RMA/ROM-IP-02

INDUSTRIAL ENERGY EFFICIENCY POLICY AND INSTITUTIONAL ANALYSIS IN ROMANIA

MAY 1992

U.S. EMERGENCY ENERGY PROGRAM FOR EASTERN AND CENTRAL EUROPE

(USAID Project #: 180-0015)
(USAID Contract #: EUR-0015-C-00-1006-00)

Resource Management Associates of Madison, Inc.
Madison, Wisconsin, U.S.A.

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PREFACE

The work in this report is being carried out within the framework of the U.S. Emergency Energy Program for Eastern and Central Europe under an RMA contract with the U.S. Agency for International Development. RMA, as Prime Contractor to USAID, is currently implementing the **Energy Pricing Reform Project** and the **Industrial Energy Efficiency Project** in Romania, Czechoslovakia and Lithuania. This report is one of a series describing the work and outputs of the Industrial Energy Efficiency and the Energy Pricing Reform Projects in Romania. This document reports on the policy and institutional aspects of industrial energy efficiency. The policy and institutional description and analysis reflects conditions until late in 1991.

This is a working document published informally by Resource Management Associates of Madison, Inc. (RMA). To present the results of the project with the least possible delay, this report has not been prepared in accordance with the procedures appropriate to our formally printed documents.

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I. Introduction

A. Report Objectives

The purpose of this report is to provide to the GOR (Government of Romania) and USAID a review and analysis of the policy and institutional factors influencing energy efficiency decision-making in industry. The report provides both findings as well as recommendations for national policies as well as industrial plant level policies, management, and investment decision-making. Recommendations are also made for the role of international lending and donor agencies.

The report provides a very brief overview of industrial structure and energy use in **Section I. Section II** then reviews, in some detail, industrial energy management, drawing on the industrial profile report and a survey of industrial plants carried out within the project.

Section III of the report focuses on the market in energy efficiency services and investment. While these markets are still in the formative stages, there are early promising developments in this area. The importance of this topic is not so much what exists today, but what can realistically emerge during the coming months. **Section IV** then addresses policy options for market developments in this area.

Section V discusses options for improving firm level energy management. **Section VI** presents the final recommendations for improving industrial energy management at policy levels ranging from the plant level to the international institutional level.

B. Overview of Industrial Energy Efficiency Decision-Making

Industrial energy management is in the early stages of dramatic change. Until 1989, industrial factories of the same type were organized into "industrial centrals", which reported vertically to an industrial ministry for that industry. Since that time, the numerous industrial ministries became departments within one ministry, now called the Ministry of Resources and Industry and the plants became largely autonomous state enterprises. Prior to this change, analysis of conservation projects was conducted by the centrals.

Based on survey results (Florescu, Rugina, and Gliga 1991)[1], plant observations, and other discussions, it is evident that the management system prior to 1989 was producing no conservation projects in some plants and only a few small investments in others. This was true of projects requiring considerable capital as well as low-cost/no-cost projects. This outcome was partially due to the overall management system in place. Another important

[1]Alexandru Florescu, Vasile Rugina, and Radu Gliga. General Survey, Report by the Energy Research and Modernizing Institute (ICEMENERG), Bucharest, Romania, 1991.

contributing factor mentioned frequently in the GOR was the severe restrictions placed on imported technologies from the late 1970's onward due to a policy of accelerating the payment of foreign debt through increased export and import restrictions. Individual plants lacked capital, technology, individual discretion, and most of all incentives to manage energy beyond falling within the quota system. In some instances there were disincentives.

Since the plants have become autonomous and market conditions have started to emerge, plant managers have more discretion and may be beginning to perceive the incentives to reduce costs of energy and other inputs in order to reduce costs and possibly be more competitive. At the present time, lack of technology and knowledge of technologies and their costs are major barriers as well as lack of capital. A number of plants have stated, however, that they have funds available for some investments. Within this context, knowledge is quite important, including the relative importance of energy investments versus other investments. A knowledge of modern management which is fully capable of economic evaluation will need to be fostered throughout Romanian industry.

As these companies become stock companies, a constitution is established, and energy prices possibly rise further. The incentives to save energy and other costs should increase as a matter of survival of these plants. For the ones that should survive, external capital and knowledge will be critical needs. The potential amount of energy cost reduction due to conservation and industrial restructuring is between 1 and 2 billion dollars per year by the end of the 1990's. It is imperative that knowledge of low-cost/no-cost measures as well as capital for higher cost measures be made available so that advantage may be taken of these savings in **imported** energy costs. Unless a successful transformation in industrial energy efficiency decision making occurs, these savings in imported energy costs will not be significantly achieved.

II. Industrial Energy Management

The Romanian economy is in the midst of a major transformation from a centrally planned economy to a market economy. Because the transformation is not complete, this description of industrial energy management is divided into three distinct phases: Historical, Present, and Future (discussed under the heading Macro Conditions and Issues).

A. Summary Profile of Industrial Energy Use

Industrial energy use in Romania prior to December 1989 was dominated by eight subsectors. While precise data on subsectoral energy use is not available, the data assembled for the Energy Price Reform Project resulted in the estimates of industrial energy use shown in *Table 1*. As shown in *Tables 1* and *2*, the chemicals and ferrous metals subsectors account for about 60% of the industrial sector energy use. Such a structure, with very few subsectors accounting for the major portion of industrial energy use, is common to industrialized economies.

This picture of industrial energy use, concentrated in a few sectors, is reinforced in the distribution of industrial plants in terms of estimated waste energy recovery capacity (Rugina and Gliga, 1991)[2]. According to this independent analyses, there are roughly 1400 industrial plants in Romania. About one half or 697 of these are estimated to have significant waste energy capacity, i.e. waste energy that could be recovered. Of these, only 32 plants have greater than a 100,000 ton coal equivalent per year of waste energy capacity. As shown in *Figures 1 and 2*, however, these 32 plants are estimated to account for over 80% of the waste energy capacity in industry. Steel mills, refineries, and other major chemical plants are among these plants. In the judgement of the consultant, there are likely to be waste energy recovery possibilities in all of the plants and the estimates of the recovery potential by plant need revision based on better measurement of energy flows, revised economic evaluation techniques and criteria, and different price assumptions. However, this picture of waste energy capacity or energy conservation potential is useful in pointing to the concentration of potential energy efficiency improvements in a few sectors with large, energy intensive plants.

From this starting point of 1989 energy use, two dominant trends are anticipated. The first is the rapid decline of the most energy intensive industrial subsectors such as chemicals (including refining), non-ferrous metals such as primary aluminum, and ferrous metals. As these energy intensive sectors face international prices, they will not be able to compete with their existing technology. The Energy Price Reform Project determined that Romanian refineries are not computer operated and some are antiquated. These will lose money on

[2] Vasile Rugina and Radu Gliga. Documents from a Working Paper by the Energy Research and Modernizing Institute (ICEMENERG), Bucharest, Romania, September, 1991.

every barrel of oil processed. Similarly, primary aluminum production can not compete with Brazilian facilities which have access to huge hydro power resources and with facilities in Western industrialized countries having captive hydro power.

Table 1. Estimated End-Use Energy Consumption by Industrial Subsector in Physical Units for 1989

Subsector	Electricity 10(3) MWH	Thermal 10(3) GCAL	Coal 10(3) Tonnes	Fuel Oil 10(3) Tonnes	Natural Gas 10(3) M3
Mining	2042	581	0	206	85
Chemicals *	12267	46858	0	289	11605
Ferrous Metal	9018	8732	98334	206	2363
Nonferrous Metal	6297	3390	6639	91	1476
Mech Engineering	8808	11240	1195	206	1319
Constr'n Materials	3036	2910	398	23	2117
Forest Products	2863	13163	398	114	529
Food Industry	1743	9934	0	23	1024
Other Industry	3468	7248	787	1128	1201
Total Industry	49542	104056	13276	2283	21719

*Natural Gas consumption in chemicals does not include that used for refining.

Table 2. Estimated End-Use Energy Consumption by Industrial Subsector (in 10^{15} JOULES) for Romania, 1989

Subsector	Electricity	%	Thermal	%	Coal	%	Fuel Oil	%	Natrl Gas	%	Total Energy	Total %
Mining (Coal)	7	4%	2	0%	0	0%	8	9%	3	0%	22	1%
Chemicals	44	25%	196	45%	0	0%	12	13%	453	53%	705	40%
Ferrous Metals	33	18%	37	9%	167	74%	8	9%	92	11%	337	19%
Nonferrous Met	23	13%	14	3%	11	5%	4	4%	58	7%	109	6%
Mech Engineering	32	18%	47	11%	20	9%	8	9%	51	6%	159	9%
Construction	11	6%	12	3%	7	3%	1	1%	83	10%	113	6%
Forest Products	10	6%	55	13%	7	3%	5	5%	21	2%	98	6%
Food Industry	6	3%	42	10%	0	0%	1	1%	40	5%	89	5%
Other Industry	13	7%	30	7%	13	6%	46	49%	47	6%	149	8%
Total Industry	179	100%	435	100%	225	100%	93	100%	848	100%	1781	100%

Figure 1. Distribution of Industrial Enterprises According to the Amount of Waste Energy Capacity (secondary energy)

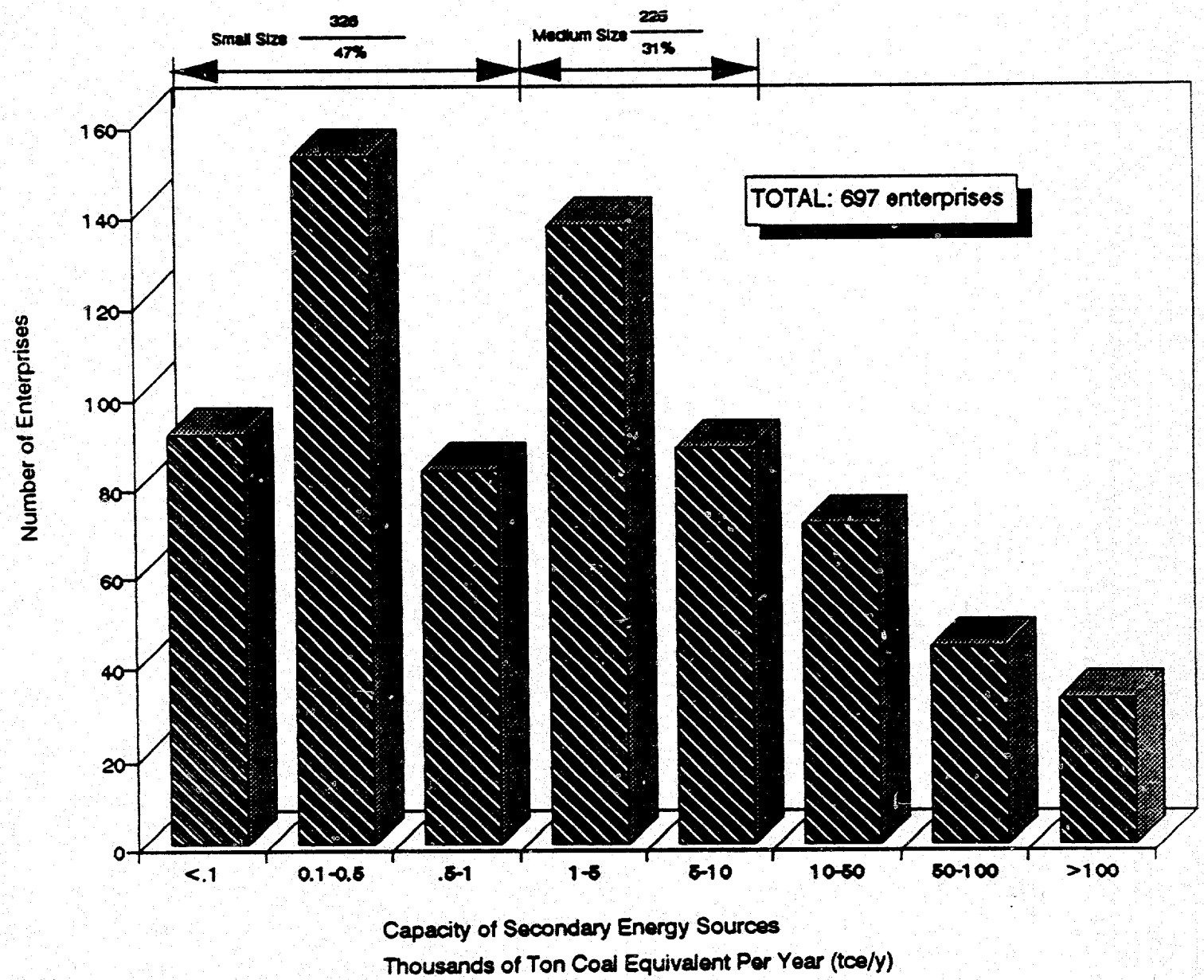
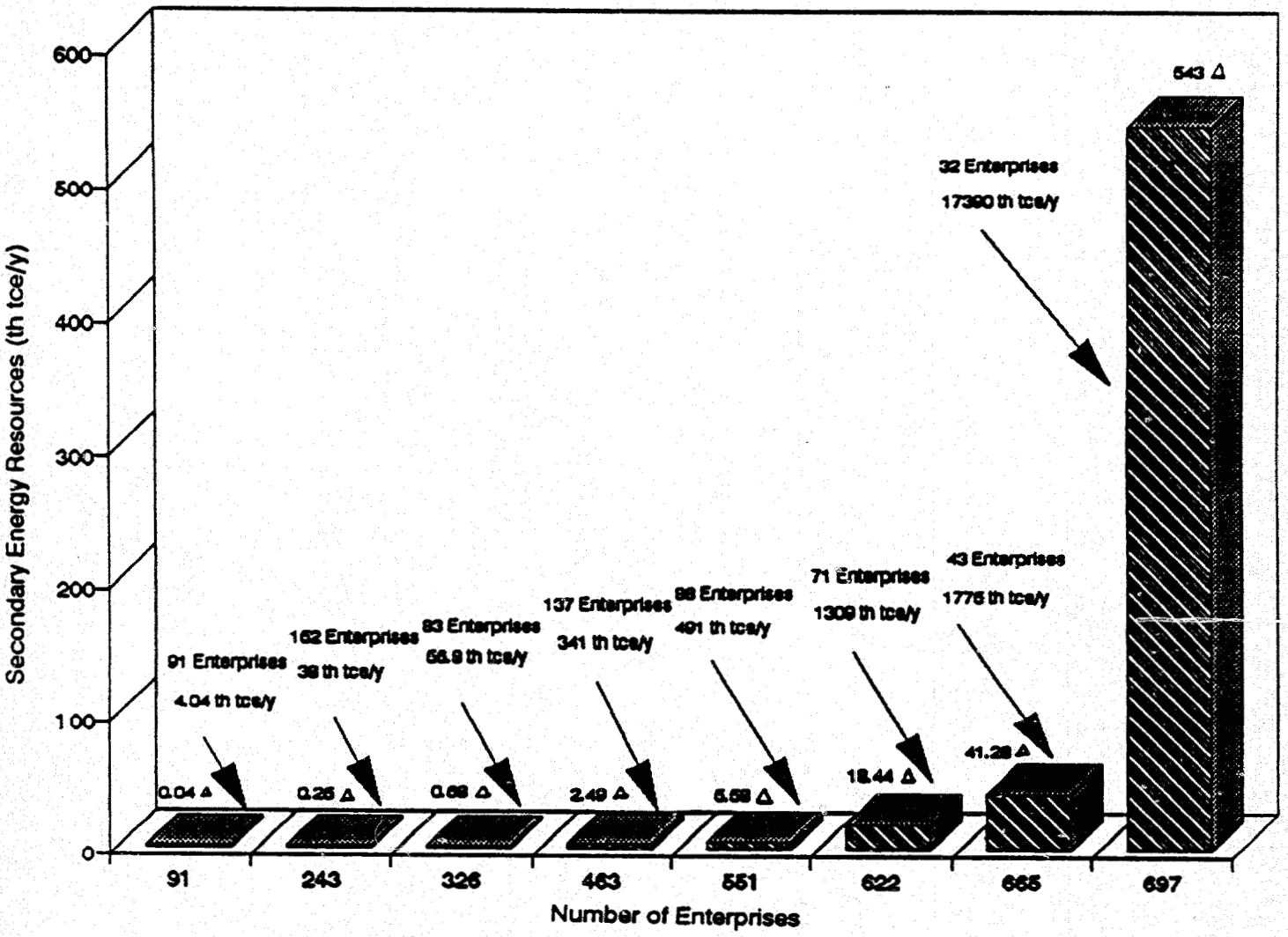


Figure 2. Classified Potential of Waste Energy Capacity (secondary energy)



The second trend is the improvement in energy efficiency in industrial plants that survive. Market prices and hard budgets will force the issue, while the enormous potential for low-cost/no-cost options identified in the Energy Efficiency Project provides opportunity. The implications of these two trends, as motivated by the impact of market prices and other factors, were considered in modeling work in the Energy Price Reform Project and briefly described in **Section II.C.**

B. Historical Energy Management Practice

Romanian industry functioned within a strict centrally planned economic system. Decisions regarding capital investment were made at a central ministry level with little regard for the needs of individual plants. Even the smallest capital improvements were evaluated and decided upon at the central level. Our inquiries about this system produced predictable responses. Most plant managers felt that their needs were ignored and recommendations for improvements at the plant level were not recognized. Instead, central planners dictated to industries as a whole. For example, the Soybean Processing Facility was required to make certain changes to the process based on modifications to other facilities. The central planning authority dictated the change to all soybean processing facilities, even though they used different equipment and processes. The change at Urziceni actually resulted in a decrease in capacity. Plant staff were forced to reverse the modifications using their own repair/maintenance budget, but did not report the activity. Yearly production quotas were still met so as to please the central planners. Judging by the operation and location of Romanian industry, capital investment decisions appear to be primarily politically motivated rather than economically justified. This concept was expressed by all the Romanian government industry people we came in contact with.

The most far reaching effect of this practice is that managers at the plant level do not have a good understanding of the decision making process, and are reluctant to accept the responsibility. There is still a predominant atmosphere of waiting for direction on investment decisions. Even with available capital, managers are hesitant to commit to investment decisions, preferring to seek guidance from central ministries.

The central ministries also allocated energy to firms by quotas. Initiatives were not provided for reducing energy use. If firms used less than their quota, they risked having their quota reduced and being penalized in future years if their energy use exceeded the reduced quota limit. The economy as a whole is still very much regulated in some sectors. This fact has a limiting effect on all sectors. For example, a private company which maintains its own power plant and produces power and thermal energy for sale to other firms, cannot set its sale prices and often must sell energy at an economic loss. It is dependent on regulatory agencies which have no clear policy. Thus, capital investment in this area is non-existent without a clear and defined price structure and policies for adjusting prices. Until this situation changes, it will be difficult even for aggressive managers to accurately make investment decisions.

The specific manner with which feasibility studies were carried out was for a special committee of experts to be established at the level of the central and/or ministerial level. This committee would evaluate capital investments and would make recommendations. It is not known how often these committees were formed, but based on the surveys of eight plants, very few projects were done during the last five years. The eight plants surveyed were:

1. SIDEX SA Galati (iron and steel plant)
2. DOLJCHIM SA Craiova (chemical products plant)
3. CIMUS SA Cimpulung (cement plant)
4. GRIRO SA Bucharest (chemical equipment manufacturing plant)
5. URZICENI OIL PLANT (soybean oil plant)
6. MIORITA SA Militari-Bucharest (milk products plant)
7. RENEL South Bucharest Plant (power and district heating plant)
8. BRAILA PAPER MILL (cogeneration plant).

From among these plants, only four made capital investments for energy conservation during the last five years. The total expenditures for these projects at three of the four plants providing actual cost data were 100 million lei, 8 million lei, and 2 million lei. At the August 1991 official exchange rate of 60 lei per dollar (the current bank auction rate is near 300 lei per dollar). These investments are $1.7 million, $130,000, and $30,000. Considering the very large energy use of these plants, this lack of investments suggests that at least in recent years, **investment in industrial energy efficiency has been virtually non-existent. There is no evidence of activity in the low-cost/no-cost conservation area. The Energy Efficiency Project identified large potential in low-cost/no-cost options.**

Furthermore, the plant surveys conveyed the attitude that the government ignores the problem of energy conservation. It neither provided incentives for the plants nor did it prohibit conservation activities. Some incentives were supposed to be available through ARCE (the former energy inspectorate), but the plants were not aware of them. ARCE was considered a source of information on energy conservation measures at three of the plants. In only two cases, however, did the plant receive technical and engineering magazines and journals. In a number of the plants, the only source of information was that gathered independently by plant personnel.

C. Present Energy Management Practice

The capacity to take energy management actions and make industrial efficiency investments may actually be diminished at the present time because of the turmoil at industrial plants as central command and control has been relinquished and the individual plants attempt to struggle with immediate organizational, market, supply, and financial crises. The industry central structures have been abandoned, with most plants now operating as separate entities.

Within this context, "investments in energy conservation projects were the last thing they (plant management) thought of" (Florescu, Rugina, Gliga 1991).

Many of the energy management practices in Romania are a corollary to the investment decision making practices described previously. The concept of a centrally planned society and economy permeates down through the plant structure as well. Some key observations are:

1. Decision making within the plant tends to be concentrated at the top, residing with the plant Director or his key management staff. The concept of delegation of authority is almost non-existent. This results in severely restricted flow of information. Decisions are not questioned, operating personnel do not participate, and there is no incentive for contributing new ideas to improve the operation. Even the smallest decisions are usually passed on to the very top management, who often have neither the time nor knowledge to make informed and timely decisions.

2. The Plant Directors tend to rely on the central Ministry to provide overall direction for the facility, and to set standards of production. We queried many plant Directors on their ideas to improve production. All deferred to their respective Ministry to address the question. Few managers felt they had the authority to institute production improvement at their respective plants without direction from the Ministry.

3. Most plants are severely overstaffed, some with 100% excess personnel. Plant management realizes that this situation has to change but have not pushed for staff reductions, instead waiting on direction from the Ministry.

4. All plant managers are hampered by a lack of metering of energy flows and associated raw materials (e.g. water). They know the plant output and overall energy usage, but are largely uninformed about specific in-plant usage, bottlenecks, energy wasters, etc. The common reason is lack of metering and control, but there is also a lack of any comprehensive in-plant energy program.

Another important observation is the apparent unwillingness to take on responsibility and authority. Most plant management will cite the constraints put upon them by their respective Ministries, yet have done little within their sphere of authority to change matters. Virtually no incentives exist, in any of the plants, to improve the operation, and managers have shown no inclination to initiate such programs.

Until the general environment of management changes to a more proactive role, changes will come about slowly in implementing low-cost/no-cost measures and in making larger capital investments. More importantly, as plants acquire new capital and responsibility,

investment decisions are in danger of being based on conservative methods to minimize risk and liability, rather than on growth potential. The political and social impact of major staff reductions will also influence decisions to improve efficiency and productivity.

D. Macro Conditions and Issues

The specific nature of the emerging Romanian market economy is not yet known. Much more will be known in the coming months as the nature of the new constitution is established and in the coming year or two as institutional reform takes place in the areas of energy pricing and utility regulation. It is possible at this time, however, to discuss three topics which strongly influence the nature of industrial management in general and industrial energy management in particular. These topics are pricing reform, institutional reform, and industrial restructuring.

1. Pricing Reforms and Their Economic Implications

Within a free market system where not only energy prices, but all commodities, services, and labor are provided at market prices, industrial plants (in theory) will purchase all inputs, including energy, only to the degree necessary. Furthermore, industries will actively pursue energy efficiency measures to the point where the last Lei invested in conservation will result in the same return as the last Lei spent on other investments or other inputs, such as energy. The incentive for this behavior which minimizes all costs is that it will maximize profits for the plant owner. In cases where market imperfections exist, this implies the opportunity to maximize excess profits. Under perfectly competitive conditions, this implies that the firm will be able to survive, pay workers and managers, and provide sufficient profits to plant owners (workers, managers, and outside investors etc.) to justify their investment in this particular plant. If plant managers do not minimize cost of inputs and/or if other firms in other countries face a different set of input costs, the plant will not be able to compete in the long-run. **The greatest response to energy prices will occur where industrial plants face hard budget constraints.** In other words, industrial plants will have to respond to energy and other prices to survive.

Based on information on the economic transformation to date, it appears that newly privatized industrial plants will be forced to reduce costs and/or improve the quality of production to survive in many domestic and international markets. In other cases where Romanian plants have favorable conditions, the minimization of costs will allow for greater profits. Within this context, **the ongoing movement of Romanian energy prices to market prices will have a great impact on industrial plant management of energy and other inputs.** Managers at industrial plants that can survive the newly emergent competitive conditions, will have to become fully versed in economic evaluation methods, conservation technologies for reducing costs, and the means for acquiring and utilizing new technologies. The industrial restructuring associated with the transformation to a market economy and the

associated price reform is discussed below, after considering institutionalization issues in the next section.

The importance of energy use to the Romanian economy can be somewhat estimated by considering the size of its annual energy bill and the portion of that energy bill that must be paid in hard currency for the purpose of energy imports. Romania's 1989 energy use, if it were purchased at 1990 world energy prices, would total about $9 billion. Based on the May 1991 Energy Price Reform Workshop, projections of annual energy costs in the year 2000 (using 1990 world energy prices) range from $7 billion to almost $9 billion. These projections are considerably below the $10.5 billion energy cost in the year 2000 without the structural adjustments and efficiency gains resulting from market forces.

Romania is moving rapidly in the direction of world market energy prices and its energy costs are rapidly approaching these levels. Because of its considerable oil and natural gas imports, the energy import bill which must be paid in hard currency is on the order of $3 billion. This is a severe load for an economy with limited exports on which it earns hard currency ($6.1 billion in 1989 and $3.5 billion in 1990).

2. Institutional Changes and Forces

For prices to play a central, coordinating role in the future Romanian economy, two broad institutional changes will be necessary. The first change is the development and adoption of a constitution that guarantees private property rights. A constitution has been prepared and was endorsed in a national referendum in December 1991. Prior to the establishment of a constitution, the **Law on Restructuring State Economic Units as Autonomous Units and Commercial Companies** was adopted by the Assembly and Senate on July 30, 1990. In this law, the transfer of existing state property (including industrial plants) to private hands, including the workers in enterprises, and the creation of new private firms, was established. The **Bulletin No.1, Documents, Opinions, Notes** issued by the Government of Romania's Council for Reform, Public Relations and Information (Sept 25, 1990) notes that:

> Small and medium industries will have a propelling role, as they have their own mobility as concerns the change in technology and market demand. In fact, these industries have to be the result of a new structural development, but also of decentralization and de-monopolization. Moreover, one can say that if these industries have so far been the Cinderellas of our economy, from now on their status should be on a par with that of the big units, for progress is the resultant of the free initiative of a qualified and creative management, rather than of the big numbers. (p. 21).

The second institutional change is the establishment of an independent regulatory body to oversee the establishment of prices for energy forms that are provided by natural monopolies, namely, electricity and natural gas. This change is necessary so as to provide

an orderly and well established basis by which energy prices can be changed to follow market conditions. Under the present conditions, energy prices in most areas are set by the central government because a true market can not exist for electricity and natural gas due to inherent natural monopoly conditions and in the area of petroleum products because conditions sufficient to allow for open competition in the market do not yet exist. The problem with the current arrangement is that the government in power is directly responsible for changes in prices. Although the GOR has shown considerable courage in changing prices in the last 20 months, it may not always have the fortitude to make the necessary changes. Furthermore, the government is subject to considerable direct pressure when prices are changed, which could lead to the termination of a particular government. The final difficulty in the current circumstance is that there does not exist a well established formal basis for setting regulated prices.

The establishment of a independent regulatory body to oversee the provision and pricing of electricity and natural gas offers the advantages of the establishment of a formalized, defensible mechanism for setting prices and terms of service. It also offers a mechanism which can be more open to public scrutiny, participation, and appeal. The potential advantage of an independent regulatory body is that unpopular but necessary price changes can be made without the "blame" focused directly on the government in power. Whether this type of insulation can be accomplished in the short and medium term can only be speculated on. The establishment of a regulatory body, however, is part of the long term educational process required in the adjustment to a market economy.

The institutional structures discussed to this point have focused on those which would be directly supportive of the emergence of prices in a central, coordinating role in the Romanian economy. There are however, a number of institutions which indirectly are supportive of the emergence of effective market economies and which are directly supportive of efficient industrial energy management. A few of these type of institutions exist in Romania while others, common to market economies, do not appear to exist.

A review of these institutions reveals that there was very little in the way of organizations which shared energy management information across many industrial sectors. Most of the management of this information, and information in general was vertically oriented, within industrial branches as discussed previously. Among those that exist in Romania at the present time are:

ARCE (Romanian Agency for Energy Conservation). This agency is the old energy inspectorate and currently resides within the Ministry of Resources and Industry. It is one of the few institutions in Romania with a role spanning many industrial sectors.

Bucharest Polytechnic Institute. This is the foremost, but not the only polytechnic in Romania. It trains engineers and managers across a wide variety of disciplines.

The polytechnics are linked with industrial sectors through various research projects as well as providing professional training.

ICEMENERG (Energy Research and Modernizing Institute). This institute has over 2000 employees located in three cities in Romania. Its responsibilities include design, testing, and manufacturing in the operation and control of thermal and hydro power generation, transmission and distribution of electrical energy, water treatment, telecommunication equipment, and control and automation equipment for general application.

ISPER (Institute for Power Studies and Design). This institute undertakes a wide variety of research and design tasks, primarily within the electrical power area. A unit within ISPER has previously done economy wide energy studies for Romania, using western models developed at the International Atomic Energy Agency and Argonne National Laboratory, and the University of Grenoble. Some of ISPER's studies have focused on economic pricing and efficiency concerns.

RENEL (National Power Corporation) Training Center. The Center trains a wide variety of RENEL employees and has a wider mandate for energy efficiency training in industry. While it hopes to be able to offer training courses similar to those that AID sponsored there in industrial energy auditing and efficiency, it is not known whether audiences will be drawn to these proposed courses and at what level the Center will be able to offer the courses.

Engineering Associations. Two engineering associations were formed during 1991 at the impetus of faculty at the Bucharest Polytechnic Institute and managers at some of the larger companies. The Romanian General Association of Engineers is the larger of the two, focussing on promoting professional meetings, studies, the development of expertise, and the documentation of information. A smaller and more specialized association was also established which focusses on energy related engineering issues. This association is the Romanian Society of Energy Engineers.

What was notably missing from the Romanian institutions, until very recently, are professional, cross cutting organizations. An energy managers' association does not exist, nor do such professional associations exist in many other related areas. Prior to the revolution, the opportunities available for professionals to interact were controlled by the various ministries. Only limited opportunities existed for professionals to interact with other professionals outside of Romania.

3. Industrial Restructuring

The Romanian economy has begun a transformation involving a major restructuring of industry away from energy intensive heavy industries where Romania does not have any natural advantage, towards industries such as machine building, food products, electrical equipment, transportation equipment etc., where Romania has or could potentially have natural advantages internationally or where domestic needs are so great as to support an industry which can successfully compete with competition from outside.

The precise nature of the transformation can only be a matter of speculation and scenario analysis at this time. Three broad scenarios focusing significantly on anticipated changes in energy prices were developed in a workshop in May 1991 with over thirty Romanian experts and energy managers. The workshop utilized three models developed for evaluating the evolution of the Romanian economy, including the RMA Industrial Sector Energy Model.

The RMA Industrial Sector Model simulates production activity in eight industrial sectors plus an "other" sector which aggregates the remaining sectors. The eight sectors are: mining, chemicals, ferrous metals, non-ferrous metals, mechanical engineering (machinery), construction, forest products, food, and other. The simulations are driven by assumptions regarding underlying output trends if prices remain stable. Trends during 1989 and 1990 were carefully considered. From this base, energy prices were considered in real terms (*Tables 3 and 4*). Energy price effects were represented by impacts on output (output price elasticities) and industrial energy intensity (intensity price elasticities). These price elasticities were influenced by U.S. experience, experience in the Hungarian economy, and judgement, but ultimately selected by the Romanian experts participating in the Energy Price Reform Project Workshop in May 1991.

Because of the known international competitive forces in refining, and the metals industry, high negative output price elasticities were chosen in the scenarios. Thus, the combination of underlying trends and large real energy price increases results in the expectation that industrial output in the areas of metallurgy and chemicals will be declining throughout the 1990's as shown in *Figures 4 and 6* for Scenario A. These sectors are by far the most energy intensive as shown in *Figure 5*. Other sectors with far more value added and employment, however, are expected to first decline during the period 1990 through 1992, but then rebound. These sectors include food products, mining and forest products, construction, mechanical engineering (electrical and non-electrical machinery), and a wide variety of light industry. As shown in *Figure 4*, total output of the economy is expected to significantly grow by the year 2000 with the net effect, however, that industrial energy use will still be considerably lower in the year 2000 than in 1989 as shown in *Figure 3 and Table 5* (note end-use demand).

While this overall picture is promising, it will clearly involve major dislocations as some plants (but not all industrial plants in the heavy industries) are closed and new ones, with

different products, opened. It was already evident in two plant visits and a discussion with the Director of the Energy Division of the Ministry of Resources and Industry in December 1991 that the primary aluminum plants had come to a halt. Capital will be required to expand existing plants and to build new plants. It is expected that private investment will be the key to just how rapidly the new plant investments and associated jobs can be put into place.

Table 3. Fuel Price Changes 1989 to 2000 for Scenarios A, B and C

FUEL PRICE CHANGES 1989 TO 2000 FOR SCENARIO A - Industrial Energy Demand Model

PRICE CHANGES BY FUEL TYPE

	ELECTRIC		NATURAL GAS		FUEL OIL		COAL		DISTRICT HEAT	
YEAR	REAL PRICES Lei/kwh (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/m3 (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/Ton (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/Ton (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/GJ (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)
1989	0.51	1.00	1000	1.00	1875	1.00	179	1.00	-	1.00
1990	1.08	2.12	2000	2.00	2860	1.53	304	1.70	-	2.12
1991	1.25	2.45	2000	2.00	2800	1.49	304	1.70	-	2.45
1992	1.30	2.55	2000	2.00	2550	1.36	300	1.68	-	2.55
1994	1.30	2.55	2000	2.00	2550	1.36	300	1.68	-	2.55
2000	1.30	2.55	2000	2.00	2550	1.36	300	1.68	-	2.55

FUEL PRICE CHANGES 1989 TO 2000 FOR SCENARIO B - Industrial Energy Demand Model

PRICE CHANGES BY FUEL TYPE

	ELECTRIC		NATURAL GAS		FUEL OIL		COAL		DISTRICT HEAT	
YEAR	REAL PRICES Lei/kwh (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/m3 (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/Ton (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/Ton (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/GJ (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)
1989	0.51	1.00	1000	1.00	1875	1.00	179	1.00	-	1.00
1990	1.08	2.12	2000	2.00	2860	1.53	304	1.70	-	2.12
1991	1.40	2.75	2200	2.20	2987	1.59	350	1.96	-	2.75
1992	1.40	2.75	2180	2.18	2900	1.55	380	2.12	-	2.75
1994	1.40	2.75	2180	2.18	2900	1.55	380	2.12	-	2.75
2000	1.40	2.75	2180	2.18	2900	1.55	380	2.12	-	2.75

FUEL PRICE CHANGES 1989 TO 2000 FOR SCENARIO C - Industrial Energy Demand Model

PRICE CHANGES BY FUEL TYPE

	ELECTRIC		NATURAL GAS		FUEL OIL		COAL		DISTRICT HEAT	
YEAR	REAL PRICES Lei/kwh (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/m3 (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/Ton (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/Ton (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)	REAL PRICES Lei/GJ (1989 Lei)	Relative PRICES in Real Lei (1989= 1.0)
1989	0.51	1.00	1000	1.00	1875	1.00	179	1.00	-	1.00
1990	1.08	2.12	2000	2.00	2860	1.53	304	1.70	-	2.12
1991	1.17	2.29	1333	1.33	2800	1.49	305	1.70	-	2.29
1992	1.11	2.18	1178	1.18	2666	1.42	305	1.70	-	2.18
1994	1.11	2.18	1178	1.18	2666	1.42	305	1.70	-	2.18
2000	1.11	2.18	1178	1.18	2666	1.42	305	1.70	-	2.18

Table 4. Fuel Prices for Scenarios A, B and C

FUEL PRICES FOR SCENARIOS A, B AND C
Transportation Energy Demand Model

RELATIVE FUEL PRICES IN REAL LEI
(Normalized to 1989 Lei)

	Year	Diesel	Gasoline	Electricity
Scenario A	1989	1	1	1
	1990	1.53	1.53	2.12
	1991	2.49	2.49	2.45
	1992	2.36	2.36	2.55
	2000	2.36	2.36	2.55
Scenario B	1989	1	1	1
	1990	1.53	1.53	2.12
	1991	2.59	2.59	2.75
	1992	2.55	2.55	2.75
	2000	2.55	2.55	2.75
Scenario C	1989	1	1	1
	1990	1.53	1.53	2.12
	1991	1.49	1.49	2.29
	1992	1.42	1.42	2.18
	2000	1.42	1.42	2.18

Table 5. Summary Energy Demand Supply for 1989, 1994 and 2000

SUMMARY ENERGY DEMAND AND SUPPLY FOR 1989, 1994 AND 2000
ALL VALUES IN 10 E+18 JOULES

		SCENARIO A		SCENARIO B		SCENARIO C	
	1989	1994	2000	1994	2000	1994	2000
ND (END-USE)							
STRY	1.9	1	1.3	0.9	1.1	1.2	1.5
SPORT	0.45	0.34	0.47	0.33	0.46	0.4	0.55
L	2.35	1.42	1.76	1.3	1.6	1.6	2
TRICITY DEMAND	0.26	0.17	0.21	0.16	0.2	0.19	0.22
RICT HEAT DEMAND	0.53	0.34	0.41	0.34	0.41	0.37	0.4
LY (PRIMARY)							
RAL GAS	1.6	0.87	1.1	0.83	1	1.1	1.3
E OIL	1	0.79	1.1	0.77	1.1	0.92	1.2
TE	0.78	0.49	0.59	0.39	0.48	0.47	0.57
RT OF PRODUCTS	-0.13	-0.12	-0.23	-0.13	-0.23	-0.16	-0.2
L (CORRECTED FOR EXPORTS)	3.3	2.1	2.6	1.9	2.4	2.4	2.9
MPORTS	1.5	0.54	0.96	0.52	0.85	0.67	1.1

Figure 3. Energy Consumption in Romanian Industry

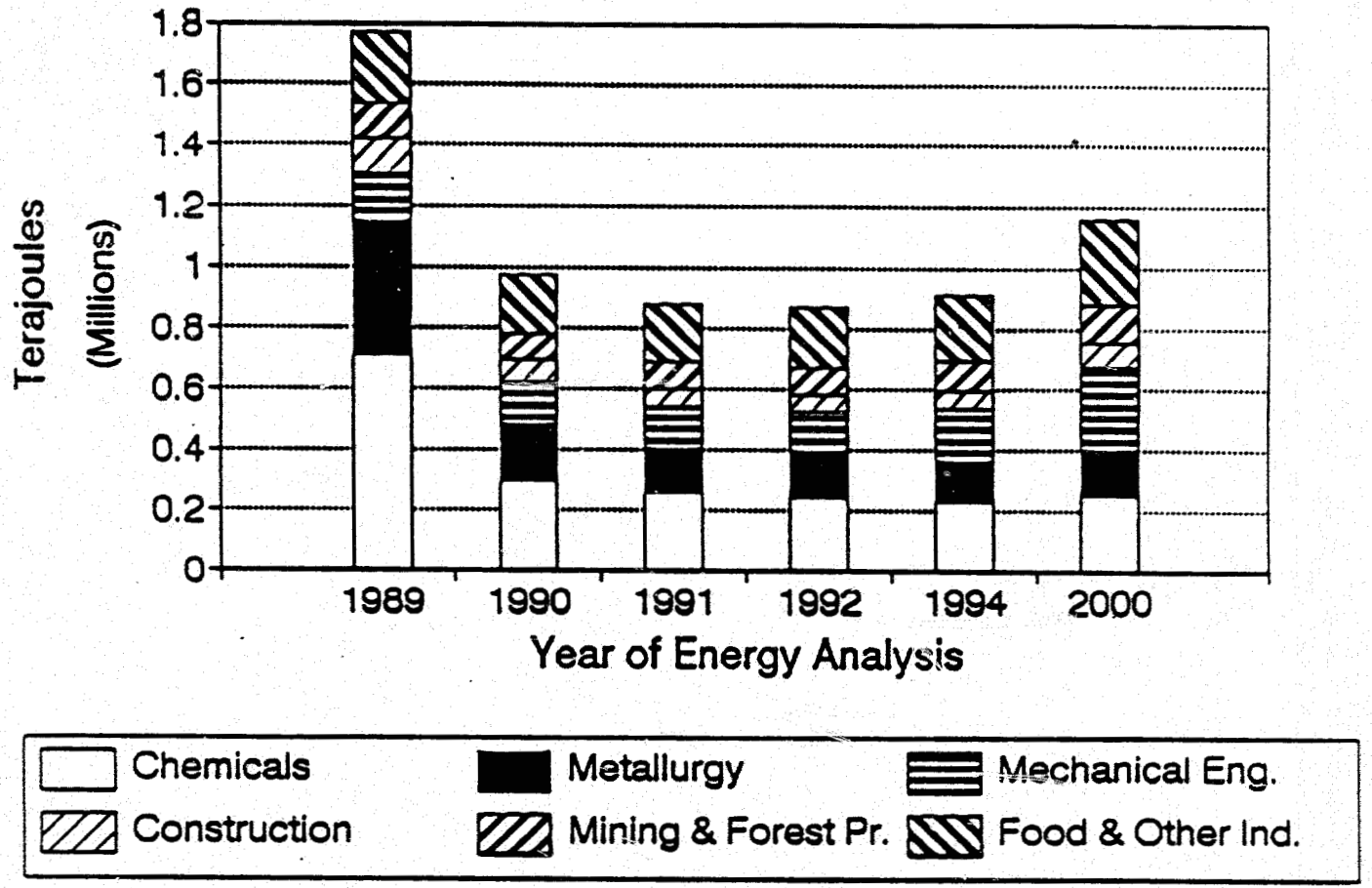


Figure 4. Gross Industrial Product in Romanian Industry

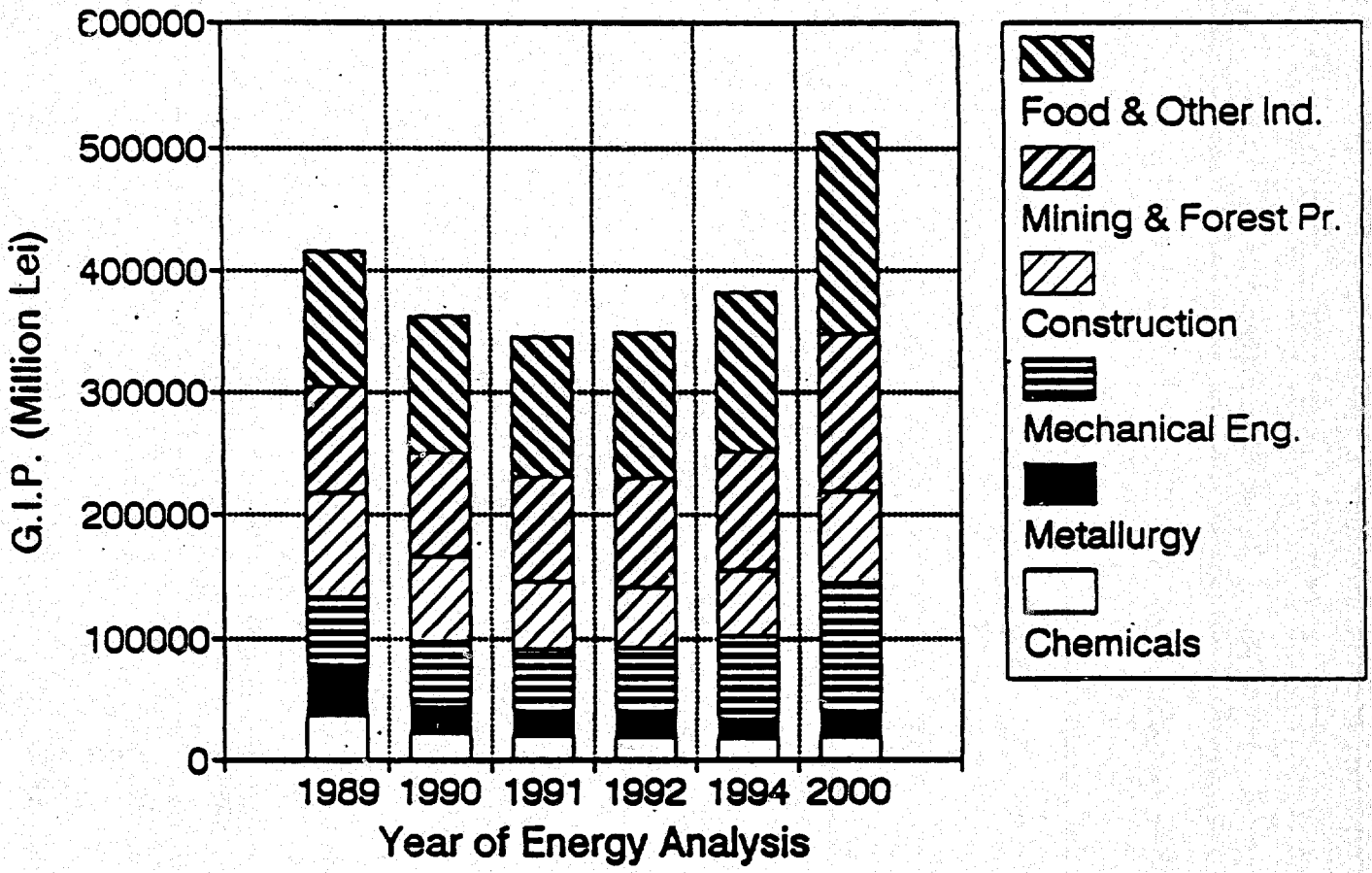


Figure 5. Energy Intensity in Romanian Industry

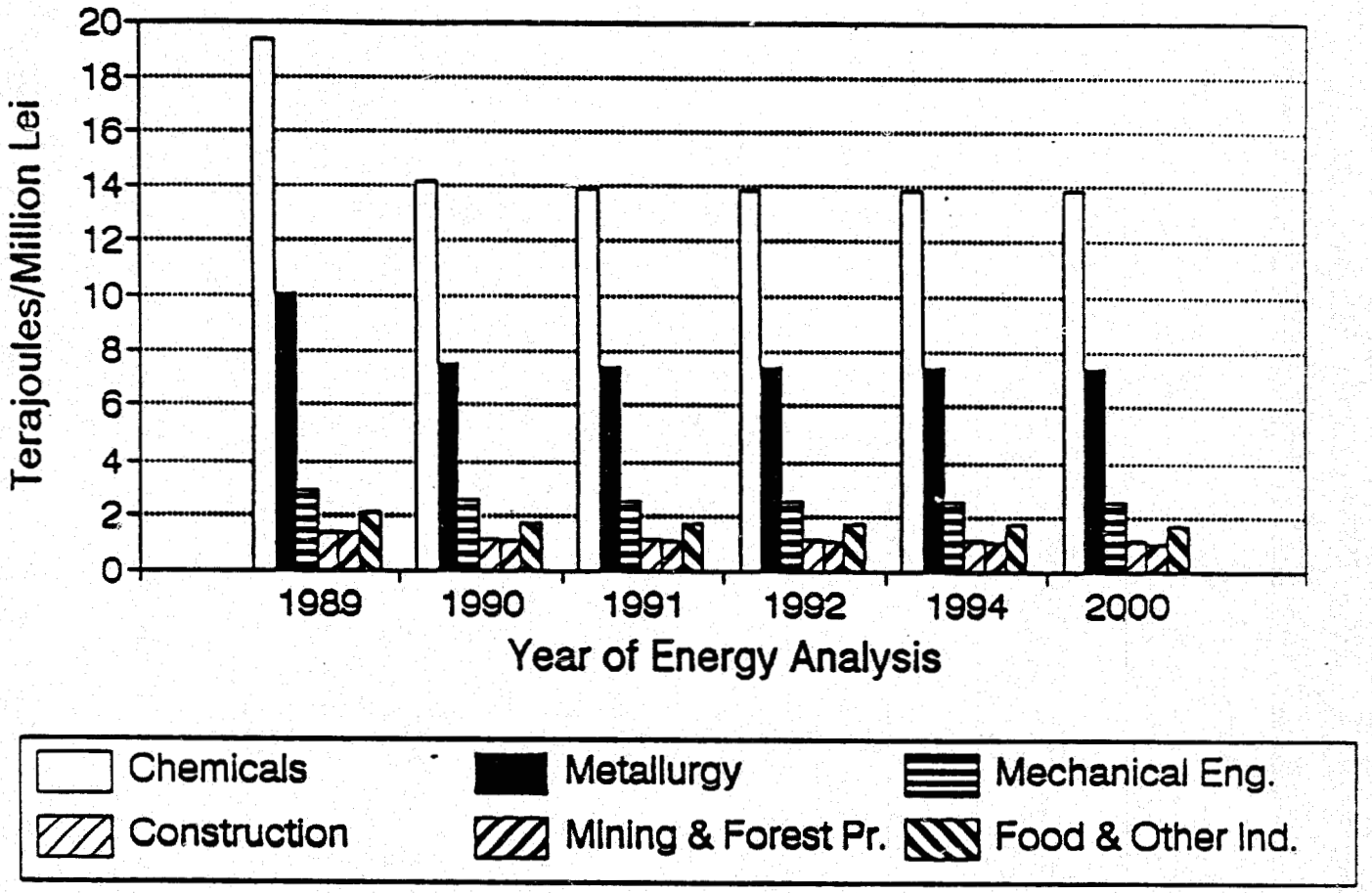
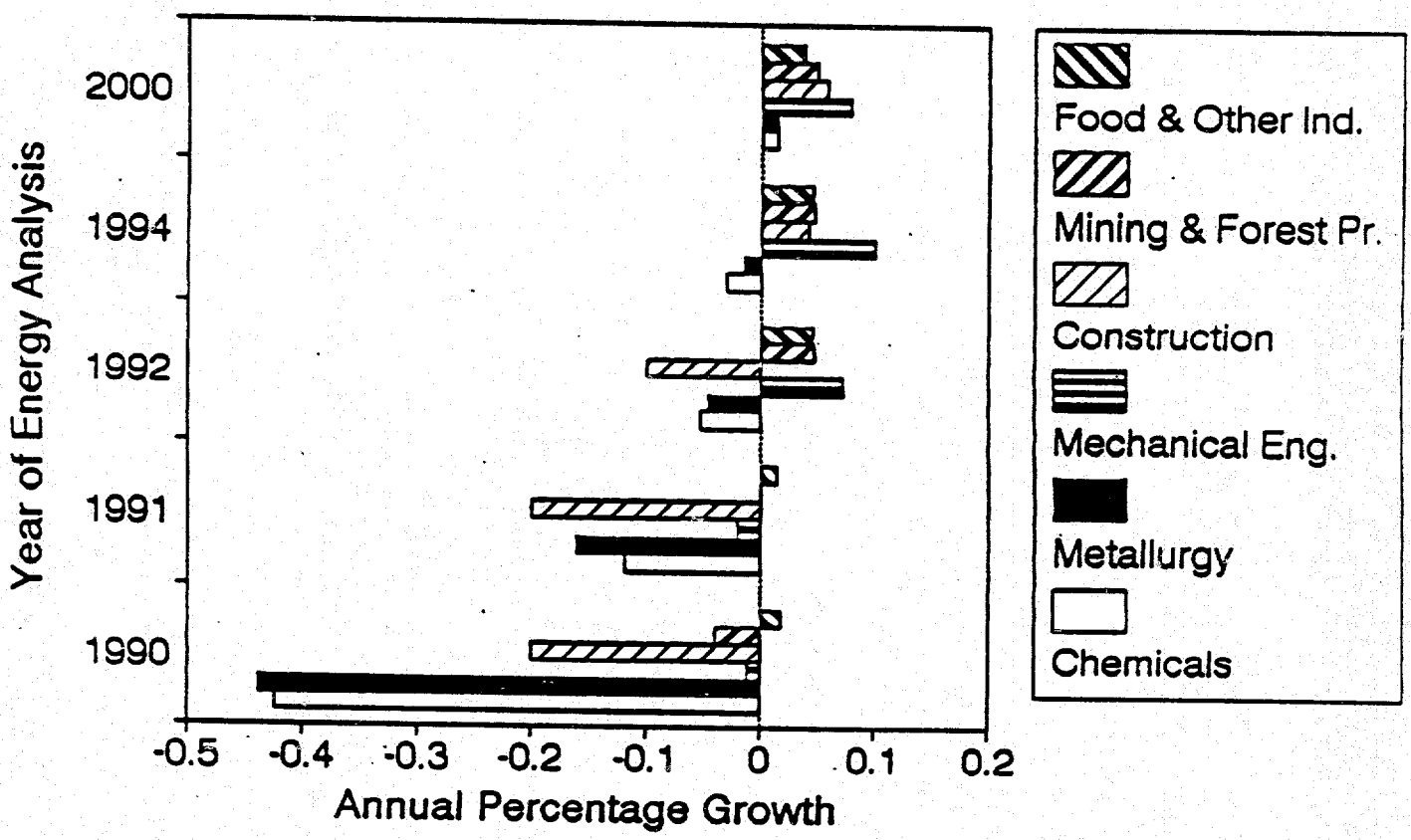


Figure 6. Growth Rates in Romanian Industry



III. The Market in Energy Efficiency Services and Investments

A. Market Definition and Status

Energy efficiency services are critically needed to foster the adoption of modern energy efficient equipment and management practices. Within a market economy, these services are provided by four types of firms in addition to in-house expertise. These firms are:

1. Architectural and engineering firms which provide technical services in identifying the need for and the equipment requirements for energy efficiency. These firms can provide complete services including audits, feasibility studies, equipment specification, construction oversight, and start-up support. They may also provide services on a selective basis to back up in-house plant staff. Such firms may also provide architectural services related to energy efficiency.

2. Equipment vendors play a critical role in making industrial plants and the architectural and engineering firms aware of the equipment available as well as providing a source of the equipment in a timely fashion. Vendors also play important servicing roles.

3. Financial institutions such a banks provide sources of capital for investment in energy efficient equipment and design.

4. Construction firms provide installation services.

In a fully functioning free market, there is competition in each of these areas, with bidding a common technique used to compare the offerings of services in each area.

B. Market Deficiencies

Each of these services is present in the Romanian economy at the present time. The services have been provided in the past, however, through state organizations with little if any competitive forces at work. The service organizations have also not had available modern technology, measuring capability, and management techniques. Thus, there is a critical need for private firms to emerge to provide these services. Because of the availability of knowledgeable and skilled individuals, there are professionals available in the labor force who can provide many of the service needs at the present time and who would be capable of assimilating the knowledge to be brought "up to speed" in these areas.

C. Emerging Market Conditions

There has been a rapid build-up of private firms in Romania during the last 12 months. Many of these firms are in the trade and retail services area as would be expected. There

also has been, however, the emergence of small manufacturing firms, engineering services firms, private construction firms, and vendors. Some of these private firms are privately held by Romanian entrepreneurs while others are joint ventures with outside interests. Discussions with professionals in the energy and environmental fields also point to a considerable eagerness on the part of professionals to move out of state run enterprises or to convert state run enterprises to private firms.

The overall impression is that a private market is emerging in the energy efficiency services area. Many private services can be acquired at the present time, although some searching is sometimes required. If the demand for these services can be stimulated, however, a full fledged market could emerge. At the present time, it is impossible to determine how rapidly large scale privatization will take place.

IV. Policy Options for Improving the Energy Efficiency Services and Investment Market

A. Institutional Needs and Other Policy Issues

Any discussion of policy options for offering privately based energy efficiency services in Romania is predicated on the underlying institutional conditions necessary to support private entities offering those services. A new constitution which defines property rights is being adopted. Until this is fully established, considerable uncertainty surrounds private investment. A national referendum on the proposed constitution was held in early December 1991. Romanians voted 77% in favor of the proposed constitution.

A second key institutional need is for currency convertibility. Until recently, a bank auction was held daily for currency exchange at very high Lei to dollar transactions, driven by the scarcity of dollars. In mid November, action was taken to unify the bank auction rate and the much lower official exchange rate to a value between the two, namely 180 Lei per dollar. It is too soon to judge how defensible this rate will be, but it appears to be a major step in the right direction. If the rate holds reasonably well, foreign investors in Romania will have increasing assurance of being able to take their earnings out if desired. More immediately, vendors of outside energy efficiency technology in critically short supply have the opportunity to sell their equipment.

Sources of Romanian currency denominated loans appear to be available with the country. While there is a likely need for reform in these financial institutions, they may suffice in the near term as sources of finance. Financial sources for loans in dollars or other tradable currencies have not been widely available. What changes currency convertibility and the entry of outside banks bring will have to be observed in the coming months.

Other institutional issues which are considerations in evaluating policy options include import tariffs, tax incentives for conservation investments, and the existence of energy efficiency codes and standards.

Existing import tariffs for energy efficiency equipment are low. There is, however, no justification for any tariff on this type of equipment. (The need to protect infant industries or to preserve foreign currency for crucial imports may justify tariffs for some consumer items, but these arguments do not pertain to energy efficiency or environmental protection equipment at the present time.)

In addition to eliminating tariffs, the cost of introducing energy efficiency equipment (whether low-cost or more costly items) could be further reduced by the adoption of investment tax credits for the equipment and installation costs of conservation equipment. To assure the performance of these tax credits, efficiency standards could be adopted for various types of equipment such as boilers, certain types of furnaces, motors, power factor control, insulation, and lighting. The advantages of efficiency codes and standards are

certainty of target and the ability to place a "floor" or lower limit on the level of efficiency. The disadvantages of standards, however, are that they can restrict options for obtaining efficient outcomes and require considerable care in adoption. If they are too lax, they may not achieve the intended result. If they are too severe, they may require too much cost, resulting in an increase in overall cost rather than a decrease. In light of these concerns, standards should be adopted carefully for target areas where market forces by themselves have been shown to be inadequate.

Another potential avenue to encourage industrial conservation is to allow and encourage RENEL to participate in promoting energy efficiency. RENEL's options include direct investment in efficiency in industrial users (where it is less costly to invest in conservation than to provide additional power), sales of efficiency equipment to customers, provision of interruptive power contracts, and avoided cost rates for the purchase of power from customers with cogeneration. The primary policy change required for these options is to allow RENEL to make a return on efficiency investment equal to or greater than return on added power provision. Because of the lack or an independent utility regulatory body at this time, this decision is currently based at the highest levels of government.

The primary disadvantages of RENEL's potential role as an efficiency provider is that in the case of direct investments and the sale of equipment, there is the real possibility of competition with small emergent private firms in areas such as auditing, vending, and shared savings. These disadvantages could be significantly avoided by RENEL using these private firms to provide its services, and by doing this on a competitive basis.

B. A&E Firms (domestic and international)

In addition to the obvious need to establish the new constitution, there are a small number of actions that the GOR can take to foster the development of private A&E firms. One action item is the separation of the existing A&E personnel and facilities from specific industries currently under the Ministry of Resources and Industry, Ministry of Agriculture, and others. Existing organizations such as ICEMENERG could be separated into a number of smaller, privately held, and competing organizations. Simultaneously, the opportunity should also be provided for new private firms to emerge. Open competition should be required for all government including utility contracted services. More government services should be obtained by contracting with private entities rather than maintaining government organizations to do the work.

Another option would be to dissolve the existing state organizations completely, and allow private firms to emerge to provide all of the services. It is difficult to know which transformation strategy will produce better results.

The role of private A&E firms could be enhanced by the provision of energy efficiency services in conjunction with the National Electric Utility (RENEL) and the National Natural

Gas Utility. This role is particularly important for small and medium sized firms which may not have sufficient staff for energy management. The interest of the utility in this service is the opportunity to reduce capital needs via energy efficiency, and to reduce operating costs, particularly imported fuel costs.

The final option in this area is for the establishment of Energy Service Organizations or firms which provide capital investment in plants in return for the opportunity for profit based on energy sales savings achieved.

C. Financial Institutions

Since financial service institutions such as banks appear to exist to meet finance needs for domestic currency investments, the main policy concern is how to reach the financial community with the message that energy efficiency investments are sound management practice and should be supported. The GOR, specifically the Ministry of Finance, has the option, through its upcoming World Bank Loans to make capital earmarked for energy efficiency investments available to banks. Such a provision would make critically needed capital available on strictly commercial terms.

Such an effort should be coupled with a GOR program of education targeted to the finance industry, as this community is likely to overlook energy efficiency investments. As noted in section III.C, Romania's total energy bill in the year 2000 in today's dollars is anticipated to be $10.5 billion at present international prices. The combination of higher prices and aggressive efficiency management as used in the Energy Pricing Reform Project Workshop Scenario B would reduce this bill by over $3.0 billion per year. Because energy at the margin is imported to Romania, such an aggressive stance on energy conservation would help to reduce critical import needs by that amount.

V. Policy Options for Improving Firm Level Energy Management

The Romania Industrial Energy Efficiency Component of the USAID Emergency Energy Program for Eastern and Central Europe allowed an initial assessment of the energy management procedures of eight plants. Based on the work with these plants as well as discussions with other plant managers, other site visits, and discussions with other government officials and energy professionals, a set of policy options can be identified for improving energy management within firms.

A. Management Training

A major difficulty for plant managers in existing and newly emerging firms is that they are not experienced in managing from market and cost based perspectives. Not only are they significantly inexperienced in some of these areas, but in many instances there was no opportunity to manage. Important training options are short course opportunities as well as on site training with experienced managers from market economies. Extension courses could be set up in conjunction with the Polytechnic Institute in Bucharest and with the RENEL Training Center.

Other training opportunities can be set up directly with managers from various specific industries, matching outside professionals who can specifically address the training needs in specific industries or technical areas. Training opportunities as well as on-site energy management participation by outside professionals could be initially targeted to the 32 enterprises that account for a large share of the potential waste energy as shown in *Figure 2*. Caution would be necessary as some of the enterprises may not survive. Cost sharing may be appropriate so as to partially move such a program to a market situation when such services would be contracted out.

There are long-term needs as well for basic University level training in the management field, but these are long term propositions and there is evidence that these needs are already being anticipated with the establishment in 1991 of new curricula in Romanian institutions of higher education.

B. Management Restructuring

The most obvious management restructuring is in moving basic production and investment decisions from the ministry level to the firm or plant level. This has largely been accomplished. At the plant level, there is a need to either identify an energy manager, or explicitly assign energy management duties to one of more existing managers. Such managers should have the responsibility for overall energy management from auditing through to feasibility studies, design, installation, and ongoing monitoring of energy costs.

Top level management must then be willing to consider the recommendations and investment requests from their energy managers as they compare their relative investment opportunities across all areas of the firm. With the higher prices that are being rapidly put in place, there should be increasing attention to energy costs within firms. Energy managers should be explicitly required to work with other managers as new capital decisions are being made, as this is typically the most cost effective point for energy efficiency investments. Energy managers should also be given an incentive structure to positively reward cost savings in the energy area. Currently, there still are some conservation disincentives in some Romanian firms.

Within a free market context, management restructuring can not be required by the central government. Thus, these type of recommendations can only be made to firms. The GOR, however, can provide encouragement for these changes through the provision of training opportunities, the continued rapid adjustment of energy prices, investment tax credits, and the elimination of tariffs on energy efficiency equipment.

C. Energy Management Equipment Provision

There is a severe shortage of basic energy management equipment, including portable and fixed energy measurement devices and microcomputers and software for energy management. Such equipment is immediately needed for both the GOR auditors, plant energy managers, and for emergent private sector firms that are involved in energy management. The bilateral and multilateral donor institutions can certainly provide equipment in this area through grants and/or lending programs. A possible role for the GOR is to establish an organization which would procure this equipment and in turn sell the equipment and provide financing for private entrepreneurs to buy the equipment over time as part of their work. A sunset provision could be included so that after a certain period of time, the organization would be disbanded in favor of private vendors and finance institutions that would take over the role.

An alternative model would be for the GOR to establish, possibly in conjunction with an international lender, an energy efficiency equipment fund through which emergent small energy service firms and other manufacturing firms could obtain loans and advice on energy efficiency equipment procurement. Partial loan guarantees could be considered. The firms would then work through vendors or trading companies in obtaining the equipment. Partial loan guarantees may be useful as an incentive to overcome the barrier of start up costs and risks in the uncertain economic climate of Romania.

D. Professional Associations

Professional associations, such as an Energy Managers Association can be very helpful in overcoming the isolation of energy managers, and managers in general, in the Romanian economy. Such associations provide, among other services, conferences on energy

management which offer the opportunity for information exchange in an information starved country. Such exchanges can make an important contribution to the introduction and rapid dissemination of modern management. The recent establishment of two engineering associations is a positive step.

VI. Recommendations for Improving Industrial Energy Efficiency

A. National

By far the most important action to be taken in the area of industrial efficiency is for the GOR to establish a constitution which guarantees property rights and to place the ownership of industry with private owners. In areas where national ownership is to be retained (e.g. power, where ownership is often national in market economies), transfer to autonomous management is necessary so that the survival of the entity or its management is dependent on the ability to generate sufficient revenues and efficiently manage so as be able to survive within those revenues. These actions are the cornerstone of a decentralized, market driven approach to the management of industry in general and the management of energy, within industry, in particular.

Because of the existence of natural monopolies in power and natural gas, it is recommended that a national utility regulatory body be established. Such a body will serve to establish market tariffs and terms of service, providing confidence to industry and other consumers that power and natural gas prices are fair. In the short run, energy prices could be set at average cost. In the longer run, appropriate uses of marginal cost pricing can be included.

Import tariffs for energy efficiency (and environmental protection) equipment should be eliminated and an investment tax credit established for efficiency equipment of the low-cost or higher-cost type. RENEL should establish buy-back rates based on avoidable cost. In addition, RENEL should be allowed a rate of return somewhat higher than normal for investments and other activities in the efficiency area. In order to encourage private firms, RENEL should provide its services through private firms on a competitive basis. RENEL should also establish a separate rate for interruptable power. To ensure the utilization of efficient equipment, the GOR should selectively introduce efficiency standards.

Other actions which the GOR should take include continuing on the path to a convertible currency and establishing a market rate loan fund for energy efficiency. The GOR should work through existing banks and private banks as they emerge. Such a loan fund should have two components, one in Lei and one in dollars. This would guarantee a source of funding for industrial energy efficiency and in the case of western equipment, provide the possibility for imported equipment. The attraction of such a fund is the availability of financing particularly for dollars, rather than the interest rate.

The GOR has a number of actions it can take in regards to the transformation and use of the institutions briefly described in **Section II. D.** The Romanian Agency for Energy Conservation has been the beneficiary of both audit training and equipment. At the present time it is continuing to do audits, and even by September of 1991 claimed to have done work in over 100 industrial plants. While this record is commendable and productive, the GOR should move in the direction of spinning the inspectorate off into a number of private

firms. In order to start up the activity, the government could offer industrial plants audit funds in the first year which, if applied for, could only be used for audits provided on a competitive basis. The funding for the first year of activity would be provided by the budgetary savings of no longer funding ARCE.

Similar privatization is recommended for ICEMENERG and ISPER, both of which are subsidiaries of RENEL. While RENEL has a legitimate need for some in house personal for research purposes and to manage anticipated demand-side programs in the coming years, major portions of both organizations could be divided into a number of private entities offering engineering, design, and other consulting services, as well as manufacturing capabilities. It is anticipated that some of the existing services, personnel, and in the case of ICEMENERG, manufacturing capabilities may not survive economically such a transformation.

The Bucharest Polytechnic is an impressive institution. While it has a management department which is expanding its offerings, the Polytechnic needs more resources to upgrade its teaching staff, libraries, and computer hardware and software in this area.

The RENEL Training Center appears to fill an important training niche, which in the U.S. is filled by in-plant training and a broad range of short courses often by a variety of institutions ranging from university extension to private firms. While a review of the course offerings is appropriate, much of RENEL's training role is appropriate to any electric utility. In addition to providing some support for the ongoing operation of the Training Center, the government should provide or obtain funds to bring the computer hardware and software facilities up to an acceptable level.

B. Firm

The GOR can take, and appears to be taking, many of the necessary actions to support a market based economy. In that emerging economy, the firm is the fundamental decision unit. If industrial firms are to approach their economic optimum position, they must manage all expenditures (including labor, capital, energy, and so on) so as to maximize their profits and thereby minimize costs in doing so. Firms must take rapid and often drastic action to reduce costs in many areas simultaneously. The adoption of modern, market based management approaches with hard budgets is an essential recommendation for firms as they move to reduce costs of operation.

It is also recommended that firms, particularly energy intensive firms, specifically manage energy as a discrete area, and establish incentive structures for management success. Energy management should be carefully coordinated with other investments, because the best opportunities for energy investments occur at times when other capital investments are being made.

Firms will need to take a careful look at joint ventures with outside firms, which can offer capital, technology, and modern management skills. The domestic banking system and international lenders do not have sufficient resources to meet the needs of Eastern Europe, and the international lenders are largely oriented to government loans. Joint ventures can help to meet the needs for Western capital. While the advantages of joint ventures are obvious, they also present difficult problems for firms which are often at a disadvantage in knowledge. Under these circumstances, it is difficult to negotiate a fair sharing of future profits and other rewards.

C. International Lenders and Donors

An important early role of these organizations is to encourage and provide practical guidance in laying the groundwork for a fully functional market economy. As described above, essential parts of the groundwork are the constitution, a convertible currency, and the establishment of an independent regulatory body in the energy and other natural monopoly areas.

For international lenders, a recommended action is the establishment of a government managed conservation loan fund to private firms for western currency loans through conventional banking sources within the country. International lenders should also expand their role in making loans directly to the private sector. The difficulty in channelling loans through the government is that the loans are primarily appropriate for areas where government has a traditional role in a market economy. Public infrastructure such as power, water, sewer, and roads are examples. While there are needs in these areas, the situation is fundamentally different than developing countries. Romania has a substantial public infrastructure in place. Thus, its most critical financing needs at this point are private sector financing. Direct relationships between lenders and the private sector are more appropriate to a market economy. Using the government as the conduit for loans tends to propagate a government role that is being largely abandoned. It may be useful, however, as an interim step to a fully functioning market economy.

Selected loans are appropriate for RENEL as a nationally owned, but autonomously operated electric utility. Loans for RENEL should include funds for investments by RENEL in industrial energy efficiency as part of Demand-Side Management (an element of least-cost planning). U.S. utilities, which are largely privately owned, are increasingly making investments which are less costly than investments in new capacity. In other words, RENEL should develop demand-side programs which enable it to invest in targeted demand-side measures. Opportunities exist in both industry and RENEL, including reducing losses in the transmission and distribution network.

It is recommended that international donors, such as USAID, focus on a variety of targeted programs. Short-term education opportunities in the form of short courses, extension type courses, and conferences are useful in rapidly infusing these markets with some of the

essentials of market economy behavior and modern management. Support for long term training is also extremely useful, but the return on this investment is longer. Semester length visiting professorships in various market management areas, including energy are a recommended means for supporting curriculum reform at the university level. Relatively low cost computers and software for energy management training (both short and long term) are an extremely attractive area for donor support.

Because of the concentration of energy use in a relatively small number of industrial plants and the desperate need to reduce energy imports, targeted programs to measure these losses and provide limited amounts of equipment for plant guidance in energy management are valuable and timely. Not only are there immediate macroeconomic benefits, and benefits to individual firms, but there are also opportunities to introduce some elements of modern management which can be carried on in the firm and serve as demonstrations to other firms. These programs could very usefully be expanded.

Donors can also provide support in energy pricing, least-cost planning, regulation, efficiency standards, and targeted engineering design support and equipment acquisition. To the degree that international lenders are unable or unwilling to provide loans for industrial conservation or demand-side management, there are expanded opportunities for the donor community.

Finally, donors can usefully support the recently established professional engineering associations. These institutions could play important roles in supporting the exchange of information in a market economy.

Appendix I
Romanian Industrial Energy Management Survey

The work was carried out in the Laboratory for Industrial Energy, co-ordinated by Mr.Alexandru Florescu, Head of the Laboratory.

The general survey and conclusions were drawn by eng.Vasile Rugină and eng.Radu Oliga, who conducted the whole survey to whom other specialists from the laboratory took part as well.

GENERAL SURVEY

1. Introduction

This work is part of the USAID Emergency Program for Romania. It was carried out by ICEMENERG (Energy Research and Modernizing Institute) at the request of Mr.Mark Hanson, Senior Consultant for Resource Management Associates, team leader of the American experts.

The work consisted mainly in conducting a survey in eight industrial plants of Romania.

1. SIDEX SA Galaţi (iron and steel factory)
2. DOLJCHIM SA Craiova (chemical products factory)
3. CIMUS SA Cîmpulung (cement factory)
4. GRIRO SA Bucharest (chemical equipment factory)
5. Urziceni Oil Factory
6. Milk products company Militari-Bucharest within Mioriţa SA Bucharest
7. Bucharest South Power Plant within [illegible]
8. Cogeneration Power Station within Brăila Paper Mill

The questionary and some specific work items were sent by mail by Mr.Mark Hanson on July 8, 1991, and were received by ICEMENERG on July 22, 1991.

The beginning of the survey was greatly delayed owing to communication difficulties between Mr.Mark Hanson and our team. Some contacts with the authors of the questionary would have been highly useful in order to clear up certain aspects regarding the questions in the survey, but unfortunately this was impossible. There was no time to discuss the questionary with Romanian experts outside our institute

In every surveyed plant our delegates contacted first the staff of the plant to inform them about the survey. Although we recommended that the person meant to answer the survey be a specialist in energy problems, they were free to name whoever they wanted. This is why in two plants the interviewed persons were part of the plant staff (namely directors).

The interviewed persons were free to write down their own answers, our delegates being only trained to give some hints if they were asked for them. At GRIRO SA, two persons from the same department were willing to answer the questions, and, as they had different opinions, we let them fill in two separate questionaries. Those interviewed refused to answer some questions, therefore we wrote nothing. It must be recalled that some of the information asked for in the survey were considered secret until 1989, and some people still are unwilling to discuss them.

2. Comments on the results of the survey

The survey was conducted during a transition period for the Romanian economy, and this caused some problems in answering the questions.

The name of the plant and of the firm represented the first problem. Until 1989, industrial factories of the same type (considering their production) were organized in industrial centrals with large management responsibilities. The industrial centrals of the same industrial branch were grouped in an industrial ministry with important executive and co-ordination prerogatives. Nowadays, the industrial centrals disappeared and the industrial ministries became departments in the Ministry of Industry, with far less prerogatives and responsibilities. Most of the plants became highly autonomous commercial companies, and the departmental co-ordination is not actually a proper management. Therefore, we considered the "plant" and the "firm" to be the same in five cases (CIMUS Cîmpulung, DOLJCHIM Craiova Urziceni Oil Factory, GRIRO Bucharest, SIDEX Galaţi), as there is no other higher level management outside the plant.

The other three cases are:

- Bucharest South Power Station which is part of RENEL (National Board for Electrical Energy)
- Cogeneration Power Station Brăila which belongs to Brăila Paper Mill
- The Militari-Bucharest milk products factory which belongs to the firm Mioriţa SA Bucharest, together with two other plants of the same type.

It is to be noted that the selection of the plants was obviously made so that the most important industrial branches in Romania be covered (energy, iron and steel, chemistry, machine building, food).

Regarding question 3

The number of full time employees working in the plants varies between 282 (Urziceni Oil Factory) and 38ooo (SIDEX Galaţi). The situation is the following:

No.	Plant	Employees
1.	SIDEX Galaţi	38ooo
2.	DOLJCHIM Craiova	57oo
3.	CIMUS Cîmpulung	18oo
4.	GRIRO Bucharest	39oo
5.	Urziceni Oil Factory	28o
6.	Milk Factory Militari	16oo
7.	Bucharest South Power Plant	1ooo
8.	Cogeneration Plant Brăila	57o

Regarding question 4

At this very moment all the plants are state enterprises. The Parliament has recently voted the Law of private property which was signed a few days ago by the President of Romania. Therefore in the near future this situation will surely change, although Bucharest Power Plant will remain a state enterprise within RENEL.

Regarding question 5

This question caused probably the most discussions. Although it did not specify so, we considered it asks for 199o data (as questions 8 and 9 do).

In one case, the intervewed person considered this to be confidential information (Doljchim SA Craiova) and gave no answer. In other cases (Bucharest South Power Plant, Urziceni Oil Factory, SIDEX Galaţi) the annual production expressed in lei was considered irrelevant because of the great price changes in 199o which continued in 1991. Five plants indicated what percentage of the production capacity represents the real production. Among them, Bucharest South Power Plant made the comparison with the average programmed power indicated by the National Energy Dispatcher (which explains the over 1oo% percentage), instead of the installed power. The other percentages are:

GRIRO Bucharest	66%
CIMUS Cîmpulung	6o%
Cogeneration Plant Brăila	6o%
Urziceni Oil Factory	82%

The difference between the production and the production capacity was explained always by the lack of raw materials.

Regarding questions 7 and 8

The percentage of energy bills in the plant total operating cost varies from 4% in the Urziceni Oil Factory to 85% in Bucharest South Power Plant. Some points are worth mentioning:

- the energy bill of Doljchim Craiova included the natural gas used as raw material for the ammonia;
- the energy bill of the Militari Milk Factory included the water used by the factory according to the wish of the interviewed person.

Regarding question 9

Four plants indicated only the activities of specialists from the plant or/and firm. One plant (Urziceni Oil Factory) relies only on outside engineering/consulting audits. The other three plants use both inside and outside experts to identify whether energy efficient measures could be taken or not.

Regarding question 1o

There are persons responsible for the implementation of energy conservation measures in all the surveyed plants.

Regarding question 11

The answers to this question reveal quite an abnormal situation. Three persons indicated only the personal gathering of documentary material as source of information about energy conservation measures, and no other organized activities. In two cases, only, the plant receives engineering and technical magazines. In three cases ARCE (the former Energy Inspectorate) is considered a source of information.

Regarding questions 12 and 13

The answers express the conviction of every interviewed person that the government ignores the problem of energy conservation (no incentives, but also no prohibiting policies). Theoretically, some incentives for the implementation of energy conservation measures are available through ARCE but nobody knows about them, and nobody got any

Regarding questions 14 and 15

Only four plants from the seven interviewed made capital investments in order to reduce energy cost within the last five years, out of which only three have specified the money needed:

Urziceni Oil Factory	2 million lei
CIMUS Cîmpulung	8 million lei
Doljchim Craiova	loo million lei

Regarding questions 19 and 2o

The many discussions aroung these questions proved the answers were not the same in the past and in the present. Before 1989, technical and economic analyses were carried out at the industrial central an/or the ministry level by special commissions of experts from the industrial central, ministry research and design institutes, plants. The decision to go on with a project was based on the conclusion of this commission.

At present such analyses are carried out at the plant/firm level, and the responsible person usually is the technical director.

Regarding questions 21 and 22

The interviewed persons were not acquainted with the economic analysis methods listed. In fact, most plants in Romania used the recovery period method:

a = the value of the investment

b = the value of spared energy in one year

$t = \frac{a}{b}$ (years)

If "t" was smaller than five, the project was usually accepted.

Regarding question 23

This question was not very clear (what does "more than lo million lei" mean) We asked the interviewed persons to consider the project as costing lo million lei or a little bit more.

At this very moment, the sum of lo million lei is quite small for a lot of plants (considering the present prices). So, something aroung lo million would be paied from the plant cash flow. A much greater sum (about loo million or more) would be financed from outside (loan from a bank or other lender). Until 1989 the important investments were paied by the government. Some interviewers considere

that the present government should do the same. The fact is that in 1990 the plants had very great organizing, financial and supply problems, therefore the investments in energy conservation projects were the last thing they thought of.

Regarding questions 24 and 25

The final decision on energy efficient investments, as well as all the other investments, are taken by the management council (or something similar).

Regarding question 26

At the end we found out some interesting aspects by analysing the answers to the question 26. The lack of technical information is considered as important or very important in prohibiting the plant investments in energy efficiency (see also the comments on question 11 by everyone. At the same time, the lack of available capital and/or of governmental funds for energy conservation is considered as a very important factor. Five plants considered also the lack of available energy efficient equipment in Romania to be very important (the other two considered it of average importance).

On the other hand, the lack of time to evaluate potential projects is the least important factor. Everybody considers to have potential for additional conservation. Six plants consider the lack of technical expertise as "not important", and again six plants consider they are able to interrupt the production for energy efficiency improvement.

As a conclusion of the survey, we think that it really shows a Romanian industry in a transition period, when centrally planned economy was abolished but is still strong, and market economy is being implemented with a lot of pains.

Name of Plant SIDEX Galaţi Date August 28, 1991
Name of Firm SIDEX Galaţi

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management a. a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Stan Ostache- Head of the power service

2. Briefly describe your job responsibilities.

Co-ordination of the repairs to the power equipments; estimations of how power is used within the enterprise.

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 38,000

4. Ownership. Which description best fits this plant?

X State Enterprise
__ Cooperative
__ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

5. How many plants are part of this firm? 1

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why?

5.5 million tons steel

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity 1940000 lei
Fuel oil -
Coal 3600000 lei
Natural Gas 1525000 lei
Thermal -
Coke 6315000 lei
Other (please specify) _____

Peak: 300000 MWh
the rest: 2004700 MWh
Penalties: 0

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
X Through own plant monitoring by plant engineers
X Through own plant audits
__ Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
__ Through own plant management's inspection
__ All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes.

IF YES, indicate their name, title, and responsibilities.
Stan Ostache, Head of the power unit of the enterprise
All the chiefs of the mechanical-energy sections at facility level

11. **From what sources does this plant receive information about energy conserving measures? (Please List)**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Energy Inspectorate
__ Outside Engineering Firms
X Similar firms in the industry
__ Industry organizations
X Engineering/technical magazines
__ Other magazines
X Other (please specify) Research&design institutes of metalurgical speciality
__ Do not know

12. **Do you know if the government offers any incentives for conserving energy? Do not know.**
IF YES... Please specify the types of incentives.

13. **Do you know of any government policies that would prohibit this plant from implementing energy conservation? Do not know.**
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. **Has this plant made any capital investments to reduce your energy costs within the last 5 years?**

Yes X
No

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. **What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?**

16. **Which of these investments do you think have been most effective in reducing energy cost at this plant?**

Action 1: Providing the metal heating furnaces with recovery boilers

Action 1: using the heat of the flue gas.
Action 2: Recovering the heat of the iron ore agglomerates in order to obtain domestic hot water.
Action 3:

17. **Were any of these investments part of a larger project?**
IF YES.... Which ones?

No.

18. **What were the main reasons why this firm invested in energy conserving equipment?**

Limited power resources; the high price of energy.

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. **Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?**

The speciality design institutes; the technical-economic council of the firm.

20. **Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?**

The speciality design institute; the technical-economic council of the firm.

21. **What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?**

__ Simple payback
__ Discounted payback
__ Internal rate of return
__ Net present value
__ Life cycle cost analysis
X Other (please specify) Period of return of the expenses.
__ Do not know

22. **Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?**
IF YES..X.What are they? Period of return of the expenses.

Simple payback - Number of years? 5 years
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
_X_ Plant's cash flow
_X_ Requires a loan from a bank or other lender
__ Other (please specify)_____
__ Do not know

Note: The legislation in this field is not yet finalized.

24. Who or what department in this plant makes the final decision on energy efficiency investments?

The administration council of the firm, on the basis of the technical-economic council report.

25. Is this the same person or persons who make the final decisions on all other investments?

Yes

26. Which of the following energy conserving technologies could be or has been installed in your plant?
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system	Y	____
Waste Heat Recovery	Y	____
Improvements to Steam Systems	Y	____
Insulation	Y	____
Cogeneration System	Y	____
Energy Efficient Lighting	Y	____
Other (please specify)	____	____

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	1	2	(3)	4	5
2.	Lack of information on performance of new systems in other companies.	1	(2)	3	4	5
3.	Lack of information on performance of new systems in other countries.	(1)	2	3	4	5
4.	Lack of available energy efficient equipment in Romania.	1	2	(3)	4	5
5.	Lack of available technical expertise within this plant.	1	2	3	4	(5)
6.	Lack of available technical expertise in Romania.	1	2	3	4	(5)
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	(1)	2	3	4	5
8.	Lack of government funds available for investment in conservation.	(1)	2	3	4	5
9.	Lack of information about future energy prices.	(1)	2	3	4	5
10.	Projects which do not meet economic acceptance criteria.	1	2	3	(4)	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	(1)	2	3	4	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	3	(4)	5
14.	Lack of any real potential for additional conservation.	1	2	(3)	4	5
15.	Energy costs are only a small portion of operating costs.	1	2	(3)	4	5

5

Name of Plant DOLJCHIM S.A. Date July 29, 1991
Name of Firm DOLJCHIM S.A.

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management at a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Eng. Mihail Tomsa - Director

2. Briefly describe your job responsibilities.
Co-ordination for the manufacturing, economic and financial activity of the company.

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 5700

4. Ownership. Which description best fits this plant?

_X_ State Enterprise
___ Cooperative
___ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

5. How many plants are part of this firm? 1

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why?

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

About 60% (energy carriers used as raw materials included)

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity 488.8 x 10^6 lei
Fuel oil 15.9 x 10^6 lei
Coal _____
Natural Gas 1231.4 x 10^6 lei
Thermal 344.2 x 10^6 lei
Coke _____
Other (please specify) _____

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties. The power consumption is approximately constant in time. No penalties were paid.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
__ Through own plant monitoring by plant engineers
X Through own plant audits
__ Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
__ Through own plant management's inspection
__ All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes

IF YES, indicate their name, title, and responsibilities.
Eng. Ileana Radu, Head of the power team within the technical sector.

11. From what sources does this plant receive information about energy conserving measures? (Please List)
DO NOT READ LIST; USE FOR PROMPTING ONLY

X Energy Inspectorate
X Outside Engineering Firms
__ Similar firms in the industry
__ Industry organizations
__ Engineering/technical magazines
__ Other magazines
__ Other (please specify)_____
__ Do not know

12. Do you know if the government offers any incentives for conserving energy?
IF YES... Please specify the types of incentives.
I don't know

13. Do you know of any government policies that would prohibit this plant from implementing energy conservation? No
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. Has this plant made any capital investments to reduce your energy costs within the last 5 years?

Yes
No

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?

$\approx 100 \times 10^6$ lei

16. Which of these investments do you think have been most effective in reducing energy cost at this plant?

6 MW generator turbine to recover the energy of the steam

Action 1: generated at 40 bar and used at 15 bar
Action 2: Waste-heat boiler
Action 3: Residual gases boiler

17. Were any of these investments part of a larger project? No
IF YES.... Which ones?

18. What were the main reasons why this firm invested in energy conserving equipment?

Difficulties with the power supply of the enterprise.

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?

A speciality institute and a group of specialists from the enterprise.

20. Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?

A speciality institute and a group of specialists from the enterprise.

21. What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?

__ Simple payback
__ Discounted payback
X Internal rate of return
__ Net present value
__ Life cycle cost analysis
__ Other (please specify) _____
__ Do not know

22. Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?
IF YES.....What are they?

Simple payback - Number of years? ____
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
__ Plant's cash flow
__ Requires a loan from a bank or other lender
X Other (please specify) Credit-based investment funds
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The managerial council

25. **Is this the same person or persons who make the final decisions on all other investments?**

Yes

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system		Y
Waste Heat Recovery	Y	
Improvements to Steam Systems		Y
Insulation	Y	
Cogeneration System		N
Energy Efficient Lighting		N
Other (please specify)		

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	1	(2)	3	4	5
2.	Lack of information on performance of new systems in other companies.	1	2	(3)	4	5
3.	Lack of information on performance of new systems in other countries.	1	2	(3)	4	5
4.	Lack of available energy efficient equipment in Romania.	1	(2)	3	4	5
5.	Lack of available technical expertise within this plant.	1	2	(3)	4	5
6.	Lack of available technical expertise in Romania.	1	2	3	4	(5)
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	(1)	2	3	4	5
8.	Lack of government funds available for investment in conservation.	(1)	2	3	4	5
9.	Lack of information about future energy prices.	1	2	(3)	4	5
10.	Projects which do not meet economic acceptance criteria.	1	2	3	(4)	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	1	2	3	(4)	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	3	4	(5)
14.	Lack of any real potential for additional conservation.	1	2	3	(4)	5
15.	Energy costs are only a small portion of operating costs.	(1)	2	3	4	5

CIMUS S.A.Trading Company-

Name of Plant Cîmpulung Arges Date July 29, 1991
Name of Firm CIMUS S.A. Trading Company

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

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1. Can you please tell me your name and title?

Ioan Florea, Engineer, Head of power sector

2. Briefly describe your job responsibilities.

Co-ordination, control and decision-making in the power activity.

Establishes relationships with other sectors and firms.

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 1800

4. Ownership. Which description best fits this plant?

X State Enterprise
__ Cooperative
__ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

5. How many plants are part of this firm? 1

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why? 1×10^9 lei

1 ooo t 6o% - lack of resources

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

15-2o%

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity $9o \times 10^6$ lei { peak 25×10^6 lei; off-peak 65×10^6 lei }
Fuel oil _____
Coal _____
Natural Gas $14o \times 10^6$ lei
Thermal _____
Coke _____
Other (please specify) _____

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. **How did or does this plant identify whether energy efficient measures could be taken in this plant?**
DO NOT GIVE LIST USE FOR PROMPTING ONLY

- X Through Energy Inspectorate audits
- X Through own plant monitoring by plant engineers
- X Through own plant audits
- X Through outside engineering/consulting audits
- X Through inspection by the firm's engineers or management
- X Through own plant management's inspection
- __ All of the above
- __ Other (please specify)_____
- __ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes

IF YES, indicate their name, title, and responsibilities.

See points 1 and 2.

11. **From what sources does this plant receive information about energy conserving measures? (Please List)**
DO NOT READ LIST; USE FOR PROMPTING ONLY

X Energy Inspectorate
__ Outside Engineering Firms
X Similar firms in the industry
__ Industry organizations
X Engineering/technical magazines
__ Other magazines
__ Other (please specify)_____
__ Do not know

12. **Do you know if the government offers any incentives for conserving energy?** No.
IF YES... Please specify the types of incentives.

13. **Do you know of any government policies that would prohibit this plant from implementing energy conservation?** No.
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. **Has this plant made any capital investments to reduce your energy costs within the last 5 years?**

(Yes)
No

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. **What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?**

Between 5 and 8 million lei (1989 prices)

16. **Which of these investments do you think have been most effective in reducing energy cost at this plant?**

Action 1: Variable speed operations with direct current to the grate coolers

Action 2: Variable speed operations with frequency converter at the grate coolers

Action 1: _____
Action 2: _____
Action 3: Telemanagement system for the electro-power consumptions.

17. Were any of these investments part of a larger project? No
IF YES.... Which ones?

18. What were the main reasons why this firm invested in energy conserving equipment?
1. Reduction of production costs. 2. Increasing the equipment reliability. 3. A better information to help decision-making.

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?

The technical Director and the Head of the power sector, plus collaborators.

20. Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?

The Head of the power sector

21. What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?

X Simple payback
__ Discounted payback
__ Internal rate of return
__ Net present value
__ Life cycle cost analysis
__ Other (please specify) _____
__ Do not know

22. Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?
IF YES.....What are they?

Simple payback - Number of years? 5
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
X Plant's cash flow (within the limits of the surplus)
X Requires a loan from a bank or other lender(depending on the conditions specified by the bank)
__ Other (please specify)_____
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The management council

25. **Is this the same person or persons who make the final decisions on all other investments?**

Yes

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system		Y
Waste Heat Recovery	Y	
Improvements to Steam Systems		Y
Insulation	Y	Y
Cogeneration System	NA	NA
Energy Efficient Lighting	Y	Y
Other (please specify) Variable speed drives		

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	1	(2)	3	4	5
2.	Lack of information on performance of new systems in other companies.	1	(2)	3	4	5
3.	Lack of information on performance of new systems in other countries.	1	(2)	3	4	5
4.	Lack of available energy efficient equipment in Romania.	(1)	2	3	4	5
5.	Lack of available technical expertise within this plant.	1	2	3	(4)	5
6.	Lack of available technical expertise in Romania.	1	2	3	4	(5)
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	1	2	(3)	4	5
8.	Lack of government funds available for investment in conservation.	1	(2)	3	4	5
9.	Lack of information about future energy prices.	1	2	3	(4)	5
10.	Projects which do not meet economic acceptance criteria.	1	2	3	(4)	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	1	2	(3)	4	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	3	4	(5)
14.	Lack of any real potential for additional conservation.	1	2	3	4	(5)
15.	Energy costs are only a small portion of operating costs.	1	2	(3)	4	5

Name of Plant GRIRO S.A. Date August,6, 1991
Name of Firm GRIRO S.A.

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management at a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Serban Stroe - Electrotechnical engineer

2. Briefly describe your job responsibilities.

Head of mechano-power sector;Planning, preparing, controlling the activity of maintenance, repairs and operation for the equipments, machine-tools, and the power networks and facilities

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 4000

4. Ownership. Which description best fits this plant?

- X State Enterprise
- __ Cooperative
- __ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

5. How many plants are part of this firm? 1

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why? 2×10^9 lei

11,000 t of chemical equipment 66%

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

8 - 10%

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity 6×10^6 lei
Fuel oil 3×10^6 lei
Coal _____
Natural Gas 60×10^6 lei
Thermal _____
Coke _____
Other (please specify) _____

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
X Through own plant monitoring by plant engineers
__ Through own plant audits
X Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
__ Through own plant management's inspection
__ All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes

IF YES, indicate their name, title, and responsibilities.
Eng.Dan Ioniţă, Head of Power Office. He co-ordinates the activity of planning, preparing and controlling of the maintenance and operation of power equipment and facilities.

11. **From what sources does this plant receive information about energy conserving measures? (Please List)**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Energy Inspectorate
__ Outside Engineering Firms
__ Similar firms in the industry
__ Industry organizations
__ Engineering/technical magazines
__ Other magazines
X Other (please specify) Personal documentation.(There is no organized informational system)
__ Do not know

12. **Do you know if the government offers any incentives for conserving energy?** No, but I think things are going to change before long.
IF YES... Please specify the types of incentives.

13. **Do you know of any government policies that would prohibit this plant from implementing energy conservation?** No
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. **Has this plant made any capital investments to reduce your energy costs within the last 5 years?**

Yes
(No)

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. **What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?**

16. **Which of these investments do you think have been most effective in reducing energy cost at this plant?**

Action 1: _____
Action 2: _____
Action 3: _____

17. **Were any of these investments part of a larger project?**
IF YES.... Which ones?

18. **What were the main reasons why this firm invested in energy conserving equipment?**

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. **Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?**

The mechano-power sector (power office)

20. **Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?**

A group of specialists from the mechano-power sector, eventually together with specialists from other sectors.

21. **What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?**

__ Simple payback
__ Discounted payback
__ Internal rate of return
__ Net present value
__ Life cycle cost analysis
X Other (please specify)
__ Do not know

Other:
No methods of technical-economic analysis are used. The projects are analysed, but subjectively estimated from the efficiency pov, thus greatly depending on the respective person(s) experience, training and skillfulness.

22. **Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?**
IF YES.....What are they?

Simple payback - Number of years? ____
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify **There are no limits.**

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
__X__ Plant's cash flow
__X__ Requires a loan from a bank or other lender
__ Other (please specify)_____
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The Council of State authorized agents.

25. **Is this the same person or persons who make the final decisions on all other investments?**

Yes

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system		Y
Waste Heat Recovery	Y	
Improvements to Steam Systems		Y
Insulation	Y	
Cogeneration System	Y	
Energy Efficient Lighting		Y
Other (please specify)		

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	(1)	2	3	4	5
2.	Lack of information on performance of new systems in other companies.	(1)	2	3	4	5
3.	Lack of information on performance of new systems in other countries.	(1)	2	3	4	5
4.	Lack of available energy efficient equipment in Romania.	(1)	2	3	4	5
5.	Lack of available technical expertise within this plant.	(1)	2	3	4	5
6.	Lack of available technical expertise in Romania.	(1)	2	3	4	5
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	(1)	2	3	4	5
8.	Lack of government funds available for investment in conservation.	(1)	2	3	4	5
9.	Lack of information about future energy prices.	(1)	2	3	4	5
10.	Projects which do not meet economic acceptance criteria.	(1)	2	3	4	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	(1)	2	3	4	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	3	4	(5)
14.	Lack of any real potential for additional conservation.	1	2	3	4	(5)
15.	Energy costs are only a small portion of operating costs.	1	2	3	4	(5)

Name of Plant GRIRO S.A. Date August 8, 1991
Name of Firm GRIRO S.A.

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management at a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Dan Ioniță, Eng.

2. Briefly describe your job responsibilities.
Organize and control the energy management, maintenance and repairs for power plants and facilities, drawing up power contracts.

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 3894

4. Ownership. Which description best fits this plant?

X State Enterprise
__ Cooperative
__ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

GRIRO S.A. is a share trade society under way of emerging. It has a 7.6 MW co-generation plant burning gaseous and mixed fuel.

5. How many plants are part of this firm? 1

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why?

1.96×10^9 lei

11,000 t of chemical equipment - 66%

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

8 - 10%

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity 5,603,495 lei
Fuel oil 2,865,225 lei
Coal _____
Natural Gas 65,442,716 lei
Thermal _____
Coke _____
Other (please specify) _____

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
X Through own plant monitoring by plant engineers
__ Through own plant audits
X Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
X Through own plant management's inspection
__ All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes

IF YES, indicate their name, title, and responsibilities.

Eng. Dan Ioniţă, Head of power office (see point 2).

11. From what sources does this plant receive information about energy conserving measures? (Please List)
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Energy Inspectorate
__ Outside Engineering Firms
__ Similar firms in the industry
__ Industry organizations
__ Engineering/technical magazines
__ Other magazines
X Other (please specify) No information are received.
__ Do not know

12. Do you know if the government offers any incentives for conserving energy? The government does not stimulate in any way
IF YES... Please specify the types of incentives.
energy conservation.

13. Do you know of any government policies that would prohibit this plant from implementing energy conservation? Yes. The US-made
IF YES ..... Please specify. equipments we received were kept for four days in the duty warehouse until obtaining tax derogation, but we had to pay storing taxes. I consider it a governmental impediment to the activity of energy conservation.

This next set of questions asks about your plant's actions to reduce energy use.

14. Has this plant made any capital investments to reduce your energy costs within the last 5 years?

Yes
(NO)

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?

16. Which of these investments do you think have been most effective in reducing energy cost at this plant?

Action 1: _____
Action 2: _____
Action 3: _____

17. Were any of these investments part of a larger project?
IF YES.... Which ones?

18. What were the main reasons why this firm invested in energy conserving equipment?

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?

The Institute for Power Study and Design - I.S.P.E. -

20. Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?

ISPE

21. What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?

X Simple payback
__ Discounted payback
__ Internal rate of return
__ Net present value
__ Life cycle cost analysis
__ Other (please specify) _____
__ Do not know

22. Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?
IF YES.....What are they?

Simple payback - Number of years? ____
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
X Plant's cash flow
X Requires a loan from a bank or other lender
__ Other (please specify)_____
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The managerial council

25. **Is this the same person or persons who make the final decisions on all other investments?**

Yes

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system	N	Y
Waste Heat Recovery	Y	
Improvements to Steam Systems	N	Y
Insulation	Y	
Cogeneration System	Y	
Energy Efficient Lighting	Y	
Other (please specify)		

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	(1)	2	3	4	5
2.	Lack of information on performance of new systems in other companies.	(1)	2	3	4	5
3.	Lack of information on performance of new systems in other countries.	(1)	2	3	4	5
4.	Lack of available energy efficient equipment in Romania.	(1)	2	3	4	5
5.	Lack of available technical expertise within this plant.	1	2	(3)	4	5
6.	Lack of available technical expertise in Romania.	1	2	(3)	4	5
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	(1)	2	3	4	5
8.	Lack of government funds available for investment in conservation.	(1)	2	3	4	5
9.	Lack of information about future energy prices.	(1)	2	3	4	5
10.	Projects which do not meet economic acceptance criteria.	(1)	2	3	4	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	(1)	2	3	4	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	3	4	(5)
14.	Lack of any real potential for additional conservation.	1	2	3	4	(5)
15.	Energy costs are only a small portion of operating costs.	1	2	3	4	(5)

Name of Plant The Oil Enterprise Urziceni Date August 1, 1991
Name of Firm The Oil Enterprise Urziceni

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management at a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Corneliu Pintilie, Engineer

2. Briefly describe your job responsibilities.

Keeping within the prescribed energy consumptions, controling the total energy line.

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 282

4. Ownership. Which description best fits this plant?

_X_ State Enterprise
___ Cooperative
___ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

5. How many plants are part of this firm? 1

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why?

145oo t of vegetable oil (soya bean) ; 82.8% ; lack of raw material

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

4%

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity 4 x 10^6 Kwh (6.6 x 10^6 lei) { peak 0.34 x 10^6 kWh; off-peak 3.66 x 10^6 kWh }
Fuel oil _____
Coal _____
Natural Gas 5 x 10^6 Nm^3 (14.5 x 10^6 lei)
Thermal _____
Coke _____
Other (please specify) _____

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
__ Through own plant monitoring by plant engineers
__ Through own plant audits
X Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
__ Through own plant management's inspection
__ All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes

IF YES, indicate their name, title, and responsibilities.

Nicolae Leca- Chief Engineer; Cornel Pintilie- Power Engineer; Mariana Bănică- Manufacturing Engineer; Savu Sandu- Technologist Engineer; Nicolae Matei- Technologist Eng.; Gheorghe Delistoian-quality control

11. From what sources does this plant receive information about energy conserving measures? (Please List)
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Energy Inspectorate
__ Outside Engineering Firms
__ Similar firms in the industry
__ Industry organizations
__ Engineering/technical magazines
__ Other magazines
X Other (please specify) Personal gathering of documentation.
__ Do not know

12. Do you know if the government offers any incentives for conserving energy? No
IF YES... Please specify the types of incentives.

13. Do you know of any government policies that would prohibit this plant from implementing energy conservation? No
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. Has this plant made any capital investments to reduce your energy costs within the last 5 years?

(Yes)
No

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?

2×10^6 lei

16. Which of these investments do you think have been most effective in reducing energy cost at this plant?

Action 1: Optimizing the transport of thermal energy
Action 2: Recovering the condensate from the TOASTER equipment
Action 3: _____

17. Were any of these investments part of a larger project? No
IF YES.... Which ones?

18. What were the main reasons why this firm invested in energy conserving equipment?

In order to cut down the power consumptions and expenses.

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?

The persons mentioned in point 1o.

20. Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?

The management council.

21. What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?

__ Simple payback
__ Discounted payback
X Internal rate of return
__ Net present value
__ Life cycle cost analysis
__ Other (please specify) _____
__ Do not know

22. Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved? Yes.
IF YES.....What are they?

Simple payback - Number of years? ____
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? 5 years
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
X Plant's cash flow
__ Requires a loan from a bank or other lender
__ Other (please specify)_____
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The management council

25. **Is this the same person or persons who make the final decisions on all other investments?**

Yes

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system	____	Y
Waste Heat Recovery	____	Y
Improvements to Steam Systems	Y	____
Insulation	Y	____
Cogeneration System	NA	NA
Energy Efficient Lighting	Y	____
Other (please specify)	____	____

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	1	(2)	3	4	5
2.	Lack of information on performance of new systems in other companies.	(1)	2	3	4	5
3.	Lack of information on performance of new systems in other countries.	(1)	2	3	4	5
4.	Lack of available energy efficient equipment in Romania.	1	2	(3)	4	5
5.	Lack of available technical expertise within this plant.	1	2	(3)	4	5
6.	Lack of available technical expertise in Romania.	1	2	3	(4)	5
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	1	2	3	4	(5)
8.	Lack of government funds available for investment in conservation.	1	2	3	4	(5)
9.	Lack of information about future energy prices.	1	2	(3)	4	5
10.	Projects which do not meet economic acceptance criteria.	1	2	3	4	(5)
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	1	(2)	3	4	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	(3)	4	5
14.	Lack of any real potential for additional conservation.	1	2	3	(4)	5
15.	Energy costs are only a small portion of operating costs.	1	2	3	4	(5)

Name of Plant Militari Factory Date August 7, 1991
Name of Firm Miorita Commercial Company

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management at a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Mariana Rădoi - Fitting engineer

2. Briefly describe your job responsibilities.

Supervision of power consumptions

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 1600

4. Ownership. Which description best fits this plant?

X State Enterprise
__ Cooperative
__ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

5. How many plants are part of this firm? 3 units.

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why?

446×10^6 lei (1990 prices)

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

5.7%

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity 3892.5×10^3 lei { peak 1011.6 Mwh; off-peak 6712.6 Mwh }
Fuel oil _____
Coal _____
Natural Gas 12941×10^3 lei
Thermal 371.7×10^3 lei
Coke _____
Other (please specify) Water 2502.5×10^3 lei

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
X Through own plant monitoring by plant engineers
X Through own plant audits
__ Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
X Through own plant management's inspection
__ All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes

IF YES, indicate their name, title, and responsibilities.

Eng. Mariana Rădoi- fitting engineer; supervision of power consumptions

11. From what sources does this plant receive information about energy conserving measures? (Please List)
DO NOT READ LIST; USE FOR PROMPTING ONLY

X Energy Inspectorate
__ Outside Engineering Firms
__ Similar firms in the industry
__ Industry organizations
__ Engineering/technical magazines
__ Other magazines
__ Other (please specify)_____
__ Do not know

12. Do you know if the government offers any incentives for conserving energy? No
IF YES... Please specify the types of incentives.

13. Do you know of any government policies that would prohibit this plant from implementing energy conservation? No
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. Has this plant made any capital investments to reduce your energy costs within the last 5 years?

Yes
(No)

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?

16. Which of these investments do you think have been most effective in reducing energy cost at this plant?

Action 1: _____
Action 2: _____
Action 3: _____

17. Were any of these investments part of a larger project?
IF YES.... Which ones?

18. What were the main reasons why this firm invested in energy conserving equipment?

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?

The technical Director

20. Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?

The technical Director

21. What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?

__ Simple payback
__ Discounted payback
__ Internal rate of return
__ Net present value
_X_ Life cycle cost analysis
__ Other (please specify) _____
__ Do not know

22. Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?
IF YES.....What are they?

Simple payback - Number of years? ____
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
X Plant's cash flow
__ Requires a loan from a bank or other lender
__ Other (please specify)_____
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The management council.

25. **Is this the same person or persons who make the final decisions on all other investments?**

Yes

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system	____	Y
Waste Heat Recovery	Y	____
Improvements to Steam Systems	Y	____
Insulation	Y	____
Cogeneration System	NA	____
Energy Efficient Lighting	Y	____
Other (please specify)	____	____

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	1	(2)	3	4	5
2.	Lack of information on performance of new systems in other companies.	1	(2)	3	4	5
3.	Lack of information on performance of new systems in other countries.	(1)	2	3	4	5
4.	Lack of available energy efficient equipment in Romania.	(1)	2	3	4	5
5.	Lack of available technical expertise within this plant,	1	2	(3)	4	5
6.	Lack of available technical expertise in Romania.	1	2	(3)	4	5
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	(1)	2	3	4	5
8.	Lack of government funds available for investment in conservation.	(1)	2	3	4	5
9.	Lack of information about future energy prices.	1	(2)	3	4	5
10.	Projects which do not meet economic acceptance criteria.	1	2	3	(4)	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	1	2	3	(4)	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	3	(4)	5
14.	Lack of any real potential for additional conservation.	1	2	3	(4)	5
15.	Energy costs are only a small portion of operating costs.	1	2	(3)	4	5

Bucharest South District

Name of Plant Heating Power Station Date July 25, 1991

Name of Firm ~~National Board for~~ Electrical Energy - RENEL -

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management at a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Eng. Laurentiu Popper - Commercial Deputy Director

2. Briefly describe your job responsibilities.

Co-ordinating the activity of supply and marketing within the power station.

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 1,000

4. Ownership. Which description best fits this plant?

X State Enterprise
__ Cooperative
__ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

5. How many plants are part of this firm? RENEL has 38 branch offices. The Bucharest South co-generation power plant belongs to the Branch of Bucharest electro-power stations, together with other 4 stations.

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why? The annual production of electricity: 2805 Gwh, heat annual production: 5096 Toal, which is 101.4% of the average set capacity.

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

85%

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity _____
Fuel oil 2.7 x 10^9 lei
Coal _____
Natural Gas 1.6 x 10^9 lei
Thermal _____
Coke _____
Other (please specify) _____

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
X Through own plant monitoring by plant engineers
X Through own plant audits
__ Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
X Through own plant management's inspection
__ All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes.

IF YES, indicate their name, title, and responsibilities.

Eng. Alexandru Ilie - co-ordonating dispatcher

Eng. Ioana Pătru - responsible for the economic operation

11. From what sources does this plant receive information about energy conserving measures? (Please List)
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Energy Inspectorate
__ Outside Engineering Firms
__ Similar firms in the industry
__ Industry organizations
X Engineering/technical magazines
__ Other magazines
X Other (please specify) 3. The experience of other power stations of the firm
__ Do not know

Other:
1. Studies of the firm's research institutes
2. Courses at the Staff Training Centre of the firm

12. Do you know if the government offers any incentives for conserving energy? I don't know.
IF YES... Please specify the types of incentives.

13. Do you know of any government policies that would prohibit this plant from implementing energy conservation? No.
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. Has this plant made any capital investments to reduce your energy costs within the last 5 years?

Yes
(No)

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?

16. Which of these investments do you think have been most effective in reducing energy cost at this plant?

Action 1: _____
Action 2: _____
Action 3: _____

17. Were any of these investments part of a larger project?
IF YES.... Which ones?

18. What were the main reasons why this firm invested in energy conserving equipment?

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?

The technical-economic council of the firm (RENEL)

20. Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?

The technical-economic council of the firm (RENEL)

21. What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?

__ Simple payback
__ Discounted payback
__ Internal rate of return
__ Net present value
_X_ Life cycle cost analysis
__ Other (please specify) _____
__ Do not know

22. Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?
IF YES.....What are they?

Simple payback - Number of years? ____
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
X Plant's cash flow
__ Requires a loan from a bank or other lender
__ Other (please specify)_____
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The management council of the firm (RENEL)

25. **Is this the same person or persons who make the final decisions on all other investments?**

Yes

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system	Y	
Waste Heat Recovery	Y	
Improvements to Steam Systems		Y
Insulation	Y	
Cogeneration System		
Energy Efficient Lighting	Y	
Other (please specify)		

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	1	(2)	3	4	5
2.	Lack of information on performance of new systems in other companies.	1	2	(3)	4	5
3.	Lack of information on performance of new systems in other countries.	1	2	(3)	4	5
4.	Lack of available energy efficient equipment in Romania.	(1)	2	3	4	5
5.	Lack of available technical expertise within this plant.	1	2	3	(4)	5
6.	Lack of available technical expertise in Romania.	1	2	3	4	(5)
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	(1)	2	3	4	5
8.	Lack of government funds available for investment in conservation.	(1)	2	3	4	5
9.	Lack of information about future energy prices.	1	2	(3)	4	5
10.	Projects which do not meet economic acceptance criteria.	1	(2)	3	4	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	1	2	(3)	4	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	2	3	4	(5)
14.	Lack of any real potential for additional conservation.	1	2	3	4	(5)
15.	Energy costs are only a small portion of operating costs.	1	2	3	4	(5)

- a2

Name of Plant Cogeneration Power Station Date August 6, 1991
Name of Firm Cellulose and Paper Works Brăila

ENERGY CONSERVATION DECISION-MAKING SURVEY FOR ROMANIA
(for personal interview)

This survey is being conducted as part of the USAID Emergency Energy Program for Romania. The purpose of this survey is to understand what factors influence decisions to implement energy conserving measures in those plants where energy audits were conducted for this program and when appropriate in the entire firm. Therefore, questions in this survey that can not be answered at the plant level will be directed towards the appropriate person(s) at the firm level. (The distinction between plant and firm is intended to distinguish between management at the local level--i.e. plant management--and management at a higher level that may be located at some other part of the country or outside of the country--i.e. firm management. Using the example of the electric utility, the South Bucharest Plant would be the plant level management while the firm level management would be RENEL headquarters in central Bucharest. It is recognized that this distinction may not apply as easily to other industries.) Throughout this survey, "implementation of energy conserving measures" refers to both optimization of energy use through improved energy management practices and installation of energy conserving equipment.

1. Can you please tell me your name and title?

Ioan Ghinea, Engineer, Assistant of the Section Head

2. Briefly describe your job responsibilities.

Co-ordination for the activities of running, maintenance, repairs.

The first set of questions ask about this plant's characteristics.

3. How many full time employees work at this plant? 570

4. Ownership. Which description best fits this plant?

X State Enterprise
__ Cooperative
__ Private (Please describe ownership. Circle correct one below.)

Sole proprietor Partnership Subsidiary of foreign firm

Subsidiary of Romanian firm Investor-owned firm

93

5. How many plants are part of this firm?

6. Approximately, what is the annual production quantity of this plant in Lei and in physical units (if available) such as tons? What percent of production capacity does this represent? If this is less than capacity, why? 3.223×10^6 Goal and 416207 Mwh

60% lack of fuel

7. Approximately what percentage of your plant's total operating cost goes towards energy bills? (Operating costs include all labor, materials, capital depreciation, taxes and so forth)

80%

8. Approximately, how much did this plant spend in Lei in 1990 for the following sources of energy?

Electricity _____
Fuel oil 14544 t 58.176 $\times 10^6$ lei
Coal _____
Natural Gas 456082 thousand Nm^3 1.277×10^9 lei
Thermal _____
Coke _____
Other (please specify) _____

Please break electrical consumption into peak and off-peak consumption if available. Also, indicate any payments of penalties, indicating the type of penalties.

This next set of questions asks about how you or other people in this plant receive information regarding energy conservation and how energy conserving measures were or could be implemented in this plant.

9. How did or does this plant identify whether energy efficient measures could be taken in this plant?
DO NOT GIVE LIST USE FOR PROMPTING ONLY

__ Through Energy Inspectorate audits
__ Through own plant monitoring by plant engineers
__ Through own plant audits
__ Through outside engineering/consulting audits
__ Through inspection by the firm's engineers or management
__ Through own plant management's inspection
X All of the above
__ Other (please specify)_____
__ Do not know

10. Are there persons in this plant who are responsible for implementing energy conserving measures in this plant? Yes

IF YES, indicate their name, title, and responsibilities.

Ioan Ghinea, Engineer

11. From what sources does this plant receive information about energy conserving measures? (Please List)
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Energy Inspectorate
__ Outside Engineering Firms
__ Similar firms in the industry
__ Industry organizations
__ Engineering/technical magazines
__ Other magazines
X Other (please specify) Personal gathering of documentary material.
__ Do not know

12. Do you know if the government offers any incentives for conserving energy? No
IF YES... Please specify the types of incentives.

13. Do you know of any government policies that would prohibit this plant from implementing energy conservation? No
IF YES ..... Please specify.

This next set of questions asks about your plant's actions to reduce energy use.

14. Has this plant made any capital investments to reduce your energy costs within the last 5 years?

Yes
(No)

IF "YES" ... CONTINUE TO NEXT QUESTION.
IF "NO" ..... GO TO FOLLOWING PAGE (PAGE 5, QUESTION 19.)

15. What was the approximate total cost (including installation, financing, taxes, etc.) of these investments?

16. Which of these investments do you think have been most effective in reducing energy cost at this plant?

Action 1: _____
Action 2: _____
Action 3: _____

17. Were any of these investments part of a larger project?
IF YES.... Which ones?

18. What were the main reasons why this firm invested in energy conserving equipment?

IF ANSWERED "NO" TO QUESTION 14 ABOVE. START HERE.

19. Please specify who would do (or did) the technical analysis for an energy conservation project in this plant?

The analysis is performed by the specialists of the enterprise named by the technical Director.

20. Please specify who would do (or did) the economic analysis for an energy conservation project in this plant?

The analysis is performed by the specialists of the enterprise named by the technical Director.

21. What economic analysis method(s) does this plant (or firm) use most when evaluating energy conservation projects?

__ Simple payback
__ Discounted payback
__ Internal rate of return
__ Net present value
__ Life cycle cost analysis
__ Other (please specify) _____
X Do not know

22. Do you have minimum economic criterion for any of the methods you mentioned above, which the project must meet in order to be approved?
IF YES.....What are they?

Simple payback - Number of years? ____
Discounted payback - What is the discount rate? ____
Internal rate of return - What is the rate? ___
Positive net present value - What is the discount rate? ____
Other - Please specify ____

23. **If you were to (did) invest in an energy conservation project costing more than 10 million Lei, how would (did) this plant usually pay for this?**
DO NOT READ LIST; USE FOR PROMPTING ONLY

__ Government pays for investment
X Plant's cash flow
__ Requires a loan from a bank or other lender
__ Other (please specify)_____
__ Do not know

24. **Who or what department in this plant makes the final decision on energy efficiency investments?**

The management council

25. **Is this the same person or persons who make the final decisions on all other investments?**

The management council

26. **Which of the following energy conserving technologies could be or has been installed in your plant?**
(Indicate Y = yes or N = no, or NA = not applicable)

	has been	could be
Combustion Control system	Y	Y
Waste Heat Recovery	Y	Y
Improvements to Steam Systems		Y
Insulation	Y	Y
Cogeneration System	Y	
Energy Efficient Lighting	Y	
Other (please specify)		

The next set of questions ask about the reasons why your plant did not or would not invest in energy efficiency projects.

26. Please tell me how important, on a scale from 1 to 5 where 1 is Very important and 5 is Not important, the following factors are in prohibiting this plant's investment in energy efficiency?

		Very Important				Not Important
1.	Lack of technical information.	(1)	2	3	4	5
2.	Lack of information on performance of new systems in other companies.	(1)	2	3	4	5
3.	Lack of information on performance of new systems in other countries.	(1)	2	3	4	5
4.	Lack of available energy efficient equipment in Romania.	1	2	(3)	4	5
5.	Lack of available technical expertise within this plant.	1	2	3	4	(5)
6.	Lack of available technical expertise in Romania.	1	2	3	4	(5)
7.	Lack of available capital (Lei) to invest in energy-efficient equipment.	(1)	2	3	4	5
8.	Lack of government funds available for investment in conservation.	1	(2)	3	4	5
9.	Lack of information about future energy prices.	1	(2)	3	4	5
10.	Projects which do not meet economic acceptance criteria.	1	2	3	(4)	5
11.	Lack of time to evaluate potential projects.	1	2	3	4	(5)
12.	Uncertainty about availability of future energy supplies.	(1)	2	3	4	5
13.	Inability to interrupt production in order to make energy efficiency improvements.	1	(2)	3	4	5
14.	Lack of any real potential for additional conservation.	1	2	3	(4)	5
15.	Energy costs are only a small portion of operating costs.	1	2	(3)	4	5