
POLAND

POLICY AND INSTITUTIONAL ANALYSIS

FINAL REPORT

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LIST OF ACRONYMS/ABBREVIATIONS

A.I.D.	U.S. Agency for International Development
CHP	combined heat and power plants
CMEA	Council for Mutual Economic Assistance (COMECON)
EC	European Community
ESCO	energy service company
GDP	Gross Domestic Product
IEA	international Energy Agency
IRG	International Resources Group, Ltd.
MW	mega watt
NIS	Newly Independent States (republics of the former Soviet Union)
OECD	Organization for Economic Cooperation and Development
PSENN	Polish Power Grid Company
PURPA	Public Utilities Regulatory Policies Act of 1978 (US)
VAT	value added tax

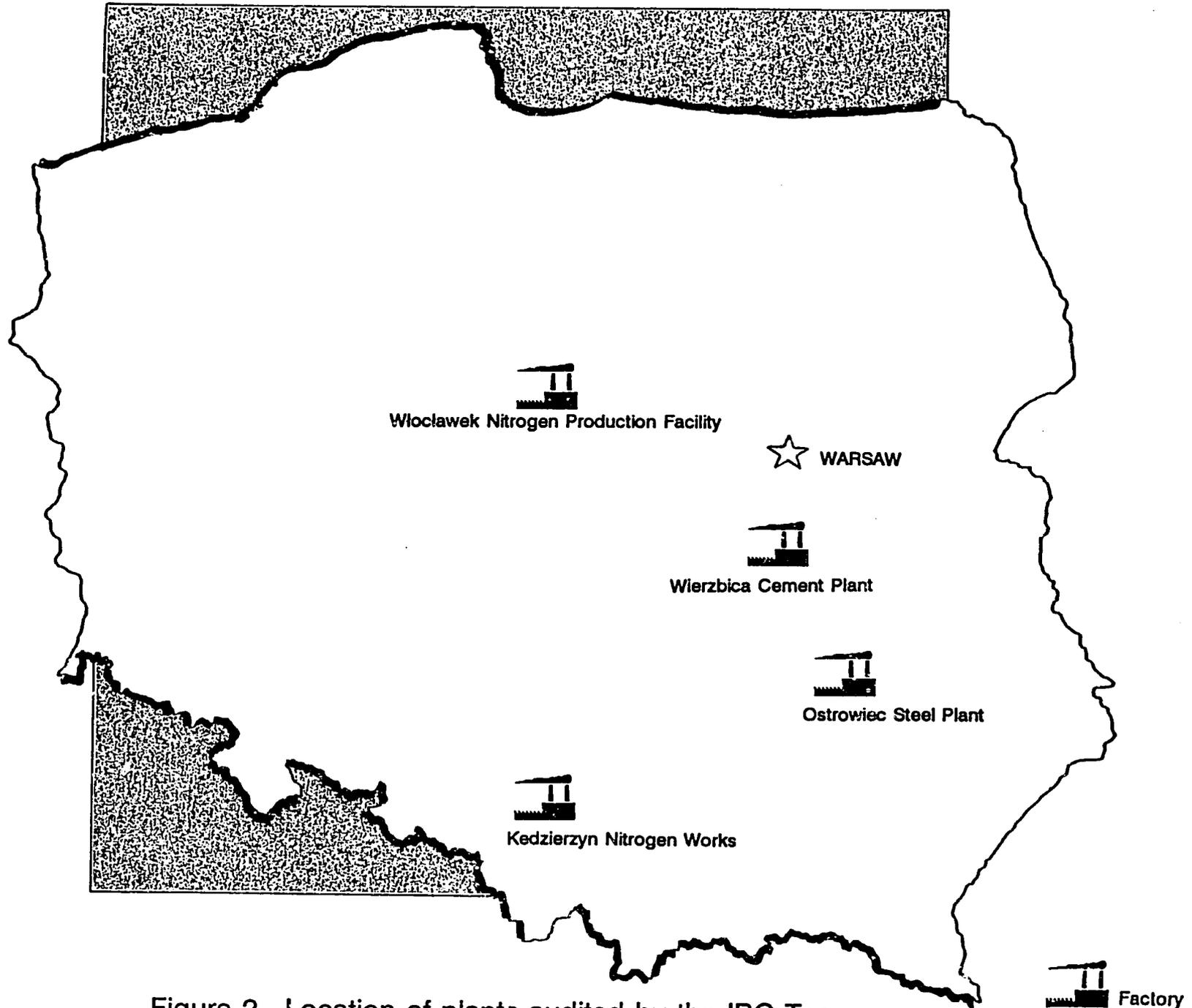


Figure 2. Location of plants audited by the IRG Team

1. INTRODUCTION

In February 1991, the United States Agency for International Development (A.I.D.) initiated the Emergency Energy Program for Eastern and Central Europe to help newly emerging democracies in the region cope with some of their most pressing energy problems. The Program addressed four major energy areas:

- Industrial energy efficiency;
- refinery efficiency and optimization;
- oil purchasing; and
- energy pricing.

International Resources Group (IRG), selected as one of three prime contractors, coordinated the energy efficiency and energy pricing components in Bulgaria and Poland, as well as the oil purchasing work in Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and Yugoslavia.

The first component of the Program, Industrial Energy Efficiency, involved auditing eight major industrial facilities in each country. At these facilities, IRG engineers analyzed current energy usage and recommended changes in operational and maintenance policies, strategic planning, and investment decision-making. The engineers also specified low-cost equipment items to be purchased as part of the Program.

In conjunction with these audits, Team members also analyzed the policy and institutional factors influencing energy efficiency decision making in Poland. This analysis was meant to supplement the initiatives in energy efficiency improvement taken in the eight demonstration plants and to provide insights into how best to use the demonstration results as a basis for broad, nationwide energy-efficiency improvement.

This Policy and Institutional Analysis Report presents the results of IRG's policy and institutional analysis and summarizes findings of other IRG studies on current plant-level management practices and investment decision-making processes as they relate to the efficiency of energy conversion and use. It analyzes the policy and institutional factors influencing plant-level energy efficiency and the provision of appropriate equipment and services by domestic entities, including private companies. The report also assesses the likely impacts of reforms recently introduced or under consideration.

According to the Organization for Economic Cooperation and Development (OECD), Poland has a ratio of energy use to Gross Domestic product (GDP) roughly 1.75 times that of Western Europe – that is, Poland uses 1.75 times as much energy to produce one unit of economic output (GDP).¹ Recognizing this imbalance, the Polish Government established a policy target to reduce national energy intensity per unit of GDP by 25% (from 17.3 to 12.9 kgoe² per constant 1000 zlotys) by the year 2000 and by 40% (to 9.9 kgoe per 1000 zlotys) by

¹ OECD/International Energy Agency, Energy Policies - Poland: 1990 Survey, Paris 1991, page 11.

² Kilogram of oil equivalent.

2010. The Government aims to achieve even greater reduction in the industrial sector to offset rising personal energy use as incomes increase through:

- Large-scale restructuring of the industrial sector to reduce the role of energy- and materials-intensive heavy industry and build up light industry;
- Modernization of industrial process technologies to improve not only energy efficiency but also economic competitiveness and environmental management; and
- Efficiency improvements within the bounds of present technologies across the spectrum of Polish industry.

The A.I.D. Emergency Energy Program, of which International Resources Group has been a part, focuses on the last of these three objectives. This Program provides opportunities to achieve improvements in energy efficiency at no or low cost. Most options identified and adopted by eight industrial and district heating plants participating in the initial demonstration phase of the program have payback periods (i.e., the time it takes for cost savings to more than offset the original cost of the measure) of six months or less.

By reducing day-to-day operating costs, these measures - and, more importantly, the on-going energy management programs of which the discrete measures are a part - improve a plant's economic competitiveness. By reducing energy use, no-cost/low-cost improvements in energy efficiency also reduce environmental impacts from both the energy user and all earlier steps in the energy extraction and conversion system - mining, electricity production, and so forth.

This report addresses ways in which to build on the successful demonstration phase to achieve broad energy-efficiency improvement throughout Polish industry. In particular, this report focuses on policy and institutional factors which influence the ability of the industrial sector to adopt operational, maintenance, and investment practices that optimize the use of energy as an industrial input.

In preparing this report, the IRG Audit Team held extensive discussions with Government and private sector managers in Poland. The Team drew on its experience in carrying out collaborative energy audits and in implementing low-cost/no-cost energy-efficiency improvement programs in the eight industrial and district heating facilities that participated in the demonstration phase. The analysis also utilizes previously prepared written materials and Government statistics.

Most of the field analysis for the policy and institutional analysis was conducted during and prior to July 1991. At the end of that month, the Government announced a number of changes, including combination of the former Ministry of Industry, previously responsible for energy, into a new Ministry of Industry and Trade. Shortly after her appointment, the new Minister signalled her desire for more aggressive Government action to promote improvements in energy efficiency. She appointed a Task Force under the direction of Dr. Slawomir Pasierb, a leading expert within Poland and key counterpart for IRG's work, to develop policy recommendations.

IRG returned in early October 1991 for a workshop on the industrial energy efficiency program, co-sponsored by the Government and A.I.D; this workshop included a discussion of policy and institutional issues. Following the workshop, the IRG Team updated its report. To maintain the independence of the two analyses and because the Task Force still is in the early stages of its work, this report does not reflect their analyses or recommendations except as they ultimately reflect views expressed by Task Force members. Finally, IRG returned in May 1992 to assess the energy price and policy changes that had occurred and their potential impact on energy efficiency initiatives.

2. REQUIREMENTS FOR AN EFFECTIVE INDUSTRY-WIDE PROGRAM

There are a number of important prerequisites for achieving industry-wide no-cost and low-cost energy efficiency improvement, as Poland seeks to do. The IRG team believes the most important are:

- **Energy Prices and Markets** -- Energy prices should reflect the full cost of extraction, production/conversion, transportation, and distribution, including the cost of capital for additional supplies of such energy. There should be effective competition among alternative forms of energy (for example, coal versus gas versus electricity) and incentives for each user to use the form(s) of energy most cost-effective for its needs. Recent price changes have gone a long way towards achieving the goal of world-market pricing.
- **Other Government Policies** -- Taxes, import duties, monetary policy and so forth - should not discriminate against efficient energy use and should provide positive incentives where consistent with other government objectives.
- **In-Plant Attitudes and Incentives** -- These should be conducive to energy efficiency improvement (although where attitudes and incentives are negative these can be addressed through policy or program initiatives).
- **Necessary Energy Efficiency Improvement Inputs** -- Enterprises desiring to improve energy efficiency require awareness of and access to technical and financial information, and engineering and other expertise where this does not exist within the enterprise. Enterprises also require the ability to finance improvement measures which offer attractive financial returns.

Subsequent sections of this report discuss these requirements. Plant-level behavior and incentives are discussed first since these are central to discussion of all other aspects. To begin, though, it is important to describe the economic context within which Polish industry must consider improvement in energy efficiency.

3. BACKGROUND: RESTRUCTURING AND THE STATE OF THE ECONOMY

3.1 Government Policy Reform

The Government of Poland is generally ahead of its neighbors in Eastern Europe in political and economic restructuring. The Government is well into an Economic Transformation Program which includes liberalization of domestic prices, reduction of subsidies, demonopolization, and privatization.

Poland was the first country in Eastern Europe to float its currency and make it internally convertible. As discussed elsewhere, it established 14 commercial banks in 1989 from branches of the National Bank of Poland, specialized state financial institutions, and began accepting licenses to establish new commercial banks. Poland now has more than sixty banking institutions and, despite recent problems, is proceeding with the restructuring of its financial sector along Western lines. It has secured substantial debt relief from its foreign commercial creditors, though total external debt remains high.

Concurrent with the flotation of the zloty, Poland freed most prices from Government controls; some important exceptions remained, however, particularly in the energy sector. The gradual de-subsidization of energy prices is detailed later in this report. In the industrial sector, it has introduced a program of de-monopolization and decentralization, and has moved to eliminate subsidies of state enterprises from the government budget, although like other countries in the region it has used indirect means to permit large state enterprises to retain employees even as output has fallen.

The Government has identified some 900 enterprises as candidates for privatization and is moving rapidly to change their corporate status (to joint stock or limited liability companies) and privatize them. Polish enterprises have already concluded a number of joint ventures with Western partners. The government has also reinstated the Warsaw Stock Exchange which, while tiny (seven equity issues were listed as of July 1991), provides important potential for broadening Polish ownership of privatized companies.

3.2 Market Collapse

As elsewhere in the region, Poland has had to restructure its system at the same time that its economy has been devastated by the collapse of the CMEA regional trading block and the reliance of the USSR on dollars rather than convertible rubles for all external trade. Trade has been reduced due to uncertainties over who in the "former Soviet Union" controls output of raw materials and finished products and who controls that country's transportation and distribution systems, including those for energy (oil, gas, and power).

It appears that, even at greatly reduced levels, much of the output of Polish enterprises destined for the USSR over the past year has been financed by Polish government export credits. Since there is uncertainty whether such credits will be repaid, these represent a hidden subsidy of the producing enterprises, most of which are large state-owned heavy industries.

The decline in the CMEA market has affected industrial sectors differently, even allowing for the dampening effect of government export credits. Thus, in the twelve months through

June 1991, gross revenues of the chemical industry (in current zlotys) declined by 19.3% while iron and steel revenues dropped by 25.8%, versus an average decline for all manufacturing industry of "only" 17%³. During the same period, income of the coal mining sector increased by almost 3%, due to exchange rate changes, reduction in Government taxes on export revenues, and the ability of mines to charge domestic power plants for quality differentials.

Domestic markets also have declined dramatically in the face of price increases and removal or reduction of subsidies to industrial and agricultural enterprises. For example, with prices 8-10 times higher than those of 3-4 years ago, some producers of nitrogen fertilizers reportedly have inventories equal to 6-12 months' of current sales.

The combination of the collapse of Poland's CMEA markets and the austerity program introduced as part of the restructuring process has fueled labor unrest and public disaffection. Poland has the highest percentage of work stoppages in Eastern Europe. The recent threat of the Prime Minister to resign over the issue of whether or not to keep the Finance Minister is but one of many signs of the split among politicians and the public over the direction and pace of restructuring. As the Government continues to raise energy prices and moves to close the first of many hard coal mines in Silesia, the energy sector has been an important focus of this political debate.

3.3 Energy Prices

Industrial energy users already or will soon pay world prices for most forms of energy. With the phase-out of Government subsidies to industry, enterprises no longer can recapture these or other cost increases. These price changes have drastic implications for the incentive structure faced by existing energy-using industrial enterprises.

The situation in the district heating sector is more complex. Like their counterparts in industry, heating plant managers face fuel costs at or moving toward world-market levels. At the same time, the Government will continue to regulate price and other aspects of service provided by the district heating companies. Despite recent increases, maximum prices plant managers may charge for household (residential) heat use remain far below the costs of providing that heat. In May 1992, residential prices for hot water and steam heat were still subsidized by approximately 50% as a result of a continued decline in real income.

The Government is committed, as a condition of capital assistance for district heating and other purposes, to a schedule of gradually raising prices to levels equal to long-run marginal costs. Marginal cost-based pricing is necessary if Poland is to attract the considerable private capital needed, in addition to official capital assistance, to modernize this sector.

Prospective investors, however, may treat the Government's schedule with skepticism until it is clear the new Parliament is committed to maintaining its support for these aggressive changes, in the face of considerable public opposition. Responding to public concern about the state of the economy, the new Government has rhetorically suggested it will re-evaluate the pace of the restructuring process in light of economic difficulties. It is not expected that the

³ Central Statistical Office, "Statistical Bulletin, July 1991", Table 39 (page 60).

Government will change its policies in this regard, however, and it is expected that it will maintain its original plans for restructuring prices.

4. PLANT-LEVEL DECISION MAKING

4.1 Implications of Restructuring

Poland has moved more aggressively than other countries in the region to free markets and prices, eliminate industrial subsidies (with the exception, noted above, of continued export trade credits to the NIS/Republics), and demonopolize and decentralize former state-owned industrial sectors. It also seems to be further ahead in commercialization and privatization of those enterprises the Government believes have the potential to compete in a market economy.

As elsewhere in the region, restructuring has placed considerable pressures on enterprise managers. Of these, the cost of energy - even after prices have increased manyfold - is not necessarily the highest priority. This is true for a number of reasons.

First, most plants that have suddenly become enterprises do not start with the full range of experience needed to survive as competitive entities. Most were formerly production units, with rudimentary plant-level accounting. Marketing was either performed by separate export trading monopolies, the umbrella Kombinats or, for the many plants simply producing/delivering to a government plan, was nonexistent. At the same time they are expected to become effective marketers, most enterprises see their traditional domestic markets declining rapidly (since consumers, with wages fixed and prices up substantially, have dramatically cut back expenditures, and plants have cut back purchases of intermediate goods) or as in the case of many CMEA markets, disappearing altogether.

For the majority of enterprise managers, marketing - and acquisition of marketing skills and relationships - is the number one priority. In this area, metallurgical, chemical, and other heavy industries may have important advantages. First, they, or their associated trading companies, often have prior experience in international marketing of commodity-type products. Second, most are very capital-intensive, yet the capital charges and debt levels for such enterprises may be 1% or less of replacement cost because they still are based on former exchange rates. Thus, even where they have outmoded technologies and excessive labor staffing, heavy industries may still be able to price their products competitively in world markets - until they need substantial new capital.

An important strategy in gaining access to new markets at both the Government and enterprise levels, has been to seek joint ventures with firms which can provide such access. In seeking joint venture or other types of investors, Polish enterprises have a major advantage over other countries in Eastern Europe; with 38 million persons, Poland offers a domestic market larger than most other countries combined. Other things being equal, Poland is more attractive to Western companies for whom the domestic markets in Eastern Europe are important, regardless of whether or not they also desire to export.

Second, managers of most enterprises face labor unrest or the prospects of such unrest, and there is considerable pressure on both the Government and individual enterprises to avoid, or at least delay employment reductions. Thus, during the twelve-month period through March

1991, average employment in manufacturing declined less than 8% or less than half the decline in manufacturing income.⁴

Problems in labor relations influence restructuring efforts in important ways other than its effect on political debate and consequent public policy. On one hand, managers strive to maintain cooperative labor relations both to preserve some level of output and to avoid politicalization which may jeopardize the enterprise. At the same time, many managers recognize one of the most important changes needed to compete in open markets is to alter the current perspective and motivation of workers and supervisors on the shop floor. Achieving both efficiency improvement and cooperative labor relations will require great skill on all sides.

Finally, another major aspect of economic restructuring has been the continued control of the money supply. In May 1992, nominal interest rates were approximately 50-55%, despite the fact that annualized inflation was running between 55-60%. Thus, the real (inflation adjusted) interest rates were low or negative as part of a deliberate loose money policy, which in theory could enable firms to use debt financing for modernization or other investments - including energy investments. However, in practice, enterprises are not borrowing for structural reasons, and are postponing payment of their accounts payable. This phenomenon is offset by the fact that firms are also not getting paid by firms they supply, including the Polish Power Grid Company (PSENN) and other power distribution companies. These organizations, often have accounts receivable totalling several billion zlotys; often, an important concern of enterprise managers is having the necessary cash flow to operate.

The Government, which has gradually reduced inflation after huge initial increases when prices were freed from controls, has been disappointed that interest rates have not declined more quickly and have not prompted the desired level of growth-oriented debt financing. Other governments in the region have had similar experiences. Although real interest rates (that is, the difference between stated interest rates and the rate of inflation), are actually low or negative, unsophisticated borrowers appear to be "scared off" by the high nominal rates. These borrowers interpret such high rates to be indications that suppliers of capital remain pessimistic about future inflation prospects, country policy risks, or other factors.

4.2 Plant-Level Management and Incentives

As the above discussion states, the current overriding objective of plant managers is survival of the enterprises for which they work and their personal survival as managers. This generally leads managers to focus on the following immediate priorities:

- Markets and marketing, as discussed above;
- Labor relations and changes in employee perspectives and motivation; and
- Cash management.

The IRG Team believe most managers also have the following additional priorities, but that these are subordinate to or addressed in the context of those listed above:

⁴ Op. Cit., Table 9 (page 27).

- **Cost Reduction and Quality Improvement:** In virtually all export and domestic markets, there is pressure to improve cost-competitiveness and product quality. In heavy industry, energy is a sufficiently large percentage of costs to represent an important target for cost reduction. Even in mid-sized industries, many managers were beginning to seek ways to reduce energy costs in reaction to substantially higher prices.
- **Environment:** A few industries, especially in "hot spots" such as Upper Silesia, are targets of growing environmental and/or occupational safety and health pressures. In chemical, ferrous and non-ferrous metals, oil refining, heat and power, and other sectors, enterprise managers are being forced to devote their energy to finding ways to deal with such pressures. Certain other industries are affected to a lesser extent. Most environmental pressures are for reduction in air emissions associated with industrial processes (e.g., smelting) or boilers. In these cases, environmental and energy improvement go hand-in-hand.
- **Capital Investment:** Many enterprise managers believe cost reduction, quality improvement, and environmental improvement in target industries will require major capital investment and technology/management transfer. This may be at least as important a motivator in considering joint ventures as market access has been.

It bears restating that most new enterprises are starting with important gaps in the skills and experience required for success. Plant managements either did not have authority over marketing or accounting, or their authority was tightly circumscribed. For example, most had very little discretion to deviate from budgeted expenditures for even relatively minor spare parts. In most plants visited, cost accounting and control as practiced in the West is nonexistent, and few plants had prior marketing experience or knowledge of basic marketing concepts. IRG also found a lack of strategic planning. Most managers address individual issues in isolation from one another, without consideration of the whole. They also often lacked strategic vision of where to take the enterprise or in what directions the choices might be.

Many of the above comments apply not only to industry but also to district heating plants. Such plants, however, have additional concerns in that their organization and competitive/regulatory environment is not yet clear, prices are controlled at levels below cost, and availability of capital for needed investment will be influenced at least as much by the Government as by the actions of the enterprises themselves.

In contrast to these generalizations, a few plant managers and their staffs in both industry and district heating had a clear strategic vision and were effective in pursuing that vision. They were marketing aggressively based on clear concepts of where and how they could compete, and were improving cost-competitiveness where they could do so themselves and seeking outside help (consultants or joint ventures) where needed. They also identified joint venture opportunities and/or potential international financing sources at interest rates one fifth of those in Poland (but with foreign exchange risks). It appeared their labor relations were at least as good as and in most cases better than, the average in their sectors.

The presence or absence of such pro-active management seemed to have no effects on the objective prospects of the enterprise. For example, one manager and his staff, with the

support of labor, are doing all they can to make a success of a chemical plant with outdated technology. While other plants in the same industry may be able to produce at much lower cost, this enterprise may be more successful in attracting a joint-venture investment because it offers prospective partners a motivated "can do" team at all staff levels.

4.3 Demand for Energy Efficiency Improvement Assistance

Evidence is mixed regarding plant-level demand for assistance in energy efficiency. The Government has not yet offered services in energy-efficiency improvement beyond the eight plants that participated in the initial demonstration program. After evaluating audit results in the eight demonstration plants, the Government is considering possible options for its future role in energy efficiency. In the absence of a test market, comments on demand in the industrial sector are somewhat conjectural. On the other hand, many power generation and district heating plants are hiring consultants and engineers - including one of IRG's two subcontractors - to improve energy efficiency, and are paying for this outside help out of their own financial resources. Although these services are being provided on an *ad hoc* basis, it appears as if a significant market for energy-efficiency services does exist.

The plants included in the initial program (Figure 1) do not represent a reliable sample for industry as a whole, since they were primarily selected due to their interest in and commitment to energy efficiency improvement. They generally did not have the capability to recognize and implement energy efficiency measures by themselves. They also lacked effective energy accounting systems (or in most cases an effective cost accounting system), basic instrumentation for measuring energy flows, and instruments for controlling energy use, such as boiler controls. This also was true of other plants that the Team visited but were not included in the demonstration program.

With a few exceptions, most responsible personnel lacked awareness of the specifics and extent of energy wasted and of the measures necessary to use energy more efficiently. This reflects the lack of importance placed on energy in the past, which in turn was reflected not only in-plant operations and incentives, but in an apparent decline in the quality of energy engineering and economics taught in schools at all levels. However, by the conclusion of the audit work, the Emergency Energy Program generated sufficient interest on the part of the plants, that they initiated a number of energy efficiency projects outside the scope of the A.I.D. initiative.

Despite the lack of data and knowledge of specific actions to take, enterprise managers and engineers seem to recognize they must take urgent action to reduce energy costs. There also is concern that their enterprises are in such financial trouble that they could not muster the cash to undertake anything beyond no- or low-cost actions.

Some Polish counterparts felt that few enterprises would participate if they had to pay for the initial energy audit and identification of efficiency improvement opportunities. These members recommended a program of free initial energy audits. One model cited is the Alberta Energy Bus program, where the provincial government uses mobile units outfitted with measurement equipment to conduct free initial plant audits.

Figure 1.

At the same time, there is widespread feeling within the demonstration team and among outside experts that the most important precondition for energy efficiency improvement is a change in attitudes and behavior at all levels of enterprises. There are already signs of change in response to new market and pricing conditions, but "old habits die hard" and change has been slow. It may be that expenditure on public and in-plant education will yield more benefits than subsidization of energy audit costs. Also, in the current climate of uncertainty over which firms will survive, it may be better to invest in changing the attitudes of people that are mobile rather than in auditing enterprises which are not.

In addition to demonstration participants, IRG has held discussions with more than a dozen enterprises facing energy or environmental problems. Virtually every one requested assistance in identifying and implementing no-cost and low-cost energy efficiency improvement measures; most expressed willingness to pay for the service. This certainly does not constitute conclusive proof of demand; but taken together with experience elsewhere in the region, it suggests that managers may be more receptive and more willing to pay than is often assumed. It is difficult to say why they would not do so after being shown that an effective energy efficiency program can have a 50-100% rate of return with negligible capital investment.

5. PRICING, REGULATORY AND OTHER POLICIES

5.1 Energy Pricing and Policy

The Government of Poland has produced in recent years a number of energy policy documents and has acted based on those policies. The most concise overview is contained in "Status and Assumptions for Future Development of the Polish Energy Sector in the Years 1990-2010", prepared by the Ministry of Industry in October 1990 and included in the OECD/IEA report Energy Policies - Poland: 1990 Survey. The National Environmental Policy prepared by the Ministry of Environmental Protection, Natural Resources, and Forestry in October 1990 is also important in that it places major emphasis on rationalization of energy management.

A recent statement of the Government's energy policy is the "Letter of Sector Development Policy" prepared for the World Bank by the Ministry of Industry (now the Ministry of Industry and Trade) in July 1991. This chapter draws heavily on sections of that document relevant to issues of industrial energy efficiency incentives. It does not summarize the entire policy; for that, interested readers should refer to the document itself. Moreover, a number of additional energy pricing changes were announced at the beginning of 1992, which significantly move the pricing of energy commodities toward world levels.

The Government has two objectives in increasing energy price levels:

- improving economic efficiency in the supply and use of energy and
- mobilizing additional domestic and foreign private capital for energy investment.

These objectives are to be achieved by eliminating energy price distortions and by restructuring energy supply industries.

In its approach to energy pricing, the Government decided to phase out budget subsidies to energy consumers and eliminate cross-subsidies between industrial and household energy consumers. Then, as a second step, it sought to ensure that energy prices would reach economic levels by decontrolling prices and/or by establishing appropriate pricing rules as part of new regulatory regimes for inherently monopolistic supply industries.

More or less concurrently, the Government will restructure and demonopolize the energy sector and either decontrol potentially competitive subsectors or, for subsectors which are not inherently competitive, establish new regulatory frameworks to promote competitive behavior to the extent possible. The main instruments of regulation will be "licenses (or equivalent regulatory instruments) which specify pricing, performance, and contractual relationships within the sector and with consumers." Thereafter, the Government will commercialize the sector (i.e., convert the restructured state enterprises to joint stock or limited liability companies) and then progressively privatize the industry.

Although the Government still has much to accomplish before it has achieved its goals in relation to overall energy sector restructuring, from the perspective of this analysis, it has already totally changed the incentive structure faced by energy-using industries. Most energy

prices paid by industrial users are at or rapidly approaching world/OECD levels in market exchange rates for the zloty.

In the case of oil and natural gas, Poland, like its neighbors, has been forced to pay world prices in hard currency to Russia and the other NIS Republics since early 1991. This has necessitated dramatic increases in consumer prices for these fuels, particularly for industrial users. At the same time, the Government has moved fairly rapidly toward removal of budget subsidies to industry, preventing industries from recovering price increases from the State as they did in the past. The specifics of current energy prices are included below.

5.1.1 Electricity

The Government has both raised prices and begun wholesale restructuring of the power sector. As a first step, generation was demonopolized by establishing each generating unit as a separate enterprise, and in most cases, granting each the right to negotiate freely to purchase its fuel and sell its power to the grid. Then, the Government spun off distribution companies as separate companies, leaving the Polish Power Grid Company (PSENN) as a transmission and bulk power supply company. In response to demand of the distribution companies and bulk power users, PSENN will purchase power from individual generating units based on time-of-day economic dispatch, and will be obligated to use its lines to wheel power under agreements concluded directly between generators and end-users.

Effective in January 1992, a new Electricity Law was passed which formalized a cost-based tariff structure through the Rules of Settlement Between Generators, the Grid Company [PSENN] and Distributors. Under these rules, tariffs are regulated by the Ministry of Finance, and energy commodity sales are regulated by the Ministry of Industry and Trade. These rules also establish fuel, customer, and region-specific criteria for determining sales prices and tariff rates. Moreover, the law provides a uniform procedure for recovering costs and settling differences between generators, PSENN, and local distribution companies (of which there are 36 in Poland).

Recently, the Government has concluded many individual generating units are too small or too marginal economically to raise needed investment capital of their own. Minemouth lignite-fired plants may remain separate or be combined into a single enterprise. Current state-owned heat/power (CHP) plants will be combined into nine independent enterprises. More than 30 other generating plants, excluding pumped storage units (which remain under PSENN) and industrial generation, will also be combined into 4-5 multi-unit enterprises, economically viable and attractive privatization candidates. Similarly, the Government plans to create 15-18 power distribution companies.

This restructuring is to be followed by valuation and, where appropriate, privatization. Current valuations of assets and debts of companies are very low, reflecting historic balance-sheet valuations at former zloty exchange rates.

It is worth noting that, as partner in a 1000 MW nuclear power plant currently under construction in the Ukraine, Poland will be entitled to import 6 billion kilowatt-hours per year. PSENN pricing should provide the correct signals to use this power (assuming it ultimately is delivered) to its highest-value use, whether domestically to back out more expensive power

(which presumably would be coal- or lignite-fired) or to wheel to re-sell to the Ukraine itself or other NIS members.

There also are widely differing opinions regarding the economics of industrial generation. PSENN states there is a glut of industrial generation and that even modern cogeneration facilities cannot compete with central station units. Industries are eager to install or upgrade industrial generation plants, and members of the demonstration plant Team identified opportunities where they believe cogeneration would be profitable under pricing regimes such as those required in the United States under the Public Utilities Regulatory Policies Act (PURPA) of 1978.

5.1.2 Coal and Lignite

Historically, the most important energy sectors in Poland have been coal and lignite, used primarily as fuel for power generation and for some industries. More importantly, coal has been a major Polish export and is one of the country's largest employment sectors. In the hard coal sector, the Government has moved quickly toward full deregulation of the industry, recognizing this will force closure of several mines. It first eliminated uniform national pricing of hard coal (and the corresponding cross-subsidies of coal transport), then allowed individual mines to set their own ex-mine prices based on market and quality considerations. Combined with individual generating plants' ability to negotiate their own fuel supply contracts, this has created the basis for a competitive market in coal supplied to the power sector.⁵ The Government also reduced the previous 20% turnover tax on coal exports and considerably narrowed its application.

In January 1992, a 10% increase in hard coal prices was approved, and in April 1992 an additional 5% price increase was put into effect. Thus, hard coal prices for industry are nearing non-subsidized levels, with only 5-10% of subsidies remaining. Lignite prices have also been gradually decontrolled, with full de-subsidization expected by July 1992. However, prices to the power sector still reflect a higher level of subsidies, at least 30-40% below world market levels.

Price and market liberalization, together with the prospect of industries not being able to recover environmental fines from government subsidies, have already had the effect of creating/increasing premiums paid for higher-quality types of coal, especially those with lower ash or sulfur contents. The Government believes liberalization is beginning to foster coal-to-gas conversions of small boilers, although industry representatives interviewed said such switching was not taking place because users could not be assured of adequate gas supplies.

The Government has already begun closing unprofitable mines and expects by the end of 1992 to have eliminated all industry subsidies other than transition costs for mines to be closed. As in the case of power generation, the Government intends to combine the roughly sixty remaining mines into 10-15 commercial enterprises.

⁵ All lignite mines supply dedicated minemouth power stations. For each mine and power station, there is but a single buyer and seller. The Government therefore has decided to place each lignite-powered generating station and its associated lignite mine under a single management.

Despite these actions, many of which have a political cost, coal is still subsidized. Even at these prices, users complain it would be cheaper for them to import coal from South Africa, Australia or Indonesia. Thus, from the perspective of interfuel substitution incentives, users are paying world prices for coal even if though these prices do not cover full domestic production costs. Nonetheless, the pace of elimination of remaining subsidies embedded in coal prices (currently scheduled to be eliminated by the end of 1993)⁹ remains an important unresolved energy pricing issue.

5.1.3 Natural Gas

Natural gas policy and pricing are important for a number of reasons. First, in view of their substitutability and lower emissions from burning natural gas, relative prices between gas and coal send correct signals to users regarding environmental costs. Higher prices for natural gas are also important in the long term as a means of stimulating increased gas supply. Poland has the potential to expand natural gas reserves and production extensively if it can attract increased investment in exploration and development. With support from the World Bank and others, it is embarking on an ambitious program to stimulate private-sector exploration and development of both natural gas and coal-bed methane. Prospects for future domestic gas supply and prices are particularly important for industries which use natural gas as chemical feedstock (ammonia fertilizer industry) or as the principal heat source (glass factories).

The Government has committed itself to de-control natural gas prices. Thus, in the first quarter of 1992, the price increased 14%. In the second quarter, the price for natural gas is expected to rise an additional 5-10%, and in the third quarter, another 5% jump is projected. Although prices for industry and residential consumers varied substantially in the past with higher subsidies for residential consumers, the Government has attempted to address this situation. Nonetheless, residential consumers still pay approximately 25% less than industrial consumers.

5.1.4 Household Heat and Electricity

Traditionally, governments throughout Eastern Europe extensively subsidize energy costs (especially heat) to households, with the subsidies covered from either the government's general budgets or by higher prices charged to industries (which, in turn, were subsidized from the general state budget). In Poland and other countries, these household subsidies are being removed but more slowly than prices charged to industry. In May 1991, the Polish Government increased prices of electricity and gas to households by more than 100%, to rough parity with industrial prices; but household heating prices remained very low. A 58% increase in prices of hot water delivered to households, which the Government committed itself to instituting as part of a World Bank district heating loan, still leaves household costs at only 30% of parity with industrial prices. As of May 1992, household hot water and steam prices remain subsidized at approximately 50% of the cost of generation.

⁹ In theory, lignite mines will have no subsidies since they are to be owned by the minemouth power plants to which they dedicate their entire supply. Whether electricity prices received by those minemouth plants contain an embedded fuel subsidy depends on the pricing and price negotiation and economic dispatch regimes adopted by the plants and PSENN.

The Government recognizes higher delivery and servicing costs dictate household energy prices be 40-100% higher than bulk industrial prices, but it also senses considerable political resistance to moving rapidly to price levels. From the industry perspective, even gradual reduction of household subsidies will dampen pressures on industrial energy prices by gradually eliminating industrial cross-subsidization of household energy use. Rapid transition to pricing based on long-run marginal costs also is important to both the electricity and district heating sectors if they are to attract needed capital investment in modernization and, later, supply expansion.

5.1.5 Environmental Costs

Treatment of environmental impacts is an unresolved energy pricing issue. Eastern Europe has a history of imposing stringent standards (often more stringent environmentally than U.S. or European Community standards) and not enforcing them. Most former standards still are in place, and new laws and standards also have been promulgated; but it remains unclear what levels of environmental control will actually be required in enforcement or levying of environmental fines. Until users know the standards and compliance schedules, they cannot correctly assess the cost of using alternative fuels, even if relative prices are correct. In the case of coal, standards will also dictate choice of technologies, such as coal cleaning versus stack-gas cleaning technologies. If standards favor coal cleaning, environmental control will be largely embedded in coal prices themselves, with even more price differentiation than at present. If most cleanup costs are external, however, coal prices will reflect differences in total use costs (including environmental control costs).

5.2 Energy Regulatory Issues

As previously noted, an important aspect of energy pricing and restructuring which has yet to be worked out in Eastern and Central Europe is the regulatory regime to be used for those energy subsectors which the Government believes are not amenable to market-based competition. In Poland, these subsectors are electric power transmission and distribution, natural gas, and heat.⁷ All three will require major capital investment in new or rehabilitated/modernized plants and equipment and most financing will have to come from the private-sector. Prices therefore must be sufficiently high, and there must be sufficient private sector confidence in Government adherence to the price-setting mechanisms and formulas, so such investment will be forthcoming. At the same time, the Government must preclude the excessive margins possible with uncontrolled monopolistic price setting.

The Government has stated its intention to have "suitable regulatory bodies for electricity, gas and heating in operation and functioning" by late 1992; this is an ambitious timetable. The important point in terms of energy efficiency incentives is that, assuming that this schedule is roughly adhered to and that the principles espoused by the Government are embedded in the regulatory and associated pricing processes, energy end-users will pay essentially the full economic cost for all forms of energy, whether regulated or unregulated, by 1993.

⁷ Power generation also will be regulated but will include competitive bidding to supply new generation capacity and, for existing capacity, economic dispatch based on prices negotiated between the Polish Power Grid and individual generating units.

An important subset of the regulatory regime is treatment of regulated companies' activities to promote improved efficiency in their customers' energy use. This aspect is discussed in the next section.

5.3 Relevant Non-Energy Policies

Two examples often cited of negative impacts of general government policies are

- import duties on imported energy efficiency improvement equipment and/or
- turnover/VAT or income taxes on sales of domestic energy efficiency equipment or services.

There may be an argument for eliminating import duties or other "negative incentives" as long as one does not jeopardize a fledgling domestic Polish energy-efficiency equipment industry. However, since there is the prospect for building up such an industry through joint ventures or other means, eliminating such duties merits careful analysis.

A turnover/VAT tax may or may not constitute a negative incentive, depending on whether it also is levied on energy supply. If imposed on both energy supply and equipment or services, the effect is neutral. For the next few years, it is unlikely such a tax will be imposed on fuels, keeping some regulated energy prices below full cost. During this period, there is a strong argument for not taxing energy efficiency equipment or services. Otherwise, taxes alone will increase the costs of, but not the prospective returns from, energy efficiency improvement.

A more difficult case is financing; because they are generally very large projects which often have foreign exchange aspects, powerplants, gas transmission, and distribution facilities are well-suited to international project financing. The World Bank and other donor agencies provide substantial co-financing of energy supply projects at attractive rates; the Poland District Heating Project is an example. As a result, the overall cost of capital for an energy supply project may be less than 10%, while those financing energy-efficiency investments based on their own balance sheets face domestic interest rates of 50%. To maintain neutrality between energy supply and efficiency improvement, should not the Government and donors make financing available for energy efficiency improvement on the same terms as for energy supply?

There is an important complicating factor. The energy supply borrower assumes a foreign exchange risk which is hard to value but which clearly offsets part, or perhaps all, of the interest rate differential. A facility for energy users presumably will have to pass this same foreign exchange risk on to its borrowers. Thus, having to borrow in hard currency may constitute a major impediment to energy users contemplating efficiency improvement.

Rather than specialized financial incentives, the single most beneficial incentive would be an overall economic and monetary situation which permitted reduction of nominal interest rates to reasonable levels and, on a controlled basis, creation of sufficient liquidity in the financial system to permit long-term lending to borrowers based on enterprises' credit-worthiness and prospective returns from the proposed uses for funds borrowed. Seen in this light, a new special fund for energy efficiency improvement may actually be counterproductive by perpetuating the past history of special funds operating outside the financial system and subject to political or other influences rather than strictly on the basis of credit-worthiness.

6. ENERGY EFFICIENCY INPUTS

The conclusion of the IRG Team is that the need is less for specialized incentives to stimulate demand than for awareness-building and for better organization and quality, and introduction of Western technology, on the supply side. This chapter provides the analysis leading to this conclusion.

6.1 Energy Institutions

6.1.1 Energy Consumers

As noted earlier, enterprises do not have the ability to identify specific energy efficiency improvements or the financial benefits of implementing those improvements. They also are likely to require basic changes in awareness and attitudes within the plant.

An approach successfully implemented in many countries has been to use industry and professional organizations as primary vehicles to promote and disseminate information on energy efficiency options, costs, and returns. There currently are important institutional obstacles to using this approach in Poland. The former Kombinats have been broken up. Industrial, engineering, scientific, and other professional associations are in disrepute, and new institutions are beginning to emerge. Two examples are the Polish Foundation for Energy Efficiency and, most notably, the "Energy and Environmental Club" recently formed with strong support from the Ministry of Industry and Trade and Ministry of Environment. However, these organizations are currently new and small, and do not yet have the national network in place to reach large numbers of enterprises or professionals.

Nonetheless, both industry and professional organizations, if broadly trusted, could potentially provide an important information dissemination and outreach function the Government is unlikely to play itself, particularly if enterprises fear initial dissemination could potentially lead to later regulation. This function is sufficiently important that Poland and other Eastern European countries have proposed forming another new energy efficiency institution and providing strong donor support to this institution. It is likely that, once restructuring progresses, enterprises in specific industrial sectors will find it in their interest to (re)create associations for information dissemination, lobbying, and other purposes. These could be supplemented and supported by either one or both of the above new groups, both of whom will need financial support, or older professional associations should they regain the trust of a broad membership.

6.1.2 Energy Efficiency Improvement Equipment and Services

At least as important as demand constraints is the underdeveloped nature of the energy efficiency industry in Poland. The IRG Team found virtually no providers of industrial energy efficiency services, nor a network of reliable providers of such equipment or services. It is difficult to identify a potential nucleus for such an industry - yet an industry must be helped to evolve if energy-efficiency improvement is to become widespread throughout Poland.

Institutions either have been disbanded or may not have great potential to become effective service providers in a market economy. The Foundation for the Rational Use of Energy

has retrenched to a small fraction of its former size, and those who could have gained the confidence of industry in the current market environment have departed. The Institute Energetika (Power Institute) has fair coverage (headquarters in Warsaw and branches in Gdansk and Katowice), but is likely to have trouble changing from a government-supported research and analysis institution to a competitive market-oriented service provider. Institutes for other energy sectors face the same problem if they try to become providers of energy efficiency services to paying customers.

There are energy supply organizations with skills that can conceivably be applied to improvements in industrial energy efficiency and/or cogeneration. Energoprojekt designed and constructed all but two central station power units in Poland and many industrial and district heating facilities. Rafako will presumably continue to focus on large central station boilers; but Poland's two smaller boiler companies, Fakop and Sefako, are well suited to industrial and mid-scale district heating projects. There also are a number of other entities, including the turbine company (now in a joint venture with Asea Brown Boveri), and private power developers from the U.S. and other countries can play a strong role in industrial power generation. Some have the potential to help industrial clients design and implement energy efficiency programs. They have not yet shown interest, but neither have they been encouraged to do so.

Except for the company equipped by A.I.D. (energopomiar) as part of the Emergency Energy Program, virtually no enterprises or Government units have adequate equipment to conduct energy audits or to identify and institute energy improvement programs.

It also appears that, while overall industrial and energy engineering training may be good, there is no pool of trained energy efficiency specialists to be tapped by enterprises needing such services. Even the one enterprise that participated in the demonstration program believed that it will need considerable training support to launch an expanded program. The one likely exception is in the area of boiler maintenance where, even though the IRG Team saw no evidence of aggressive marketing of boiler maintenance services, it is likely that Western companies may begin offer such services to enhance their marketing of new or retrofitted boilers.

Another area of weakness is instrumentation/controls and energy efficiency equipment. There are some state-owned enterprises that produce energy instrumentation or energy conservation equipment, but most equipment produced is outdated, energy-inefficient and/or unreliable; examples include stack-gas analysis instruments, combustion controls, steam traps, and insulation. These represent needs and opportunities for joint ventures or other forms of technology transfer from Western firms.

Basic industrial energy audits, identification of no- and low-cost energy efficiency measures, and provision of assistance in designing and implementing long-term energy management programs in individual plants (including design and implementation of employee and supervisor motivation and training programs) could be undertaken by joint venture companies or, with other forms of technology transfer, by Polish firms themselves. Capital requirements are small relative to establishing a manufacturing company or private power-generation company. Key requirements are strong backgrounds in industrial process engineering and management, financial analysis skills, and a working knowledge of technical and institutional aspects, costs, and returns of energy efficiency options. In the U.S. and other countries, many relatively small firms can gain easy market access and do a credible job. At

the same time, Polish private sector firms start with little or no capital and a lack of basic information and experience.

Two approaches may be desirable to foster development of a Polish energy services industry. The first is to promote joint-ventures in both energy efficiency services and related equipment. The second, for those current or potential Polish enterprises that eschew the joint venture approach, is to:

- provide broad-based technical, financial and marketing/management training and
- establish a program to lease basic measurement equipment to new firms having the necessary staff capabilities.

It also will be desirable to underwrite general training of energy efficiency services experts, since even strong joint-venture companies may be unwilling to underwrite the large-scale training required because of fears that most persons trained will then be hired by competitors. Training appears to be an area where continued donor assistance can stimulate accelerated expansion of the industry.

Potential Polish entrepreneurs have little access to modern technologies and to companies, particularly U.S. companies, providing those technologies. A.I.D. can assist in bringing energy efficiency market opportunities to the attention of relevant U.S. businesses - either directly or by acting through U.S. industry associations - and by publicizing U.S. capabilities within Poland. Trade missions are a traditional way of doing this and may have some role. However, trade missions suffer from being one-time events. A more sustained initiative is needed in lieu of or in addition to trade missions.

The Polish Government has given approval for the establishment of a new State Energy Efficiency Agency; but, as of the date of the IRG's team's discussions, had not decided what that Agency should be. The IRG team believes that such an Agency, if formed, should limit itself largely to overall data collection, analysis, public education, and similar functions. Rather than trying either to force energy efficiency improvement through standards (the approach of previous regimes) or itself to provide energy efficiency improvement standards, it should establish the framework and then encourage and support the private sector to provide such services. The Government has not proven to be an effective or efficient provider of such services in the past. There is no reason to believe that it will do any better now.

6.1.3 Energy Supply

Important issues of institutional structure remain in virtually every segment of the industry. For example, the Government prepared a new Electricity Law to detail the new entities in generation (after reconsolidation into fewer enterprises), transmission, and distribution, as well as the relationship between the various entities, and outlines of the licensing and regulatory regimes governing them. Relative to energy efficiency incentives, however, there are only a few important issues.

First, it is desirable to adopt a combination of market-based and regulatory regimes in the various segments of energy supply - coal, oil, gas, and power - which promote interfuel competition. This will have three benefits.

- consumers will be encouraged to use the energy forms most efficient for their particular situation.
- faced with tight interfuel competition, an important marketing approach for supply firms could be to offer both industrial fuels and assistance in improving efficiency of use of their use.

This can be an effective strategy for market differentiation. Faced with a lack of marketing competition and in many cases (especially for natural gas) limits on the amount of product sold, there are no suppliers with an incentive to devise such a strategy.

- competition among and in some cases, within, supply sectors provides incentives for supply companies to improve their own energy production/conversion efficiencies, which seem to be quite poor in most Eastern European countries.

A related point is that there must be sufficient incentives to attract needed private sector investment into those energy supply sectors which have the potential for overall sector efficiency improvement. Two examples which immediately come to mind are natural gas and private power (and combined heat and power) generation.

In addition, regulatory regimes adopted by the Government can provide important incentives for energy supply companies to promote energy efficiency improvement among their customers. Most important are incentives to companies providing power to end-users; these could range from simply defining costs of provision of energy efficiency services as an allowable cost to providing positive incentives, such as higher allowable returns. Since the PSENN presumably will continue to supply bulk power users (which include the largest industries in the country) and generators may wheel power to these or other users, incentives should be provided to generators and PSENN as well as to the distribution companies.

6.2 Energy Financing

The Government established nine state-owned commercial banks in early 1989 from the regional structure of the National Bank of Poland. According to the Ministry of Finance, these account for some 90% of all credit extended in the country. Two are headquartered in Posnan and Katowice, but have branches throughout the country. The model discussed so far is for the Government to retain a 30% "Golden share", strategic foreign investors to hold 20% with the opportunity to have a management contract, employees to receive 5%, and the rest to be floated through a public offering. Shares would then be traded on the newly (re)created Warsaw Stock Exchange (which began started trading in April 1991 and currently lists seven stocks).

There also are more than seventy additional institutions (including six foreign banks and two branches of foreign banks) licensed to carry out at least some banking functions. The largest have a total capitalization of \$80-120 million, but many are much more thinly

capitalized.⁸ More importantly, there is concern that some banks formed from previous State-owned financial institutions specializing in particular industrial sectors have inherited weak loan portfolios which are not reflected in reserves on the banks' balance sheets.⁹

Until recently, the Government handed out banking licenses liberally in an effort to build up the sector. It still intends to encourage entry in an effort to build a competitive banking system. However, it also has recognized that the regulatory framework has not developed as rapidly as have the banks' activities and that this imbalance needs to be corrected. Early in 1991, it began tightening licensing requirements (for example, minimum capitalization was increased from 1 billion to 20 billion zlotys). With outside assistance, it has begun to develop necessary bank regulatory structures. Recent bank scandals have hastened and lent urgency to these actions.

The Government is preparing a new draft Banking Law which it intends to introduce to the parliament in 1992, and is also developing a deposit insurance plan.

As discussed earlier, debt financing of energy efficiency improvement currently does not appear to be a viable option. With nominal interest rates of 55%, enterprises are reluctant to take on new debt given the present economic uncertainties. Nominal interest rates are too high to justify more capital-intensive projects which require substantial debt financing. Until interest rates decline substantially, more capital-intensive energy efficiency projects are likely to be undertaken only on a joint venture basis tied to overall restructuring to make the enterprise economically competitive.

Once these rates decline to levels that re-establish borrower confidence, there will be an option for medium- and long-term financing of investments, assuming loans are available. No one knows what maturities will be available from the present market-oriented banking sector.

Although banks are offering leasing services, there was no definition of or provision for leasing in the Polish Commercial Code as of October 1991. The Ministry of Finance is also considering amendments to the Commercial Code to permit widespread introduction of leasing, and is starting to address the many issues regarding this idea.

There may be a case for modest provision of capital to promote early development of the energy efficiency services sector. Any such capital is better provided through the financial system rather than through special government funds. Certain financing options could accelerate the pace of energy efficiency improvement without violating sound financial principles or creating counterproductive incentives. One is a leasing program for equipment used to improve energy efficiency which can be removed if a company failed to make its lease payments. The positive economic and financial return will more than offset capital costs even

⁸ The Ministry of Finance is trying to assure that all banks meet the EC minimum capital ratio of 8% of total liabilities; it acknowledges that all banks do not currently do so, even before consideration of adequacy of reserves.

⁹ This is in addition to the Central Investments Fund backed by the State Treasury, which currently has a deficit of more than 15 trillion zlotys.

at relatively high interest rates. It also may be desirable to provide partial guarantees, with the cost of such guarantees embedded in the interest cost, for relatively short-term (6-18 month) small loans for equipment which has a rapid payback period (i.e., shorter than the period of the loan). These initiatives can also apply to equipment needs of energy service companies or possibly to energy equipment companies with modest capital requirements.

IRG suggests that any financing option:

- Operate through the normal financial system;
- Incorporate market interest rates even if those rates are prohibitively high;
- Force the lender/lessor to take enough of the risk so it has an incentive to provide funding only to credit worthy borrowers or lessees; and
- Include sufficient transparency and outside audits to assure it is not taken over by a few insiders and corrupted.

6.3 Need for Other Incentives

Higher energy prices alone appear to provide an adequate incentive to energy consumers to seek ways to increase efficiency of energy use. Additional incentives discussed below can be instituted and are reasonable by Western standards. Except for changes which make sense anyway as part of comprehensive tax reform, it may be beneficial to stimulate improved supply of equipment and services rather than increased demand which cannot be satisfied.

One option is tax credit for investment in energy efficiency improvement. The problem with an investment tax credit anywhere in Eastern and Central Europe is that it will strengthen enterprises' inclination to seek capital-intensive solutions to their problems. Most enterprises are not yet implementing no- and low-cost actions. The Government should focus on these before providing new incentives for more capital-intensive solutions. Given their continued political power, heavy industries could also use these tax credits to subsidize wholesale the kinds of process changes discussed earlier even though, such investment may not necessarily represent productive use of the country's scarce capital resources.

Other demand incentives under consideration include standards for insulation or building lighting. Outside the industrial sector, there also is a need for more extensive energy metering (to meter and charge for, for example, energy consumption in individual units of large residential apartment blocks). Standards may be desirable (insulation of industrial piping, for example, is very poor) but only as suppliers are prepared to provide equipment which meets more stringent standards. Moreover, there is a real risk of building a new Government bureaucracy operating on principles which have failed in the past. The IRG Team cautions against any early introduction of standards-based approaches before market-based approaches have been tried and found wanting.

On the supply side, there may be a case for temporary incentives, realizing that supply incentives also entail risks. Potentially beneficial incentives include:

- A temporary period (three years is recommended) during which income taxes would be wholly or partially rebated for a new energy efficiency enterprise that reinvests its profits in training, product development, etc. (realizing since most new firms are unprofitable during their first years, this may not be a major incentive, but neither will it entail a large revenue loss for the Government).
- An investment tax credit and/or long-term credits for companies investing to produce instruments, more efficient and/or multi-fuel boilers, energy-efficient electric lights, better insulation, or other pre-approved energy efficiency improvement equipment. Earlier comments about the drawbacks of investment tax credits and other demand-related incentives apply as well.
- Incentives for energy (oil, gas, coal, and power) supply companies to provide and aggressively market energy efficiency services. At a minimum, the Government should exempt such services from price or profit controls or other regulation and allow supply companies to use their capital to invest in the provision of energy efficiency services. Energy supply companies should be able to offer shared-savings programs to their customers and to use their normal invoices to bill for such services.

It also will be desirable to permit independent energy service companies (ESCOs) to offer shared savings programs and establish a favorable pricing and regulatory regime for power purchased from industrial cogenerators or other private producers. The regulatory regime should assure that, if the power company also enters the energy efficiency business, it cannot then favor its own subsidiary or joint venture to the exclusion of independent suppliers.

7. CONCLUSIONS AND RECOMMENDATIONS

The potential benefits of energy efficiency improvement to both individual enterprises and the Polish economy are sufficiently great that the Government should use the present A.I.D. demonstration program as a base from which to foster broad-scale industrial consideration and adoption of energy management approaches, beginning with no- and low-cost options which will yield rapid returns.

The Ministry of Industry and Trade wants to wait approximately six months, until initial results from the current demonstration plants can be assessed, and then (assuming results are positive) wants to use a workshop of the top 400 industrial enterprises as a vehicle for initiating a broad-scale program. The interim period should be used to make decisions regarding the groundwork for an effective long-term industrial energy efficiency program.

Two aspects of a long-term program are equally important. One is identification of no- and low-cost measures, which can yield concrete short-term results and build support for more far-reaching measures. The other is that individual enterprises design and implement explicit energy management programs and incentives for identification and implementation of measures which increase energy efficiency.

Once the current economic crisis abates and enterprise managers get beyond current short-term priorities, energy prices will provide sufficient incentive to implement at least no-/low-cost programs to improve energy efficiency. It may be useful to demonstrate new financing mechanisms suited to relatively low-cost, rapid-payback energy efficiency measures; such a demonstration should work through and strengthen, rather than substitute for, the financial system.

A more pressing need is for development and strengthening of the energy efficiency services and equipment industry. The Government is currently considering long-term options, including establishment of a new State agency with responsibility for promoting or even mandating energy efficiency improvement. This approach was unsuccessful throughout Eastern Europe and other countries with which Team members have direct experience. The other option, used successfully in the U.S. and other countries, is to rely primarily on the private sector.¹⁰

To strengthen the industry without undermining the market, the IRG team proposed:

- Training and technical assistance in technical aspects of energy efficiency improvement and basics of business management;

¹⁰ Western Europe has a mix of both private sector and statist approaches to promoting industrial energy efficiency improvement. The Team believes that most concrete improvement has been due to increases in energy prices (which are considerably higher than in the U.S.) and, secondarily, to making technical and financial information available to individual enterprises through a combination of industrial associations, quasi-government information dissemination organizations, and private sector service firms.

- A leasing program or some other way of providing trained energy service firms with necessary equipment while forcing them to pay for such equipment out of fees earned;
- Assistance in making U.S. companies aware of opportunities in Poland and of making Poland aware of the capabilities of interested U.S. companies; and
- Possible assistance to help enterprises define their financial needs and resources and access commercial financial markets.

Once restructuring has progressed further, it also will be desirable to consider assistance to relevant energy supply companies to establish subsidiaries to help their consumers use energy more efficiently. Such subsidiaries can provide energy assessment and no-cost/low-cost program development assistance or provide financing for higher-cost energy efficiency improvement measures, with the financing cost charged to the user on the power or gas company's normal invoice. Ultimately, the subsidiary can offer shared savings programs along the lines of those offered by energy service companies (ESCOs) in the U.S.

Officials of the Ministry of Industry also expressed the desire to develop and install a computerized data system to track energy use in each industrial sector. This system would be similar to the former Carnegie-Mellon industrial energy-use database which provided valuable comparative information. The officials acknowledged practical problems in introducing such a system in Poland, especially enterprises' possible fear that plant-specific data will either be used by the Government to impose old Soviet-style quotas or fines or will fall into the hands of competitors. They recommended waiting until enterprise restructuring and privatization is further advanced before deciding on such a system; the IRG Team concurs.

Longer-term, A.I.D. can assist in feasibility assessment and design work leading to possible establishment of a legal and policy framework conducive to both ESCOs and private power companies.