,396	$32,725	$16,817	$14,499	$12,330		$53,042	$14,504	$21,097	$34,748	$114,203	$27,486	$13,746	$77,766	$278,825
Some results	S	$338,857		$2,610	$27,086	$10,946	$451	$7,960	$970	$68,764	$121,012	$23,793	$14,288	$28,757	$22,447	$9,574	$49,253	$289,604
Poor results	P	$50,152								$3,765			$46,387					$50,152
No results	N																	
Other answers / no answer		$25,805									$25,484					$321		$25,805
Often	O																	
Excellent	E	$120,390		$17,041	$65,230	$12,867	$16,119	$9,133									$120,390	
Some results	S	$216,482		$50,380	$70,619	$59,348	$4,446	$18,319				$2,619	$10,753				$203,110	$13,372
Poor results	P	$17,190			$794						$16,396						$794	$16,396
No results	N	$374		$374													$374	
Other answers / no answer		$739				$580	$179										$739	
Rarely	R																	
Excellent	E																	
Some results	S	$157,799		$30,818	$11,760	$8,937	$11,935	$538	$501	$25,768	$4,000		$18,650		$44,310	$582	$63,988	$93,811
Poor results	P	$23,297		$1,685	$2,766	$3,846					$15,000						$8,297	$15,000
No results	N	$1,387		$495		$892											$1,387	
Other answers / no answer																		
Never	N																	
Excellent	E																	
Some results	S	$17,337			$13,112					$4,225							$13,112	$4,225
Poor results	P																	
No results	N	$89,981		$5,870	$740	$1,644		$330	$14,661	$19,066	$33,999	$13,872					$8,584	$81,398
Other answers / no answer																		

Results expressed in terms of dollar value

	Code	By Country									Recipient Type		Bought from...				Bought in...		
		Latvia	Bulgaria	Czech Republic	Estonia	Hungary	Lithuania	Poland	Romania	Slovakia	Plant	Other (engineering)	from Manufacturer	from vendor	from nation-wide catalog	unknown	in US	in CEE	unknown
Breakdown of "frequency of use" by "conservation results"																			
Continuously	C																		
Excellent	E	$26,716	$54,185	$42,976	$13,785	$85,325	$52,403	$48,867	$22,900	$9,635	$322,879	$33,712	$80,196	$203,422	$20,997	$51,976	$225,948	$86,107	$44,536
Some results	S	$11,613	$23,905	$14,288	$3,421	$113,485	$29,092	$105,162	$15,783	$22,107	$337,865	$992	$129,173	$168,944	$14,751	$27,989	$293,012	$15,332	$30,513
Poor results	P						$3,765			$46,387	$50,152			$3,765		$46,387	$3,765	$46,387	
No results	N																		
Other answers / no answer						$321		$25,484			$25,805		$25,484		$321		$25,805		
Often	O																		
Excellent	E	$10,532	$23,211		$13,662	$25,995	$15,637	$8,000	$23,354		$86,465	$33,926	$72,731	$27,082	$20,577		$117,590	$2,800	
Some results	S	$15,294	$42,269		$19,290	$18,759	$16,046	$13,644	$85,919	$5,261	$134,811	$81,671	$95,088	$69,951	$51,442		$198,029	$10,753	$7,700
Poor results	P					$16,396			$794		$17,190		$794	$16,396			$17,190		
No results	N								$374		$374				$374		$374		
Other answers / no answer		$560				$179						$739		$560	$179		$739		
Rarely	R																		
Excellent	E																		
Some results	S	$28,108	$54,825	$7,199	$7,013	$43,454	$6,375		$10,825		$121,174	$36,625	$46,718	$99,506	$11,575		$141,613	$12,987	$3,199
Poor results	P	$1,120			$565		$15,200	$997	$5,415		$22,911	$386	$5,601	$15,000	$2,696		$23,297		
No results	N		$892			$495					$892	$495			$1,387		$1,387		
Other answers / no answer																			
Never	N																		
Excellent	E																		
Some results	S					$4,225		$13,112			$4,225	$13,112	$17,337				$13,112	$4,225	
Poor results	P																		
No results	N	$42,071	$16,449			$740		$30,722			$89,607	$374	$41,058	$33,888	$15,035		$89,981		
Other answers / no answer																			

APPENDIX K

CONTACT INFORMATION FOR THE ORGANIZATIONS THAT RECEIVED EQUIPMENT

BULGARIA

Company:	**"Sodi" Soda Ash Plant**
Contact:	Mr. Stephan Stephanov
Address:	SO "Dewnjia" 9160 Dewnia Bulgaria
Phone:	359-519-3128
Fax:	359-519-3195
Updated from survey?	No; New name; Fax OK

Company:	**Kremlkovtzi Steel Co. - Cold Rolling Mill**
Contact:	Mr. Roumen Petrov, Director Power Engineering Department
Address:	kv. Botounets 1870 Sofia Bulgaria
Phone:	359-2-895-006
Fax:	359-2-879-806
Updated from survey?	Fax OK

Company:	**Chimco Company Fertilizer Works**
Contact:	Mr. Georgi Andonov, Process Engineer
Address:	S. Vratza 3037 Bulgaria
Phone:	359-92-232-19 or 361-97 or 2-23-81 or 2-22-71 or 2-40-81
Fax:	359-92-361-92 or 331-18
Updated from survey?	Yes

Company:	**Izida Ceramics**
Contact:	Mr. Boris Cholev, Deputy Director, Technical
Address:	2109 Elin Pelin Sofia Bulgaria
Phone:	359-2-725-2133 or ? 99-71-51
Fax:	359-2-725-2046
Updated from survey?	No; Fax not OK?

Company:	**Combinat Serdika**
Company Description:	Serdika Milk Plant
Contact:	Mr. Boris Nanov, Technical Manager
Address:	Ohridsko Ezero Str. No. 3 1330 Sofia Bulgaria
Phone:	359-2-223-633
Fax:	359-2-221-935 or 2-465-314
Updated from survey?	Fax OK

Company:	**"Pharmacia" Chemical and Pharmaceutical Works**
Contact:	Mr. Simeon Georgiev, General Director
Address:	No. 3 Samokovfko Chaussee 2600 Dupnica, Bulgaria
Phone:	359-0701-242-81
Fax:	359-0701-223-65
Updated from survey?	Yes

Company:	**Poultry Complex**
Contact:	Dr. Alexandrov, Managing Director
Address:	9300 Dobritch Bulgaria
Phone:	359-582-2872
Fax:	359-582-29104
Updated from survey?	No

Company:	**"Galatex Ltd." Cotton Processing Plant**
Company Description:	formerly "Parvi Mai"
Contact:	Mr. Ovanes Taschtschijan, Director Production and Technology
Address:	No. 1 Stamatov Str. 9003 Varna, Afparuhovo Bulgaria
Phone:	359-52-77-41-33 or 77-41-07
Fax:	359-52-77-44-19
Updated from survey?	Yes

Company:	**Ministry of Industry**
Contact:	Dipl. El. Eng. Dobrin Oreshkov, Manager, Energy Efficiency Department
Address:	8 Slavyanska str. 1046 Sofia, Bulgaria
Phone:	359 2 87 32 25 or 867 26 95
Fax:	359 2 80 17 14
Updated from survey?	Yes

Company:	**Committee on Energy**
Contact:	Mr. Ivan Yurukov, Head, Energy Efficiency Division
Address:	8 Triadista Street 1040 Sofia, Bulgaria
Phone:	359-2-882-687
Fax:	359-2-875-826
Updated from survey?	No

Company:	**Ecotech Products**
Contact:	Mr. Christian Spassov, Director
Address:	66 Dimitar Manov Str. Sofia 1408, Bulgaria
Phone:	359-2-541-267
Fax:	359-2-547-206
Updated from survey?	Yes

CZECH REPUBLIC

Company:	**Pragolaktos Milk Plant**
Contact:	Mr. Holy
Address:	Ceskobrodska 1174 198 99 Praha 9 Czech Republic
Phone:	422-71-81-51
Fax:	422-83-87-05
Updated from survey?	No

Company:	**Prazske Pivovary Branik**
Company Description:	Brewery
Contact:	Mr. Josef Dolansky,
Address:	Udolni 1/212 147 00 Praha 4 Czech Republic
Phone:	42-2-46-18-41-5
Fax:	42-2-46-08-42
Updated from survey?	just names and numbers

Company:	**DETOA spol, s r.o.**
Company Description:	Wood Products, formerly TOFA Albrechtice
Contact:	Mr. Miroslav Stepanek, Technical Deputy Manager
Address:	Jiretin p.B. 468 43 Albrechtice v Jizerskych horach Czech Republic
Phone:	0428-65-541
Fax:	0428-65-509
Updated from survey?	Yes

Company:	**MILETA Plant X**
Contact:	Mr. Havlak,
Address:	Cerny Dul 508 01 Horice Czech Republic
Phone:	438-92-106
Fax:	(42-435) 311 or (435) 3740
Updated from survey?	No

Company:	**AUTOBRZDY, spol s r.o.**
Contact:	Mr. Vladimir Teplik, Executive Director
Address:	Na Roli 26 466 90 Jablonec nad Nisou Czech Republic
Phone:	422-262-70
Fax:	422-245-27
Updated from survey?	Not phone and fax

161

Company:	**INSTAR ITS Ostrava s.r.o.**
Company Description:	formerly INORGA
Contact:	Mr. Antonin Riman, President
Address:	28 rijna 205 500 37 Ostrava Czech Republic
Phone:	42-2-069-50037
Fax:	42-2-069-50037
Updated from survey?	Yes, not numbers and name

Company:	**SEVEn - Center for Energy Efficiency**
Contact:	Mr. Jaroslav Marousek, Executive Director
Address:	Sleska 7, PO Box 146 120 29 Praha 2 Czech Republic
Phone:	42-2-256-104
Fax:	42-2-258-556
Updated from survey?	No

162

ESTONIA

Company:	**Baltic Ship Repairers**
Contact:	Mr. Valeri Kovalenko, Technical Director
Address:	Kopli str.103 EE 0017 Tallinn Estonia
Phone:	372-2-47-94-08
Fax:	376-2-39-54-15 ?
Updated from survey?	Yes (fax seems strange (376))

Company:	**AS Termox**
Company Description:	formerly: Tartu District Heating - Ropka Station
Contact:	Mr. Leo Märtin, Project Manager
Address:	Tähe 112-A EE 2400 Tartu Estonia
Phone:	372-7-474-924
Fax:	372-7-475-527
Updated from survey?	Yes

Company:	**Püssi Puitlaastplaatide Kombinat**
Company Description:	Püssi Fiberboard Factory
Contact:	Mr. Nikolai Neshumayev, Chief Engineer
Address:	Maidla tee 7 EE2041 Püssi Estonia
Phone:	372-33-57-874
Fax:	372-33-57-874
Updated from survey?	Yes

Company:	**Eesti Fosforiit**
Company Description:	Eesti Phosphate Chemical Plant
Contact:	Mr. Peeter Nikopensius, Chief Engineer
Address:	Maardu Fosforidi 4 Estonia
Phone:	372- -23-41-32
Fax:	
Updated from survey?	No

Company:	**Tallinn Technical University**
Contact:	Dr. Arvo Ots, Head of Thermal Engineering Department
Address:	Thermal Engineering Department Kopli 116 EE-0017 Tallinn Estonia
Phone:	372-2-47-44-32
Fax:	372-2-47-40-95
Updated from survey?	Yes

HUNGARY

Company:	**Magyaróvári Timföld- és Mûkorund Kft**
Company Description:	Motim Alumina Factory
Contact:	Dr. Zoltán Sûdi, Energy Manager
Address:	Mosonmagyaróvár, Timfold ut 1 75 H-9201 Mosonmagyaróvár, pf. 75 Hungary
Phone:	36-98-313-022
Fax:	36-98-315-527
Updated from survey?	Yes

Company:	**Budapesti Tavhoszolgaltato Reszenytarsasag**
Company Description:	District Heating Works of Budapest
Contact:	Mr. Gabor Gönnert, Head, District Heating Technology Development
Address:	Kalotaszeg utca 31 H-1116 Budapest Hungary
Phone:	36-1-161-0290
Fax:	36-1-181-1545
Updated from survey?	Yes

Company:	**BUSZESZ Budafoki Élestzô- és Szeszgyár**
Company Description:	Budapest Yeast and Alcohol Factory
Contact:	Mr. Géza Szabó, Chief Engineer
Address:	Gyár utca 5-9 H-1775 Budapest Hungary
Phone:	36-1-22-66-6940
Fax:	36-1-22-66-5011
Updated from survey?	No

Company:	**Csepel Fémmû Rt.**
Company Description:	Copper and Brass Works
Contact:	Mr. Attila Hídvégi, Chief Energetics Engineer
Address:	Gyepsor utca 1 H-1751 Budapest XXI Hungary
Phone:	36-1-276-2222 or 277-2222
Fax:	36-1-276-6260
Updated from survey?	Yes

Company:	**Fovarosi Sutoipari Vallalat**
Company Description:	Budapest Bakery
Contact:	Mr. Gyula Kasa, Technical Director
Address:	Angol utca 17-19. H-1149 Budapest Hungary
Phone:	36-1-18-31-389
Fax:	36-1-16-43-035
Updated from survey?	No

Company:	**Budapesti Vegyimûvek**
Company Description:	Basic Chemicals Plant
Contact:	Mr. Gyula Eifert, Deputy General Manager - Technical Affairs
Address:	Kén utca 5 H-1097 Budapest Hungary
Phone:	36-1-15-73-122
Fax:	36-1-14-77-702
Updated from survey?	No

Company:	**Budafoki Papirgyar**
Company Description:	Paper Plant
Contact:	Mr. Jozsef Farkas, Energy Manager
Address:	Gyar utca 15. H-1222 Budapest Hungary
Phone:	36-1-22-66-792
Fax:	36-1-22-66-153
Updated from survey?	Just the address

Company:	**Orosházi Üveggyár**
Company Description:	Glass Container Manufacturer
Contact:	Mr. Ferenc Gorbics, Technical Director
Address:	Orosháza, Csorvasi ut. 5 H-5901 Orosháza, pf. 118 Hungary
Phone:	36-68-311-011
Fax:	36-68-311-207
Updated from survey?	Yes

Company:	**EGI Contracting/Engineering Co. Ltd.**
Contact:	Mr. Zoltan Lontay, Head of Department
Address:	Bem rakpart 33-34, Pf. 15 H-1251 Budapest II Hungary
Phone:	36-1-201-81-82 or 201-86-52
Fax:	36-1-201-92-16 or 201-85-70
Updated from survey?	Yes

LATVIA

Company:	**Slokas Celulozes un Papira Fabrika**
Company Description:	Sloka Pulp and Paper Mill
Contact:	Mr. Gunars Dankfelds, Technical Director
Address:	Fabrikas icla 2 Jurmala, LV-2011 Latvia
Phone:	371-2-732-469 or home: 6-35040
Fax:	371-2-732-401
Updated from survey?	not person

Company:	**Jelgava District Heating Enterprise**
Contact:	Mr. Alberts Tocs, Head of Technical Department, Jelgava City Board
Address:	Liela str. 11 Jelgava, LV-3001 Latvia
Phone:	371-30-22224
Fax:	371-30-29059
Updated from survey?	Yes

Company:	**A/S "Preiju Siers"**
Company Description:	Preili Cheese-Making Plant
Contact:	Mr. Victor Solovyov, Director
Address:	Daugavpilsskaya Str. 75 Preili LV-5301 Latvia
Phone:	371-53-21136 or 22063 or private: 23130
Fax:	371-53-21402
Updated from survey?	not the person

Company:	**VU "Saulkalne"**
Company Description:	Saulkalne Lime Plant
Contact:	Mr. Anatolijs Avdejevs, Chief Engineer
Address:	s/n Saulkalne Riga Region LV-2117 Latvia
Phone:	371-2-947392 or 947287
Fax:	371-2-948-262
Updated from survey?	Yes

Company:	**Riga Technical University**
Contact:	Dr. Janis Bazhbauers, Professor, Faculty of Energy and Electronics
Address:	Kronvalda Bulv. 1 Riga LV-1010, Latvia
Phone:	371-2-32-3252
Fax:	371-8820094 or 8-830-067 (fax at AID) e-mail:janis@eef.rtu.lv
Updated from survey?	11/8/94 Yes

LITHUANIA

Company:	**Akcine Bendrove "Vilniaus Baldu Kombinatas"**
Company Description:	Vilnius Furniture Plant
Contact:	Mr. V Radzius, Technical Director
Address:	Savanoriu pr. 178 2600 Vilnius Lithuania
Phone:	370-2-65-32-73
Fax:	370-2-63-33-95
Updated from survey?	Yes

Company:	**Vilniaus "Pergale"**
Company Description:	Vilnius Sweets Plant
Contact:	Mr. A. Juodkazis, Technical Director
Address:	Stirnu 25/28 2600 Vilnius Lithuania
Phone:	370-2-75-13-11
Fax:	370-2-75-11-35
Updated from survey?	Yes

Company:	**Alytus Wood Products Plant**
Contact:	Mr. Valentinas Anuzis, Deputy Director of Energy Services
Address:	Naujoji 124 4580 Alytus Lithuania
Phone:	370-2-35-58-281
Fax:	370-2-35-20-920
Updated from survey?	No

Company:	**AB "Palemono Keramika"**
Company Description:	Kaunas Ceramics Plant
Contact:	Mr. Antanas Martinaitis, Technical Director
Address:	Pamario 1 3023 Kaunas Taujanio Lithuania
Phone:	370-7-737-369 (verify)
Fax:	370-7-731-770 (verify)
Updated from survey?	Yes 10/4/94

Company:	**Lithuania State Power System**
Contact:	Mr. Vladas Paskevicius, Deputy General Director
Address:	14, Zveju Street 2600, Vilnius Lithuania
Phone:	370-2-73-46-38
Fax:	370-2-22-67-36
Updated from survey?	Yes

POLAND

Company:	**Zaklady Azotowe "Kedzierzyn"**
Company Description:	Kedzierzyn Nitrogen Works
Contact:	Mr. Henryk Nawrot, Chief Power Engineer
Address:	skr. Poczt 163 47-220 Kedzlerzyn-Kozle Poland
Phone:	48- -135-00 or 331-61
Fax:	48- -129-99 or 137-00
Updated from survey?	Yes but could not get fax through

Company:	**Huta "Ostrowiec" SA**
Company Description:	Ostrowiec Steel Plant
Contact:	Mr. Marian Strzelecki, Chief Power Engineer
Address:	ul. Samsonowicza 2 27-400 Ostrowiec Poland
Phone:	48-047-622505
Fax:	48-047-624142
Updated from survey?	Yes 11/8/94

Company:	**Cementownia Wierzbica w Wierzbicy**
Company Description:	Wierzbica Cement Plant
Contact:	Inz. Jan Chyb, Technical and Production Director
Address:	Stacja kolej. Jastrzab-bocznica wlasna 26-600 Wierzbica Poland
Phone:	48- 289-72 or through central: 221-21 (2-3-4)
Fax:	48- 221-25
Updated from survey?	Yes

Company:	**Zaklady Azotowe "Wloclawek"**
Company Description:	Wloclawek Nitrogen Production Facility
Contact:	Mr. Marek Lewandowski, Power Complex Director
Address:	ul. Torunska 222 87-805 Wloclawek Poland
Phone:	48-54-36-26-31 or 54-37-31-00
Fax:	48-54-36-19-83 or 54-37-36-70
Updated from survey?	Yes

Company:	**Blachownia Steam Power Plant**
Contact:	Mr. Zygmunt Bracha, Chief Power Engineer
Address:	ul. Energetykow 11 47-225 Kedzierzyn-Kozle Poland
Phone:	48- 393-65
Fax:	
Updated from survey?	No

Company:	**Elektrocieplownia Krakow-Leg**
Company Description:	Leg Thermal Electric Power Station
Contact:	Dr. Jan Krupa, Chief of Performance Analyses Department
Address:	ul. Cieplownicze 1 31-587 Krakow Poland
Phone:	48- 44-41-74 or 44-21-77 w. 610
Fax:	48- 44-41-74
Updated from survey?	11/8/94 name only

Company:	**Zespol Elektrocieplowni W Lodzi, No. 2**
Company Description:	The Thermal Power Company, Plant No. 2
Contact:	Mr. Cztonek Zarzadu, Technical Director
Address:	Ul. Andrzejewskiej 5 90-972 Lodz 6, skr poczt. 32 Poland
Phone:	48-42-74-11-98 or-43-91-94 or -74-97-01
Fax:	48-42-74-70-47
Updated from survey?	Yes

Company:	**Wola District Heating Plant**
Contact:	Mr. Zbigniew Skorzewski, Director
Address:	Warsaw Poland
Phone:	
Fax:	48-22-368136 ?
Updated from survey?	No

Company:	**Energopomiar**
Company Description:	Energy and Power Consulting Engineers
Contact:	Dr. Zygmunt Rozewicz, President
Address:	ul . gen. J. Sowinskiego 3 PO Box / Skr. Poczt. 402 44-101 Gliwice Poland
Phone:	48- 32-37-61-00 or 68-00
Fax:	48- 32-31-65-42
Updated from survey?	Yes

Company:	**FEWE - Polish Foundation for Energy Efficiency**
Contact:	Dr. Slawomir Pasierb, Director
Address:	Ul. Gorskiego 7-IIIp PL-00033 Warsaw Poland
Phone:	48-22-227-3271
Fax:	
Updated from survey?	No

ROMANIA

Company:	**SC Miorita SA**
Company Description:	Milk Processing Plant
Contact:	Eng. Cezar Popescu, Manager
Address:	19 Armata Poporului Blvd Bucharest 6 Romania
Phone:	401-631-11-61
Fax:	401-312-06-17
Updated from survey?	Fax not OK

Company:	**SC SIDEX SA - GALATI**
Company Description:	Galati Iron and Steel Works
Contact:	Mr. Sebastien Stavar, Assistant General Manager
Address:	1 Smardan Street Galati, Jud. Galati Romania
Phone:	tel/fax: 40-36-46-37-01
Fax:	40-36-430-568
Updated from survey?	Yes 11/8/94

Company:	**CET BUCHAREST SUD**
Company Description:	South Bucharest Thermal Power Station
Contact:	Eng. Gavrila Sofran, Manager
Address:	2 Releului Street Bucharest 3 Romania
Phone:	401-321-35-91
Fax:	401-321-35-91
Updated from survey?	Yes

Company:	**SC EXPUR SA**
Company Description:	Soybean Processing Plant
Contact:	Eng. Nicolae Leca, Technical Director
Address:	2 Industriel Street 8230 Urziceni, Jud. Ialomita Romania
Phone:	40-43-510-72
Fax:	40-43-515-55/510-73
Updated from survey?	Fax not OK

Company:	**SC Cimus SA**
Company Description:	Cimpulung Cement Plant
Contact:	Eng. Luighi Gheorghe Pepenel, Vice President
Address:	1 Brasovului Street Cimpulung 0425, Judetul Arges Romania
Phone:	40-48-11419; 11429; 12700; 12705; 21051
Fax:	40-48-22704
Updated from survey?	Yes

Company:	**SC DOLJCHIM SA**
Company Description:	Combinatil Chimic Craiova Plant - Fertilizer Plant
Contact:	Eng. Ioan Nica, General Manager
Address:	1100 Craiova Drunul European 70 Romania
Phone:	40-51-18-58-33
Fax:	40-51-18-64-71
Updated from survey?	Not phone and fax numbers

Company:	**SC GRIRO SA**
Company Description:	Pressure Vessel Plant
Contact:	Eng. Radu Balan, Vice President, Manufacturing Division
Address:	355-357 Calea Grivitei 78311 Bucharest 6 Romania
Phone:	401-665-40-90
Fax:	401-666-35-48
Updated from survey?	Yes

Company:	**SC CELHART DONARIS SA**
Company Description:	Paper Products Plant
Contact:	Eng. Nicolae Miru, Technical Manager
Address:	Calea Calarasi Km 10 Braila, Jud. Brailia Romania
Phone:	40-39-31642
Fax:	40-39-35833
Updated from survey?	No

Company:	**Agentia Romana Pentru Conservarea Energiei**
Company Description:	ARCE - Romanian Agency for Energy Conservation
Contact:	Eng. Corneliu Rotaru, General Director
Address:	Ministerul Industriilor 202 A. Splaiul Independentei 77208 Bucharest, Sector 6 Romania
Phone:	401-638-71-05 or 638-49-81
Fax:	401-312-31-97
Updated from survey?	Yes

SLOVAKIA

Company:	**Mostaren Brezno, a.s.**
Contact:	Ing. Peter Rusnak, Commercial Director
Address:	9 Mostaenska Str. 977 56 Brezno Slovakia
Phone:	42-867-63-21-71 to 75
Fax:	42-867-63-24-40
Updated from survey?	Yes

Company:	**Biotika AS**
Contact:	Ms. Elena Kostiviarova, Technical Director
Address:	976 13 Slovenska Lupca Slovakia
Phone:	42-88-742-445
Fax:	42-88-742-453
Updated from survey?	Yes

Company:	**Matador**
Contact:	Mr. Frantisek Dudas, Manager, Energetics
Address:	Kopcianska 2c 852 01 Bratislava Slovakia
Phone:	07-352 189
Fax:	
Updated from survey?	No

APPENDIX L

CONTACT INFORMATION FOR U.S. EQUIPMENT MANUFACTURERS

USAID EMERGENCY ENERGY PROGRAM FOR CENTRAL AND EASTERN EUROPE

CONTACT INFORMATION FOR U.S. EQUIPMENT

April 28, 1995

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Pyramid Automatics
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ALNOR INSTRUMENT COMPANY

USA Headquarters:
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Attn: Mr. Alan Traylor, Director of Marketing
Phone: (708) 677-3500
Fax: (708) 677-3539

European Headquarters:
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Edvard Berlingsgatan 1
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114

AMETEK

USA Headquarters:
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Austria & Hungary
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ANGUS ELECTRONICS

USA Headquarters:
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Fax: (317) 247-4749

APV CREPACO, INC

USA Headquarters:
APV CREPACO
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J. Tausk, General Manager
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Fax: (708) 678-4407

European Offices:

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Dk-8100 Aarhus C
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Fax: (45) 8619-5558

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APV PASILAC
Silkeborg Division
Pasteursvej
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Fax: (45) 8681-5611

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116

ARMSTRONG INTERNATIONAL, INC.

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Ecotech Products
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Fax (359 2) 541-267

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Termox AS Ltd.
Tähe 112-A
EE 2400 Tartu
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Partizanska 94
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Slovenia
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Parc Industriel des Hauts-Sarts
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USA Headquarters:
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Russia
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119827
GSP Moscow, G48
Konsomolsky Av 42
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8700 - Constanta
CP204
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Gasanalysis Sistems Eng.
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8700 - Constanta
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Cole Parmer International
Amex Sofia Office
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Fax: 359 2 22 37 24

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Phone: 359 2 819060
Fax: 359 2 687092

MBL Bulgaria ComputerLand
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1000 Sofia
Attn: Kamen S. Petroff
Phone: 359 2 87598
Fax: 359 2 818477

2 Plus Ltd.
10 Ivaz Voivoda Str.
1124 Sofia
Attn: Robert Kuenstler
Phone: 359 2 466173
Fax: 359 2 445409

Express Consult
51 Cherni Vrah Blvd.
Sofia
Attn: Nikolay Nikolov
Phone: 359 2 622 833
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Risk Electronics Ltd.
125 Tzarigradsko shosse Blvd, Block 26 B
1113 Sofia
Attn: Jordan Kissjov
Phone: 359 2 711171
Fax: 359 2 703196

GTI Ltd.
35-37 Klokotnitza Str.
1233 Sofia
Attn: Lazar Detchev
Phone: 359 2 325 081
Fax: 359 2 328 175

NOAC GmbH
215 Tsar Boris III Blvd.
1618 Sofia
Attn: Nina Blagoeva, General Manager
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18

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CENTECH
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Slovakia
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CONTROLOTRON

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SAE CONTROL a.s.
010 01 ZILINA
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Czech Republic
SCHINZEL GmbH
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Davis Instrument Manufacturing Co., Inc.
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DIETERICH STANDARD

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Dieterich Standard
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Phone: (303) 530-9600
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East European representatives: Honeywell offices

DRANETZ

USA Headquarters:
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International Representatives:

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184

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USA Headquarters:
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186

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A-1123 Vienna, Austria

The Foxboro Company
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Fax: 48 22 172 885

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Fluke Europe B.V. Export
Science Park Eindhoven 5110
5602 BD Eindoven
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Bulgaria
Czech Republic
Hungary
Poland
Romania
Russia
Slovak Republic
Slovenia

HOFFER FLOW CONTROLS, INC.

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Budejovicka 1
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Honeywell Austria GESMBH Organizacna Zlozka
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831 04 Bratislava
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189

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ITT

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1500 East Ninth Street
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Attn: Carol Ross, Sales
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Attn: Mr. John Halverson, Manager, Export Sales Department
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Eastern European Headquarters
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192

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193

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19

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196

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177

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193

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CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT
EUR-0030-C-00-2053-00

Energy Pricing, Energy Efficiency, and
Energy Sector Restructuring Component

Support to AEE Chapters

Task Completion Memorandum

Prepared for:

U.S. Agency for International Development
Bureau for Europe and NIS
Office of Environment, Energy,
and Urban Development
Energy and Infrastructure Division

Prepared by:

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December 1996

200

CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT

Task Completion Memorandum

Support to AEE Chapters

Summary Task Description

As part of its Energy Efficiency Market Development project in Hungary, Romania and Bulgaria, the U.S. Agency for International Development (USAID) has supported the setting up of local chapters of the Association of Energy Engineers (AEE), a U.S. professional organization headquartered in Atlanta. Under the project, approximately 15 potential consultants were selected from over 100 applicants, and provided a 3-4 week training program which included topics of energy auditing, energy efficiency technology, industrial production quality programs, financial analysis, and business practices for consultants. These 15 persons were also administered the AEE Certified Energy Manager examination (CEM) by AEE representatives, and are now certified.

To support their initial consulting efforts, USAID assisted these CEMs in selling their services for industrial energy audits, and provided technical assistance and measuring instruments for completing these audits. USAID provided donations of equipment on the order of $10,000 to $40,000 to industries participating in the local CEM audits. As this USAID program draws to a close, the CEMs have at least one good industrial audit reference for their business. Many have succeeded in obtaining follow-on contracts with the same plants, some have negotiated contracts with other industries, commercial and institutional facilities, and even residential apartment buildings. The CEMs have achieved local AEE Chapter status in their respective countries or cities, and are now focusing their efforts in using these Chapters to support their business and expand the private sector activities in energy efficiency services in these countries.

This task seeks to build upon the accomplishments of the USAID program and strengthen the local AEE chapters as professional organizations dedicated to the development of a market for energy efficiency services, and their members.

Specific Goals and Objectives

The objective of this assignment is to apply management, business and marketing skills in support of fledgling professional organizations working to support small business efforts in energy consulting and engineering services. As a result of this assignment, the local AEE Chapters will have business and marketing plans to follow in order to provide support to local energy consultants, grow in membership, and be able to exert some influence on energy policies and programs as they relate to their membership.

Expected Outputs

(1) Orientation will consist of an introductory training week at the Czech Management Center, attend the regional AEE conference in Budapest.. Participate as an observer, identifying the issues facing each AEE Chapter, and building a base for the work to be accomplished in the following steps.

(2) Review the status of the AEE Chapter(s) in the country, bylaws used for local incorporation, membership, and activities to date.

(3) Estimate the market for new membership for the Chapter and develop ideas for growth of Chapter membership under various scenarios of time commitment and financial investment.

(4) Work with the Chapter members to evaluate the local market for activities and products such as:

- -- training courses
- -- technical manuals
- -- services to building managers served by the district heating system (installation of metering, temperature control systems, data logging procedures, etc.)
- -- measuring services to industrial, commercial and institutional clients
- -- newsletter or other subscription service for technical information
- -- organization of a national conference on energy efficiency
- -- other activities as identified by chapter members.

(5) Develop a business plan for the Chapter over 3 years, based on (2) and (3) above.

(6) Provide a detailed marketing plan as part of the overall business plan.

(7) Prepare weekly reports on activities, summarizing how the time was spent and what was accomplished, what problems were identified.

(8) Summarize all the activities in a brief report containing the initial analysis of the AEE Chapter status, the business and marketing plans, discussion of activities undertaken in support of the Chapter, and recommendations for additional Chapter activities as well as outside support required.

Deliverables

Weekly reports as described in (7) above, final report as described in (8) above; printed AEE Chapter brochure

Results and Next Steps

Hagler Bailly recruited and assigned three short term advisors to work with the AEE Chapters in Hungary, Bulgaria, and Romania. These advisors worked closely with the AEE chapters and produced a business and marketing plan for each chapter, which is included in this Section of the final report. These plans enabled the Chapters to develop marketing materials, newsletters, and long-range activity plans and budgets for continuing the AEE activities in each country.

The next steps for each AEE Chapter will be to follow-up with these plans, adjust the business and marketing plans on an annual basis, and evaluate the results with respect to the overall AEE Chapter goals and objectives.

COMPENDIUM OF STRATEGIC BUSINESS PLANS FROM IN-COUNTRY ADVISORS TO ASSOCIATION OF ENERGY ENGINEERS CHAPTERS IN BULGARIA, HUNGARY AND ROMANIA

Prepared for:

U.S. Agency for International Development
Bureau for Europe and Newly Independent States
Office of Environment Energy and Urban Development
Energy Infrastructure Division
Washington, D.C. 20523

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Prepared under:

Contract No. EUR-0030-C-00-2053
March 1996

204

CONTENTS

1. PROJECT DESCRIPTION

2. AEE BULGARIAN CHAPTER STRATEGIC BUSINESS PLAN

3. AEE BULGARIAN CHAPTER BROCHURES (IN ENGLISH AND BULGARIAN)

4. AEE HUNGARIAN CHAPTER STRATEGIC BUSINESS PLAN

5. AEE HUNGARIAN CHAPTER RECOMMENDATIONS

6. AEE ROMANIAN CHAPTER STRATEGIC BUSINESS PLAN

7. AEE ROMANIAN CHAPTER BROCHURES

8. AEE COMMENTS ON THE REPORTS

AEE Chapter Strategic Business Plan
Project Description

Objective

The objective of this assignment was to apply management, business and marketing skills in support of fledgling professional organizations working to support small business efforts in energy consulting and engineering services. As a result of this assignment, the local AEE Chapters have business and marketing plans to follow in order to provide support to local energy consultants, grow in membership, and be able to exert some influence on energy policies and programs as they relate to their memberships. In addition, three engineers, who at the time were second-year MBA students at Georgetown University, interned as in-country advisors for two months supporting the organization and business development efforts of the local AEE chapters in Sofia, Bulgaria; Bucharest, Romania and Budapest, Hungary.

Background

As part of its Energy Efficiency Market Development project in Bulgaria, Hungary and Romania, the U.S. Agency for International Development (USAID) has supported the establishment of local chapters of the Association of Energy of Engineers (AEE), a U.S. professional organization headquartered in Atlanta. Under the project, approximately 15 potential consultants were selected from over 100 applicants. They were provided a 3-4 week training program which included topics of energy auditing, energy efficiency technology, industrial production quality programs, financial analysis and business practices for consultants. These 15 people were also administered the AEE Certified Energy Manager examination (CEM) by AEE representatives, and are now certified.

To support their initial consulting efforts, USAID assisted these CEM's in selling their services for industrial energy audits and provided technical assistance and measuring instruments for completing these audits. USAID provided donations of equipment in the order of $10,000 to $40,000 to industries participating in the local CEM audits. As this USAID program draws to a close, the CEM's have acquired the experience of an industrial audit reference for their business, many have succeeded in obtaining follow-on contracts with the same plants, some have negotiated contracts with industries, commercial and institutional facilities, and even residential apartment buildings. The CEM's have achieved local AEE Chapter status in their respective countries or cities, and are now focussing their efforts on using these Chapters to support their businesses and expand the private sector activities in energy efficiency services in these countries.

ASSOCIATION OF ENERGY ENGINEERS
BULGARIAN CHAPTER
STRATEGIC BUSINESS PLAN

Prepared for:

U.S. Agency for International Development
Bureau for Europe and Newly Independent States
Office of Environment Energy and Urban Development
Energy Infrastructure Division
Washington, D.C. 20523

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August 1995

207

CONTENTS

ACKNOWLEDGEMENTS v

1. INTRODUCTION 1-1

2. ORGANIZATIONAL STRUCTURE 2-1

2.1 Establishment of an Office 2-1
2.1.1 Office Expenses 2-1
2.1.2 Purchasing Office Equipment 2-1
2.2 Full/Part-time Coordinator 2-3
2.2.1 Qualifications 2-3
2.2.2 Monthly Salary 2-3
2.3 Scope of Work 2-4
2.3.1 Bylaw Registration and Additions to Bylaws 2-4
2.3.2 Member and Board Responsibilities 2-4
2.3.3 Correspondence 2-5

3. MEMBERSHIP EXPANSION 3-1

3.1 Qualifications 3-1
3.1.1 Atlanta Member Designation 3-1
3.1.2 Bulgarian Chapter Designation 3-2
3.2 New Memberships 3-3
3.2.1 Bulgarian Chapter Membership Form 3-3
3.2.2 Individual Membership Acceptance 3-3
3.2.3 Membership Drives 3-3
3.2.4 Revenues 3-4

4. CHAPTER MEETINGS 4-1

4.1 Typical Format 4-1
4.1.1 Administrative 4-1
4.2 Alternative Formats 4-1
4.2.1 Member Presentations 4-1
4.2.2 Speakers 4-2
4.2.3 Plant Tours 4-2

4.3	Chapter Meeting Structure	4-2
	4.3.1 Planning	4-2
	4.3.2 Timing	4-3
4.4	Yearly Chapter Meeting Schedule	4-3
4.5	Chapter Meeting - Hourly Schedule	4-5
	4.5.1 General Meeting Format	4-5
	4.5.2 Location	4-5
	4.5.3 Expenses and Revenues	4-6
	4.5.4 Implementation	4-7
5.	**RENTAL PROGRAM**	5-1
5.1	Organization of Council	5-1
5.2	Responsibilities	5-1
	5.2.1 Equipment Rental and Return	5-1
	5.2.2 Insurance	5-2
6.	**SEMINARS AND TRAINING**	6-1
7	**CONFERENCES**	7-1
7.1	World Energy Engineering Congress (WEEC)	7-1
	7.1.1 Potential Sponsors	7-1
	7.1.2 Correspondence	7-2
	7.1.3 Conference Expenses	7-2
7.2	EE200 - Energy Management in Buildings and Cities	7-2
7.3	National Bulgarian Conference	7-3
8.	**CERTIFICATION**	8-1
9.	**INTERACTION WITH OTHER ORGANIZATIONS**	9-1
9.1	Interaction with Plovdiv Chapter	9-1
	9.1.1 Benefits	9-1
	9.1.2 Consistent with the Bylaws	9-1
	9.1.3 Opportunities for Interaction	9-1
9.2	EnEffect	9-2
	9.2.1 Collaborative Options	9-2
9.3	Other Professional Organizations	9-2

209

10.	**MARKETING EFFORTS**	10-1
10.1	AEE Objectives and Goals Brochure	10-1
10.2	Individual Member Brochure	10-1
	10.2.1 Distribution	10-1
	10.2.2 Expenses - Individual Brochure	10-2
	10.2.3 Brochure Distribution List	10-2
10.3	Additional Advertising	10-2
	10.3.1 "24 Hours"	10-3
	10.3.2 "Standard"	10-3
11.	**FINANCING**	11-1
11.1	Annual Chapter Operations Report	11-1
	11.1.1 AEE - Atlanta Appropriations	11-1
11.2	Selective Industries and Funding Opportunities	11-2
	11.2.1 Embassy Information	11-2
	11.2.2 Environmental Funding	11-2
	11.2.3 Operations Management	11-2
	11.2.4 Agricultural Sector	11-2
	11.2.5 Bank Loans	11-3

610

APPENDICES

APPENDIX A	BROCHURE DISTRIBUTION LIST	A-1
APPENDIX B	SCOPE OF WORK - COORDINATOR	B-1
APPENDIX C	EQUIPMENT RENTAL	C-1
APPENDIX D	RENTAL PROGRAM	D-1
APPENDIX E	RENTAL CONTRACT	E-1
APPENDIX F	WEEC POTENTIAL SPONSORS BY $	F-1
APPENDIX G	WEEC POTENTIAL SPONSORS	G-1
APPENDIX H	AEE - HUNGARY PROPOSAL	H-1
APPENDIX J	OPERATIONS REPORT	J-1
APPENDIX K	BALANCE SHEET	K-1
APPENDIX L	SCHEDULE OF EVENTS	L-1
APPENDIX M	BYLAWS OF AEE	M-1
APPENDIX N	AEE MEMBER QUESTIONNAIRE FEEDBACK	N-1

211

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The attached business plan is based on Theresa Preslik's individual meetings with the AEE members and additional sources highlighted in Appendix A. She had the opportunity to speak at length with almost all of the consultants and they were very helpful in expressing their views on AEE. Hagler Bailly Consulting, Inc. would like to extend their appreciation to Yordan Katzarov, Boris Petkov, and Deyan Yordanov who organized plant tours of Crystal in Pernik, Silicatkeram in Plovdiv, and the Varna Shipyards in Varna, respectively.

CHAPTER 1
INTRODUCTION

Hagler Bailly appropriated funds from USAID for future development of the AEE Bulgarian Chapter. A business and marketing plan was part of this development. This plan covers the next year of operation for six months from July 1995 to December 1995 (Stage 1) and for the following year from January 1996 - December 1996 (Stage 2). Expense and revenue data corresponding to each Chapter activity should be itemized in the Operations Report of Appendix J for each stage. In addition, $500 was appropriated for implementation of activities that will enable the Chapter to function self-sufficiently. The final business plan and budget will need to be approved by Hagler Bailly.

In this report, "AEE" will designate the AEE - Bulgarian Chapter. AEE - Atlanta and AEE-Plovdiv Chapter will be designated as such. The finances will be expressed in dollars, rounded to the nearest dollar. Bulgarian leva will be added for reference; The exchange rate will be 66 BGL/$ unless otherwise stated.

Although this plan was written expressively for the Bulgarian Chapter, the Plovdiv Chapter is welcome to these ideas and I hope that both Chapters will interact constructively with each other.

CHAPTER 2
ORGANIZATIONAL STRUCTURE

2.1. ESTABLISHMENT OF AN OFFICE

The AEE Chapter Headquarters shall be established at the office of EES/Alex H&S at 100A Vasil Levski Blvd Apt. 8, Sofia 1527. The telephone/fax number is (+3592) 447-495. The headquarters was published on the brochure as this address and an extra set of keys were made with Chapter funds for the office coordinator.

The headquarters will share one of the three room office and will have a desk, two shelves for the AEE Library, and two drawers for AEE materials. AEE shall have access to a computer, printer, telephone, fax, and email address (Internet: "Alexees @Bulmail.Sprint.com"). This office and equipment will be provided on behalf of Hagler Bailly for Stage 1, after which, AEE will be charged rental fees.

2.1.1 Office Expenses

Stage 1 - July 95-December 95

Phone ($25/month)	19 800 BGL	$ 300
E-mail ($25/month)	19 800 BGL	$ 300
Printer (toner)	4 950 BGL	$ 75
Office supplies:		
Paper for fax and printer	5 165 BGL	$ 78
Binders clips, disks, folders, staples	6 072 BGL	$ 92
Copying (CM's, Business Plan)	24 000 BGL	$ 364
Total	79 787 BGL	$1,209

Stage 2 - January 96-December 96

Office Rental ($60/month)	47 520 BGL	$ 720
Phone ($25/month)	19 800 BGL	$ 300
Email ($25/month)	19 800 BGL	$ 300
Computer (access time- $25/month)	19 800 BGL	$ 300
Printer (toner)	9 900 BGL	$ 150
Office supplies:		
Paper for fax and printer	10 230 BGL	$ 155
Binders clips, disks, folders, staples	12 144 BGL	$ 184
Copying	48 048 BGL	$ 728
Total	187 242 BGL	$2,837

2.1.2 Purchasing Office Equipment

- Enhances perceived stability of the Chapter as a viable Association
- Defrays photocopying costs
- Ensures access to a computer
- Members have a place to write AEE correspondence - selling tool of the Chapter
- Large fixed costs and operating costs (insurance, maintenance, etc.)
- Requires monitoring of member under or over utilization
- Questionable ownership if the Chapter dissolves

Fixed Costs - Office Equipment - Stage 1 & 2

Copier	69 300 BGL	$1,050
Computer w/Modem	118 800 BGL	$1,800
Printer	19 800 BGL	$ 300
Phone & Fax Machine	9 900 BGL	$ 150
Office Furniture	9 570 BGL	$ 145
Insurance	11 370 BGL	$ 172
Total	238 740 BGL	$3,617

Immediate purchase of all the listed office equipment would require financial assistance. It may be possible to use the $500 allotment from Hagler Bailly plus current membership dues of $225 to purchase some of the items. Immediate purchase of the copier may defray copying costs and providea means of collaboration to reduce computer access and other costs among the other businesses at the AEE Headquarters.

215

If the Chapter purchases office equipment, the following expenses will need to be added back into the operating budget for stage 2: (assume the same toner expense)

Copying Expenses	$ 728
Computer Access Expenses	$ 300
Total Expenses	$1,028

2.2 FULL/PART-TIME COORDINATOR

2.2.1 Qualifications

- Knowledgeable of either energy efficiency or business practices.
- Perform the duties assigned by the scope of work and the AEE Executive Board.
- Self-directed and should not require supervision.
- Interact with all AEE members as required to complete the scope of work and to complete special assignments from the Chapter.

2.2.2 Monthly Salary

- $200 full-time-40 hrs/wk
- $100 part-time-20 hrs/wk
- Amount designated by the Chapter or Executive Board and acceptable to the Coordinator.

Miroslava Mircheva has been hired to fill this position full-time over the summer and part-time for Stage 1 plus one month until January 31, 1996. She is well informed regarding the Chapter's objectives and has met or spoke with all the members of the Chapter. She has been instrumental in development of the Chapter in the past six weeks. Hagler Bailly will pay her salary for Stage 1 plus one month.

Stage 1 Coordinator: July 95-December 95

Salary - full time	46 200 BGL	$800

Stage 2 Coordinator: January 96-December 96

Salary - part time	81 600 BGL	$1200

216

2.3 SCOPE OF WORK

See description in Appendix B.

2.3.1 Bylaw Registrations and Additions to Bylaws

Bylaws registration and lawyer fees were 1000 BGL each. Any "official" revision to the registered Bylaws will cost an additional 1000 BGL. Since the Bylaws will need to be revised on an ongoing basis, it is suggested that ongoing revisions occur throughout the year and updates to the "official" Bylaws occur once a year.

Stage 1 Legal Expenses: July 95 - December 95

Bylaw Registration	1 000 BGL	$15
Lawyer Fees	1 000 BGL	$15
Total	2 000 BGL	$30

Stage 2 Legal Expenses: January 96 - December 96

Bylaw Revisions	1 000 BGL	$15

2.3.2 Member and Board Responsibilities

The AEE members and the Executive Board & Supervisory Board are responsible for their involvement in the Chapter as designated by the duties assigned in the Bylaws. However, there are a number of procedural duties not yet described or assigned that will be required for the Chapter to function smoothly. These include the following items:

- The EB members responsible for determining the Annual Chapter Operating Plans and determining the Budget.
- The EB members responsible to approve membership.
- The EB members to determine the first, student's & annual membership fees.
- The EB members to collect membership fees and to distribute warning letters to members who do not pay within 30 days of January 1.
- Distribution of Agenda and Meeting Minutes to members and AEE - Atlanta.

217

- Determination of appropriate bank for the AEE account upon registration - is this bank amenable to future loans? have good interest rates for $ and BGL.

2.3.3 Correspondence

Other responsibilities of the Executive Board and the Members is in effective representation for the Chapter especially in the area that directly affect both. Chapter stationary is available from the Chapter President and from AEE Headquarters.

- Prompt and sincere letters of appreciation to government agencies and manufacturers for their assistance and sponsorship (for example: AEE-Conference in Hungary).

- Letter writing on behalf of the Chapter to capitalize on opportunities for future employment.

CHAPTER 3
MEMBERSHIP EXPANSION

One of AEE's objectives stated in the Bylaws is to assist in the creation and the development of a free competitive market for energy consulting. This can be accomplished by increasing energy efficiency awareness and membership. To obtain new members, there must be activities and benefits beyond those provided by AEE-Atlanta. (See Chapters 6-10.)

3.1 QUALIFICATIONS AND RESTRICTIONS

The Chapter's current membership is comprised of 17 members (13 Qualified, 2 Ordinary, and 2 Honorable), it has the potential to double or triple within one year. Because of the political nature of organizations in Bulgaria, certain restrictions on new member activities have been placed to maintain the integrity of AEE's original objectives and goals.

3.1.1 Atlanta Member Designation

AEE - Atlanta member designation are based on experience and education:

- *Senior members* have six years' experience in energy engineering or energy management.
- *Members* have an engineering, architectural, business or law degree or a registered Professional Engineer or Architect.
- *Affiliate members* do not meet the above criteria.
- *Student members* are full-time students.
- *Retired members* are no longer involved in any career activity.

3.1.2 Bulgarian Chapter Designation

Bulgarian Chapter designation is based on experience and time length of membership:

- *Honorable members* are members of AEE-Atlanta but not of the Bulgarian Chapter and do not have voting or elective rights.
- *Qualified members* are members of AEE-Atlanta and have an advanced degree, three years experience, elective, voting and ruling board rights. They include the founders.
- *Ordinary members* are members of AEE-Atlanta and have three years experience, voting, elective rights and remain ordinary for two years before eligible for ruling boards.
- *Student members* are not obliged to be members of AEE-Atlanta and have no elective, or ruling board rights.

AEE Atlanta Designation	Fee to Atlanta	Bulgarian Designation	Fee to Bulgarian Chapter
Senior	$30 Atlanta ($105 orig.)	Honorable	Only to Atlanta
Member	$30 Atlanta ($105 orig.)	Qualified	$15
Affiliate	$30 Atlanta ($105 orig.)	Ordinary	$15 + $15 enrollment
Student	$ 5 Atlanta ($15 orig.)	Student	$ 5 + $ 7.5 enrollment
Retired	$ 5 Atlanta ($15 orig.)	*	*
Corporate	$195 Atlanta* ($595 orig.)	Collective	*

* Yet to be determined

220

3.2 NEW MEMBERSHIPS

After meeting the above qualifications, new members must be approved by the Executive Board according to the Bylaws. The Bulgarian Chapter runs the risk of discrimination if they deny membership based on factors other than the required qualifications.

3.2.1 Bulgarian Chapter Membership Form

In addition to the AEE-Atlanta application form, the Bulgarian Chapter may want the applicant to fill out a specific Chapter form.

- To certify the receipt, acknowledgement and an understanding of the Bylaws.
- To include a "code of ethics" to ensure the integrity of the applying member.
- To sign-up for specific functions for their participation.

3.2.2 Individual Membership Acceptance

- Rapidly increases membership.
- More members to immediately participate in Chapter activities.
- Can accept new members with a formal "Welcome" at each Chapter Meeting.
- May require a prorated membership fee, depending upon their membership start date.
- Application forms shall be provided and received on a continual basis will require regular EB meetings to determine their acceptance.

3.2.3 Memberships Drives

- Can indoctrinate each new member at the same time.
- Membership dates can coincide with the AEE-Atlanta or Bulgarian Chapter fiscal year.
- Less clerical work to update membership lists, monitor qualifications, etc.
- Risks losing potential members because of any time delay.

221

Chapter Size

As the Bylaws state, the number of members is not limited. However, the Chapter should be organized and should provide services and tangible benefits to new members. The Chapter should set membership quotas for until the activities become well-established. Each current member should try to recruit at least two or three new people who want to be members. Recommended goals:

- Double membership by the end of the year (17 new members)
- Double membership by June 1996 (34 members)
- Double membership by December 1996 (68 members)

Membership Fees

- Use existing scheme set forth, however, once the price is set, it is unwise increase it often.
- Can increase fees at each new election of the Executive Board
- AEE-Atlanta will not increase membership dues in the foreseeable future.

3.2.4 Revenues

Stage 1 Membership: July 95 - December 95

Membership Dues (15 current, 17 new x $15)	31 680 BGL	$ 480
First Enrollment Fee (17 new x $15)	16 830 BGL	$ 255
Total	48 510 BGL	$ 735

Stage 2 Membership: January 96 - December 95

Membership Dues (32 current, 32 new x $15)	63 360 BGL	$ 960
First Enrollment Fee (32 new x $15)	31 680 BGL	$ 480
Total	95 040 BGL	$1,440

222

Assumptions

- Non-prorated membership dues and First Enrollment fees for membership start date.
- AEE will not lose existing members.
- Expenses for application form and administrative costs will be considered operating costs.

223

CHAPTER 4
CHAPTER MEETINGS

The Chapter Meeting (CM) can have many functions. The CM is the highest ruling board of AEE in which business and operating procedures are created and voted upon. The CM can be administrative, entertaining, informative and a unique selling tool of the Chapter. It could provide the main benefit for membership in the Bulgarian Chapter of AEE. The alternate formats can include non-members (potential members and business leaders) to increase network opportunities with other professionals and create contacts in the energy field. The CM could also be a revenue making activity.

4.1 TYPICAL FORMAT

4.1.1 Administrative

- Includes the attendance of only AEE members to discuss past, present, and future activities as designated by a prepared agenda.
- Occur during the day at the Union of the Scientists or some local and convenient place.
- Coffee and refreshment is served and the meeting lasts approximately 1-1/2 hours.
- Sometimes viewed as an obligation rather than a useful occurrence.

4.2 ALTERNATIVE FORMATS

4.2.1 Member Presentations

- AEE is a *unique* organization of professionals whom apply and demonstrate their technical expertise with practical business methods in energy efficiency in a wide range of industries.
- Each member is involved in unique problems and solutions in the energy field.

- Sharing this information can not only increase the reputation of AEE, but also increase their business opportunities and energy efficiency awareness overall.

4.2.2 Speakers

- Leaders in the energy field to give a presentation of interest
- Willing to participate for a nominal fee in the area of energy efficiency.
- Government agency officials, finance experts, plant managers, manufacturers, other professional organizations, etc.
- Prepared to give a thirty minute presentation
- Open and receptive to a 1/2 hour questioning and answering period from the audience.

4.2.3 Plant Tours

- Requires participation of the plant manager.
- Useful marketing tool of the plant for both their products and for their workers.
- Introduce energy audits (its methods, problems and solutions) to a selective and interested audience at the plant site which can increase the awareness of energy efficiency and the business of consulting.
- Can lead to future training and business opportunities within the plant in energy efficiency or at other locations, depending on the attendants.

4.3 CHAPTER MEETING STRUCTURE

4.3.1 Planning

- Secure meeting place well in advance of the meeting.
- Prepare the agenda as stated in the Bylaws.

225

- Adhere to the agenda or additional topics mutually agreed upon before the start to limit lengthy and unproductive meetings.
- Elect members for specific CM responsibility (create the agenda, obtain the meeting place and visual aids (if necessary), notify members, invite guests, provide refreshments, collect payments, secure speakers for meetings, etc. Titles for these duties could be: CM Director/Speaker Coordinator/Site Organizer, etc.

- Devise a point and reward system to ensure participation of all members.

4.3.2 Timing

- Regular monthly meetings in Bulgaria have lost their significance and reduced active participation and attendance.

- More frequent meetings require less time devoted to administrative issues.

- Less frequent meetings will renew member's interest and participation.

- Schedule Chapter Meetings in the early evening to accommodate working professionals.

- Schedule of Events per Appendix L

With AEE's qualifications and reputation, they should create a competitive advantage with unique, interesting and varying Chapter Meetings. A Chapter Meeting schedule should be developed and planned for in advance, in the case of the alternative formats, which require permission, persuasion, advertisement and payment. A typical meeting schedule could be as follows.

4.4 YEARLY CHAPTER MEETING SCHEDULE

Chapter Meetings are to be held on the Third Wednesday of every other month.

Introduction Meeting - October, 1995
Topic: Energy Savings
Format: Member Presentation
Content: After formal registration of the Chapter, the goals and objectives of the Chapter can be described publicly to selected invites. The presenter can provide a description of an energy audit that demonstrated savings, how the savings was achieved

226

and the steps taken to achieve it (i.e., a USAID project). Administrative: WEEC participants for Atlanta, rental program, applications for new members

2nd Chapter Meeting - December, 1995
Topic: Winter Heating
Format: Speaker
Content: Have someone from the District Heating Company talk about developments in energy efficiency for the winter months. Invite persons from the municipalities and end users interested in reducing their winter heating bill. Administrative: Introduce new members, discussion on WEEC.

3rd Chapter Meeting - February, 1996
Topic: Legislation
Format: Speaker
Content: Have a speaker like Ivan Yuroukov from the Committee of Energy to talk about the upcoming legislation submitted to the Council of Ministers and Parliament. Administrative: Introduce new members, discussion on WEEC in Atlanta

4th Chapter Meeting - April, 1996
Topic: Industry
Format: Plant Tour
Content: Select a local site for a plant tour and discussion by the plant manager on the energy savings/consumption/operation of their facility. This plant could have participated in the USAID programs or be slated for Privatization. Invite other plant managers from different industries. Depending on the location, it could be a convenient for a joint meeting with the Plovdiv Chapter, since everyone will need to travel. Administrative: applications for new members

5th Chapter Meeting - June, 1996
Topic: Annual Meeting of the Chapter
Format: Administrative
Content: Yearly dues are collected, the yearly business plan is distributed and discussed. This meeting shall be a private meeting of only AEE members

6th Chapter Meeting (Optional) - August, 1996
Format: Speaker
Topic: Speaker -Manufacturer
Content: Have a manufacturer discuss their latest products for the Bulgarian market for a specific industry. Invite businesses that will benefit from these products. For example:

steam traps for boiler condensate problems. Potential invites: municipalities, hospital administrators.

4.5 CHAPTER MEETING - HOURLY SCHEDULE

4.5.1 General Meeting Format

A General Meeting Format could be followed per the Chapter Organization Procedure provided in the Chapter President's Manual. It is repeated here:

18.30 - 19.00	Social; dinner ticket sales; distribution of name tags	Treasurer
19.00 - 19.40	Seating and Dinner	
19.40 - 19.50	Call to order and self-introduction of attendees	President
19.50 - 19.55	Reading of last general meeting minutes	Secretary
19.55 - 20.00	Treasurer's report	Treasurer
20.00 - 20.15	Old and new business	President
20.15 - 21.15	Program speaker	Vice-President
21.15 - 21.25	Acknowledgements and final announcements	President
21.30	Adjournment	

The following items are available from AEE - Atlanta for Chapter Meetings:

- Certificates of Appreciation for Chapter Meeting speakers - free of charge.
- AEE - Badges for meeting participants - free of charge.
- AEE Lapel/Tie Tac with AEE Log - $5.00 each.

4.5.2 Location

Location of the CM shall be determined by the meeting format

- KEDAR Hotel & Restaurant- has halls for seminars - costs money, room for large gatherings
- Union of the Scientists - free of charge, limited space
- Personal Offices - inconvenient for the host, limited space
- Plant Facility -requires group transportation costs, need multiple approvals.

4.5.3 Expenses and Revenues

Expenses - Kedar Hotel - Speaker Format - 30 participants - 1 meeting

Rental Space (3 hr - includes visual	1 150 BGL	$18
Speaker (1/2 hr presentation)	2 000 BGL	$31
Dinner* (300 BGL x 30 people)	9 000 BGL	$137
Refreshments* (35 BGL x 30	1 050 BGL	$16
Presentation handouts (30 x 120	3 600 BGL	$55
Total	16 800 BGL	$257

* Does not include alcoholic beverages

Revenues - Kedar Hotel - Speaker Format - 30 participants - 1 meeting

Member Fee (15 x 450)	6 750 BGL	$103
Non-Member Fee # (14 x 500)	7 000 BGL	$106
Total	13 750 BGL	$209

Assumptions:

- The Alternate Format will run at a loss of $48/meeting (3 050 BGL).
- Chapter Members and non-members will be willing to expend the money to attend a well-organized, interesting presentation that could further their careers.

229

4.5.4 Implementation

Adoption of the proposed yearly schedule

Member Presentation	Expense: $226 (less Speaker $)	Revenue: $209	Loss: $ 17
Three Speakers	Expense: $771	Revenue: $627	Loss: $144
Plant Tour**	Expense: $120 (less dinner $)	Revenue: $ 77	Loss: $ 43
Administrative	Expense: $ 16 (refreshments only)	Revenue: $ 0	Loss: $ 16
Total	Expense:$1,133	Revenue: $913	Loss: $220

** Assume Rental Space Expense will cover group transportation costs.

230

CHAPTER 5
RENTAL PROGRAM

5.1 ORGANIZATION OF COUNCIL

From the Chapter Meeting on July 19th, the following members agreed to participate in the rental council: Tsancho Tsanev, Nikola Kaloyanov, Dimitar Baev, and Nikola Stankov.

5.2 RESPONSIBILITIES

The following procedural responsibilities need to be established for an equipment rental program.

5.2.1 Equipment Rental and Return

- Fill out forms.
- Issue the equipment.
- Inspection of the rented equipment upon return to ensure that it works properly.

Rental Payment

- Covers a specific length, adequate to properly use the equipment and conduct tests.
- Proportionate to the value of rented equipment.
- Delivered to the Treasurer or designee who can deposit the funds in the AEE bank account.

Overdue Equipment

- Can become easily lost, damaged, or stolen.
- Can be "borrowed" for over one year without monitoring. (See Appendix C.)
- The council should establish appropriate or apply restrictions for future rentals.

5.2.2 Insurance

The current available equipment in was purchased near the end of 1993.

- This equipment shall be fully depreciated in 1998.
- Can insure only those items that are useful to the AEE Chapter.
- Can insure the full purchase price amount until 1998 to cover replacement costs if stolen.
- Can adjust the insurance cost to the depreciated value.
- Insurance Companies should be evaluated based on cost and services provided.

Description of Insurance

State Insurance Company
International Insurance
Dates: 25/11/93 to 24/7/94
Conditions: Damages are not covered when the equipment is not used according to its specifications. Insured for theft, fire & explosion, and natural disasters.

Orel Insurance Company
Dates: 28/7/94 to 27/3/95
Conditions: Insured for theft, fire & explosion, and natural disasters.

State Insurance Company
Dates: 26/4/95 to 25/4/96
Conditions: The equipment is insured when it is kept in the office, it is transported or used by the authorized individuals specified in the list provided. It is insured for theft during the daytime hours (8-18h) with certification proof by the police, fire & explosion, car accident when transported (documented by the police), and natural disasters.

Cost of Insurance

Time Frame	Insurance	Cost/month	Amount Insured	Exchange
Nov '93 to Jul '94	$855	$107	$26,695	
Jul '94 to Mar '95	$753	$94	$26,695	54 BGL/$
Apr '95 to Apr	$1,335	$111	$26,695	66 BGL/$

Rental Payment. The rental payment was based on the number of times the equipment was borrowed and the average borrowed time over the past years multiplied by its percentage of insurance costs. An example of equipment rental costs, rental period, items to be insured and approximate insurance costs are presented in Appendix D in table format. The Council should consider a form which provides the AEE member with a receipt and contract for rented equipment, see Appendix E.

232

CHAPTER 6
SEMINARS AND TRAINING

The AEE consultant should develop seminars and training programs in their respective area of expertise, such as:

- Energy Auditing
- Boiler Efficiency
- Steam & Condensate System Efficiency
- Industrial Electric Energy Efficiency
- Marketing & Financing

See Appendix H for seminar and training suggestions of the AEE - Hungarian Chapter[1].

[1] Provided by Michael Maier, AEE / Hagler Bailly Representative for the Hungarian Chapter.

CHAPTER 7
CONFERENCES

7.1 WORLD ENERGY ENGINEERING CONGRESS (WEEC) ATLANTA, NOVEMBER 8-10, 1995

- Provides invaluable manufacturing contacts and useful seminars to enhance the member's personal business.
- Provides interaction with AEE Administrators and International members.
- Too expensive to attend without sponsorship from either manufacturers or governmental organizations.
- Past attendees and the Executive Board of the Chapter have an obligation to assist those AEE members who have not attended in the past in obtaining sponsorship. The application deadline for the WEEC is October 20, 1995, however, AEE - Atlanta will accept registrations on-site on November 7th. Note: The deadline to file papers for publication at the next 1996 AEE Conference in Atlanta is in February 1996.
- The AEE budget would provide for AEE international officers to attend the AEE Annual meeting. In addition, AEE staff would attend a meeting or seminar in Bulgaria once a year.

7.1.1 Potential Sponsors

- Sponsors can be companies in which you have a good working relationship.
  - Companies from which USAID purchased equipment for the Eastern European energy efficiency program. (see Appendices F & G).
  - Governmental agencies with an interest in energy efficiency. (see Appendix A).

- Companies that the member is interested in doing business with in the future and can arrange a mutually beneficial contract for attendance.

7.1.2 Correspondence

▸ The main method to obtain sponsorship for attendance is through written request.

▸ These letters should be written on behalf of the Chapter and should provide concrete detail as to why the member wants to attend the conference.

▸ These following questions should be well thought out before the letter is written:

- Why should the manufacturer, organization, or government agency provide financial assistance?
- In what ways does the Congress help the AEE member?
- In what way will their financial assistance in turn benefit the sponsor?
- Will the AEE member supply a report to the sponsor upon return?

The potential sponsor should be contacted by phone for receipt of the letter and for further discussion. Perhaps many phone calls and letters will be required. NOTE: One sponsor need not provide the whole fee, but rather one member may have multiple sponsors.

7.1.3 Conference Expenses - 1 Person

Full Registration (International fee)	21 780 BGL	$3,30
RT Airfare (from Sofia to Atlanta)	66000 BGL	$1,000
Lodging & Food & other expenses (5	79 200 BGL	$1,200
Total	166 980 BGL	$2,530

7.2 EE2000 - ENERGY MANAGEMENT IN BUILDINGS AND CITIES NOVEMBER 22-23, 1995

This conference is focusing on Central and Eastern Europe and is encouraging partnerships from countries in the West with countries in the East.

▸ Conduct a similar approach to obtain sponsorship as stated above.

236

- Review the lists of "Countries doing business in Bulgaria" obtained from commercial attaches of the embassies to select prospective partners.

7.3 NATIONAL BULGARIAN CONFERENCE

This conference should be approved by Hagler Bailly, Inc. and USAID, however, it should be organized by the Bulgarian Chapter. The Conference should coincide within the same two-week as the Hungarian and Romanian National Conferences, therefore, coordination between the Eastern European Chapters is essential.

CHAPTER 8
CERTIFICATION

The Certified Energy Manager (CEM) needs to be aware that they must participate in various Chapter and professional activities to earn CEM renewal credits or the certification will no longer be valid. A total of 8 credits are necessary during a three year renewal period..These activities include:

- Continued employment in energy management/engineering activities - 4 credits/3 years
- Membership in a professional engineering society - 3 credits
- Continuing education/professional activities - 2 credits/10hours
- Awards and Papers presented and published in energy engineering or energy management - 2 credits each
- Offices held in a professional engineering society - 1 credit/year

Each Bulgarian CEM's renewal date is December 31, 1996

See AEE-Hungary's proposal for additional certification for their Chapter listed in Appendix H.[1] The Bulgarian Chapter can use this request as a guideline.

[1] Provided by Michael Maier, Consultant to Hagler Bailly for the Hungarian AEE Chapter.

CHAPTER 9
INTERACTION WITH OTHER ORGANIZATIONS

9.1 INTERACTION WITH PLOVDIV CHAPTER

9.1.1 Benefits

- Strengthens and promotes the AEE organization as a whole by increased visibility and promotion of energy efficiency
- Should not be viewed as a competitor but as an ally
- Presents a unified Association to Bulgarian organization outside AEE
- Presents a unified Association to potential members
- Provides opportunities to create AEE member partnerships in geographical locations and in different industries.
- Will eliminate redundant and time consuming tasks best conducted with both Chapters.

9.1.2 Consistent with the Bylaws

"...To support and encourage the professional development and growth either of its member or of all interested parties." (Article 4. AEE Objectives)

9.1.3 Opportunities for Interaction

- Create an Annual Joint Meeting in which all members can introduce themselves to each other. The location mutually determined by both Presidents or Executive Boards.
    - Provide an open invitation to all AEE Members from both Chapters for any Chapter Meeting regardless of its location. The agenda and resulting minutes (upon request) should be given to the Presidents for distribution within their respective Chapters.

9.2 ENEFFECT

9.2.1 Collaborative Options

- Work with EnEffect to define the structure, distribution and publication the energy efficiency catalog-database at EnEffect.
- Work with EnEffect to publish articles for their newsletter. These articles can include translations of technical information from any of the four publications received from AEE- Atlanta. In addition to translated articles, create an "AEE - CORNER" for their newsletter, which highlights past and future AEE activities.
- Develop business ties with EnEffect which they receive a consulting and administrative fee for assisting AEE consultants to prepare project applications and to access their contacts and knowledge of various energy efficiency programs and funding opportunities.
- Enroll EnEffect as a corporate member in AEE. Mutually construct the guidelines for corporate membership that will attract other future corporate members.

9.3 OTHER PROFESSIONAL ORGANIZATIONS

With the development of specific councils, clubs and sections, AEE can work with other organizations in specific tasks, i.e., collaborate with the Scientific Technical Unions to help organize the yearly Energy Conference in Varna; help create policy with the newly founded Bulgarian Energy Association (BAE).

CHAPTER 10
MARKETING EFFORTS

10.1 AEE OBJECTIVES AND GOALS BROCHURE

AEE's objectives will be distributed in the EnEffect Newsletter near the end of September. The EnEffect newsletter distribution list consists of 1,200 copies in English and 1,200 copies in Bulgarian. This brochure will be provided free of charge by EnEffect.

10.2 INDIVIDUAL MEMBER BROCHURE

A second newsletter will be printed on A3 (11" x 17") paper and will consist of four pages. The A3 page will be folded such that an address label can be affixed for mailing on the blank page. The pages will read as follows:

Page 1 - AEE Objectives (as printed in the EnEffect newsletter)
Pages 2 & 3 - AEE member description
Page 4 - blank for mailing label

There have been very positive responses and comments to the preliminary AEE brochure given to people and organizations listed on the Brochure Distribution List, See Appendix A, highlighted by the asterisk in the MET column. They are looking forward to receiving the formal version. After review of the effectiveness of this type of advertising, another campaign can be conducted with a new brochure including new members and revised objectives and goals if they have changed.

10.2.1 Distribution

- 500 total copies will be made for distribution:
  - 10 copies for each consultant -including the Plovdiv Chapter (16 + 11 members)
  - 2 copies to the 50+ organizations on the *Brochure Distribution List.*

- The remaining copies for Chapter distribution at Chapter Meetings, etc.

- Hand delivery of each brochure is preferred and will be pursued for at least half the companies.

- It will be the responsibility of the AEE members to obtain their 10 copies at Chapter Meetings or at the AEE Headquarters.

10.2.2 Expenses - Individual Brochure

Formatting of Complete Brochure (approx 500 BGL x	1 500 BGL	$22.73
Printing (approx 2,90 BGL/pg x 3 pgs x 500 copies)	4350 BGL	$65.91
Address Labels (6 pages x 50 BGL/pg)	300 BGL	$4.54
Mailing (Approx 25 companies x 2 copies x 18 BGL)	990 BGL	$15.00
Total	6 240 BGL	$94.55

10.2.3 Brochure Distribution List

- ▸ Requires continual review
  Include members of the press

- ▸ Monitor its success by notifying the Coordinator (Miroslava Mircheva) when the member has been contacted due to the brochure

- ▸ Continually contact the organizations on the distribution list to inquire about business opportunities for the consultants

10.3 ADDITIONAL ADVERTISING

With AEE's position in the energy efficiency industry as high price and high quality organization, a selective distribution list better suits the position of the AEE for membership. However, additional advertising can be published for the following AEE sponsored activities in special circumstances.

242

- Seminars and Training courses
- AEE - Bulgarian National Conference
- Member Awards Announcements
- Selected Chapter Meetings
- Employment Searches in the form of 'Help Wanted' or 'Position Wanted' Advertisements

10.3.1 "24 Hours"

1/4 Page Ad - 1 day	77 500 BGL	$1,174
1/8 Page Ad - 1 day	38 750 BGL	$587
1/16 Page Ad - 1 day	19 375 BGL	$294

10.3.2 "Standard"

1/4 Page Ad - 1 day	37 500 BGL	$568
1/8 Page Ad - 1 day	18 750 BGL	$284
1/16 Page Ad - 1 day	9 375 BGL	$142

CHAPTER 11
FINANCING

11.1 ANNUAL CHAPTER OPERATIONS REPORT

The Annual Chapter Operations Report is due on February 15th of every year. A copy of the report format is listed in Appendices J & K. Approximately $500 has been allotted to the Chapter by Hagler Bailly, Inc. and USAID for the development of feasible activities. The Chapter should vote within the next month (including a mail vote from members not in attendance) to decide which activities should be funded.

11.1.1 AEE - Atlanta Appropriations

Appropriations from AEE- Atlanta are available to the Chapter if it meets the eligibility requirements. This is a ready source of available funding for the Chapter. If the Chapter operates efficiently, these requirements should not be burdensome.

- Annual Chapter Operation Report must be completed and signed by officers of the Chapter and returned to AEE - Atlanta by February 15th
- Notify AEE of all new officers within 30 days of taking office and file yearly officer information with AEE - Atlanta.
- Current officers of the Chapter must be members in good standing of AEE. AEE Administrator will notify Chapter President of any Chapter officers who are not in good standing.
- Copies of all minutes and newsletters must be sent to AEE.
- Chapter Bylaws and subsequent revisions must be approved by AEE Board of Directors.
- Names of members who attend each meeting must be provided to AEE Headquarters at time of appropriation request.

Important dates for appropriations, report filing, and other activities are listed in Appendix L.

11.2 SELECTIVE INDUSTRIES AND FUNDING OPPORTUNITIES

Many organizations have already provided the Chapter with investor and Fund information that can used for energy efficiency in the private sector. Theresa Preslik and Miroslava Mircheva has met with the organizations and people highlighted on the *Brochure Distribution List.* In all meetings, the main objective was to advertise the Chapter and the member's individual consulting company. The AEE member consultant must look for ways to exploit these initial meetings and the information provided from each. Miroslava will continue contacting persons and organizations listed on the *Brochure Distribution List* to advertise the Chapter and for investing opportunities..

11.2.1 Embassy Information

The embassies have provided lists of companies from their country that are conducting business in Bulgaria. The consultant can select specific industries in which they have some knowledge of, either based on the USAID program or through other professional experience, in which to target for future consulting work. The consultant can use these company lists for form local partnerships as distributors or engineering coordinators of their products.

11.2.2 Environmental Funding

Many governmental agencies and investors include energy efficiency as an environmental concern. Highlighting the project proposal to bring forth the environmental aspects will aide its approval and funding.

11.2.3 Operations Management

Contact major consulting firms and known manufacturing companies and developing industries from the embassy lists to market your services.

11.2.4 Agricultural Sector

CARESBAC, IESC, CDC provide funding and technical expertise for start-up companies.

245

11.2.5 Bank Loans

Banks are only interested in economical aspects. They could care less about the boiler efficiency or the number of luminaires needed to create energy efficient lighting, but they do care about an Integrated Resource Plan (IRP), Long Run Marginal Cost Pricing (LRMC), and Demand Side Management (DSM).

246

APPENDIX A
BROCHURE DESCRIPTION LIST

MET	Government Organizations & Municipalities	Contact	Business	Address	Phone
*	Committee of Energy	Ivan Yuroukov		8 Triaditsa Str., Sofia 1040	885-930/567-573
•	Parliament - Commission of Energy	Dora Grosdanova		1 Batenberg Sqr., Sofia	840-3207; Fax:394-731
	Council of Ministers			1 Dondukov Blvd, Sofia	
*	Ministry of Industry	Dobrin Oreshkov		29 Aksakov Str., Sofia 1000	861-3315
	Privatization Agency			29 Aksakov Str., Sofia 1000	882-402; Fax:879-088
	Center for Mass Privatization				
	Municipalities				
	Municipalities				
	Municipalities				
	Consulting Firms	**Contact**	**Business**	**Address**	**Phone**
	KPMG - Barents Company	Zhivko Nemov / Vladimir Karolov	Consultants for mass Privatization; Selection Criteria		44-23-38
*	Arthur Anderson	Marcus Delouche		1 Bulgaria SQ, NDK, 4th Fl.	525-118; Fax:80-16-39
	Coopers & Lybrand	Levon Hampartzoumian		3 Pozitano Str.,5th Fl., Sofia 1000	81-55-76; Fax:80-32-20
	Deloitte & Touch	David Saer		135A Rakovski Str, Sofia 1000	888-643; Fax:888-769
	Ernst & Young	John M. Ayerst		46 Alabin Str., Sofia 1000	54-30-05; Fax: 54-29-08
	Price Waterhouse	David Terry		10 Stefan Karadzha Str., Sofia 1000	88-01-22; Fax:87-24-61

248

	Opportunity International	Ken Vander Weele	Provides financing for small-scale energy efficiency projects		65-58-07
*	Phare Program	Vladimir Stariradev		8 Triaditsa Str., Sofia 1040	66-51-40; 87-89-81
	Thermie Program	Alexei Krustev		51 James Boucher Blvd.,15th fl.,Sofia 1407	68-35-42; Fax: 681-461
	U.S. Trade and Development Agency TDA Program	Ann Lien	Feasibility Studies and Subcontraction for American Investors	Room 309, SA-16; Washington, DC 20523-1602	(703) 875-4357; Fax: (703) 875-4009
	Professional Associations	**Contact**	**Business**	**Address**	**Phone**
	Scientific and Technical Union	Lazar Petkanchin		108 Rakovski Str.,Sofia 1000	884-158;Fax:879-360
*	National Foundation of Energetics			Dondukov Str.,Sofia 1000	
	USAID Energy Efficiency Audits	**Program**	**Plant Manager - Contact**	**Address**	**Phone**
	Chimco Ammonia & Urea Production, Vratza	IRG/Eco Techproduct	Rumen Kostov	Vratza 3037	(092)22-381; Fax:33-118
*	Crystal Plate Glass, Pernik	HB/AEE Consultants	Stefan Gavrilov	Pernik 2300	Tel./Fax:(076) 23-024
*	Flotski Arsenal Ship Repair, Varna	HB/AEE Consultants	Aleko Angelov	Varna 9000	(052)222-731; Fax:237-222
	Integrated Cotton Textile Plant, Varna	IRG/Eco Techproduct	Tanya Hahliyska	16 Stamatov Str., Varna 9000	(052)772-0025;Fax:774-419
	KMX Tissue Paper, Belovo	HB/AEE Consultants	Alexander Vasilev	Belovo 4470	(903481)2650; Fax:7454
	Kremikovtzi Iron & Steel Works	IRG/Eco Techproduct	Lilian Vachkov	Botunetz, Sofia 1870	877-628; Fax:879 806
	Lev Leather Tanning & Dyeing, Gabrovo	HB/AEE Consultants	Pencho Baev	7 Totio Benev Str.,Gabrovo 5305	(066)22-081; Fax:27-083

249

APPENDIX B
AEE CHAPTER COORDINATOR
WORK DESCRIPTION

B.1 MAIN DUTIES

- Update mailing lists of the AEE members.
- Manage the AEE Library and the borrowing of books and articles. Inform members when the borrowed books are overdue and when new books and materials arrive.
- Obtain all Chapter related information and documents for the file in the AEE Library.
- Distribute the brochure to those parties on the *Brochure Distribution List.* The brochure should be hand delivered to interested parties if possible, otherwise, it can be mailed.
- Schedule meetings between interested members of the Chapter and key persons in the business community from the *Brochure Distribution List.*
- Monitor the success of the Brochure by soliciting feedback from members and businesses For example, have the members received phone calls? Are there business opportunities?
- Redistribute the revised business plan and provide a Bulgarian translation.
- Monitor the Chapter's progress and provide support to implement the business plan.
- Translate Chapter Meeting minutes into English and submit to AEE - Atlanta.
- Supply AEE - Atlanta quarterly reports on the Chapter's activities, upon approval of the President or Executive Board.

- Translate Chapter President's Manual for distribution to AEE - Members only for the next Official Chapter Meeting.

B.2 OTHER DUTIES AS ASSIGNED BY THE CHAPTER/EXECUTIVE BOARD

- Inform members and potential members of upcoming Chapter Meetings and events.
- Attend Chapter Meetings and those of individual councils.
- Provide copies of the prepared agenda for Chapter Meetings and distribute the meeting minutes afterwards to AEE-Atlanta
- Assist in the preparation of the yearly financial statement to AEE-Atlanta.
- Help create a new membership application form for AEE - Bulgarian Chapter.
- Monitor and file new memberships and applications.
- Assist the Treasurer to receive membership dues.
- Translate English written technical manuals into Bulgarian, as requested by the Chapter.
- Assist in monitoring the rental program. For example: create letters informing consultants that the rental equipment is overdue; receive payment of rental equipment.
- Help organize Seminars for the consultants: copying, reserve meeting halls and luncheons.
- Help organize of the National Conference for February or March: reserve meeting hall; prepare documents for distribution at the conference (formatting, typing, copying)
- Assist in letter writing. For example: create English written letters for manufacturers sponsorship to WEEC - Atlanta in November; create draft funding application letters.

251

B.3 DELIVERABLES

- Monthly reports to Mark Oven of Hagler Bailly, on the progress, developments, problems, suggestions or recommendations of the Chapter. Use email as necessary to receive immediate assistance and feedback.
- Provide Final (Modified) version of Business Plan & Marketing Plan
- Final report to Mark Oven, Hagler Bailly upon completion of work for Stage 1.

APPENDIX C
EQUIPMENT RENTAL

Appendix C

	Description	Qty	Part #	Mfr	Unit Cost	Total Cost	Status	Rental Time	Rental Insurance	% Total Cost
1	Fyrite Duplex Kit CO2 & 02 analyzer	3	-5011	Bacharach	$293.00	$879.00	1. New 2. New **3. Out - Janos Zhelev - 06.94**	Out Twice;	YES	3.3%
2	Spare CO2 fluid	3	-5047	Bacharach	$31.00	$93.00	1. OK 2. OK 3. OK			
3	Spare O2 fluid	3	-5050	Bacharach	$56.00	$168.00	1. OK 2. OK 3. OK			
4	CO2 repair kit	3 2	-7041	Bacharach	$35.00	$70.00	1. OK 2. OK 3. Used	Out once; ave 7 days	YES	0.3%
5	O2 repair kit	3 2	-7043	Bacharach	$46.50	$93.00	1. OK 2. OK 3. Used	Out once; ave 7 days	YES	0.3%
6	True - Spot Smoke Tester	3	-6985	Bacharach	$59.04	$177.12	1. OK 2. OK 3. OK			
7	Spare kit for smoke tester	3	21-0020	Bacharach	$23.25	$69.75	1. OK 2. OK 3. OK			
8	Model 300PB comb analyzer w/printer	2	-8087	Bacharach	$2,788.00	$5,576.00	1. OK 2. OK	Out 27 x; ave 13 days	YES	20.8%
9	Model 300NXEB comb analyzer w/printer, SOX, NOX	1	-8098	Bacharach	$3,813.00	$3,813.00	**Out - Katzarov - 26.06.95**	Out 27 x; ave 13 days	YES	14.2%
10	Spare oxygen sensor	3 2	24-0108	Bacharach	$102.50	$307.50	1. OK 2. OK 3. Used			
11	Spare CO sensor	3	24-0498	Bacharach	$196.80	$590.40	1. OK 2. OK 3. OK			
12	Spare NOX sensor	1	-7982	Bacharach	$237.80	$237.80	1. OK			

	Description	Qty	Part #	Mfr	Unit Cost	Total Cost	Status	Rental Time	Rental Insurance	% Total Cost
13	Spare SO2 sensor	1 2	-7983	Bacharach	$237.80	$475.60	1. OK 2. OK			
14	Extension probe	3	-7107	Bacharach	$348.50	$1,045.50	1. OK 2. OK 3. OK			
15	Printer paper (10 roll pack)	3	24-0531	Bacharach	$24.00	$72.00	1. Partially Used 2. OK 3. OK			
16	Ultraprobe 2000	1	UP 2000	UE Systems	$3,995.00	$3,995.00	1. OK			
17	220V adapter/ battery pack	1	BCH-220V	UE Systems	$137.00	$137.00	1. OK, in Ultraprobe case	Out 14 x; ave 17 days	YES	0.5%
18	Combination video-SECAM	1	VT-100	UE Systems	$0.00	$0.00	OK - Video should be previewed before rental of Ultraprobe			
19	Hand held thermocouple indicator, J/K	2	HH-22	OMEGA	$229.90	$459.80	**1. Out - Kaloyanov - 16.05.95** **2. Out - Katzarov - 06.06.95**	Out 18 x; ave 17 days	YES	1.7%
20	Connection on retractable cable	2	SDX-SMP-K-SM	OMEGA	$27.50	$55.00	**1.OK** **2. Out - Kaloyanov - date?**			0.2%
21	Probe and sensor kit	2	TK-2-K	OMEGA	$328.90	$657.80	**1. Out - Kaloyanov - 16.05.95** **2. Out - Katzarov - 06.06.95**	Out 3 x; ave 56 days	YES	2.5%
22	28" long probe	2	KHIN-14G-RSC	OMEGA	$50.05	$100.10	**1. Out - Katzarov - 26.06.95** **2. Out - Katzarov - 26.06.95**	Out 3 x; ave 56 days	YES	0.4%
23	48" long probe	2	KHIN-14G-RSC	OMEGA	$58.30	$116.60	**1. Out - Katzarov - 26.06.95** **2. Out - Katzarov - 26.06.95**	Out 2 x; ave 95 days	YES	0.4%
24	Heat resistant gloves	1	5378T3	OMEGA	$25.96	$25.96	**Out - Janos Zhelev - 08.94**	Out once; 347 days	YES	0.1%

	Description	Qty	Part #	Mfr	Unit Cost	Total Cost	Status	Rental Time	Rental Insurance	% Total Cost
25	Digital dissolved solids meter	3	L-01489-02	Myron L Co.	$349.00	$1,047.00	**1. Out - Janos Zhelev-08.94** **2. Out - B. Petkov - 04.11.95** **3. New**	Out 5 x; ave 75 days	YES	3.9%
26	Case for meter	3	L-01489-48	Myron L Co.	$33.00	$99.00	1. OK - each w/case 2. OK - each w/case 3. OK - each w/case			
27	Standard solution 300PPM	3	L-01489-43	Myron L Co.	$8.00	$24.00	1. OK 2. OK 3. OK			
28	Standard solution 3000PPM	3	L-01489-45	Myron L Co.	$8.00	$24.00	1. OK 2. OK 3. OK			
29	Battery 9V 4/pk	3 2	L-09376-04	Energizer	$9.00	$27.00	1. OK 2. OK 3. Used			
30	Deluxe Clamp - On Multimeter w/test leads	3	MX1200S	ITT Instr	$556.00	$1,668.00	**1. Out - Boris Petkov - 04.95** **2. Out - Kaloyanov?** **3. OK**	Out 13x; ave17 days	YES	6.2%
31	Electrician's gloves	3	5289T14	WHSalisbury	$56.60	$169.80	1. OK - not numbered, new 2. OK - not numbered, new 3. OK - not numbered, new			
32	Infrared pyrometer	1	OS2102	OMEGA	$2,245.00	$2,245.00	**Out - Katzarov - 06.06.95**	Out 13x; ave 15 days	YES	8.4%
33	Soft carrying case	1	OS2012	OMEGA	$30.00	$30.00	OK			
34	Alnor Air Velocity Measuring Kit, Metric readings	2	30050	Alnor	$1,150.00	$2,300.00	**1. Out - Kaloyanov - 05.06.95** **2. Out - Katzarov - 06.06.95**	Out 27 x; ave 13 days	YES	8.6%
	Total					$26,848.73				71.7%
35	Oxygen Sensor	6	24-7075	Bacharach	0	0	Extra Materials, unused			

APPENDIX D
RENTAL PROGRAM

Appendix D

NO	Description	Qty	Part #	Unit Cost	Total Cost	% Total Cost	Insured Amount	Average Rental Period	Average # of rentals	Rental Costs	SL Depr/year* Five years	1994 Value	1995 Value	1996 Value	1997 Value	1998 Value
1	Fyrite Duplex Kit CO2 & 02 analyzer	3	10 5021	$293 00	$879 00	3 8%	$43 94	2 weeks	2	$21 97	$175 80	$703 20	$527 40	$351 00	$175 80	$0 00
4	CO2 repair kit	3/2	11-7052	$35 00	$70 00	0 3%	$3 50	2 weeks	7	$0 50	$14 00	$56 00	$42 00	$28 00	$14 00	$0 00
5	O2 repair kit	3/2	11 7054	$46 50	$93 00	0 4%	$4 65	2 weeks	7	$0 66	$18 60	$74 40	$55 80	$37 20	$18 60	$0 00
8	Model 300PB comb analyzer w/printer	2	24 8111	$2,788 00	$5,576 00	24 1%	$278 76	3 weeks	13	$21 44	$1,115 20	$4,460 80	$3,345 60	$2,230 40	$1,115 20	$0 00
9	Model 300NXEB comb analyzer w/printer, SOX, NOX	1	24 8122	$3,813 00	$3,813 00	16 4%	$190 62	3 weeks	13	$14 66	$762 60	$3,050 40	$2,287 80	$1,525 20	$762 60	($0 00)
16	Ultraprobe 2000	1	UP 2000	$3,995 00	$3,995 00	17 2%	$199 72	2 weeks	0	$0 00	$799 00	$3,196 00	$2,397 00	$1,598 00	$799 00	$0 00
17	220V adapter/ battery pack	1	BH 220V	$137 00	$137 00	0 6%	$6 85	3 weeks	14	$0 49	$27 40	$109 60	$82 20	$54 80	$27 40	($0 00)
19	Hand held thermocouple indicator, J/K	2	HH 22	$229 90	$459 80	2 0%	$22 99	3 weeks	18	$1 28	$91 96	$367 84	$275 88	$183 92	$91 96	$0 00
21	Probe and sensor kit	2	TK-2-K	$328 90	$657 80	2 8%	$32 89	4 weeks	3	$10 96	$131 56	$526 24	$394 68	$263 12	$131 56	$0 00
22	28" long probe	2	KHIN 14G-RSC	$50 05	$100 10	0 4%	$5 00	4 weeks	3	$1 67	$20 02	$80 08	$60 06	$40 04	$20 02	$0 00
23	48" long probe	2	KHIN 14G-RSC	$58 30	$116 60	0 5%	$5 83	4 weeks	2	$2 91	$23 32	$93 28	$69 96	$46 64	$23 32	$0 00
24	Heat resistant gloves	1	5378T3	$25 96	$25 96	0 1%	$1 30	4 weeks	1	$1 30	none	$0 00	$0 00	$0 00	$0 00	$0 00
25	Digital dissolved solids meter	3	L-01489-02	$349 00	$1,047 00	4 5%	$52 34	4 weeks	5	$10 47	$209 40	$837 60	$628 20	$418 80	$209 40	($0 00)
30	Deluxe Clamp - On Multimeter w/test leads	3	MX1200S	$556 00	$1,668 00	7 2%	$83 39	3 weeks	13	$6 41	$333 60	$1,334 40	$1,000 80	$667 20	$333 60	$0 00
32	Infrared pyrometer	1	OS2102	$2,245 00	$2,245 00	9 7%	$112 23	3 weeks	13	$8 63	$449 00	$1,796 00	$1,347 00	$898 00	$449 00	$0 00
34	Alnor Air Velocity Measuring kit, Metric readings	2	30050	$1,150 00	$2,300 00	9 9%	$114 98	3 weeks	27	$4 26	$460 00	$1,840 00	$1,380 00	$920 00	$460 00	$0 00
	Total				**$23,183 26**	**100.0%**	**$1,169.00**					**$18,626 84**	**$13,894.38**	**$9,262.92**	**$4,631 46**	**($0.00)**

APPENDIX E
RENTAL CONTRACT

Company Name

Name:
Street Address
Town

Tel/Fax:

Rental Contract

Contract Number:_____

Explanation of Use:

RENTAL DATE	EXPECTED RETURN	ACTUAL RETURN	RECEIVED BY	AMOUNT OVERDUE

ITEM	DESCRIPTION WITH PART NUMBER	RENTAL PRICE	TOTAL
		TOTAL DUE	

Send all correspondence to:
AEE - Bulgarian Chapter
100A Vasil Levski BL AP 8
Sofia 1527, Bulgaria

INSPECTED BY:_____

AUTHORIZED BY:_____

DATE:_____

259

APPENDIX F
WEEC POTENTIAL SPONSORS

Company Name	Amount Purchased	Manufacturer - M Vendor - V
Advent Electric	$44,310	V
Alliance to Save Energy	$170	V
Alnor	$2,300	M
Anders Williams	$1,590	V
APV	$2,940	M
Armstrong	$14,413	M
Associated Steam	$11,573	V
Bacharach	$19,852	M
Barber Coleman	$6,716	M
Briggs	$274	V
Brooks	$3,983	M
Buhl	$1,200	M
Carotek	$6,716	V
Comeco	$753	M
C. B. Ives	$512	V
Davis	$16,183	M
Deluxe	$390	M
Dickson	$4,388	M
Dieterich Standard	$11,281	M
Dranetz	$17,610	M
Dynamation	$6,279	V
Eastern Controls	$5,343	V
Ecotech Product	$8,226	V
EES	$56,517	M & V
Fairmont Press	$722	M
Fisher	$2,840	M
Fluke	$564	M
Foxboro	$5,343	M
Foxboro/Ashcroft	$2,403	M
Genlyte/Universal	$58,130	M
Herman Goldner	$2,403	V
Hewlett Packard	$3,040	M
ITT	$1,838	M
Johnson Controls	$603	M
Kane-May	$4,760	M
Kurtz	$2,800	M
K.E.P.	$1,943	M
Lenze	$44,310	M
Microsoft	$413	M
Mueller	$353	M
Naturella Agency	$3,453	V
Omega	$4,010	M
Pacer Industries	$1,069	M
Packard Bell	$8,535	M
Phasetronics	$10,861	M
Power Hydraulics	$15,444	M
P.C. Rent & Lease	$8,535	V
Rosemount	$5,036	M
Scott Instrument	$1,695	M
Spence	$26,989	M
Tegam	$1,374	M
Thermal Devices	$10,861	V
UE Systems	$8,068	M
Veris	$668	M
Wahl	$8,432	M
Warrick	$274	M
W. S. Jenks & Sons	$58,694	V
Yarway	$25,303	M

APPENDIX G
WEEC POTENTIAL SPONSORS BY DOLLAR AMOUNT

Company Name	Amount Purchased	Manufacturer - M Vendor - V
W. S. Jenks & Sons	$58,694	V
Genlyte/Universal	$58,130	M
EES	$56,517	M & V
Lenze	$44,310	M
Advent Electric	$44,310	V
Spence	$26,989	M
Yarway	$25,303	M
Bacharach	$19,852	M
Dranetz	$17,610	M
Davis	$16,183	M
Power Hydraulics	$15,444	M
Armstrong	$14,413	M
Associated Steam	$11,573	V
Dieterich Standard	$11,281	M
Phasetronics	$10,861	M
Thermal Devices	$10,861	V
Packard Bell	$8,535	M
P.C. Rent & Lease	$8,535	V
Wahl	$8,432	M
Ecotech Product	$8,226	V
UE Systems	$8,068	M
Carotek	$6,716	V
Barber Coleman	$6,716	M
Dynamation	$6,279	V
Eastern Controls	$5,343	V
Foxboro	$5,343	M
Rosemount	$5,036	M
Kane-May	$4,760	M
Dickson	$4,388	M
Omega	$4,010	M
Brooks	$3,983	M
Naturella Agency	$3,453	V
Hewlett Packard	$3,040	M
APV	$2,940	M
Fisher	$2,840	M
Kurtz	$2,800	M
Foxboro/Ashcroft	$2,403	M
Herman Goldner	$2,403	V
Alnor	$2,300	M
K.E.P.	$1,943	M
ITT	$1,838	M
Scott Instrument	$1,695	M
Anders Williams	$1,590	V
Tegam	$1,374	M
Buhl	$1,200	M
Pacer Industries	$1,069	M
Comeco	$753	M
Fairmont Press	$722	M
Veris	$668	M
Johnson Controls	$603	M
Fluke	$564	M
C. B. Ives	$512	V
Microsoft	$413	M
Deluxe	$390	M
Mueller	$353	M
Briggs	$274	V
Warrick	$274	M
Alliance to Save Energy	$170	V

APPENDIX H
HUNGARIAN PROPOSAL

Please See ***Strategic Business Plan for Hungary.***

APPENDIX J
OPERATIONS REPORT

Appendix J

Annual Chapter Operations Report

STATEMENT OF REVENUES AND EXPENSES

INCOME

January 1, 19___ to December 31, 19___
Appropriations from AEE - Atlanta
Local dues collected $
Interest and dividends earned (4%/yr in $)
Meetings and special events
Educational courses, symposiums, other
TOTAL INCOME

EXPENSES

January 1, 19___ to December 31, 19___
Meetings
Facility Rental
Meals
Notices
Promotions
Honoraria
Transportation
Other (list on separate sheet)
Sub Total

Educational Courses/Symposia:
Facility Rental
Transportation
Honoraria
Printing/Mailing - Announcements
Other (list on separate sheet)
Sub Total

Operating:
Stationery
Postage
Clerical Help
Bank Service Charges
Transportation
Insurance
Legal & Accounting
Office Supplies
Office Rental
Telephone
Utilities
Other (list on a separate sheet)
Sub Total

TOTAL EXPENSES

EXCESS OF LOSS IN REVENUE
(Total Income minus Total Expenses)

APPENDIX K
BALANCE SHEET

267?

Appendix K

CHAPTER BALANCE SHEET

Period Ending December 31, 19____
(CASH BASIS)

ASSETS

Cash, Checking & Savings
Bonds, Securities, Others

TOTAL ASSETS (A)

LIABILITIES & FUND BALANCE

Loans (B)

FUND BALANCE (A) minus (B)

Please indicate Accounts Payable

APPENDIX L
SCHEDULE OF EVENTS

Appendix L

Annual Schedule of Events - Bulgarian Chapter

January 1	Yearly dues required in Atlanta
January 1	Call for Scholarship Nominations
January 15	List Chapter Officer information for AEE- Atlanta (for Jan-Dec Officer term
February	Deadline to file Publications for the next WEEC Conference in Atlanta.
February 15	Annual Chapter Operations Report Due
March 1	Deadline for article submittal for Spring issue of Insight News
March 1	Deadline for International Awards Entry
March 15	Call for Officer Nominations
March 31	Dissolution of members who have not paid membership fees
May 1	Deadline for Officer Nominations to Committee
May 1	Deadline for Scholarship Nominations to Committee
June 1	Yearly dues required by the Bulgarian Chapter for the following year
June 1	Deadline for article submittal for Summer issue of Insight News
June 1	Announcement of CI Award Recipients
June 15	List Chapter Officer information for AEE- Atlanta (for June-May Officer terr
August 1	Announcement of Scholarship Recipients
September 1	Deadline for article submittal for Fall issue of Insight News
September 1	Announcement of AEE Award Recipients
November	WEEC - Atlanta
November 1	Operations Report mailed to Chapter Presidents
November 15	Call for Awards Nominations for following year
December 1	Deadline for article submittal for Winter issue of Insight News

APPENDIX M
BYLAWS OF AEE

BYLAWS OF THE ASSOCIATION OF ENERGY ENGINEERS®

I. COMMON, NAME, LOCATION

Article 1. A professional nonprofit organization is established with the name of: "Association of Energy Engineers (AEE) - Bulgaria"; is written in Latin "AEE" as a voluntary, self-acting, independent, professional and creative public organization - union of engineers and specialists working in the of energy efficiency and energy management, and are members of AEE - Atlanta.

Article 2. AEE is an independent law entity organized as a union of its members which implement its activity in accordance with the Family and Persons Law and these Bylaws.

Article 3. AEE's headquarters are in Sofia.

II. MAIN OBJECTIVES AND FUNCTION

Article 4. AEE has an objective:

to assist for the creation and the development of a free competitive market for consulting and engineering services in the field of energy efficiency;

to support and encourage the professional development and growth either of its members or of all interested specialists;

to actively participate the technical and scientific fields listed in article 1;

to assist in the creation and maintenance in these fileds on a high professional level;

to take part in the functioning of state boards and other professional organizations and centers of energy efficiency to prepare and create normative documents;

to implement publication activities in which to disseminate information to wide public circles in the fields listed in article 1.

Article 5. In accordance with the stated objectives, AEE supports and encourages innovation and creativity and implements activities with which it:

assists for the research and development in the fields listed in article 1, in Bulgaria, for the raising of their authority and influence of the research in these fields,

212

teaches courses and post-graduate specializaties connected with the fields listed in article 1,

implements scientific, methodological, and organizational participation in international and national scientific conferences, workshops and other activities in the fields listed in article 1, taking place in Bulgaria and abroad,

organizes periodic scientific seminars in the fields listed in article 1;

organizes qualification courses in accordance with the objectives stated in article 4;

implements publishing activities connected the objectives of article 4;

establishes the rewards and prizes for the members of the Association of Energy Engineers for creative achievements in the fields listed in article 1

assists in raising the professional level of its members through the organization of workshops, courses, specializations and so on;

provides consulting assistance to its members and also to other organizations in the fields listed in article 1;

publicizes and advertises the achievements of its members through the publishing of newsletters, journals and other printed materials;

collects and provides information activities in the fields listed in article 1;

supports the establishment of agreeable relations between its members and companies from the country and from abroad;

assists in the participation of its members in international events and provides opportunities for their professional and scientific growth;

establishes and maintains contact with specialists from related fields and takes part in organizations with similar objectives in the country and abroad (as a member and as an observer);

publishes a recommendation of norms and forms which make the practical work of its members easier to accomplish and which leads to the unification and creation of higher professional standards, as long as they are not in contrast with the present norms and standards.

Article 6. AEE implements its activities based on annual plans and a budget for the achievement of its objectives.

Article 7. AEE may, according to a decision of its Executive Board (EB), form clubs and sections on territorial and professional principles.

Article 8. AEE may form unions with other organizations in accordance with the implementation of its non-profit objectives.

Article 9. The time length of AEE's operation is not defined.

III. MEMBERS RIGHTS AND OBLIGATIONS

Article 10. The number of AEE's members is not limited.

Article 11. AEE members must be either:

the founders whom have signed the Bylaws;

other bodies approved by the EB or by the relevant section or club's ruling board, members of AEE-Atlanta on the basis of a filed request for membership in AEE under the conditions specified below in the Bylaws;

physical or legal bodies which can be adopted by the EB on the basis of a filed request for membership in AEE under the conditions specified in the Bylaws.

Article 12. AEE members can be specialists working in the fields listed in article 1 and must accept the Bylaws.

The membership in AEE is personal.

New AEE members must be adopted by the EB or by the relevant club's ruling board.

The refusal of the EB or the relevant club's ruling board to accept a candidate for membership must be appealed in front of the CM in a time-period of 1 month from receiving the refusal. The CM's decision of the refusal is a final one.

A membership in AEE is voluntary and it is proven with a membership card and a filed enrollment application form.

Article 13. The members in AEE are divided into Qualified, Ordinary, Honorable, Collective and Student categories.

The Qualified members must have:

graduated from an institute of higher education in the country or abroad.

at least 3 years experience of professional or scientific experience or have two international publications or editions in the scientific or technical fields listed in article 1.

at least 2 years membership as an Ordinary member in AEE, representative of Collective members, or Student members; this is not a requirement for the founders of the association.

The Ordinary members must have:

at least 3 years professional or scientific experience or two international publications or editions in the scientific or technical fields listed in article 1.

to be a member of AEE - Atlanta.

Honorable members can be physical entities significantly developing any of the scientific or technical fields listed in article 1, who give exclusive assistance in developing AEE and are members of AEE - Atlanta.

Collective members can be legal entities from the state or private sector, enterprises, banks and other organizations which have an interest in AEE's objectives.

Student members can be undergraduates, graduates, or post-graduates from an Institute of Higher Education. For them the membership in AEE - Atlanta is not obligatory.

Article 14. The membership in AEE - Atlanta, USA can be proven with membership card and a certificate signifying paid membership.

Article 15. The AEE's members have the right:

to participate in AEE's activities;

to express opinions and to make proposals for all spheres of AEE's activities;

to receive AEE's assistance when they are accomplishing their professional obligations, including a defense when their rights are violated.

to use freely or with a discount services, information from AEE, connected with their activity;

to be elected in ruling boards of AEE if they are Qualified members;

to elect the ruling boards of AEE;

the members, under the above item, have the right to vote with one vote. They execute this right personally;

If the representative of the Collective member is also a Qualified member, he has the right of only one vote;

The Student member has the right to participate in the meetings and in the discussions but they do not have the right to vote, to elect or to be elected to ruling boards.

Article 16. AEE members are obliged:

to observe the Bylaws and to accept the organization's decisions;

to assist in the implementation of the objectives and the tasks of AEE;

to participate in the accomplishment of target programs and other collective performances for which they have given their consent beforehand;

to pay the defined membership fee;

the Qualified, Ordinary, Collective and Student members are obliged to pay:

a single first enrollment fee (except the Qualified);

an annual membership fee;

additional financing when it is defined by the CM, needed to achieve AEE's objectives;

Honorable members are not obliged to pay the above mentioned fees;

Student members pay a percent of the single enrollment fee and the annual membership fee of the Qualified members. The percent is defined by the EB.

Article 17. The Executive Board defines the amount of the enrollment fee and the amount of the annual membership fee at an annual Chapter Meeting.
/1/ The annual membership fee is paid in advance toward January 1st of each year.
/2/ When there is a delay in the payment of the membership fee more than 30 days, the EB sends a warning letter to the member.
/3/ When the membership fee is not paid by March 31st of the given year, the EB has a right to dissolute the member.

Article 18. The members can be unified in clubs (sections) according to a territorial or professional principle meeting the Bylaws.
/1/ Club (section) members elect among them, with an ordinary majority, a coordinator who will make the connection of the ruling boards of AEE

Article 19. Dissolution of the membership in AEE:
on a request of the member. The request should be field at least 1 month before the date of leaving and should be addressed to the EB or the corresponding club's ruling board.

on EB's decision because of heavy violations of the Bylaws and where there is infliction of harm to AEE. This decision for exclusion can be appealed in the Chapter Meeting in a 1 month period from its learning. The decision of the Chapter Meeting is the final one.

IV. RULING BOARD AND ELECTIONS

Article 20. The Ruling Boards in AEE are: the Chapter Meeting (CM), the Executive Board (EB), Supervisory Board (SB), and the Chairman and Vice-Chairman of the EB and the SB, respectively.
/1/ The Chapter Meeting consists of all AEE's members.
/2/ When the number of AEE's members increases above 200 people, the CM then consists of delegates for whose election a specific order is applied under the decision of the EB.

CHAPTER MEETING

Article 21 The highest Ruling Board in AEE is the Chapter Meeting (CM).
/1/ The CM makes decisions on all items connected with the achievement of the AEE's objectives.
/2/ The CM is directed by a Chairman of the meeting and two persons take minutes of the meetings.

278

The proposals for a chairman are made in the following order: President of AEE, if he is absent or is unable to perform this duty, the vice-president is delegated, after that follow ex-presidents of AEE, members of the EB and at the end, other members of AEE.

For note-takers, the secretary and then the vice-secretary are proposed and if they are absent or are unable to perform these duties, then two other members of AEE are delegated.

The chairman of the CM and the two note-takers are elected with an open voting.

/3/ The CM's are Regular and Irregular, Extraordinary on the necessity that the EB may organize an Irregular meeting of AEE.

Once a year a Regular, meeting of AEE is assembled.

When it is needed, the EB may assemble an Extraordinary meeting of AEE

The Extraordinary meeting is assembled by the EB and with the approval of 1/10 of the total members but not less than 10 members with a right to vote and with a written request to the EB in which the reason according for the requested Extraordinary meeting must be defined.

In this case, the EB is obliged to assemble a CM within a two month time-period from the filing of the request and is obliged to include the stated issue in the agenda

/4/ All AEE members have the right to participate in the CMs.
/5/ The invitations to participate in the CM are signed by the secretary and are sent at least 2 weeks before the defined day for the CM. The invitations must include the agenda as well as the place, time and date of the CM.
/6/ A quorum exists when half plus one of the members with a right to vote are attending the meeting.
/7/ If the number of members present at half an hour after the scheduled time, then a new meeting will be schedules within the next two weeks and it is considered a legal meeting regardless of the number of the members or delegates present at that time.
/8/ Any decisions that the CM makes which violate the Bylaws are not valid.
/9/ For an alteration of these Bylaws or for the dissolution of AEE's activity, the CM is considered legal when at least 2/3 of the members with a right to vote are present at the meeting.

Article 22. The CM of AEE has the right to:

affirm, change and add to the Bylaws;

elect the members and the chairmen of the EB and of the SB and to accept their resignations;

define the direction of development activities and to accept the business plan for AEE;

accept the reports of the EB and the SB;

affirm the AEE's budget and defines the amount of membership fee;

make decisions on topics resulting from the business plan and the Bylaws;

make decisions for excluding the EB and SB members and their chairmen during periods of inactivity or nonperformance;

make decisions for forming unions or mergers of AEE with other organizations

make decisions for the dissolution or the reorganization of AEE's activities;

make decisions for membership in organizations with similar objectives and tasks;

announce donators and an honorable Chairman of AEE according to a EB's decision.

Article 23. The CM discusses the topics included in the beforehand prepared or accepted agenda.
/1/ The decisions of the meeting are taken with an ordinary majority and with an open voting of the members with a right to vote, unless the CM adopts otherwise.
/2/ For an alteration of the Bylaws, for the dissolution of AEE's activity, for leaving of an union with other organizations, for mergers with other organizations, the decisions are made with the qualified majority of 2/3 of the members present with a right to vote.
/3/ The CM's decisions regarding elections, issues of confidence (trust) and personal issues are made with a secret vote.
/4/ The decisions on issues of confidence or on personal issues are made with an ordinary majority of the members present with a right to vote.
/5/ The CM's decisions are recorded in the meeting's minutes which is signed by the Chairman of the meeting and one of the note-takers. The minutes are kept by the Secretary.

EXECUTIVE BOARD

Article 24. The Executive Board is a collegial executive board of AEE with a duration period of 2 years.
/1/ The EB consists of five to seven members including president, vice-president, secretary, and treasurer.
/2/ The CM can change the number of the EB members.

Article 25. The EB has the right to:

make operational decisions for AEE's activity, resulting from the Bylaws, the business plan, and signed contracts.

assemble a CM according to an order announced beforehand.

organize the implementation of CM's decisions and report about its activity to CM once a year or before this time by the request of all the members.

sign agreements for the implementation of AEE's objectives and tasks and creates conditions for their realization.

propose a draft budget to the CM for the next year and to implement this AEE's budget if agreed to by CM.

rule AEE's activity and represent it by its chairman when it is necessary.

make decisions for the formation of creative groups, working groups, for the attraction of experts and consultants.

file proposals in the CM for forming unions with other organizations in the country and abroad.

accept the reports of the signed agreements for their implementation.

hire and fire the staff if there is such a need and to define their payment.

make decisions for participation in congresses and conferences in the country and abroad, and to define its representatives.

make decisions for subscription journals, for the price, for the distribution of reports and other materials and for the copyrights.

present a financial report for its activity during the past year on every regular CM.

make decisions to enroll and exclude its members.

Article 26. The EB meets Regularly at least once every two months according to an invitation of the president who defines the agenda and meets Extraordinarily when there is a need. The EB members must be informed about the agenda, the date, time, and place of the meeting at least seven days prior.
/1/ The president is obliged to assemble a meeting if it is requested at least by three members of the EB and accompanied by a request defining the issues.
/2/ The meetings of the EB are valid if more than half of its members are present there.
/3/ The EB's decisions are made with an open voting and with an ordinary majority and if the votes are equal, the president's vote defines the decision.
/4/ The decisions are recorded in the meeting minutes, which are signed by the President and the Secretary and are kept by the Secretary.
/5/ All documents according to which AEE is under obligation will be signed by the President.

Article 27. The President of AEE:

organizes and coordinates the whole activity of AEE in accordance with the Bylaws and the decisions of CM and EB.

directs the meetings of the EB.

represents AEE in its relations with third parties in the country and abroad.

directs the operating financing according to EB's decision.

convokes regular meetings of the EB at least once every two months.

makes other decisions in accordance with the rights given to him from the CM and EB.

Article 28. When the president is absent, he is replaced by the Vice-president. The president can leave some of his functions to the Vice-president with the consent of the EB.

Article 29. The Secretary of AEE

receives, files and sends AEE's correspondence, and signs it together with the president;

is responsible for the registering AEE's members;

keeps the records, the seal and all other documentation of AEE;

assists the President with the forming of the meeting agendas of the EB;

complies a report for EB's activity during the year;

Article 30. If the secretary is absent, he is replaced by AEE's treasurer.

Article 31. The Treasurer of AEE

receives all amounts of money which are due to AEE, including the membership fees, the amounts donated by the government, organizations or other entities;

deposits all finances except the sum of money defined for the current needs of the EB;

accomplishes all payments with the documents signed by the President or in case that he is absent, signed by the Vice-president.

prepares the financial reports when they are needed or required, prepares also an annual balance sheet of AEE and presents if for the approval of the EB.

Article 32. When the Treasurer is unable to perform his functions, he is replaced by a member of the EB, specified by the EB.

Article 33. Supervisory Board (SB)

The SB consists of three members and it is elected by the CM for a period of 2 years. The SB controls and supervises the management and all other activities of AEE.

/1/ The SB has the right to:

control and examine the financial and economic operations as well as the other activities of the EB and the Treasurer, following and observing the provisions of the Family and Persons Law, the Bylaws and the CM's decisions;

examines AEE's documents and books connected with the financial state and all other activities of AEE and also has the right to inspect the money in cash;

prepares a report for EB's functioning once a year. The report is presented in front of the CM and after its approval it is applied to the minutes of the CM.

/2/ The SB reports about its activity every year.

/3/ The SB is obliged to inform AEE's members if it violated any financial, contractual or other discipline and it is also obliged to demand an Irregular or Extraordinary CM.

/4/ In case of the resignation or the exclusion of the SB's member, the EB invites other members to take the vacant positions according to the proposal of the President.

ELECTIONS

Article 34. The elections for a new EB an SB take place every two years on the day on which the Regular CM takes place.

V. PROPERTIES AND FINANCING

Article 35. /1/ Main sources for the implementation of AEE's activities are the receipt of first (entry) enrollment fees, membership fees, and donations from state or private organizations and entities or revenues from those activities mentioned in article 5.

Article 36. AEE's property consists of ownership right and other rights on movable and unmovable things; rights on intellectual property, securities, assets and liabilities.

Article 37. AEE's functions are financially supported from:

one-time first (entry) enrollment fee and yearly membership fees;

probable irregular fees which the CM defines in case of a necessity;

the revenues of distribution of printed and other materials and editions.

the rights for participation in seminars, congresses and other forums.

the subsidies from the government;

donations, inheritance, as well as other property, the acquisition which is not against the law and the Bylaws.

the interest rates and other revenues coming from AEE's property.

Article 38. AEE's financial activities ares implemented in accordance with the annual budget accepted by the CM.
/1/ Target are funds in levas and foreign currency for the financing of defined activities and target programs that can be formed as a part of AEE.
/2/ AEE is responsible for the obligations (liabilities) which it has undertaken with its properties. AEE is not responsible for the obligations of its members as well as the members are not responsible for AEE's obligations.
/3/ AEE accepts donations for financial support of its activity and it reports to the donators and the CM.

285

CLUBS AND SECTIONS

Article 39. Clubs and sections can be formed by no less than 11 AEE members.
/1/ The clubs and the sections can be established after coordination with the EB.
/2/ The clubs and the sections accomplish their activities by the means of club (section) meetings and an elected coordinator.
/3/ The meetings of the clubs (sections) are legal if more than half of their members are present at the meeting.

Article 40. The clubs and sections can implement their activities independently these Bylaws, the AEE objectives and tasks and the decisions of EB and of SB.

Article 41. The clubs and the sections can prove their identification by AEE's seal, the name of AEE, plus the addition of "club" or "section". Unless there are not other rules, the clubs and the sections must abide by the provisions of the Bylaws and the internal AEE rules.

VII. DISSOLUTION OF AEE

Article 42. /1/ AEE is dissolute in the following cases:
according to a CM's decision.

if in a 3-month time-period its membership comprises less than the necessary number needed for the formation of an EB.

according to a decision of the Regional Court in case that the law, the Bylaws or the state public order is violated and when it lacks ability to pay.

/2/ For the dissolution of AEE, a CM is needed with at least half of the members present with a right to vote and the decision is taken with a 3/4 majority of the members present.

VIII. OTHER (SEAL)

Article 43. AEE has around circle seal which can be put on documents and correspondence.

IX. FINAL PROVISIONS

Article 44. The present Bylaws can be altered in a CM under the proposal of the EB or 1/5 of AEE members with a right to vote. All alterations are accomplished with a quorum as specified in Article 21, section /9/ and with a majority specified in Article 23, section /2/.

Article 45. The information that is not included in the Bylaws is according to the relevant provisions of the Family and Persons Law.

Article 46. The present Bylaws enter into from the date of its adoption by the CM of the founders.

Article 47. AEE is created in accordance with Article 135 to 147 from Part III of the Family and Persons Law.

Article 48. AEE dissolutes its activity under the conditions of Article 146 of the Family and Persons Law.

FOUNDERS:

Boris Petkov

Georgi Rampov Ivanov

Deyan Yordanov

Dimitar Baev

Dimiter Shivkov

Iolian Marionov Ivanov

Yordan Katzarov

Lubomir Spassov

Nikola Zikatanov

Nikola Stankov

Nikola Kaloyanov

Stefan Hristov

Janos Zselev

APPENDIX N
AEE MEMBER QUESTIONNAIRE FEEDBACK

AEE Member QUESTIONNAIRE Feedback

Other Professional Organizations
- Bulgarian Energy Association
- Energetica
- Union of Energetics
- Union of Automation Engineers
- Club of Energy Specialists
- EnEffect
- Bulgarian Automation and Information
- Nuclear Society

What are their strengths?
- Russian Theoretical Scientific Direction or the East
- AEE - Engineering Applications from the West

How many meetings per year would be ideal?
- 2-3 official meetings.
- Combine with Varna Conference
- Every month between Oct - June (9 meetings)
- 3 meetings/year
- 10 meetings/year

What do you like about being an AEE Member and what are the benefits?
- (First Private) non-government organization which is self-supported.
- Being part of the Future for Energy Engineers
- Periodicals - Energy Engineering; Engineer Systems Magazine; Energy User News; Strategic Planning. (Some articles are good for Bulgarian Specialists)
- New information knowledge, seminars, books
- New equipment measurement based on rental program
- Meet new people - American and new manufacturers.
- RECOGNITION
- Acceptance into an association based on skill and not private connections
- Help develop markets in energy efficiency
- Advantage for personal business and increased contracts in Bulgaria.

What are the drawbacks in being an AEE Member?
- energy efficiency is not a priority in government, legislation and industry so less benefit to be an AEE member
- fear of government involvement

What AEE services should be developed?
- Simple methodologies and practical measures for consultants to apply their theoretical base.
- Information Dissemination
- Contribution list for new members
- Moral and Ethic norms

AEE Member QUESTIONNAIRE Feedback

Two day training courses
- Thermal Efficiency; Electrical Systems
- Courses geared toward industry and enterprises
- Courses geared toward end users - consumer side

FINANCE AND ECONOMICAL SEMINARS
Performance Contracting and Pricing of Services
Technical Problem solving sessions and round table discussions
Energy Efficiency Funds
Technical approaches first, then DSM
Maintenance Systems
Create contacts with suppliers
Bridging the gap between Highly technical professionals and the Business Professionals
Conference with the University

What would be the ideal number of members for the AEE Bulgarian Chapter?
In one year 30-50 members
Double in size by the end of the year.
Accept 10-15 people now.
100 members long term.

What will be the key professional characteristics of value for future AEE members?
professors and engineers
specialists from plants and enterprises
Energetics as members (ie District Heating Committee)
Specialists from Ministry and COMMITTEE OF ENERGY
Energy efficiency specialists
Students: electrical, mechanical; economical
Only Professionals
Economic persons

Other comments?
There should be barriers to limit the number of new members; education-university degree, experience, background, sponsorship, membership fee is not a serious barrier.

Is the plant audit an industry area to pursue for future business?
Yes,
No, no benefit unless it is privatized
No, no other competitors, state owned monopoly
Yes, ongoing programs with audited plant.

What are the major manufacturing problems?
need maintenance free equipment
need worldwide manufacturers

AEE Member QUESTIONNAIRE Feedback

Which manufacturers do you like the most and why? Quality of product? Availability? Service? Reliability of information? Cost of product? etc

Carrier; Product: - Air Conditioning System;
Powers; Product - Controls, temperature regulator, Local Distributor
Graystone, Canada, Moncton
General Eastern, Boston, MA - Humidity measurements
HiCal
Omega Engineering, Stamford CT and Czech Republic
Armstrong, useful in new area of air distribution
Spirex - Sarco, UK, training and service is good.
Honeywell
Johnson & Johnson
APV
Westinghouse
EPS

The Association of Energy Engineers

The Association of Energy Engineers (AEE) is a nonprofit, non-governmental organization comprised of professionals, independent engineers and specialists working in fields connected with energy efficiency and energy management. It is a Chapter of the American Association of Energy Engineers (AEE - Atlanta, GA, USA). There is also an AEE Chapter in Plovdiv.

Goals and Objectives

It assists in the creation and the development of a free competitive market for consulting and engineering services in the field of energy efficiency. It supports and encourages the professional development and growth of its members and their private companies.

Training & Certification

The founding AEE members participated in seminars sponsored by USAID & AEE on a wide range of energy efficiency problems and conducted by leading American specialists. The seminars included: Feasibility Studies; Project Financing; Demand-Side Management; Auditing Energy Accounting; Marketing; Lighting Management; Motor Management; Combustion Efficiency; Industrial Process Control, and others. The founding members entered a Certified Energy manager program (CEM) which demonstrated their working knowledge of the seminar topics. The CEM is widely recognized as the leader in Energy Efficiency Auditing and Implementation in the United States. The written CEM examination is conducted in English.

Energy Auditing, Project Management, and Implementation

Many of AEE members have substantial experience conducting energy audits, preparing recommendations for improvements and implementing their recommendations with the installation of new equipment and operating procedures. In the framework of the Program for Energy Efficiency in Bulgaria of USAID and the Ministry of Industry, the members of the chapter conducted energy audits in ten industrial enterprises.

Access to other professionals

AEE members have attend the World Energy Engineering Congress, held every year in Atlanta, GA, USA, which delivers over 160 presentations and showcases over 300 exhibits and where AEE members converse with worldwide energy equipment manufacturers and leaders in the industry. AEE members can publish articles in newsletters and technical publications sponsored by AEE - Atlanta.

Publications

The AEE members receive information on the latest technology and methods in engineering, strategic planning, and management for energy efficiency through four publications received monthly, bi-monthly, and quarterly. A library of energy engineering, auditing, management, and finance textbooks and manuals and manufacturer information is available for each members' use.

Services

AEE members have, as a resource, the latest equipment to conduct on-site energy audits to provide immediate measurements.
AEE members have as a resource specialized information on Cogeneration & Competitive Power, Environmental issues, Demand-Side Management and others. They have the opportunity to interact with leading American experts.
AEE members can give competent opinions through their participation in various councils and committees and share their expertise with other interested organizations.
AEE contains the following councils:
The Policy Council which creates awareness and proposes solutions to Bulgaria's energy needs through the development of criteria and prerequisites for energy suppliers and end-users.
The Certification Council which seeks to elevate the local expertise in the area of energy audits, management, and implementation methods through self-administered seminars and certification programs.

AEE Members
Bulgarian Chapter

Christian I. Spassov is the President of "ECOTECH PRODUCTS", an official representative of "Armstrong"- a manufacturer of steam and condensate equipment systems - and "Cleaver Brooks" - a leading manufacturer of industrial boilers. "ECOTECH PRODUCTS" specializes in engineering activities resulting in substantial energy savings from the reconstruction of steam and condensate systems, compressed air, refrigerators and complete boiler installations. Tel/fax:(+3592) 541-267.

Deyan Yordanov is the President of "Argus 91", a design and consulting company specializing in HVAC and electricity projects. Deyan holds an MS from Varna Technical University in geothermal and solar energy implementation and studied one year at Reading University, UK, specializing in over the heat pipe technology. He has over 10 years' experience in HVAC project design and energy efficiency. Tel/fax: (+35952) 884-613

Dimitar Baev is the Executive Manager of "Energy Efficient Systems, Ltd.", a company specializing in energy audits and installation of equipment, business development and information services. As the President of "Design and Business Consulting" he conducted marketing research projects for the transforming Bulgarian business environment. Dimitar holds a PhD in the field of Information Technology. Tel/fax: (+3592) 447-495

Dimiter Shivkov is the Manager of "AMECON Consulting" which provides industrial engineering, operations management and process automation consulting for various industries. Dimiter has a PhD in Control Engineering and is an Associate Professor at the Sofia Technical University. He received a Master's degree in Economics and Management from Erasmus University in Rotterdam is a licensed business valuer. Tel/fax: (+3592) 708-509.

Georgi Rampov is a Senior Assistant Professor at the Sofia Technical University in the Thermal and Nuclear Power Department. He is a specialist in the field of steam and condensate heat recovery systems, thermal measurements and energy economics. He is the President of "Rampov & Son Company" which specializes in instruments, steam quality measurements, software & hardware and automation designs & engineering. He holds an MS in Thermal Engineering. Tel/fax:(+3592)545-895

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Janos B. Zselev is the manager of "Exerg Co.Ltd." and the technical director of "CENTECH" (Center for Energy Technology) in Budapest. He has 10+ years of research and development experience in chemical engineering and since 1992 he has conducted industrial energy audits in Hungary and Bulgaria. He holds a PhD in the field of heat and mass transfer processes, steam generation and steam & condensate distribution systems. Tel: (052) 472-672; (+3660) 303-048; Fax: (052) 463-562

Lubomir I. Spassov is the Manager of "EnergoControl Ltd.", specializing in energy management and performance contracting for the Pleven and surrounding areas. "EnergoControl" has installed heating systems for building blocks, apartments and military schools and has generated energy savings to reinvest into future projects. Lubomir holds an MS degree in Engineering. Tel:(+3592)(064)419-262

Nikola G. Kaloyanov is a co-partner of "Alpha-Pro," an energy consulting group specializing in efficient industrial, commercial and residential energy transforming systems. He is an Associate Professor at the Sofia Technical University in the fields of heat exchanger systems, heat & mass transfer, and the functional analysis of commercial and residential heating and refrigeration. Tel: (+3592) 742-609 Fax: (+359) 526-740

Nikola Stankov is a Project Manager in combustion systems and utilization for "TETIVA, Ltd." a company which specializes in energy efficiency audits and implementation of new technology, automation systems, and computer programs for thermal energy. Nikola holds a PhD and is a Senior Assistant Professor at the Sofia Technical University in the field of boiler utilization and steam condensate systems. Tel: (+3592) 439-735

AEE Members
Bulgarian Chapter

Nikola Zikatanov is the Director of "Energy Efficient Systems Ltd.", a company specializing in energy audits and the installation of energy efficiency equipment, business development and information services. He manages a manufacturing facility and various businesses in the Sofia area, including energy efficient and decorative window film dressing. He holds an MBA from Pittsburgh University, USA and IMC in Budapest, Hungary. Tel/fax: (+3592)445-878

Stefan Hristov represents "Energo Eco Iconomia Ltd.", a company which provides steam boiler energy efficiency investigations and financial services to support the implementation of their recommendations. Stefan has over 10 years' experience in the field of thermal energy efficiency. Tel: (+3592) 727-131 Fax: (+359) 727-650

Yordan Katzarov is the Senior Project Manager of "Risk Engineering Ltd.", a company specializing in nuclear reliability, energy conservation, safety, quality assurance, management studies and software development services. He has an extensive background in conventional power production. He holds an MS in the fields of power and combustion processes and is the author of Bulgarian and foreign translated articles in those areas. Tel: (+3592) 521-217 Fax: (+3592) 522-546

The above members are registered Certified Energy Managers (CEMs) recognized by the Association of Energy Engineers in Atlanta, Georgia, USA for their achievement in energy efficiency, auditing and management. They Founded the AEE Chapter in Bulgaria.

Methody Konstantinov is the president of "Ecosapiens", a Foundation for ecology and energy efficiency. He holds a PhD and teaches at the Sofia Technical University in the field of energetics, environment and energy efficiency. Tel: (+3592) 884-351 ext 353; Fax: (+3592) 521-390

Tsancho Tsanev is the President of "Magnet Electric" a company specializing in electrical and lighting equipment. He is also an Associate Professor at the Sofia Technical University, lecturing in electricity, lighting, and motors. Tsancho holds a United States Patent for his revolutionary magnet design. Tel: (+3592) 520-439

Garabed S. Moumdjian is a professor at the Sofia Technical University and was Head of the Thermal and Nuclear Power Energy Department. He is the author of over 100 scientific publications. His recent research is directed towards energy conversion technologies and process control systems. He is a member of the Bulgarian National Counsel of WEC and participates in PHARE programs of EC in the Bulgarian Energy Sector. He is an Honorable member of AEE. Tel: (+3592) 750-175

Plovdiv Chapter

Boris Petkov holds an MS in Control Engineering from the University of Food Technology. He is a Control Engineer with five years' experience in the design and implementation of control systems. He is the President of "IVEL Ltd., Engineering Consulting Company." He is also one of the founders of the Bulgarian Chapter - Sofia and is a Certified Energy Manager (CEM). Tel/fax: (+35932) 455-505

Georgi Vangelov is an Electrical Engineer who has been working in the design, maintenance and servicing of high and low voltage electrical systems for more than 30 years. He has several inventions awarded for his contribution in innovative activities. He is a private consultant in the design of energy efficient electrical systems. He is an Advisor on illumination standards for the Bulgarian Ministry of Health.

Prof. Dr. Ivan Dragotinov is a Control Engineer and is Head of the Automatic Control Department at the Higher Institute of Food Industry in Plovdiv. His professional achievements include the application of control theory for solving control problems in the food industry. He has presented and published over 40 papers has worked in the Department of Industrial Control at the Sofia Technical University

Petko Kostadinoff holds an MS in Architecture from the University of Civil Engineering and Architecture in Sofia. He is the President of the Plovdiv Chapter of the Bulgarian Architectural Society. He is the owner of the "Architectural Consulting Company."

Plovdiv Chapter

Maxim Dunchev holds an MS in Control Engineering from the University of Food Technology. He is a Control Engineer with 14 years' experience in the design of control systems and equipment. He is the Vice President and one of the founders and owners of "COMECO" - the largest private Bulgarian manufacturer of thermostats and temperature, pH, level and humidity electronic controllers and sensors.

Marietta Vracheva holds an MS in Control Engineering from the University of Food Technology. She is a Control Engineer with five years' experience in the design and implementation of control systems. She works as a freelance consultant in the area of control and monitoring systems.

Minko Rusalev is the Managing Director of "Naukaenginering, Ltd." which is a subsidiary of the Bulgarian Union of the Scientists and provides management and engineering consulting services, mostly to subcontracting members of the union and outside consultants. He holds a Master's degree in Business Administration (MBA).

Prof. Dr. Stefan Dichev has a PhD in the fields of Refrigeration and Air-Conditioning. He has been elected as "Academician" of the Academy of Science of Ukraine and the International Academy of Science, Technology and Engineering. He has presented and published over 180 papers and has registered over 20 inventions and patents. He has worked as a designer, researcher and an instructor for over 30 years in the fields of refrigeration, air-conditioning, and heat pump systems.

Toma Georgiev is a Law Expert on Commercial Law in Bulgaria. He graduated from the Sofia University and completed his training in Business Administration. He is an expert in Performance Contracting and other energy related contract methods.

Velik Petkov is a Mechanical Engineer who has been working in the design, maintenance and servicing of HVAC systems for more than 30 years. He has several inventions awarded for his contribution in innovative activities. He is the leader of the design group, "SINTZ", a subsidiary of the Bulgarian Union of the Scientists in Plovdiv. He is an Advisor on HVAC Standards for the Bulgarian Ministry of Health.

For more information concerning the Association of Energy Engineers (AEE), feel free to contact the Chapter Coordinators, the Executive Boards and the individual members.

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АСОЦИАЦИЯ НА ЕНЕРГИЙНИТЕ ИНЖЕНЕРИ (АЕИ) - БЪЛГАРИЯ

Асоциацията на Енергийните Инженери (АЕИ) - България е неправителствена организация-сдружение с идеална цел на професионалисти, независими инженери и специалисти, работещи в области, свързани с енергийната ефективност и енергийния мениджмънт. Тя е клон на Американската Асоциация на Енергийните Инженери (АЕЕ - Атланта, САЩ). Клон на АЕЕ съществува и в Пловдив.

ЦЕЛИ И ЗАДАЧИ

Съдейства за създаването и развитието на свободен конкурентен пазар за консултантски и инженерингови услуги в областта на енергийната ефективност и подпомага и насърчава професионалното развитие и растеж на членовете си и техните частни фирми.

ОБУЧЕНИЕ И СЕРТИФИКАЦИЯ

Учредителите на АЕИ взеха участие в семинари, организирани от USAID и АЕЕ, по широка гама от проблеми на енергийната ефективност, провеждани от изтъкнати американски специалисти. Семинарите включваха: проучвания за изпълнимост на проекти; енергийна ефективност при производството и потреблението; финансиране на проекти; енергийни оценки; анализ на енергийните разходи; предлагане на енергийни услуги; политика за енергийна ефективност; енергиен мениджмънт на осветлението, ел. задвижванията и др.; горивна ефективност; управление на промишлени процеси и др. Членовете-учредители се включиха в програмата за Сертифицирани Енергийни Мениджъри (CEM), която демонстрира техните знания върху темите, включени в семинарите. CEM е широко признат като професионална титла за водеща фигура в енергийно ефективния одитинг и внедряване в САЩ. Писменият CEM изпит се провежда на английски език.

ЕНЕРГИЕН ОДИТИНГ, УПРАВЛЕНИЕ И ИЗПЪЛНЕНИЕ НА ПРОЕКТИ

Много от членовете на АЕИ имат съществен опит в провеждането на енергиен одитинг, в разработването на препорьки за подобрения и изпълнение на проекти при внедряването на ново оборудване в производствени условия. В рамките на Програмата за енергийна ефективност в България на USAID и Министерството на промишлеността от членове на клона бяха разработени енергийни проучвания в 10 промишлени предприятия.

КОНТАКТИ С ДРУГИ ПРОФЕСИОНАЛИСТИ

Много от членовете на АЕИ са участвали в Световния Конгрес по Енергийно Инженерство, провеждан всяка година в Атланта, Джорджия, САЩ. На него те могат да чуят над 160 доклада и да видят витрини на над 300 изложители. Членовете на АЕИ се срещат с производители на енергийно оборудване от целия свят и с водещи фигури в индустрията. Членовете на АЕИ могат да публикуват статии в бюлетини и технически издания, спонсорирани от АЕИ в Атланта, САЩ.

ИЗДАНИЯ

Членовете на АЕИ получават информация за последните технологии и методи в инженеринга, стратегическото планиране и мениджмънта за енергийна ефективност чрез четири издания, получавани съответно ежемесечно, двумесечно и тримесечно. На разположение на членовете е библиотека от учебници и ръководства по енергийно инженерство, одитинг, мениджмънт, финанси и информация за производители.

УСЛУГИ

Членовете на АЕИ разполагат с модерно оборудване за провеждане на експресни измервания и енергийни експертизи.
Членовете на АЕИ разполагат със специализирана информация за комбинираното производство, нетрадиционните източници на енергия, опазването на околната среда, ефективност на потреблението и др., както и с възможност за привличане на водещи американски експерти.
Членовете на АЕИ могат да дават компетентни мнения с участието си в съвети и комитети и да споделят своя опит и знания със заинтересовани организации.

Към АЕИ са изградени:

Съвет по енергийна политика, който предлага решения на енергийните нужди на България чрез развитие на критерии и изисквания към доставчиците на енергия и крайните потребители.

Съвет по сертификация , който се стреми да издигне националния авторитет в областта на енергийните експертизи, методите за управление и изпълнение чрез провежданите от него семинари и участие в конференции.

296

ЧЛЕНОВЕ НА АСОЦИАЦИЯТА НА ЕНЕРГИЙНИТЕ ИНЖЕНЕРИ (АЕИ) - БЪЛГАРИЯ

Георги Рамповв е главен асистент в Техническия Университет в София, катедра Топло и Ядрена енергетика и е специалист в областта на паро-кондензните регенеративни топлинни измервания и икономика на енергетиката. Той е също и президент на ЕФ „РАМПОВ&СИН", която се специализира в КИП и топлинни измервания, софтуер & хардуер, автоматизация, консултиране по енергоспестяване, влажност на пара и инженерингови услуги. Тел./Факс: (+3592) 545-895

Деян Йорданов е президент на „АРГУС 91", проектантска фирма, специализираща в областта на енергийно ефективните отоплителни и вентилационни системи за търговски и жилищни сгради във Варна, България. Той е завършил Техническия Университет във Варна със специализация в областта на използването на геотермична и слънчева енергия и е специализирал една година в Университета Рийдинг, Великобританиял Тел./Факс: (+359)(052) 884-613

Димитър Баев е управител на „ЕНЕРГИЙНО ЕФЕКТИВНИ СИСТЕМИ" ООД, фирма със специализация в областта на енергийните проучвания и инсталации на оборудване за енергийна ефективност и информационно обслужване. Като президент на „DBC", създадена през 1992г., той е изпълнил редица проекти, свързани с проучвания на сектори от българската икономика. Той е к.т.н. и ст.н.с. II в областта на автоматизацията и информационните технологии. Тел./Факс: (+3592) 447-495

Димитър Живков е управител на „АМЕКОН Консултации", която осигурява консултиране по системен и индустриален инженеринг, производствен мениджмънт и автоматизация на процеси за промишлеността. Той е к.т.н. в областта на автоматиката и е доцент в Техническия Университет в София. Получил е магистърска степен от Университета Еразмус в Ротердам по Икономика и Мениджмънт и е лицензиран бизнес оценител. Тел./Факс:(+3592) 708-509

Йордан Кацаров е ръководител на проекти в „РИСК ИНЖЕНЕРИНГ" ООД, специализираща в сферата на ядрената безопасност, оценка на риска, проучвания на управлението и осигуряваща консултантски услуги в областта на конвенционалната енергетика, ядрената енергетика и индустрията. Завършил е Техническия Университет в София със специализация в областта на енергийните и горивни процеси и има публикации в тези области в България и чужбина. Тел.:(+3592) 521-217 Факс:(+3592) 522-546

Кристиян Спасов е президент на „ЕКОТЕХПРОДУКТ", официален представител на Ф„Armstrong" - производител на оборудване за паро-кондензни стопанства и технологичен въздух и Ф"CLEAVER BROOKS" - водещ производител на промишлени котли. Ф„Екотехпродукт" е специализирана в инженерингови дейности, водещи до значителна икономия на енергия, свързани с реконструкция на: паро-кондензни стопанства, системи за сгъстен въздух, хладилни инсталации, комплексно оборудване на котелни инсталации. Тел./факс: (+3592) 541-267; 542-743; 542-379

Любомир Спасов е управител на „ЕНЕРГОКОНТРОЛ" ООД, специализираща в сферата на енергийния мениджмънт и енергийното договаряне за Плевен и околните райони. „ЕнергоКонтрол" е внедрила ефективни отоплителни системи в жилищни блокове, апартаменти и военни училища и е създала енергийни икономии, които да реинвестира в бъдещи проекти. Той е инженер-топлотехник. Тел.: (+359)(064) 419-262

Никола Зикатанов е директор в „ЕНЕРГИЙНО ЕФЕКТИВНИ СИСТЕМИ" ООД, фирма със специализация в областта на енергийните проучвания и инсталации на оборудване за енергийна ефективност и информационно обслужване. Той ръководи и други дейности, свързани с енергийната ефективност. Има магистърска степен по бизнес администрация от Университета Питсбърг в САЩ и Международния Център по Мениджмънт в Будапеща, Унгария. Тел./Факс: (+3592) 445-878

Никола Калояновв е к.т.н. и доцент в Техническия Университет в София в областта на топлообменници и ситеми, топло и масо пренос,функционален анализ, отопление на търговски и жилищни сгради и хладилни инсталации. Той е партньор в „АЛФА-ПРО", консултантска фирма, специализирана в промишлени, търговски и жилищни енергийно ефективни преобразуващи системи. Тел.: (+3592) 742-609 Факс: (+3592) 526-740

Никола Станковв е програмен мениджър на „ТЕТИВА" ООД по горивни и паро-кондензни системи и приложения. „ТЕТИВА" специализира в енергийно ефективни проучвания и внедряване на нови технологии, автоматизационни системи и компютърни програми за топлинна икономичност. Той е гл.ас. по ТЕЦ в Техническия Университет в София и е к.т.н.. Тел.: (+3592) 439-735

ЧЛЕНОВЕ НА АСОЦИАЦИЯТА НА ЕНЕРГИЙНИТЕ ИНЖЕНЕРИ (АЕИ) - БЪЛГАРИЯ

Стефан Христов представлява „ЕНЕРГО ЕКО ИКОНОМИЯ" ООД , компания, която осигурява проучвания на енергийната ефективност на парни котли и финансови услуги за подпомагане изпълнението на техните препоръки. Той има десетгодишен опит в сферата на топлинната енергийна ефективност. Тел.:(+3592)727-131 Факс:(+3592) 727-650

Йолиан Иванов е ел.инженер. Президент е на фирма „ЙОЛИ" , която осигурява консултантска дейност в областта на енергийната ефективност и трансфера на know-how в обекти от българската индустрия, мениджмънт, инвестиционни и приватизационни проекти. Защитил е дисертация в областта на роботиката и е ръководител на проекти в БАН. Завършил е международна програма за икономическо развитие в Университета на Централен Ланкашир, Великобритания. Той е директор на Международна Инвестиционна Група „ЕВРОКАПИТАЛ"-АД. Тел.: (+3592) 808-500 Факс: (+3592) 314-180

Янош Желев е управител на „ЕКСЕРГ" ООД и технически директор на ЦЕНТЕХ (Център за Енергийни Технологии-Будапеща. Той е кандидат на техническите науки. След повече от 10 години развойна и изследователска дейност в химическото машиностроене от 1992г. той активно участва в енергийни анализи на предприятия в Унгария и България. Специалист е в областта на топло- и масопреносните процеси и апарати, паропроизводството и паро-кондензните системи. Тел.: (052) 472-672, (+3660) 303-048 Факс: (052) 463-562

Гореспоменатите членове са регистрирани Сертифицирани Енергийни Мениджъри, признати от Американската Асоциация на Енергийните Инженери в Атланта, Джорджия, САЩ, за техните постижения в енергийната ефективност, одитинг и мениджмънт. Те са учредители на АЕИ в България и са квалифицирани членове.

Методи Константинов е президент на фондация "ЕКОСАПИЕНС", насочена към екологичната и енергийна ефективност. Той е ст.н.с. в Техническия Университет в София в областта на енергетиката, околната среда и енергийната ефективност.
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Цанчо Цанев е президент на „МАГНЕТ ЕЛЕКТРИК" - фирма, специализираща в областта на електрическо и осветително оборудване. Той е к.т.н. и доцент в Техническия Университет в София. Изнася лекции по енергетика, осветление и електрозадвижване. Притежава патент на САЩ за революционния си магнитен захват. Тел.: (+3592) 520-439

Гарабед Мумджиян е професор в Техническия Университет в София и е бивш ръководител на катедра Топло и Ядрена Енергетика. Той е автор на над 100 научни публикации. Най-новите му изследвания са насочени към технологиите за преобразуване на енергия и системи за контрол на процеси. Член е на българския национален съвет на Световната Енергийна Конференция и участва в програмата ФАР на ЕО в българския енергиен сектор. Той е почетен член на АЕИ. Тел.: (+3592) 750-175

ЧЛЕНОВЕ НА АЕИ-КЛОН ПЛОВДИВ

Борис Петков е електроинженер по автоматизация на производството с пет годишен опит в областта на проектирането и внедряването на системи за автоматизация и енергоспестяване. Има придобита титла СЕМ и е един от учредителите на АЕИ в България. Асистент е по АТП във ВИХВП, Пловдив. През 1995г. специализира в САЩ в областта на бизнес мениджмънта и има консултантска фирма за енергийни инженерни услуги - „ИВЕЛ" ООД.

Велик Петков е инженер-топлотехник, работил в областта на проектирането, поддържането и експлоатацията на отоплителни, вентилационни и хладилни инсталации и енергийни системи повече от 30 години. Автор е на редица рационализации и е удостоен със значка за принос в рационализаторската и изобретателската дейност.

Георги Вангелов е електроинженер, работил в областта на проектирането, поддържането и експлоатацията на електрически системи и мрежи повече от 30 години. Автор е на редица рационализации.

ENERGY MANAGEMENT
ENVIRONMENT
ALTERNATIVE ENERGY
COGENERATION

ЧЛЕНОВЕ НА АЕИ-КЛОН ПЛОВДИВ

Иван Иванов е електроинженер, доцент и к.т.н. в областта на приложните въпроси от теорията на автоматичното регулиране, които възникват при използване на технически средства за автоматизация при управление на енергийни и индустриални процеси. Автор е на редица научни публикации, рационализации и изобретения, проекти и реализации на системи за автоматично управление и енергоспестяване.

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Петко Костадинов е архитект на редица известни сгради в България и е носител на множество отличия от архитектурни конкурси. Той също така е и председател на Пловдивското Дружество на Съюза на Архитектите в България.

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ЗА ПОВЕЧЕ ИНФОРМАЦИЯ ОТНОСНО АСОЦИАЦИЯТА НА ЕНЕРГИЙНИТЕ ИНЖЕНЕРИ (АЕИ) - БЪЛГАРИЯ СЕ ОБРЪЩАЙТЕ КЪМ КООРДИНАТОРИТЕ, УПРАВИТЕЛНИТЕ СЪВЕТИ И ОТДЕЛНИТЕ ЧЛЕНОВЕ.

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ASSOCIATION OF ENERGY ENGINEERS
HUNGARIAN CHAPTER
STRATEGIC BUSINESS PLAN

Prepared for:

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Bureau for Europe and Newly Independent States
Office of Environment Energy and Urban Development
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300

CONTENTS

1.	POSITIONING OF THE AEE CHAPTER IN THE HUNGARIAN ENERGY SECTOR	1-1
	1.1 Introduction	1-1
	1.2 Competitive Advantage of the AEE Chapter	1-2
	1.3 Areas of Specialization	1-2
2.	OPERATIONAL STRUCTURE OF THE CHAPTER	2-1
	2.1 Current Situation	2-1
	2.2 Specific Areas in Which the AEE chapter Underperformed	2-1
	2.3 Reasons for Poor Performance	2-2
	2.4 Recommendations for Chapter Operation	2-2
3.	RECOMMENDATIONS FOR CHAPTER WORK	3-1
4.	CHAPTER ACTIVITIES WITH USAID SUPPORT	4-1
5.	CHAPTER ACTIVITIES WITHOUT USAID SUPPORT	5-1

CHAPTER 1
POSITIONING OF THE AEE CHAPTER IN THE HUNGARIAN ENERGY SECTOR

1.1. INTRODUCTION

This report will give a set of recommendations that might be useful for the chapter. It will cover the positioning of the AEE chapter, possible activities, and the chapter work in general. The recommendations focus mostly on the chapter's organization and operational structure.

Hungary has several large institutions and societies that deal with energetic aspects in general or energy efficiency in specific. Some of these institutions have a large number of members and receive continuous support from the Hungarian government and other sponsors.

The spectrum of activities and publications can be described as advanced and developed. All topics, like power generation, energy pricing, energy politics and regulations, privatization, environment, and energy efficiency are more or less covered by at least one of these institutions and their publications. There are also a number of international publications available, either in a foreign language or as a Hungarian translation.

A competitive analysis shows that the Hungarian AEE Chapter cannot compete with these institutions in terms of regularly publishing a magazine, doing research on energy, and engaging in government energy regulations. The chapter is simply to small and has too little manpower and too few financial resources to make an impact in these fields.

The AEE Chapter has to position itself specifically in the energy efficiency sector of the market. Even within the energy efficiency sector, the AEE Chapter cannot deal with all theoretical and practical aspects of energy efficiency. Due to the limited resources available, the Chapter can only maximize its impact by focusing on a limited number of activities. This specialization creates the basis for a successful existence of the AEE Chapter in Hungary. A specialization is necessary to further develop a professional reputation in the industry such as continued implementation of CEM training within the energy community.

1.2 COMPETITIVE ADVANTAGE OF THE AEE CHAPTER

- Members offer consulting services in energy efficiency and develop energy efficiency projects.

- The chapter is part of the international AEE network and therefore has international business contacts and access to a wide range of information.

1.3 AREAS OF SPECIALIZATION

Using the competitive advantages, the Hungarian AEE chapter and its members should specialize in the following areas:

- AEE members offer their consulting services and develop and implement energy efficiency projects. Successfully implemented energy efficiency projects are the backbone of the chapter and the best way for the chapter to earn a professional reputation in Hungary and among its international partners. It is the best promotion for the AEE and its members.

- Intensive contacts with equipment manufacturers and financial institutions as a basis for successful project work. Only if the AEE chapter and its members further develop the necessary contacts to manufacturers and financial institutions can they act as a link between clients, manufacturers and financing institutions.

- CEM training program as described in the proposal to USAID.

These are the main areas of specialization for the chapter. In order to spread the word about the AEE chapter's existence and the services the chapter and its members can provide, promotional activities have to be undertaken. The following could be used for promoting the AEE:

- Small scale publications on successfully implemented projects and other practical information on energy efficiency. The eight page black & white publication that is part of the USAID proposal is an example of that type of publication. The content should be geared towards energy efficiency projects with a brief description of the type of projects, technologies used and energy savings results. (The chapter has to find a balance between creating interesting project reports and not disclosing sensitive project data. An approval of the client before publishing is highly advised.)

- Seminars and workshops on specific energy efficiency topics for energy professionals. These activities provide a floor for business contacts where Hungarian energy professional meet with AEE members and manufacturers or other specialists.

- Membership directory containing information about AEE member companies. This should include a brief description of the company, area of specialization, and a project history. The leaflet could be handed to interested clients.

- As soon as the AEE chapter starts with its promotion, it is likely that clients want to receive some information about the chapter and companies of members. It is vital that the chapter can respond to such a request with sufficient information. A list of addresses and phone numbers is not sufficient. A description about each company with specialization and successfully completed projects has to be included. It might be useful to include a very brief curriculum vitae of each company president.

CHAPTER 2
OPERATIONAL STRUCTURE OF THE CHAPTER

2.1 CURRENT SITUATION

Under the current situation it is clear that the Hungarian AEE Chapter will not have the resources to employ someone on a full or even part-time basis who is responsible for AEE activities. As a result, the chapter has to rely on its members to devote some of their time for chapter work. In the foreseeable future this work will be without compensation, except for communication expenses. Because members can only devote limited time for chapter work, the AEE chapter has to rely on cooperation between the members. This is the only way the chapter can undertake activities in a successful and professional manner.

However, current chapter operations are week and non-existent in some areas. All activities are initiatives of individual AEE members and little coordination of work is taking place. As the recent conference proved, large activities have to be coordinated. The lack of an operational structure became obvious in the time period after the conference. The chapter could only prepare necessary reports or provide important information for its international partners with considerable time delay. The delayed response and the mediocre quality of the reports has hurt the reputation of the Hungarian AEE chapter.

2.2 SPECIFIC AREAS IN WHICH THE AEE CHAPTER UNDERPERFORMED

- Thank you letters to US manufacturers were not send eventhough a draft letter was prepared and handed to the vice-president for distribution.
- Six weeks after the conference a list of participants and invited persons still did not exist. USAID, Hagler Bailly, and the manufacturers are still waiting.
- US manufacturers donated equipment and the AEE chapter was unable to prepare a comprehensive list of projects with all information necessary for the manufacturers to evaluate. Manufacturers only received a list of addresses.

- A report for Hagler Bailly on the use of previously donated equipment was sent after numerous requests and four weeks late. The report was lacking in important information like rental dates and spare parts requirement.

It is important for the chapter to learn from the past activities and identify the reasons for its underperformance and search for solutions.

2.3 REASONS FOR POOR PERFORMANCE

No single AEE member is able to carry out all the work on his own. The time commitment is simply to large for a single person. Mr. Miklós Gellért, vice-president of the AEE chapter, has carried out most of the work for organizing the conference. His enormous time commitment has to be appreciated. However, Mr. Gellért could not easily share information because of the lacking information systems for the chapter. As a consequence, other AEE members could not support his work in the necessary way.

In general, reduced information flow and uncoordinated activities result from the fact that the chapter does not yet have a permanent office and computer equipment. Another reason for the reduced information flow is that all communication has to be covered by the members themselves.

AEE members have to appreciate that the AEE has to earn the statues of being a partner for other institutions, companies and professionals in the energy business. Forming an organizational structure that helps rather than hinders the planned activities should be prioritized.

2.4 RECOMMENDATIONS FOR CHAPTER OPERATION

Specific responsibilities in the following areas have to be taken over by individual AEE members:

- Coordination of work and activities
- Treasury: responsibility for accounting and administrative expenses and financial reports and setting and collecting local individual and corporate dues
- Equipment: responsibility for equipment rental, maintenance, and status reports

- Certification and training: responsibility for organizing and conducting certification and training programs
- Seminars and workshops: contact person, organization of work
- Public Relations: Contact person for other professional institutions, manufacturers etc., responsible for promotion activities, advertising
- Publishing: Contact person, coordination of publishing and editing work.

The following operational procedures have to be set:

- define the scope of work for all functions within the chapter
- define the role of the board of directors and its intent
- define reporting activities (who reports to whom and to what extent)
- select means of information flow among the members (possibly e mail) -- if e-mail is not available, monthly reports can be distributed at chapter meetings.

CHAPTER 3
RECOMMENDATIONS FOR CHAPTER WORK

- The Hungarian AEE Chapter has to focus on developing, coordinating, and implementing energy efficiency projects in conjunction with the consulting services of its members. The key to a sustainable AEE chapter is successful project work. With every implemented project the reputation of the Hungarian AEE chapter will improve.

- The AEE should only engage in publishing, training of energy managers, and organizing seminars to the extent that is necessary to promote the AEE and gain new members. These activities, however, are not the sole purpose of the Hungarian AEE chapter. They have only auxiliary character because the chapter is to small to be run like AEE-Atlanta where membership fees and seminars cover the cost of operation.

- The AEE chapter has to develop market and customer orientation to a greater extent. This means that the performance of the chapter has to satisfy the expectations of its clients and business partners. It is not always easy to critically evaluate the own organization buy looking at it from a client's perspective. But it is worth trying, because only if the chapter can add value for its clients and partners will the services be demanded in the long run.

- Most of the AEE members offer similar consulting services in the energy sector. Quite naturally, there is competition between members for energy efficiency projects. Competition is the driving force in a free market economy.

- However, the competition between members shall not interfere with interests of the AEE chapter. The chapter has to establish rules that deal with competition among members:

    - Clients are provided with information of all members and their companies. The clients chooses his partner or requests tenders from one or more consultants.

- Once a members has successfully defined an energy efficiency project with a client, other members will refrain from creating competition. Only as a cohesive group can the chapter make an impact on the energy efficiency market in Hungary. Other members should be viewed as partners within the same network and not as fierce competitors.

▸ It can also be stated that the AEE chapter faces more competition form outside than from within. A large number of companies offer consulting services in the energy sector. Manufacturers of equipment will also utilize every available means to sell their equipment in the Hungarian market. It is therefore important that the members work closer together in the future. This will help to build the reputation of the Hungarian AEE chapter as a professional organization that is well established in Hungary.

CHAPTER 4
CHAPTER ACTIVITIES WITH USAID SUPPORT

The following activities can be carried out within the next 6 to 12 months given that further USAID funding is available. A detailed description of these activities can be found in the proposal to USAID.

- Certified Energy Manager (CEM) Training Program
- Introductory Publication
- Building an Operational Structure with the help of computer technology
  - The build-up of an operational structure with the help of computer technology is the single most important activity because it prepares the AEE chapter for all other activities. The chapter has to spend considerable time in defining how to make the best use out of the new communication facilities. Computer and e-mail are just tools, their effective use is the key.
  - Given that the build-up of an operational structure will demand a large portion of the chapter's resources, the other two activities should be planed within a time frame of at least 6 to 12 month. Rather than doing them as soon as possible, the chapter should try to organize these activities as best as it can.

CHAPTER 5
CHAPTER ACTIVITIES WITHOUT USAID SUPPORT

Without receiving further assistance from USAID, the progress of the Hungarian AEE chapter will be slow. All activates have to be planed at a cost-covering level. Possible activities are:

- Organize seminars and workshops.
- Under the absence of financial support, the AEE Chapter has to plan its activities more carefully so that all costs, including administration expenses for the chapter, are covered by the revenues created.
- If resources for publishing AEE information are not available, the chapter should focus on its primary strength: developing and implementing energy efficiency projects. Again, this is one of the best promotions for the chapter.
- The Hungarian AEE chapter could try to enter an arrangement with one of the larger energy association in order to get a floor to advertise its services in their publications. Also, there are a number of organizations like "The Regional Environmental Center" that offer a large range of free-of-charge services that could be of value to the chapter.
- One possible source of income for the chapter is the rental of its equipment. The equipments could be rented out to members (at a discount rate) and also to other companies (at a higher rate). The revenues could cover the cost of equipment maintenance.

ASSOCIATION OF ENERGY ENGINEERS
HUNGARIAN CHAPTER
RECOMMENDATIONS

Prepared for:

U.S. Agency for International Development
Bureau for Europe and Newly Independent States
Office of Environment Energy and Urban Development
Energy Infrastructure Division
Washington, D.C. 20523

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312

CONTENTS

1. EXECUTIVE SUMMARY 1-1

2. BACKGROUND 2-1

3. PROPOSED ACTIVITIES 3-1

3.1 Certified Energy Manager Training Program 3-1
3.1.1 Training of Trainers 3-2
3.1.2 Cost of Proposed Activity 3-2
3.1.3 AEE Funded Activities 3-2
3.2 Introductory Publication 3-3
3.2.1 Objectives of the Publication 3-3
3.2.1 Cost of Proposed Activity 3-4
3.3 Computer for AEE Chapter and E-Mail Access for Members 3-4
3.3.1 Limitations 3-4
3.3.2 Objectives 3-4
3.3.3 Cost of Proposed Activity 3-5

4. INDICATORS OF SUCCESS 4-1

4.1 Development of a More Active Role 4-1
4.2 Anticipated Results 4-1

CHAPTER 1
EXECUTIVE SUMMARY

This proposal to the U.S. Agency for International Development is trying to outline the need for further assisting the Hungarian Chapter of the Association of Energy Engineers (AEE). Assistance is sought for marketing the services of the chapter and its members to the energy efficiency market in Hungary and supporting the set-up of an operational structure for the chapter.

The goal of this document is to show that the proposed activities will help the Hungarian AEE Chapter and its members to overcome a hurdle they have to pass in the intermediary run in order to become a self-sustainable organization. Especially in light of the previous involvement of USAID in Hungary where AEE members were trained and the chapter was set-up, further assistance should be viewed as a logical follow-up.

The Hungarian AEE chapter proposes assistance for the following three activities:

- Certified Energy Manager (CEM) Training Program
- Introductory Publication
- Computer For AEE Chapter And E-mail Access For The Members

Following is a cost summary of the proposed activities:

Cost of CEM training program	$ 33,000
Cost of publication	$ 12,000
Cost of computer technology	$ 32,000
Total cost of proposed activities	$ 75,000

CHAPTER 2
BACKGROUND

In February 1991 the U.S. Agency for International Development started the 1991/92 Emergency Energy Assistance Program for Hungary. The main objective of this program was to achieve immediate and lasting energy savings at low cost.

The 1993/94 follow-up program had the objective of developing the industrial energy efficiency market in Hungary by developing and supporting private energy service companies. In particular, nine Hungarian energy professionals were trained in energy auditing and related topics, and were provided assistance in their initial energy auditing work. These professionals passed the Certified Energy Manager (CEM) examination of the Association of Energy Engineers.

The newly certified energy managers formed the Hungarian Chapter of the AEE and were officially registered in Hungary as a not-for-profit organization in June 1995. The chapter currently has twelve ordinary members.

The mission statement of the Hungarian AEE Chapter is to promote energy efficiency and environmental technologies among industry, institutions, and energy professionals for the benefit of the Hungarian energy industry. Chapter members provide a variety of consulting services in energy efficiency ranging from energy audits, feasibility studies, project financing, and management consulting. As a chapter they were actively involved in organizing the USAID sponsored conference on "Expanding the energy efficiency market in Central and Eastern Europe" held in Budapest on June 12-16, 1995. The chapter intends to continue its work in developing energy efficiency projects, organizing seminars, workshops and conferences.

The Hungarian AEE Chapter needs further assistance to market its services to potential clients and to develop business opportunities for the members. The chapter also needs support in setting-up its operational structure. The following sections describe the proposed activities and outline the potential benefits for the Hungarian energy efficiency market and U.S. manufacturers.

CHAPTER 3
PROPOSED ACTIVITIES

The AEE chapter proposes to organize a second round of the CEM training program in Hungary for approximately 15 energy professionals. After passing the examination, participants will become Certified Energy Managers. The objectives of the training program are:

- to train Hungarian energy professionals according to U.S. technology standards and on usage of U.S. equipment
- to create awareness about the activities of the Hungarian AEE chapter and promote its services
- to increase the link between Hungarian and U.S. energy professionals, and
- to promote the benefits of AEE membership.

3.1 CERTIFIED ENERGY MANAGER (CEM) TRAINING PROGRAM

The structure of the training program is as follows:

- 15 day training program conducted by Hungarian experts on the following topics:
  - Financing opportunities for energy efficiency projects
  - Legal framework for energy and environment
  - Best available technologies for energy efficiency
  - Energy efficiency and its impact on competitiveness in the marketplace
  - Energy accounting, economics, and management

- Three day training program conducted by two Hungarian professors from the Technical University Budapest (both AEE members). The training is carried out partially in Hungarian and English to prepare participants for the CEM training. It will directly precede the program of Dr. Wayne Turner

- Two day CEM training program conducted by Dr. Wayne Turner. The exam will follow the training program.

3.1.1 Training of Trainers

The AEE chapter also proposes to train two Hungarian professors from the Technical University Budapest to conduct future CEM training courses without the help of a U.S. guest lecturer. The objectives of the activity are:

- to regularly conduct CEM training courses in Hungary

- to conduct these courses without financial assistance in the long run, and

- to develop the AEE as a training center.

The Hungarian training program will comply with all standards set by AEE-Atlanta.

3.1.2 Cost Of Proposed Activity

Cost for 15 participants in the CEM training program and training for two University professors:

Administration expenses for AEE-Atlanta including application fees, textbooks, testing	$ 10,000
Travel expenses for U.S. lecturer	$ 5,000
Promotion of CEM training program	$ 2,000
Compensation for Hungarian lecturers	$ 6,000
Two week training for two Hungarian Professors at Oklahoma State University	$ 5,000
Travel expenses to U.S. for two Hungarian professors	$ 5,000
Total expenses of CEM training program	$ 33,000

A participation fee will cover cost of training facilities and administration expenses for AEE. A participation fee will also help to establish the CEM training program on the market.

3.2 INTRODUCTORY PUBLICATION

3.2.1 Objectives of the Publication

The AEE chapter proposes to publish one issue of an introductory magazine. The objectives of the publication are:

- to introduce the Hungarian AEE chapter as part of the global AEE network
- publish success stories about energy efficiency projects
- provide follow-up on the recent energy conference
- promote the relation of the Hungarian AEE Chapter to U.S. equipment manufacturers
- create further awareness about the importance of energy efficiency, and
- give U.S. equipment manufacturers an opportunity to advertise.

The AEE chapter also plans to follow-up with a simpler publication, which will provide up-dated AEE information twice a year on a continuous basis.

The AEE has pursued industry contacts and some of the manufacturers and institutions have expressed an initial interest in supporting the AEE by paying for advertisements in the publication. This could minimize the cost for the publication.

The magazine will contain around 16 pages. In order to reach potential industrial clients and key professionals in Hungary, a volume of 1,000 copies is suggested.

A participation fee will cover cost of training facilities and administration expenses for AEE. A participation fee will also help to establish the CEM training program on the market.

3.1.3 AEE Funded Activities

AEE would like to budget for AEE International Officers to attend the AEE Annual Meeting. In addition, AEE staff would visit once a year to attend a meeting or seminar in Hungary.

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The magazine will contain around 16 pages. In order to reach potential industrial clients and key professionals in Hungary, a volume of 1,000 copies is suggested.

3.2.1 Cost Of Proposed Activity

Publishing cost	$ 3,000
Editing cost and administrative Expenses	$ 1,000
Development of client address database	$ 1,000
Mailing and distribution cost	$ 1,000
Support for 4 simpler follow-up publications including publishing and distribution cost	$ 6,000
Total expenses of publication	$ 12,000

The simpler publications will contain eight black and white pages. After four issues, the AEE chapter will be able to recover cost for further publications from advertisements of manufacturers and other institutions. However, a support for the first publications is needed.

3.3 COMPUTER FOR AEE CHAPTER AND E-MAIL ACCESS FOR MEMBERS

3.3.1 Limitations

The AEE chapter does not have an office nor has it access to a computer. All previous chapter activities have been carried out by individual members under utilization of their private resources. The lack of an operational base hampers the chapter in further developing its activities and limits information flow among the members.

3.3.2 Objectives

The chapter evaluated different alternatives to create a basis for operation and proposes to have access to its own computer with printer and e-mail accounts for all active members. The objectives of this proposal are:

- to centrally store all important AEE information
- to enable remote access to AEE information
- to create an AEE bulletin board on the E-mail system
- to enhance information flow within the chapter
- to get access to E-mail and internet services

320

▸ to help create a more professional image of the AEE.

A duration of 5 years is recommended for the activity.

3.3.3 Cost Of Proposed Activity

Personal computer with software	$ 3,000
Printer	$ 500
12 modems for E-mail access	$ 3,000
12 E-mail accounts (60 month/each)	$ 25,000
2-day E-mail training course for members conducted at REC*	$ 500
Total expenses of computer technology	$ 32,000

* The Regional Environmental Center for Central and Eastern Europe
Miklós tér 1, Budapest 1035

321

CHAPTER 4
INDICATORS OF SUCCESS

4.1 DEVELOPMENT OF MORE ACTIVE ROLE

The proposed activities will provide the necessary support to the Hungarian AEE Chapter to move towards a self-sustainable organization. These activities are vital to reach a critical mass in terms of number of members, frequency and scope of activities, and organizational capabilities. Once a strong base is developed, the chapter can play a more active role in the energy efficiency market. Specifically:

- Members can use a stronger AEE to develop more business for their companies,
- The chapter can extend its relations with international energy and finance institutions, equipment manufacturers and clients, and
- The chapter can act as a link between these parties and point of contact regarding energy efficiency projects.

4.2 ANTICIPATED RESULTS

The anticipated results of the project are as follows:

- Regularly held CEM training programs will broaden the membership base of the Hungarian AEE Chapter, and help to extend the number of private energy consulting companies in the Hungary. The demand for energy consulting services in Hungary is expected to rise in the future. For the chapter, representing more members and more energy consultants means being able to strengthen its position as a professional partner to others.
- The CEM training program will contribute to promote internationally standardized certifications and create further awareness about the AEE chapter.

- The publication will follow-up on previous AEE activities. It will associate the AEE name with specific activities. It will also further promote the AEE chapter as an Association that can be a potential partner for everyone involved in energy efficiency on Hungary. In turn, AEE members can develop their business activities and contribute to successfully implemented energy efficiency projects.

- The AEE chapter could promote U.S. technology and strengthen the already existing ties to U.S. manufacturers. Therefore, more energy efficiency projects could be implemented with U.S. equipment. Also, the AEE plans to use these contacts in the future to organize workshops on specific energy topics for industry specialists. This would not only give U.S. manufacturers the floor to introduce their equipment and technologies, it would also provide the AEE with an opportunity to run on a self-sustainable basis by recovering cost trough participation fees.

- The AEE can only fulfill its missions statement with an adequate operational structure. The investment in computer technology will enhance the capability of the AEE to communicate within the chapter and externally. This will lead to a more professional appearance of the AEE chapter and therefore make the chapter and its members better partners for business in the Hungarian energy sector.

- A stronger Hungarian AEE chapter will enhance the internationality of the AEE network. As part of that network, the Hungarian chapter can provide better opportunities for U.S. companies to enter foreign markets.

The boundary conditions for the Hungarian energy industry are likely to improve in the next two to three years due to rising energy prices, tighter regulations for energy use and environment, and improved business perspectives for Hungarian companies. It is important for the Hungarian energy industry that organizations like the Hungarian AEE chapter survive this difficult period in order to prosper in the future.

ASSOCIATION OF ENERGY ENGINEERS
ROMANIAN CHAPTER
STRATEGIC BUSINESS PLAN

Prepared for:

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324

CONTENTS

ACKNOWLEDGEMENTS iii

1. EXECUTIVE SUMMARY 1-1

1.1 AEE in Romania Today 1-1
1.2 Summary of Recommendations 1-1

2. INTRODUCTION 2-1

3. AEE MISSION AND PURPOSES 3-1

3.1 AEE Mission 3-1
3.2 AEE Purposes 3-2

4. ASSESSMENT AND RECOMMENDATIONS 4-1

4.1 Organizational Structure and Recommendations 4-1
4.1.1 Organizational Structure 4-1
4.1.2 Recommendations 4-2
4.2 Marketing and Business Development and Recommendations 4-3
4.2.1 Marketing and Business Development 4-3
4.2.2 Recommendations 4-4
4.3 Financing Issues and Recommendations 4-6
4.3.1 Financing Issues 4-6
4.3.2 Recommendations 4-7
4.4 Institutional Links and Recommendations 4-9
4.4.1 Institutional Links 4-9
4.4.2 Recommendations 4-9
4.5 Membership and Recommendations 4-10
4.5.1 Membership 4-10
4.5.2 Recommendations 4-11
4.6 Other Activities 4-12
4.6.1 Administration 4-12
4.6.2 Information Technology 4-12

4.6.3 Internet 4-14
4.6.4 Publications 4-14
4.6.5 Lectures 4-15
4.6.6 Certified Energy Manager Program 4-15

5. CONCLUSIONS 5-1

6. PEOPLE INTERVIEWED 6-1

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CHAPTER 1
EXECUTIVE SUMMARY

The purpose of this Strategic Business Plan is to give the Romanian Chapter of AEE some recommendations, ideas, and strategies to develop its business and commercial objectives. As the representative organization of private Energy Service Companies (ESCOs) and of Certified Energy Managers in Romania, AEE has a key role to play in promoting the activities of its members. Thus, the ideas presented herein provide a framework for enhancing the visibility of AEE in the local and international energy efficiency and environmental communities, and for ensuring the growth and involvement of the ESCOs in the Romanian economy.

1.1 AEE IN ROMANIA TODAY

AEE is not a well known organization in Romania today. This is attributed to two factors. First, it is a relatively new organization. Second, AEE has made no concerted effort to market itself or its members. Most marketing activities to date have been conducted by the individual members for the benefit of their own ESCOs. Similarly, the lack of readily available financing sources has hindered the rate of growth of the ESCOs. It seems that money has been lacking for investing in energy efficiency. Also, since most of the economy is still state controlled, there are no incentives from the part of major industrial enterprises to invest in energy conservation. However, the current process of transformation of the Romanian economy from a centralized to a market economy is creating many potential business opportunities that have yet to be fully exploited.

1.2 SUMMARY OF RECOMMENDATIONS

Key to the long-term viability of AEE will be its ability to market itself both locally and internationally as an authority in the fields of energy efficiency and environment conservation. Therefore, AEE must begin its marketing efforts by identifying the key players and designing a strategy for AEE members to visit them and present AEE and the ESCOs. Similarly, AEE must identify all financing sources available in Romania, and also present themselves. An important point to make is that, although there are two (2) AEE Chapters in Romania, AEE is one organization with the same capabilities and goals and objectives. Close coordination and cooperation between the chapters is critical

to the success to the marketing endeavors and to all efforts to increase AEE membership and to establish relationships with other energy efficiency organizations in the region.

Lastly, for the ESCOs as well as for AEE, it is extremely important that they incorporate information technology into their operations. No organization in today's business environment will be successful without information technology resources. AEE must make efforts to connect itself to the Internet to facilitate communications among members and with international organizations, and should attempt to have its activities published in AEE-Atlanta publications.

As Romania converts to an open market economic system, the opportunities for the ESCOs to provide energy efficiency services will undoubtedly increase. Therefore, AEE must position itself with the right technologies, methodologies, and strategies to be able to benefit from this conversion. The success of AEE depends only of the amount of dedication and hard work that AEE and its members are willing to invest to achieve this goal.

329

CHAPTER 2
INTRODUCTION

This report consists of a detailed assessment of the current condition of the Romanian Chapters of the Association of Energy Engineers (AEE). The objective of the assessment was to identify key business and commercial areas that need to be strengthened to ensure the long-term viability of AEE in Romania.

In addition to a discussion of the situation of AEE in Romania, this report includes a series of recommendations that address some of the specific areas that were analyzed during the assessment. It is the Consultant's believe that acting on these recommendations will undoubtedly strengthen the visibility and influence of AEE, and by consequence of the AEE members, in the Romanian business sector.

Since AEE is an amalgamation of private sector entities, Energy Service Companies (ESCOs), independent professionals and specialists, academics, students, and Romanian Government employees, the recommendations regarding the marketing of AEE, financing and organizational issues, institutional links, and others, can be adapted and used by the individual AEE members in their daily activities.

The superb technical capabilities of AEE members are apparent. Thus, this report concentrates on the business and commercial issues that must be addressed by AEE so as to solidify its position as a key player in the energy efficiency and environmental fields in Romania.

CHAPTER 3
AEE MISSION AND PURPOSES

3.1 AEE MISSION STATEMENT

To promote energy efficiency and environmental protection in Romania through information, professional development, and support to private energy service companies.

3.2 AEE PURPOSES

- To promote the scientific, educational, and commercial interests of those engaged in energy management.
- To advance by all means within Romanian laws the purposes of AEE members and to promote rational energy management.
- To support the development of private Energy Service Companies (ESCOs) and promote their involvement in the Romanian economy.
- To foster the implementation of state-of the-art energy and environmental technologies and methodologies in Romania.

CHAPTER 4
ASSESSMENT AND RECOMMENDATIONS

This section contains a detailed discussion of what are believed to be the main organizational and business issues that AEE has to address in order to strengthen itself and become a key player within the Romanian energy and business arena. The categories have been chosen according to what the Consultant perceives to be the critical areas to which AEE must dedicate its efforts in order to succeed in their stated goals.

4.1 ORGANIZATIONAL STRUCTURE AND RECOMMENDATIONS

4.1.1 Organizational Structure

There are currently two AEE Chapters in Romania, one in Bucharest and one in Cluj-Napoca. The Bucharest Chapter, which calls itself "The Romanian Chapter" due to its being the first "official" chapter, has seventeen members. The Cluj-Napoca Chapter has fourteen members. Although there are various positions assigned to several members (e.g., President, Vice-President, Secretary, etc.), it is the Consultant's impression that in Bucharest all AEE matters are handled by the Chapter President with assistance from the Secretary. Similarly, in Cluj-Napoca, most matters seem to be handled by the President and the Vice-President.

Members in both chapters range from professionals and specialists, academics, students, and employees of the Romanian Government. It should be noted that most of the AEE professional members are also the entrepreneurs/owners of private sector Energy Service Companies (ESCOs), consulting firms specializing in providing a broad range of energy efficiency and management services to Romanian industrial and other energy user enterprises.

Both Chapters hold monthly meetings that seem to be usually attended by about 75 percent of the members. At the one Bucharest Chapter meeting attended by the Consultant, the issues discussed revolved mainly around the activities of the Budapest Energy Efficiency Conference which had been held two weeks before. The meeting was chaired by the President and lasted about two hours. The Consultant also gave a short summary of his activities and a brief presentation of what his main recommendations for AEE activities were going to be. The Consultant did not attend an AEE meeting of the

Cluj-Napoca Chapter, although he met with most of the members individually. Also, a large number of members of the Cluj-Napoca Chapter live and work in Bucharest.

In terms of organizational issues, the one issue that Consultant believes is of utmost importance to the long-term viability of AEE in Romania is the cooperation and coordination between the two Chapters. Although no AEE member has actually discussed this issue, it is apparent that coordinations between the two chapters is minimal. In the same vein, there seems to be a propensity to rely too much on AEE-Atlanta for issues that have to be dealt with locally. Both these issues will be addressed in the recommendations sections of this report.

Although there are specific committees defined within both AEE Chapters' organizational structures, it is not readily apparent that these committees are actually involved in doing what they are meant to do. As previously discussed, these committees seem to be based on similar committees formed in a standard AEE Chapter in the U.S. Again, relying in the formal organizational structure of AEE-Atlanta seems to be the norm.

4.1.2 Recommendations

The following are some recommendations that the Consultant feels may be beneficial in making the Romanian AEE Chapters more cohesive, flexible, and able to respond efficiently to the local needs and requirements.

Close Coordination and Cooperation Between the Two Chapters. The goals and objectives, potential clients, and the services provided by the members of both Chapters are basically the same. Thus, it is imperative that the Chapters closely coordinate all their activities. Since both Chapters hold monthly meetings, an idea would be to, every three months, the meetings be held jointly. In addition, a specific strategy could also be to unify the management of both Chapters. In other words, there would be one AEE Chapter in Romania, with two offices, Bucharest and Cluj-Napoca. Thus, there would only be one President of the Romanian Chapter of AEE, and two vice-presidents, one for each Chapter. The vice-presidents would then be in charge of all the issues of AEE at their specific locations, while the president would be in charge of all national issues. Because of the difficulty with communications in Romania, the fact that a large number of the members of the Cluj-Napoca Chapter live and work in Bucharest further accentuates the difficulties in coordination. Furthermore, the Consultant believes that thinking of AEE in Romania as one organization would eliminate whatever negative competitiveness and rivalry currently exists between the two chapters.

Strict Alignment with AEE-Atlanta Organizational Structures and Other Policies. Although the Romanian Chapters of AEE are a part of AEE-Atlanta, AEE is a local organization composed of Romanian professionals who work in Romania, for the benefit of the Romanian economy. Thus, both chapters must be able to define their own goals and objectives, policies, and organizational structures, without having to strictly follow AEE-Atlanta guidelines or policies. Although AEE-Atlanta guidelines can be used as a reference, the Romanian Chapter of AEE must form its own committees to deal with Romanian issues such as privatization, import-export of new technologies, marketing, international relations, etc. The business environment in Romania is fundamentally different than in the U.S. Thus, AEE must adapt its organizational structure to this environments and position itself in a way that allows it to become a major player in the energy efficiency field. Following AEE-Atlanta guidelines too closely will undoubtedly cause AEE to focus its energies and resources in areas that may not be critical at this stage of the development of the Romanian business environment. Consultant believes that at this point, the Romanian Chapter of AEE tends to try to follow AEE-Atlanta guidelines and mandates too closely.

Specific activities:

- Hold a joint meeting of the officers of both AEE chapters to discuss the formation of ad-hoc committees to deal with Romania-specific issues such as lobbying for privatization, marketing, finance, import of state-of-the-art technologies, membership, etc.

- During the same meeting, discuss the issue of the unification of the two chapters under the leadership of one individual. Whatever is decided by the meeting of AEE officers can then be presented to a joint meeting of AEE and put to a vote.

AEE must design a dynamic yet flexible organizational structure that is ready to respond quickly and efficiently to the needs of its members and of the Romania industrial community.

4.2 MARKETING AND BUSINESS DEVELOPMENT AND RECOMMENDATIONS

4.2.1 Marketing and Business Development

Marketing of the Romanian Chapter of AEE must be a critical activity of all AEE members. It is extremely important that AEE plan and conduct activities that enhance its visibility within the Romanian business environment. Furthermore, a specific

objective of AEE must be to market itself as the key organization in Romania with the technical know how and resources to effectively deal with energy efficiency and the environment. Most important, in addition to the local targets, AEE must make itself known within the international community operating in Romania. The international organizations present in Romania are playing an increasingly important role in the restructuring of the local economy. In this capacity, they require substantial local expertise for many of the projects they undertake.

The marketing of AEE currently is very limited. Although AEE members are involved in marketing themselves and their respective ESCOs, no marketing of AEE as an organization is being conducted. AEE is not a well known organization within Romania. Thus, the following recommendations are meant to enhance the visibility of AEE within Romania, and present AEE to the major international agencies operating within the country.

4.2.2 Recommendations

As stated above, the following recommendations are meant to enhance the visibility and importance of AEE in Romania. It is believed that enhancing the visibility of AEE will undoubtedly enhance the visibility of its members and their ESCOs. All AEE members must be directly involved in the marketing efforts, since the implementation of AEE marketing strategies will not only benefit AEE, but also the ESCOs of members who actually conduct the marketing activities. Thus, participating in the AEE marketing activities can provide the members the additional attractiveness that thier particular ESCOs can end up benefiting eventually. Clearly, marketing activities must benefit all.

Marketing Targets. There should be two specific targets for marketing AEE and its members, local targets and international targets. The local marketing targets will be all the major Romanian energy users, industrial, commercial, etc. Since most of these potential clients are at this point state-owned-enterprises, the AEE marketing campaign should specifically be designed to highlight the benefits of energy efficiency and energy conservation for these organizations as they restructure and eventually privatize. The AEE marketing campaign should not only be designed to sell the services of AEE members, but should encompass a significant amount of education about the benefits of sound energy management policies in successful private sector enterprises. The second marketing target should be the international targets. These targets can be defined as of belonging to two (2) classes, the major international aid and donor agencies, and major foreign corporations interested in doing business in Romania. For example, in terms of the international organizations, AEE should make itself well known with USAID, the British ODA, the German GTZ, the European Union, the World Bank, the EBRD, etc.

335

A strategy for making itself known to foreign corporations has to start locally. In other words, a key target for AEE marketing will be the commercial sections of the embassies of the major industrialized countries (e.g., U.S., Germany, U.K., France, Spain, Italy, Japan, Korea, Canada, the Scandinavian countries, etc.).

Marketing Strategies. The principal strategy for marketing AEE will have to be personal contacts and visits by AEE members to the marketing targets. The Consultant has prepared an AEE services marketing brochure that will be distributed to all AEE members and to the two AEE chapters. Using this brochure, AEE must devise a strategy by which AEE members, probably in teams of two (2) individuals, get assigned specific targets (e.g., two or three embassies). Then it will be the responsibility of these two-person teams to schedule appointments with the key people at the target organizations, visit them, present AEE, and leave some brochures behind. For example, their own embassies are the first place foreign companies go to find information about the business environment in Romania. Therefore, as stated above, embassies must be priority targets. Similarly, all organizations that AEE members consider key for future business activities must be approached using the two-person team approach. Consultant wishes to caution AEE members, however, that this approach entails some degree of unselfishness, due to the fact that while an AEE member markets AEE, he or she is also marketing his or hers main competition, other AEE members and ESCOs. Thus, all AEE members must be allowed to participate in the marketing efforts so as to ensure all get visibility and access to important future business contacts.

National Energy Efficiency Conference. It is strongly recommended that the Romanian Chapter of AEE take the lead in organizing a National Energy Efficiency Conference. This conference would be a forum for all key players in the energy field in Romania to meet and discuss all the critical issues faced in energy management in Romania. Participants would include senior managers of all the major industrial enterprises, key people from the Romanian Government, the Academy of Sciences, international organizations involved in energy issues in Romania, Romanian universities, etc. The idea is to have all important decision makers in Romania attend and discuss all issues regarding the present and future of the energy field in Romania. It must be clear that, in order to obtain maximum visibility, the Romanian Chapter of AEE must take the lead in the organization and the sponsoring of such an event. This is a major undertaking that will require many months of planning for funding, deciding on a site, developing a comprehensive agenda, identifying key speakers and topics, etc. Thus, all AEE members must be in accordance that this is a worthwhile goal. Unless all members are committed to this endeavor, it is doubtful that it will happen.

Specific Activities:

- During the next few weeks, AEE must meet and discuss the marketing issues presented above. Specific discussions must center around the identification of the key marketing targets, and the assignment of these targets to the members. Members will be required to visit the targets within the following month and then present the findings to all AEE members at the next meeting. The identification of the key targets may be done by the AEE officers, who would then give the members the chance to form the teams and choose the particular targets they wish to visit.

- During the same meeting discussed above, AEE must form specific committees to begin the study of all issues regarding the National Energy Conference. Committees must be formed to deal with the identification of an appropriate date and length of the conference, all funding issues, identification of the key players in Romania in the energy field, development of a detailed agenda, identification of speakers, selection of a site, etc. These committees will then have to report all progress to the rest of the AEE members at the next meeting. AEE must be fully conscious that organizing the conference will be a major undertaking. However, the benefits that can arise from the visibility and accessibility to the main players can be invaluable.

Marketing itself and its members is truly the most important activity AEE can undertake at this time. The more known, visible, and active AEE becomes in Romania, the more known the members and their ESCOs will become, the more business they will generate in the future. Furthermore, AEE must not only market its abilities to conduct basic energy audits and studies, but to carry them through via an implementation phase to completion. Potential clients must be aware of AEE's ESCOs capabilities to provide the full gamut of energy efficiency services, not just the basic services that have generally been provided to date.

4.3 FINANCING ISSUES AND RECOMMENDATIONS

4.3.1 Financing Issues

The most commonly discussed issue during the Consultant's meetings with AEE members was finance. Specifically, all AEE members complained that the main obstacle to them growing as private sector enterprises is their inability to obtain financing for themselves or for their clients. Although Consultant believes this assertion is somewhat

naive (many other obstacles exist), the lack of available funds is definitely hindering the ability of some of the ESCOs to gain additional work. Most of the banks in Romania are state-owned and are currently charging prohibitively high interest rates (30% to 40%). In addition, most AEE members have never been exposed to situations where they have had to actually present formal requests for funding. This inexperience, coupled with the real lack of financing alternatives, is significantly hindering their ability to grow.

As part of this assignment, the Consultant organized a finance workshop. A representative of the U.S. Embassy's commercial section presented to AEE members information on a variety of financing sources available in Romania. The representative explained the Romanian-American Enterprise Fund, the EBRD, the World bank, the EXIM bank, the OPIC, and others. It is believed this information will be crucial to AEE members to understand that there are several agencies operating in Romanian that can be approached for potential funds for the ESCOs and their clients. In addition, it is hoped that the AEE members that attended the workshop have a better understanding of the complexities involved in obtaining funds.

However, unless the ESCOs are prepared professionally to formally prepare requests for funding, it will be difficult to obtain any. As stated above, a major problem is the ESCOs' inexperience in this field. It is believed that few, if any, have ever successfully applied and been approved for credit. Also, the Consultant believes that there is a tendency from the part of AEE members to believe that lending agencies will automatically approach them and offer credit if the ESCOs demonstrate certain technical capabilities. This is a notion that has to be dispelled immediately. AEE must dedicate substantial efforts from their part to identify the sources and to sell the viability of their lending requests.

Another complication in the finance arena is the fact that most of the ESCOs' potential clients are state-owned enterprises. By definition, these enterprises have, at this point, no incentives to curtail their energy use (and thus contract with the ESCOs), since the state picks up the tab for all energy expenses. The inability of the managers of these state-owned enterprises to grasp basic free market economic principles is significantly affecting the potential market for energy efficiency services. It must be noted, however, that this is slowly changing. As the economy opens, managers are beginning to understand the basics of containing and lowering costs, including energy costs. In addition, as these enterprises are privatized, it is believed that cost containment will be crucial to their survival. Thus, the market for services in energy efficiency will undoubtedly grow. Furthermore, AEE must be conscious that, one of the most attractive

services they can offer to potential clients, is the ability to advice them and assist them in obtaining the money that they need to invest in energy efficiency.

Obtaining the needed financing by new and small companies is a problem that exists in all countries, regarding of the level of development. Thus, the following recommendations will give some very basic ideas for AEE members to follow to increase their likelihood of their obtaining credit. It must be clear, however, that no one can assist the ESCOs obtain financing but the ESCOs themselves. Thus, these recommendations are meant to provide a simple path to follow to enhance funding possibilities.

4.3.2 Recommendations

Please note that these recommendations will not lead directly to AEE members obtaining financing. Rather, they are meant to educate the members about simple strategies to follow to maintain themselves informed of available sources of finance in Romania, and to prepare themselves to be able to present the detailed and comprehensive documentation that banks and other lending agencies usually require.

Information on Financing Sources. AEE members must keep themselves abreast of all the new developments regarding financing sources in Romania. Although this sounds as common sense, it is not being currently done. For example, AEE members must immediately follow through by visiting the agencies mentioned in the finance workshop. In addition to the marketing and National Conference committees that were recommended in a previous section of this report, AEE must form a committee who's main function is to visit the main financing agencies operating in Romania, presenting AEE, its members, and its capabilities, and then presenting the information to the other AEE members at the monthly meetings. These activities must be done constantly, since there are new banks and investment funds coming into Romania looking for attractive investments everyday.

Financial Education. AEE members must embark on a program to educate themselves in preparing the documentation that most funds and banks request. Very few, if any, AEE members have any significant experience writing the detailed funding proposals that are needed to be successful in obtaining money. Thus, AEE members must learn to develop detailed business plans, financial forecasts, cash flow analysis, and generally, any type of financial documentation and/or proposal that is needed. AEE members have to be conscious that no bank or financing institution will lend to organizations or individuals that cannot prepare these basic requirements. AEE members must attempt to quickly overcome their lack of experience in this area.

Specific Activities:

- Form the committee that will be in charge of gathering the information about the available financing alternatives in Romania. This must be a key activity, since without knowing what's available, there will be no way to approach them. It is hoped that this committee will start with the agencies presented at the finance workshop.

- Approach the European Union individuals (Mr. Mark Velody) working with the Romanian Agency for Restructuring and the Ministry of Industry. The Consultant was informed that these agencies are organizing a workshop to be held in Paris, in which attendees will be taught how to prepare financial proposals for presentation to lending agencies. This also must be done immediately. It is critical that at least some AEE members be invited to attend this course since the information to be presented will undoubtedly help all AEE members become knowledgeable in this area. Even if funds become available, unless AEE members become adept at preparing detailed and coherent proposals to request financing, no lending agency will seriously consider the requests.

In the area of finance, the key ideas that the Consultant believes must be understood by all AEE members are the information gathering and education. It will take a lot of work from the part of the AEE members to identify the lending agencies operating in Romania, visit them, present the information to other AEE members, etc. However, unless this is done, the problem of lack of money for project implementation will persist. No lending organization will come looking for AEE. AEE must go looking for the lending agencies. Similarly, loan agreements and requests are very complex and sophisticated documents, which include very detailed and hopefully accurate financial data. Unless AEE members learn how to prepare these documents, no money will be forthcoming. AEE members must realize that the key organizations with money to invest in Romanian are international agencies that have a myriad of data and documentation requirements. Unless the AEE members present professional looking documents with the key financial information required by these agencies, no money will be forthcoming.

4.4 INSTITUTIONAL LINKS AND RECOMMENDATIONS

4.4.1 Institutional Links

Many institutions, both local and international, have been mentioned throughout this report. However, apart from USAID, it is apparent that AEE does not have any significant relationships with any of these organizations. Although AEE has made efforts to recruit managers from RENEL and key people from other Romanian Government agencies, few decision makers and international organizations are really aware of the existence of AEE.

Similarly, there are many organizations in Europe working in energy efficiency and environmental issues. It is not clear whether the Romanian Chapter of AEE has any direct link with any of these. For example, the EBRD has recently formed an organizational unit based in London, to deal specifically with energy efficiency and environmental lending in Central and Eastern Europe. However, no efforts have been made to date to contact the EBRD resident representative and present AEE and its members.

The issue of linkages between the Romanian Chapter of AEE is one closely related to marketing. The recommendations provided below must be coupled with the marketing activates recommended in the marketing section of this report. In other words, the marketing initiatives to be undertaken by AEE must not only encompass potential clients and financial institutions, but must include all types of organizations involved in energy efficiency and environmental conservation.

4.4.2 Recommendations

As stated above, please note that the following recommendations are to be incorporated into the recommendations that deal with enhancing the visibility of AEE.

Research on Key Energy Efficiency Organizations. Conduct research on the main energy efficiency organizations operating in Central and Eastern Europe. These can be non-governmental organizations, private firms, international organizations, and the development agencies of the main industrialized countries. The research must include finding information on the key people responsible for Romania, the specific programs these organizations are supporting, and the critical information that is necessary to make these organizations interested in developing relationships with the Romanian Chapter of AEE. Once the research is concluded, these organizations must be included in the list of targets to be approached by AEE members during their marketing visits.

Other Central and East European Chapters of AEE. During the energy efficiency conference in Budapest, the members of the Romanian Chapter of AEE met many of the AEE members from Hungary and Bulgaria, as well as other energy efficiency professionals from Central and Eastern Europe. It is critical that the Romanian AEE members keep in close contact with their peer group. Close cooperation with their peers will allow AEE to be "in-the-loop" when it comes to technology transfer issues, other conferences, and general information that may be beneficial to Romania. For example, the energy efficiency field in Hungary is much more advanced than in either Bulgaria and Romania. Thus, keeping in contact with the Hungarian Chapter of AEE will undoubtedly keep the Romanian Chapter of AEE abreast of the initiatives that are taking place in Hungary, and of the organizations and individuals working actively in the field.

The issue of organizational linkages is also of the utmost importance, since that is one of the most effective ways of keeping abreast of the newest advances in technology, the availability and sources of funds, and on the energy efficiency and environmental programs being implemented in the region. However, as in every other initiative, it will take significant time and efforts from the part of AEE Romania to develop.

4.5 MEMBERSHIP AND RECOMMENDATIONS

4.5.1 Membership

There are currently fourtenn AEE members in Cluj-Napoca and seventeen AEE members in Bucharest. Their degree of involvement in AEE varies by individual. To date, many AEE members stay active because of the still on-going USAID project. However, once the project finishes, the Consultant believes interest in AEE will diminish, since most AEE members will have to personally increase the marketing of the ESCOs and other activities.

Most of the members are currently the owners of the ESCOs, although there are some academics, a couple of members from client enterprises and a member from RENEL. In addition, there are no apparent formal efforts being made to recruit more members. The recently joined members have been from client enterprises in Cluj-Napoca.

To be a viable organization in the long-term, and to embark on the many activities recommended herein, the Romanian Chapter of AEE must begin serious efforts to recruit more members. A new and enlarged membership will allow AEE to enhance their marketing, research, and linkage activities. The recommendations listed below are

meant to increase the number of members in AEE, as well as to increase the income to both chapters. Specifically, AEE must attempt to obtain funds for itself, rather than sending all the membership dues to AEE-Atlanta. Please note that the activities to be conducted to increase membership will also have to be conducted by the committees formed for marketing, finance, and linkages.

4.5.2 Recommendations

As part of this assignment, the Consultant has developed a membership marketing brochure. This brochure will be the main marketing tool to be used to inform and educate potential new members. All current AEE members will have access to these brochures.

Increase the Membership Dues. Not only does AEE have to increase its memberships, but it must increase the dues the members pay. Currently, all the funds gathered as dues go directly to AEE-Atlanta. AEE must begin to retain some of the membership dues to be able to afford its on-going expenses, and other expenses that it will incur as the chapters grow. The following are some suggestions for yearly fees:

	AEE-Atlanta		AEE-Romania
Regular AEE Member	$30	+	60,000 Lei
Student Member	$ 5	+	10,000 Lei

This could be implemented starting January 1996. The money that the Romanian Chapter of AEE gathers can be used for anything from the refreshments for the monthly meetings, to other uses as specified in the Other Activities section of this report. Eventually, additional local member and corporate fees will need to be collected to cover printing, mailing and administrative fees.

Create a Corporate Membership. AEE-Atlanta guidelines could be followed in this instance. Any organization in Romania willing to join AEE could benefit from the access to the AEE-owned equipment, the literature, and all the privileges that come with being an AEE member. It is imperative that AEE members target all the major Romanian industrial enterprises to become members. As these entities privatize, they will benefit tremendously from the information on new technologies and methodologies. Similarly, having the major industrial enterprises as members of AEE will substantially enhance the visibility of AEE members and of the ESCOs for future work within these organizations.

Actively recruit student members. Student members will be the future of AEE. Increasing the number of student members will ensure a pool of young and motivated group of people, that hopefully will bring to AEE and to the energy efficiency and environmental fields, the latest theoretical information and knowledge that will benefit the more experienced members. Furthermore, these will be the individuals that will eventually inherit the leadership of AEE. Similarly, the students themselves will benefit from the information available to AEE from AEE-Atlanta, and from the activities of the current members.

Increasing the membership of AEE is also a key issue that must be addressed. Not only will more members increase the pool of money available to the Chapters for their own individual activities, but will allow for more individuals available to conduct all the activates that are deemed critical if AEE is to grow and become an important player in energy efficiency and the environment in Romania.

4.6 OTHER ACTIVITIES

The following are other activities that AEE and the ESCOs must deal with if they are to become important players within the Romanian energy efficiency community. These are activities and issues that are critical in all successful private companies and any type of organization.

4.6.1 Administration

The Romanian Academy of Sciences has made two (2) rooms available to AEE to be used as the AEE Romanian headquarters. These rooms are more than adequate for AEE purposes. However, AEE has no permanent staff or office equipment. At this stage, no staff is needed. However, as AEE grows and becomes better known within the Romanian business environment, there will be a need for a permanent administrative person to deal with the daily affairs of the chapter. The issue of office equipment will be dealt with in the next section. However, eventually at least one individual will have to be hired to answer the phone, receive and send faxes from members and from organizations interested in AEE services, organize and coordinate the monthly meetings, receive and answer correspondence, manage the library materials, manage the equipment inventory, etc. Initially this individually should only be hired on a part-time basis. However, as the activities of AEE and of the members increases, there will undoubtedly be need for a full-time person. The money for this person's salary could come from the additional dues the AEE members will be paying.

4.6.2 Information Technology

In today's business environment, no organization can thrive, or much less survive, without at least some basic information technology resources. AEE has none at this point. Furthermore, apparently very few of the ESCOs have access to computers. It is imperative that the ESCOs make every effort possible to purchase at least one microcomputer and a printer, with some basic software for word processing, spreadsheet, and some graphics. Unless they invest in these basic information technology resources, the ESCOs' growth will be limited. Judging by the information gathered by the Consultant, most word processing and information management currently is done with basic typewriters. This cannot continue if the ESCOs want to be considered professional and capable private organizations. Not only must the ESCOs obtain these resources, but they must become adept at using them. If the development of the ESCOs continues, they will have to present formal and professional looking proposals to all types of sophisticated clients, international organizations, and partners. All of these must be done with microcomputers. The world of typewritten documents is no more and if the ESCOs want to be considered organizations with state-of-the-art solutions to current issues, they will have to automate immediately.

In terms of AEE, it must make every effort to obtain a desktop microcomputer (no laptop is recommended at this point), a laser printer, a fax machine, and maybe a phone answering machine. These could be installed at the existing AEE offices and be used for all word processing needs, managing a database of members, potential clients, international contacts, and AEE-owned equipment, processing the AEE accounts when they exist, updating brochures and newsletters, and any other AEE information management need. The AEE information technology resources can also be rented to AEE members and ESCOs that don't have these capabilities. These resources could be used by the AEE members for their proposal preparation, correspondence, and any other need they might have.

It is assumed that there will be one last procurement of equipment by USAID for AEE. It is imperative that the required information technology resources be included in the list of equipment to procure. If this is so, AEE officers must device a policy for the use of these resources. For example, nobody is allowed to take the microcomputer away from the AEE offices at any time, a member must schedule specific times for equipment use at least 24 hours in advance, a small fee might be charged for replenishment of supplies, etc.

The importance of using information technology cannot be overemphasized. It is very important that both the ESCOs and AEE obtain these resources as soon as possible.

Furthermore, some of the money to be collected form the additional member fees can be used for the maintenance of the equipment, other office supplies (e.g., AEE letterhead stationary), and whatever other needs arise by having an equipped and staffed office to respond to AEE member needs and to be the contact location to the outside world wanting AEE information.

4.6.3 Internet

Similar to the information technology issue, no successful organization today exists without telecommunication access via the Internet. Thus, it is strongly recommended that AEE obtain an Internet address. Although this is a recommendation that applies also to the ESCOs, the Internet environment today in Romania is somewhat limited. Thus, it will be easier for AEE to obtain one address that can then be shared by all AEE members.

Although specific Internet information has been hard to come by, there are several option that must be considered for obtaining an Internet address. The first is the Polytechnic University. Since a couple of AEE members are members of the faculty at the university, they can be approached for information on the possibility of obtaining one address or mailbox to be used by AEE. Similarly, the Center for Business Excellence has recently connected their information technology resources to the Internet. They should also be approached for a possible address and for some technical assistance. Lastly, AEE can contact the private commercial services that are apparently being set up in Romania (e.g., SprintMail). Although these services will probably be significantly more expensive, they must be approached for possible access.

AEE must note, however, that to access the Internet one must first have access to some type of computer. Therefore, although the Consultant believes that Internet is a critical tool for AEE to communicate with the entire world, it is recommended that AEE first focus its energies in obtaining information technology for the AEE office. Then, once set up, AEE will have the technical capabilities to access the Internet, regardless of who the Internet provider is.

4.6.4 Publications

Since a major AEE objective is enhancing its visibility throughout the Romanian energy efficiency and environmental community, it is also recommended that the members make every effort possible to publish some type of monthly or bi-monthly newsletter that relates the activities that are being conducted by the AEE members and by the ESCOs.

This newsletter could then be mailed to all members, potential clients, financial institutions, international organizations, etc.

Not only must AEE advertise its existence, but it must also show its technical capabilities, the technologies it utilizes, the methodologies employed, the type of clients being served, the specific technical details of every assignment, etc. In other words, as much information as is known about AEE and its activities throughout Romania, the better the image the organization will have. Similarly, AEE members must make every effort to publish articles in the AEE publications in the U.S. This can be extremely important to attract potential investors and teaming partners into Romania. Furthermore, this could lead to further assistance and sources of information from specific AEE members in the U.S.

4.6.5 Lectures

AEE should design, plan, and present periodic lectures and seminars on energy efficiency and environmental topics. These could be given to key decision makers within the Romanian Government and senior level managers within the main industrial enterprises. These lectures could be given by the same AEE members that have received the CEM certification. Not only will these lectures enhance the visibility of AEE and the ESCOs within the audience, but would actually help the attendants to understand the benefits of energy efficiency and conservation within a market economic system. The lectures could include topics such as energy policy, privatization and energy efficiency, Demand Side Management (DSM) programs, technology, minor improvements for maximum energy savings, etc.

4.6.6 Certified Energy Manager program

AEE must attempt to get financial assistance for a new round of training for the Certified Energy Manager (CEM) program. It is not clear if USAID intends to fund another round of training at this point. However, in coordination with AEE-Atlanta and with the other chapters in the region (Bulgaria and Hungary), AEE must attempt to obtain the necessary assistance to increase the number of CEMs in Romania. If donor financing assistance for this endeavor is not forthcoming, AEE may attempt to intiate a local certification program in which current CEMs train other interested parties based on the information they received during their own training. In this instance, however, the training should be focused on energy managers in industrial enterprises, with the objective being to increase the diversity of the membership of AEE, and to build contacts within these enterprises.

-347-

CHAPTER 5
CONCLUSIONS

The potential market for providing professional energy efficiency and environmental services in Romania is limitless. The on-going transformation from a centralized to a market economy is creating a myriad of opportunities within the Romanian industrial sector for consulting firms that can provide the state-of-the-art knowledge and technologies that the ESCOs possess. Thus, the success of the ESCOs will depend strictly on how well they position themselves to take part of this transformation. This is where the Romanian Chapter of AEE has to become the main organization that champions the cause of the ESCOs.

By being the primary resource by which the ESCOs market themselves, as well as the key repository of information, both technical and commercial, AEE should become an important player within the Romanian energy efficiency field, as well as the main tool to be used by the ESCOs for leading their drive to become dynamic private sector companies. AEE members must realize that the organization can be the key to their success as private sector enterprises. However, there is still much work to be done.

The recommendations listed in this report, although they may sound as common sense and somewhat logical, are the main strategies to be pursued to ensure AEE is a viable organization that furthers the objectives of the members and of the ESCOs. Unless AEE acts on these recommendations, the organization will remain unknown and incapable of influencing the move towards energy efficient industry in Romania.

The time factor is critical. Mass privatization of Romanian industry is starting and the need for energy efficiency and environmental consulting services will significantly increase in the near future. Thus, the Romanian Chapter of AEE must position itself as a modern, dynamic, informed, and well-connected organization that has the pool of technical and technology resources to meet the challenge. The Consultant believes this can be done but it entails a lot of hard work and unselfish dedication from the part of the members.

In the same vein, financial and technical assistance to AEE from organizations like USAID will undoubtedly diminish or disappear altogether Thus, AEE will have to increasingly rely on its own members and its own network of organizations for its long-term survival. In concluding, AEE and its members are the sole entities responsible for the well being and long term viability of the organization within the Romanian economy.

CHAPTER 6
PEOPLE INTERVIEWED

Richard Hough	USAID/Romania
Giannina Monceao	USAID/Romania
Mihai Maracineanu	Hagler Bailly Consulting, Inc.
Mihail Zdravcu	ARCON SRL
Bret Rogers	Center for Business Excellence, Washington State University
Constantin Manolescu	EC-ENERG
Dorin Moraru	ELECTRON-TD
Florin Mihailescu	CAMIGO
Mihai Suta	EKOBIK S.A.
Florin Voicu	EKOBIK S.A.
Simona Parvu	AUTOMATIZARI ORION
Phillipe Mihail	AUTOMATIZARI ORION
Ioan Piturescu	Technology and Business Incubator Center
Domnica Cotet	Technology and Business Incubator Center
Constantin Gleb-Dragan	Polytechnic University, Academy of Sciences
Aureliu Leca	Bucharest Polytechnic University, UNESCO Chair
Georgeta Padureanu	ECO-ERG
Vasile Grasin	ECO-ERG
Corneliu Rotaru	Romanian Agency for Energy Conservation (RAEC)
Dan Ionita	ROM-Energy Armstrong S.R.L.
Florin Gheorghisor	U.S. Embassy Commercial Counselor
Mihail Alexandru	Secretary of AEE Bucharest Chapter
Nicolae Ivan	Romanian American Enterprise Fund
Nicolae Mocan	InterTaxi
Marion Day	Romanian Agency for Restructuring
Magdalena Ambrus	CASEROM
Luca garbu	CASEROM
Dorel Ciumafaia	Electrosim
Vadan Dumitru	Exploatarea Miniera Capus
Ioan Dascal	Infotract
Sarchis Arachelian	Romanian Electricity Authority
Phillipe Mihail	AUTOMATIZARI ORION
Corneliu Dusan	RoboMatic
Paul Zara	Bureau of Industry and Technology Ltd.
Cezar Scarlat	Center for Business Excellence, Washington State University
George Stoican	Civil Engineering Institute of Bucharest
Mark Velody	NIFES Consulting Group

MISSION STATEMENT

To promote energy efficiency and environmental protection in Romania through information, professional development, and support to private energy service companies.

PURPOSES

To promote the scientific, educational, and commercial interests of those engaged in energy management.

- To advance by all means within Romanian laws the purposes of AEE members and to promote rational energy management.
- To support the development of private Energy Service Companies (ESCOs) and promote their involvement in the Romanian economy.
- To foster the implementation of state-of the-art energy and environmental technologies and methodologies in Romania.

ASSOCIATION OF ENERGY ENGINEERS (AEE)

ROMANIAN CHAPTER

aee®

For further information, please contact:

Association of Energy Engineers
Academy of Sciences Building
Calea 13 Septembrie Nr. 13
6th Floor, Sector 5
Bucharest, Romania
(401) 410-3200 ext. 2525
or
Ing. Mihail Zdraveu
Tel/Fax: (401) 673-6081
or
Ing. Vasile Grasin
Tel: (40) 64-194-208
Fax: (40) 64-187-963

BOZO

AEE CAPABILITIES

AEE members are involved in energy efficiency and the environment, and bring forth experience in a variety of related functional areas. While each AEE member provides a particular mix of the services listed below, the Romanian AEE Chapter represents a unique pool of expertise covering a wide range of capabilities.

SERVICES

Energy and environmental audits, project design and implementation, including:

- Energy audits (brief audits or detailed assessments; for a complete facility, a section, or a system)
- Process and energy utilization measurements.
- Utility bill analysis and cost reductions.
- Cost/benefit analyses and feasibility studies.
- Tailoring energy cost reduction programs to specific client needs.
- Assistance with identification of project financing sources.
- Energy efficiency project design, management, and implementation.
- Environmental impact analyses.

Access to state-of-the-art equipment (as part of the above services, or as a stand-alone service)

- Infrared imaging and analysis for building rehabilitation.
- Availability of state-of-the-art energy auditing and measurement equipment for members and for rent.

Assistance to utilities in the design of Demand-Side Management programs.

Organizing seminars and conferences on energy issues, and in-house training of managers and staff.

Representation of multinational corporations in Romania, including the import and export of energy efficiency equipment, and the installation, maintenance and repair of the equipment.

Extensive links with international energy efficiency and environmental organizations.

TYPICAL CUSTOMERS

Industrial plants, district heating systems, combined heat and power plants, building owners, equipment manufacturers, industrial consulting firms, and others.

TYPICAL TECHNOLOGIES

Boilers and fire systems, steam systems, hot water systems, pumps and fans, compressed air systems, insulation, process control and automation, process-specific applications, heating and ventilation systems, refrigeration, electric motors and drives, lighting, energy management and control systems, data acquisition and communication, electric and thermal metering, energy accounting, and others.

AEE MEMBER COMPANIES

S.C. ARCON SRL
Str. Intr. Odobesti 1, Bl.Z2,Sc.5,Apt.59
Sector 3, Bucharest
Tel: (401) 673-6081
Fax: (401) 673-6081
Ing. Mihail Zdravcu, CEM

ARCON is involved in the detailed design of process installations for the petro-chemical industry and other industrial enterprises. It conducts energy audits and measurements, environmental assessments, and provides consulting services for import/export activities.

AUTOMATIZARI ORION SRL
Str. Malu Rosu Nr. 99A, Apt. 25
Ploiesti
Tel: (404) 415-5799 / 412-1311
Fax: (404) 412-1311 / 415-5799
Ing. Simona Parvu, CEM

AUTOMATIZARI ORION is involved in the complete automatization of industrial processes and enterprises. It designs, builds, implements, and maintains industrial automation equipment, and provides consulting services in energy equipment, processes, methodologies, and turn-key solutions.

S.C. CASEROM SRL
Str. Dorobantilor Nr. 114
Cluj-Napoca
Tel: (406) 414-2569 / 414-5865
Fax: (406) 414-2569
Ing. Magdalena Ambrus

CASEROM specializes in conducting environmental impact assessments and ecological studies. It also develops environmentally safe energy solutions for industry, has been certified by the Ministry of the Environment, and has conducted several international assignments.

EC-ENERG SRL
Blvd. Lacul Tei Nr. 109, Apt. 43
Bucharest
Tel: (401) 687-8883 / 655-7329
Fax: (401) 655-7329
Ing. Constantin Manolescu, CEM

EC-ENERG concentrates its activities in the management of energy conservation programs and in delivering turn-key energy conservation systems and solutions. It also provides engineering, design, and equipment installation, testing, and training services in automation and instrumentation, and in energy efficiency and management.

ELECTROSIM SRL
Str. Sigismund Toduta Nr. 3
Cluj-Napoca
Tel: (406) 418-1618
Fax: (406) 418-7963
Ing. Simon Mircea

ELECTROSIM concentrates in the design, development, installation, maintenance, and repair of industrial thermal energy equipment and energy efficient solutions. It also designs, builds, and implements central air and heat systems for industry and civil construction.

ENERGOCHIM SRL
Str. Dna. Ghica Nr. 7, Apt. 71
Sector 2, Bucharest
Tel: (401) 688-3820
Fax: (401) 612-0156
Ing. Ion Bota, CEM

ENERGOCHIM specializes in providing engineering and management services to thermal and electric power stations, chemical plants, industrial thermal installations, refrigeration systems, pipe assemblies, and industrial buildings. It also has expertise in automation of industrial facilities and in conducting environmental assessments and restructuring analyses.

BUREAU OF INDUSTRY AND TECHNOLOGY LTD.

Str. Cimpineanu Nr. 31, Apt. 36
Sector 1, Bucharest
Tel: (401) 312-1098
Fax: (401) 312-1098
Paul Zara, CEM

BUREAU OF INDUSTRY AND TECHNOLOGY specializes in providing management and technical assistance to industrial enterprises in the field of energy management. It's staff has represented the Romanian private sector in several international conferences relating to labor and industrial relations.

CAMIGO

Str. Dr. Anibal Teohari Nr. 21
Sector 5, Bucharest
Tel: (401) 781-3353
Ing. Florin Mihailescu, CEM

CAMIGO provides civil, mechanical, electrical, and industrial engineering consulting services to industry. It concentrates in automating industrial processes, conducting energy efficiency feasibility studies, installing central air and heat systems, and developing industrial solutions to reduce polluting emissions.

S.C. ECO-ERG TECHNOLOGIES

Str. Anton Pann Nr. 26
Cluj-Napoca
Tel: (406) 419-4208
Fax: (406) 418-7963
Ing. Vasile Grasin, CEM
Ing. Georgeta Padureanu, CEM

S.C. ECO-ERG is engaged in providing turn-key energy solutions to industrial clients. It conducts energy audits, feasibility studies, project design and management, and infrared imaging and analysis for building rehabilitation. It also installs and maintains energy efficient equipment.

S.C. EKOBIK S.A.

Str. Jean-Louis Calderon Nr. 6, Apt 1
Sector 2, Bucharest
Tel: (401) 614-5196
Fax: (401) 614-5196
Ing. Mihai Suta

EKOBIK concentrates its activities in the rehabilitation of energy systems of industrial enterprises and in the manufacture and sales of thermal energy technologies. It is also involved in the development and implementation of recycling and industrial waste systems, and providing local representation for foreign companies.

GRUPUL INDUSTRIAL ROMAN

Calea Dorobanti, Nr. 99A
Sector 1, Bucharest
Tel: (401) 212-1603 / 212-1604
Fax: (401) 210-9345
Ing. Mihai Alexandru, CEM

GRUPUL INDUSTRIAL ROMAN specializes in the design, production, installation, and commercialization of telecommunications equipment and client-specific solutions. It also provides consulting in telecommunications networking and electronic engineering advisory services and training to industrial and commercial clients.

S.C. INFOTRACT SRL

Str. Cosminului Nr. 65
Cluj-Napoca
Tel: (406) 413-7919
Ing. Ioan Dascal

INFOTRACT has extensive experience in the installation, maintenance and repair of industrial and residential boilers, heating equipment, and air conditioners. It currently builds, installs, customizes, maintains, and repairs energy efficient equipment from all major international equipment vendors.

INVEST PROJECT SRL

Str. D. Cantemir, Bl.14, Etaj.III, Apt.14
Suceava, 5800
Tel: (430) 217-208
Fax: (430) 217-208
Ing. Pavel Haralambie, CEM

INVEST PROJECT specializes in general energy management consulting, including energy recuperation, modernization of thermal energy power plants, and heating and air conditioning systems. It also has capabilities for energy auditing and measuring.

MARPOS NEW TRADE SRL

Str. Cimpia Turzi Nr. 13
Sector 1, Bucharest
Tel: (401) 618-3521
Fax: (401) 210-1788
Mihai Maracineanu

MARPOS NEW TRADE furnishes energy equipment procurement, installation, service, and training services, and is the local representative for several U.S. equipment manufacturers. It is also involved in general project management consulting and business development, services which it has offered to several U.S. companies for the last five years.

ROBOMATIC SRL

Calea Floreasca Nr. 167 bis
Bucharest
Tel: (401) 212-0069
Fax: (401) 312-9769
Ing. Cornel Dusan, CEM

ROBOMATIC provides complete consulting services in the field of industrial automation, from design and production, to installation, maintenance, repair, and technical assistance. It also represents several international corporations in Romania, providing sales and service of industrial automation and energy efficient equipment.

ROM-ENERGY ARMSTRONG

Str. Gh. Baritiu Nr. 28
Sector 1, Bucharest
Tel: (401) 222-5311
Fax: (401) 222-5311
Ing. Dan Ionita

ROM-ENERGY ARMSTRONG is the exclusive Romanian representative of Armstrong International Inc. of the U.S. and is involved in the sale and service of the entire line of Armstrong products. It's expertise include the import and export of energy efficiency and other equipment.

MELTER-ELECTRONIC CO.

Sos. Pantelimon Nr. 24, Apt. 47
Sector 2, Bucharest
Tel: (401) 628-6037 / 666-6189
Fax: (401) 666-6189
Ing. Dorin Moraru, CEM

MELTER-ELECTRONIC specializes in the research and engineering design of electronic applications for industry. It also provides import/export services for electronics, and manufactures electronic systems for electrical and electro-mechanical applications.

PROJECTA INTERNATIONAL

Str. Dumbrava Rosie Nr. 11
Sector 2, Bucharest
Tel: (401) 653-6467
Fax: (401) 211-0042
Ing. George Stoican, CEM

PROJECTA INTERNATIONAL provides services in architecture and urban planning, structural engineering and seismic analysis, electrical, hydraulics, and sanitary engineering, and information systems. It also conducts energy audits and environmental assessments in thermal networks and power stations.

VV COM-PRES-IMPEX SRL

Str. Aleea Botorani Nr. 4, Apt. 79
Sector 5, Bucharest
Tel: (401) 322-6002
Fax: (401) 322-6002
Ing. Florin Voicu

VV COM-PRES-IMPEX expertise lies in providing technical services to the thermal energy industry, including measurements, installations, and the recuperation of renewable energy sources. It also has capabilities for representing foreign companies locally, and for providing advisory services in finance and accounting.

The Romanian Chapter of AEE encourages any professional, academic, student, engineer, and specialist involved in the energy and environmental fields to apply for membership.

ASSOCIATION OF ENERGY ENGINEERS (AEE)

ROMANIAN CHAPTER

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To promote the scientific, educational, and commercial interests of those engaged in the energy management.

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To foster the implementation of state-of the-art energy technologies and methodologies in Romania.

Why join AEE?

AEE is a nonprofit, non-governmental organization comprised of professionals, independent engineers and specialists, academics, students, and private companies working in energy efficiency and the environmental conservation. AEE provides its members with:

Support for individual educational and professional development and for growth of the member private energy service companies.

Information regarding the Certified Energy Manager (CEM) program developed by the Association of Energy Engineers of the U.S. There are over 1,500 CEMs worldwide.

Access to AEE-owned state-of-the art equipment for conducting energy audits and measurements at a minimal price for members.

Opportunities for publishing articles and technical papers in newsletters and other publications sponsored by AEE in Atlanta, Georgia, U.S.A.

Free subscriptions to the following publications: *Energy Engineering Journal, Strategic Planning for Energy and the Environment Journal, AEE Energy Insight Newsletter, and Energy User News.*

Access to the latest information on Demand Side Management (DSM), industrial process controls, energy efficiency and environmental policy and technology, project finance and marketing, and other topics.

Professional contacts with colleagues (local and international) active in energy efficiency and the environment. AEE has 8,000 members in 52 countries around the world.

Information about the World Energy Congress, held every year in Atlanta, Georgia, U.S.A., with opportunities to interact with worldwide energy equipment manufacturers and other leaders of the energy field.

Information on investment and financing sources for energy efficiency and the environment.

Association of Energy Engineers®

September 29, 1995

Mr. Mark Oven
Hagler Bailly, Inc.
1530 Wilson Blvd.
Suite 900
Arlington, VA 22209-0342

RE: USAID Proposed financing for AEE Chapters

Dear Mark:

Thank you very much for sending to AEE the final copies of the Interns reports from the Eastern European Chapters.

We have inclosed a copy of the reports with notes attached that outline concerns or areas in which AEE -Atlanta would like to see included in the proposed financing section for each chapter. You will also see notes pertaining to our thoughts in regards to some of the statements set forth in the reports. These notes are really for you and your staff so there is no misunderstanding of where we are coming from. We leave it to your discretion to make any changes or clarification's noted in the final reports that will be sent to Bob Archer. We do hope to receive a copy of the report that will be sent to USAID.

To summarize, we would like to see in each of the chapters proposed financial recommendations, as outlined in the Bulgarian proposal, for a minimum of three officers from **each** chapter to be financed to attend our Annual Chapter Leadership meeting and conference that takes place in Atlanta in conjunction with the World Energy Engineering Congress and Exhibition. It is very important to us that the sister chapters, Plovdiv and Cluj-Napoca are included in the financial sections of the Bulgarian and the Romanian budgets.

Additionally, we would like to have a budget for a AEE International Board or staff member to visit each chapter annually. This person may also be able to double as a speaker at the meeting that they attend in conjunction with their visit.

4025 Pleasantdale Road, Suite 420 • Atlanta, Georgia 30340 • (770) 447-5083 • Fax (770) 446-3969

Association of Energy Engineers®

We think that the area that concerns us the most, is the fact that the chapters are still not collecting annual "local" dues and soliciting corporate membership donations. As we have stated in the past, AEE - International **can not** cut the cost of the annual dues. We are doing our best to find alternative funds to subsidize our International chapters. As you can imagine $30.00 US annually does not even come close to covering our costs of benefits for a member in the US let alone a International member. We have made a commitment to USAID that we will retain our dues structure at the $30.00 annually and we are still honoring that commitment, but a decrease is not possible.

I hope that this will help you in your final preparations. If you have any questions, please contact either of us at any time.

Best regards,

Albert Thumann
Executive Director

Barbara Stroup
Executive Administrator

4025 Pleasantdale Road, Suite 420 • Atlanta, Georgia 30340 • (770) 447-5083 • Fax (770) 446-3969