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Executive Summary

EVALUATION OF USAID RUSSIA - NIS ENERGY PROGRAM

United States Agency For International Development

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BOOZ·ALLEN & HAMILTON INC.

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Program Evaluation of USAID Energy Assistance to Russia, Ukraine and Armenia

Summary of Findings, Conclusions and Recommendations

1 Introduction

USAID faces the midpoint of an unprecedented program in emergency energy assistance, restructuring and resource mobilization in the countries of the Former Soviet Union (FSU). The Agency now looks at how to consolidate the gains made and the reforms just getting under way in the face of significant cuts in resources and competing claims on the aid dollars.

To assess the progress of the energy programs in three of the major recipients, Russia, Ukraine, and Armenia, USAID engaged Booz-Allen & Hamilton to evaluate critically its energy activities in these three countries. The evaluation team consisted of an energy economist (team leader), a regulatory specialist, an electrical engineer/energy sector specialist and a mechanical engineer/energy efficiency specialist.

This evaluation report focuses on the accomplishments, the successes, difficulties and lessons learned to date. The evaluation team has provided country-specific recommendations which it believes can improve the end product of the aid program in an era of budgetary pressure. The reader should note that the strategic framework for the FSU energy program is an evolving entity. This report refers to the strategic framework that was in place in July, 1995. Changes in that framework or new tasks/projects initiated since the data gathering was completed in June, 1995 are not included in this report or the companion volumes.

Given the vast scope of the countries involved in this program and the scale of changes that are under way, it is impossible to include all aspects of the program in this short summary. Interested readers are directed to the main report or to the annexes in which individual tasks are described.

2 Overview of Program Objectives and Indicators

To organize and manage its program, USAID formulated a set of strategic components to describe its energy programs (see next page). These components were used to relate the energy assistance program to the objectives within the ENI Bureau's Strategic Framework. Four of these program objectives are relevant to the energy assistance programs. These objectives can be summarized as:

1. Transfer state-owned assets to the private sector;
2. Establish a policy, legal and regulatory framework conducive to broad-base competition and private sector growth;

3. Stimulate the development of private sector enterprises; and
4. Promote sustainable use of natural resources.

STRATEGIC FRAMEWORK FOR ENI ENERGY PROGRAMS

Overall Program Goal: *Improve the Efficiency and Environmental Performance of the Energy Systems in CEE and NIS*

Program Components and Impact Indicators:

1. **Rationalize Energy Prices and Develop Sound National Energy Policies**
   a. Decontrol of petroleum and coal prices;
   b. Increase of electricity and gas prices to LRMC
   c. Adoption of policies that encourage rational pricing competitive markets, private and foreign investment, trade liberalization and environmental protection
2. **Improve Energy Efficiency and Reduce Low-Level Emissions in Industry, Buildings, and Municipal Heating Systems**
   a. Implementation of utility demand-side management and integrated resource planning programs;
   b. Formation of private energy service companies;
   c. Creation of NGO energy efficiency centers and local energy efficiency associations;
   d. Promulgation of energy standards and legislation that support commercial market development of energy efficiency and related environmental technologies and services;
   e. Improvement in energy efficiency and reduction of emissions at selected demonstration facilities and results widely disseminated.
3. **Restructure, Commercialize and Privatize Specific Energy Subsectors (Power, Oil, Coal)**
   a. Development of effective organizational, legal, and regulatory systems;
   b. Establishment of commercially viable energy production and distribution companies;
   c. Mobilization of private and public financing for investment projects that modernize facilities, improve efficiency and environmental performance, replace high-risk nuclear reactors and are consistent with a least-cost approach;
   d. Increase in electricity and heat production by private companies and private/public joint venture.
4. **Increase the Safety of Russian-Designed Nuclear Reactors**
   a. Improvement in operational safety and reduction in possible causes of accidents at high-risk plants;
   b. Corporatization of nuclear generation and creation of regulatory and economic incentives for investment in nuclear safety and improvement in safety culture;
   c. Identification and development of economically viable options to continued operation of high risk reactors;
   d. Development of competent, independent nuclear regulatory authorities and a legal framework which enhances their effectiveness.
5. **Promote Energy Trade and Integration with Eastern Europe and International Energy Markets**
   a. Establishment of effective regional power pool among CENTREL countries (Poland, Czech Republic, Slovak Republic, Hungary);
   b. Development of regional system for managing electricity transmission among three Baltic countries and regional master plan for generation investment and the replacement of Ignalina;
   c. Integration of CEE into Western Europe UCPTE electrical system;
   d. Establishment of contractual and pricing mechanisms for energy trade among CEE and NIS countries;
   e. Development of arrangements for the reliable and efficient export of oil and gas from the NIS to CEE, Western Europe, and other markets.

Program indicators (a, b, c, d, e) show whether the objectives are met. Major indicators relevant to the energy sector assistance are listed under each objective in the complete strategic framework, shown above.

In the final report, restructuring and institutional reform are covered together. There are many other questions and issues that are important, but all of them, including the key questions of changes in attitudes, overall impact and appropriate focus of the programs, are subsumed by one or more these five strategic issues.

3 Key Findings

Discussion

The 30+ tasks in each of the three programs cover the range from short term conservation efforts at district heating plants to complicated restructurings of state enterprises both large and small. The team found that these activities which have already started have generally been undertaken in an appropriate professional manner. Annex 3 summarizes the team's findings about the progress for each of the targets identified by USAID for the various tasks. As the table shows, most targets in Russia have seen adequate or normal progress from their underlying tasks, when taken on their own grounds. However, successful outcomes for many of these tasks are conditioned by other USAID or donor activities. In such cases, the evaluation must recognize the temporal and substantive links among various tasks and targets i.e., the critical path to meeting the goals. The team has tried to do that in this evaluation with the resultant finding that two areas, energy efficiency-fuel substitution and market/enterprise restructuring are not as far along as one might wish. In both cases, the problem lies not so much with the USAID-funded activity itself but instead, with the overall structural factors that surround that activity. The commodity programs are generally moving along adequately while restructuring is problematic to one degree or another in all three countries.

Findings

1. **Energy Efficiency and Fuel Substitution:** The program currently has focused attention on particular activities in energy efficiency and fuel substitution, hoping that progress toward market prices will eventually provide the appropriate incentives to put the demonstrated technologies into use. These demonstration activities have often saved energy at specific locales. However, they will need some additional focus to have the type of impact and spread foreseen in the USAID program design (see section 4 for recommendations). The amounts of energy saved in Russia and Ukraine are not significant relative to overall energy use so that the efficiency programs can really serve only as catalysts or demonstrations. USAID contractors have shown with the Tushino plant in Moscow and the Kiev #5 plant that such positive demonstrations are possible.

In Armenia, the emergency weatherization and efficiency activities have generally been a great success. The energy saved there is significant relative to overall energy use.

2. **Restructuring and Institutional Issues:** At present USAID has teams working on regulatory issues in each of the three countries, assisting in the establishment of the laws governing the electricity sector and in the roles of the Federal Energy Commission (Russia), National Energy Regulatory Commission (Ukraine) and National Energy Commission (Armenia).

In Russia, the process of establishing the FEC is a key element of an energy sector transformation strategy that may result in a market-oriented energy economy. Since the transition could last a number of years, the quality of technical assistance to the FEC and other entities will play a large role in smoothing out the transition process. It is not clear that the activities of the FEC will have any more than a peripheral effect on oil or gas transmission, thought this is theoretically within the purview of the FEC. At the present time, the restructuring efforts in the electric power sector are inconclusive, given a lack of unanimity among the relevant Russian institutions in that sector. That is, it is unclear whether the electric power system is on its way to a system-wide monopoly à la Gazprom, or a more competitive system as is evolving in Ukraine.

In Ukraine, the construction of the regulatory mechanism is proceeding on the assumption that enterprises will remain in state hands, though assets will be split into different competitive generation entities and regional distribution companies. The regulatory entity, the NERC, is expected to act as a referee for a competitive-bid marketplace in electricity. The World Bank has acted as a sponsor and referee for much of the restructuring activity in the power sector. A competitive system is evolving in that country but privatization is thus far not an immediate objective of reform. In Armenia, the regulator does not yet exist since appropriate legislation awaits legislative approval.

3. **Private Sector Activities and Commercialization:** To stimulate private investment and commercialization of energy sector activities, USAID has supported a number of efforts to work for the creation of viable firms and markets. USAID has supported the critical first stage, getting the books right, which is vital to any flow of funds that might pay for further restructuring, modernization or improvement of the enterprise. Indeed, the enterprise will then have a model of what proper accounts should look like so that they can replicate this effort to other parts of the company.

In the case of the two **oil and gas sector enterprise corporatization** exercises, lessons have been learned about the importance of careful definition of the relevant assets and on the need for enterprise autonomy leading to independence from arbitrary decisions concerning the enterprise's business functions, asset base and financial flexibility. The work with Sidanco, carried out by Bain Link has shown that completion of the asset assignment and legal corporatization is a prerequisite for effective operation as a commercial entity. The lesson with Transneft was that management autonomy needs to accompany commercialization in order to create value in the market.

In the other two countries, restructuring efforts in the oil and gas sector have stalled. No reform is currently under way. In Ukraine, an oil and gas law covering

the upstream part of the business has been proposed by consultants working under a USAID cooperative agreement with the World Bank. This proposed legislation has not yet been approved. No hydrocarbons restructuring is in the works in Armenia at this time nor is it a part of the USAID program there.

In the case of **coal enterprise restructuring,** the team concluded that this sector must be treated as a special case, since the social costs of enterprise restructuring loom so large politically. The coal industry is important as both a fuel and as an employer of a considerable number of workers and as the owner of strategic infrastructure assets in both Russia and Ukraine. In both, production has fallen substantially with production technology and resource quality problems plaguing the coal fields. Sustainable production in Ukraine is probably less than 100 MT annually, a figure that is not being met at present.[1] Indeed, Ukraine is presently importing coal from Hungary, Poland and Russia. However, coal still provides as much energy in Ukraine as oil and gas combined, about 1 million barrels/day of oil equivalent energy. Therefore, it is reasonable to expect that coal will continue to play a major role in Ukraine's energy economy.

Armenia's coal production, guided by USAID on an emergency basis, is claimed to have reached almost 7,000 t/month, a modest contribution to the country's energy situation, if true. While perhaps not a long term solution to the country's energy woes, this amount of coal, if produced economically, can eventually contribute the equivalent of 1,000-1,500 b/d of oil and can stretch natural gas and mazout supplies in power plants through cofiring.[2]

4. **Resource Mobilization:** In a number of areas, the USAID energy program provides an initial activity that is crucial for further development and implementation of reforms. An example of this is the USAID support for investment studies for new power plant investments such as the combined cycle facility in Krasnodar, Russia. Such studies make more likely the financing of a proposed project. To the extent that such studies leverage IFI activities, they promote increased availability of financing and form a valuable part of the overall USAID program.

Synchronization: The team found that there was an important temporal link among activities and that the order in which activities are undertaken has great influence on their success or failure. For example, in some cases the USAID contractors have identified a target such as oil and gas data systems in Ukraine that is out of synchronization with its logical antecedent, in this case the oil and gas law. In the Russian power market, the proposed establishment of a UK-type wholesale market system has appeared in advance of an agreement by the Russian government on the desired final form for the electricity market. A similar process took place in the oil sector with Sidanco. In Armenia, there is no consensus on power sector

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1 This level of coal output is equivalent to about 1.4 million b/d of oil, a substantial fraction of the energy supply of the Ukraine at present.

2 The US contractor believes that production can reach as much as 40 kT/month by the end of the year. Other coal resources have been identified but plans for production have not yet been implemented.

restructuring yet already there are draft proposals for a regulatory body and a new energy law.

Attitudinal Change: A final subject concerns a less concrete but no less important output of the USAID program, promoting attitudinal change. There are several USAID-supported activities that promote healthy appreciation of decentralized resource allocation. These include:

- working with professional associations to establish voluntary standards
- promoting the growth of private energy service firms operating in a market in place of captive enterprise or plant staffs
- promoting the establishment of a market in baseline geological information and data for oil and gas
- promoting the concept of enabling legislation, not decrees, to put the energy sector on a firm footing under law

The ability of such activities to effect change in the way business is done in Russia and the Former Soviet Union may be substantial. USAID should continue to support activities that promote attitudinal changes.

In a larger context, it is important to note that USAID's energy program should create impacts that benefit more than one country, if the program is to succeed in an era of declining resources. In particular, work that is done regarding transport of oil and gas, transmission of electricity, and investments in oil refining, should complement one another, regardless of the country in which the work was performed. The evaluation team believes that this can be best handled through continuity of USAID technical staff in a multi-country context.

4 Recommendations

As the FSU aid program enters a period of declining resources, the USAID Missions will need to maximize the accuracy with which they target their activities. In general, the team has found that the effectiveness of the energy program efforts could be enhanced through synergies gained by working more closely with efforts in other areas, including overall economic restructuring, financial market development, and building intellectual capital. Further, there are specific recommendations for focusing the technical assistance program to improve its effectiveness. The general recommendations are listed first with the country-specific ones following.

GENERAL:

- Provide high level and high quality **focused** technical assistance for the regulatory institutions and related institutions in pricing, asset valuation, market structure, legislation and competition policy.
- Assist the AO Energos and local distribution companies on asset valuation, procedures, MIS and other activities that will lead to full commercialization of the enterprises that maintain contact with customers.

- Refocus professional education on local business colleges and technical institutes.
- Continue to provide technical assistance in the energy efficiency area from professional energy associations or groups in the US, with subsequent provision for micro enterprise loans to new energy service firms.
- Reinvent the energy partnership programs so that both sides contribute and receive something tangible and thus have incentives to commit more fully to a particular partnership. This done, USAID should then promote the partnership program aggressively as a vehicle for enterprise restructuring and professional education where relevant.

RUSSIA:

- Support the restructuring of the electric power system through assistance to the FEC.
- Prepare a plan to phase out of grant technical assistance to RAO-EES Rossii and to local distribution companies.
- Support investment studies that mobilize new sources of capital for the power sector.
- Foster relationships between US professional and trade associations and new or existing Russian counterparts. In particular, make use of work already done in the US on professional and equipment standards.
- Continue to support and encourage the World Bank efforts to obtain greater transparency in oil and gas transmission systems.
- Let the US legal technical assistance be oriented at the legal aspects of the recipients' proposals, not the creation of alternative market and legal structures that may not be of ultimate interest to the Russians.
- Continue assistance to the coal industry in Russia. The PIER program seems to provide a relatively inexpensive means of working with the IFIs to mobilize additional resources for restructuring in that sector.

UKRAINE:

- Reexamine the choices of factories for efficiency projects with current impact, spread and demonstration effects firmly in mind.
- Make the efficiency demonstrations into showcases of operational and managerial efficiency.
- Give priority to building up capabilities of Ukrainian energy professionals and firms. Such efforts include not only training but also involvement in audits, retrofits, plant cleanups and the like.
- Provide Arena-Eco with access to US professional energy engineering societies.
- Though the restructuring activities, encourage power companies and factories to shed in-house engineering that is better employed in energy service companies.

- Work with the ad hoc group, led by PHB, to provide the appropriate assistance to all phases of the power industry - but make sure that the USAID energy office is engaged and that they insist on keeping the activities on their appropriate critical path.
- Work through PIER to promote the humane restructuring of the sector, to be funded largely by the World Bank.
- Complete the oil and gas framework legislation.
- Examine the potential for coal mining framework legislation.

ARMENIA:

- Rehabilitate more power plants by providing up front support for IBRD rehabilitation funds through preinvestment studies.
- Continue the emergency programs instituted by USAID for as long as the fuel emergency exists.
- Advertise the weatherization program better as it can reduce the expenditures required in distribution systems and fuel.
- Explain the various stages of restructuring more completely to relevant Government and enterprise officials and promote full restructuring of the gas and electric industries.
- Engage the Government in a dialogue about energy regulation and the value of independence therein;
- Work with the USEA project to provide the gas "concern" with a US gas utility partner.
- Provide pre-investment technical assistance for small hydro and geothermal facilities and in the gas sector. In the latter case, assist the state enterprise in its restructuring as an inducement for substantial IBRD funding for rehabilitation.
- Encourage the government to allow potential investors in CHP facilities to sell both inside and outside the fence, but pay more attention to CHP investors with the largest shares of heat and power sales inside the fence of an industrial facility.
- Point out to the government in the strongest possible terms the opportunity costs of the current lack of secure legal rights for investors and natural resource production and exploration companies.

BE FLEXIBLE: The market restructuring efforts will take far longer than is commonly admitted by either the recipients of USAID efforts or their US technical helpers. The final forms for the monopoly markets have probably not been agreed upon in any of the three countries and may be the subjects of considerable internal contention. USAID should not spend a lot of money building ever-more refined structures to satisfy ephemeral and distant targets. Success should be measured in incremental steps toward a more open economy.

We recommend that USAID consider restructuring some of the technical assistance such that it is consistent with the time and location sensitive priorities of

the program. The team believes that these efforts could lead to more effective deployment of the USAID funds as well as greater progress in the key areas of monopoly market restructuring and institutionalization of the principles of efficient allocation of energy resources in a market economy.

The main report contains a more detailed discussion of the targets and tasks. The issue of AID's catalytic effect is addressed in every section. Section 1 covers the project background and USAID's strategic framework. Section 2, 3 and 4 cover Russia, Ukraine and Armenia, respectively. Section 5 contains summary issues of impact and focus.

Final Report

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Russia, Ukraine and Armenia Energy Assistance Program: Final Evaluation Report

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PROGRAM EVALUATION OF USAID ENERGY ASSISTANCE TO RUSSIA, UKRAINE AND ARMENIA

1 INTRODUCTION

USAID faces the midpoint of an unprecedented program in emergency energy assistance, restructuring and resource mobilization in the countries of the Former Soviet Union (FSU). The Agency now looks at how to consolidate the gains made and the reforms just getting under way in the face of significant cuts in resources and competing claims on the aid dollars.

To assess the progress of the energy programs in three of the major recipients, Russia, Ukraine, and Armenia, USAID engaged Booz-Allen & Hamilton to evaluate its energy program in these three countries. The evaluation team consisted of an energy economist (team leader), a regulatory specialist, an electrical engineer/energy sector specialist and a mechanical engineer/energy efficiency specialist.

This evaluation report focuses on the accomplishments, successes, difficulties and lessons learned to date. The evaluation team has provided country-specific recommendations which it believes can improve the end product of the aid program in an era of budgetary pressure.

The interaction of USAID with other international donor and financial institutions is also discussed and analyzed. The timing and sequence of activities is a particular issue in this evaluation. Projects that are appropriate now may not be in a year or two, while activities that cannot succeed at present may find a welcome reception in the near future. The team's evaluations are made with such timing issues in mind. In addition to the issues of sequencing, the evaluation team considered the program's activities on the basis of their focus and targeting, replicability, and promotion of attitudinal changes.

These criteria for success represent significant challenges for any aid program. However, the importance of energy in the Soviet economy was so great and its perceived economic value so low that in many cases industrial policy amounted to energy policy. Without significant progress in energy sector reforms, other desirable economic and political outcomes may be held up or may, indeed, be impossible.

All of the institutions engaged in assistance to the FSU are learning lessons about institutional change and reform in a superpower and its constituent parts. Not

every lesson learned elsewhere in the world is transferable to this situation. The program in the FSU will generate its own textbooks on reform and assistance activities.

The reader should note that the strategic framework for the FSU energy program is an evolving entity. This report refers to the strategic framework that was in place in July, 1995. Changes in that framework or new tasks/projects initiated since the data gathering was completed in June, 1995, are not included in this report or the companion volumes. Consequently, some new activities or changes in program direction or focus are not covered in this volume.

Background

The USAID energy program in the former Soviet Union started in 1992 as a response to an emergency situation following the breakup of the USSR. The program focused initially on targets of opportunity that might be expected to show immediate results and that were consistent with probable future activities in the energy sector. These immediate targets focused on emergency repairs to energy distribution systems. In a practical sense, some of the short term remedies from the Eastern and Central Europe program were adapted, *mutatis mutandis*, to the former Soviet Union. The program contained an early stress on energy conservation and efficiency measures, as well as seminars on pricing and restructuring. The Project Memorandum authorized an immediate expenditure of $1.8 million, largely for identification of problems, pricing and policy seminars and implementation of low and no cost efficiency improvements. By 1992-1993, the focus of the overall program had shifted to longer term concerns, with significant increases in funding levels. Life of Project funding was increased to $250 million with 50% to be spent in Russia, 20% in Ukraine and 10% in Armenia. In all three countries, and in Belarus, Kazakhstan and Kyrgyzstan (10% each), the initial focus was on emergency energy supply issues - district heating and power plant rehabilitations, gas pipeline repairs, electric transmissions system repairs and the like. In Armenia, the program focused at first on mitigating the effects on the populace of a war and the consequent disruption of energy supplies during the winter of 1992. That focus for Armenia has stayed on the emergency and short term measures until just the past few months.

The USAID program is inevitably affected by the political climate in each of the countries in which it operates. As the political situations started to stabilize, USAID program planners had time to formulate additional program activities and began to extend the initial tasks to a longer time frame with significant increases in resources. In Russia and Ukraine, there was an explicit link between the energy program and overall goals for the country, including enterprise restructuring, improving nuclear safety and turning around adverse trends in energy production,

distribution and use. Life of Project funding for Russia alone was increased to $250 million following the 1993 G-7 meetings. In Armenia, a new set of projects, aimed at restructuring of the energy sector, has begun.

In the case of Ukraine, the changes in the political system have sped up the ongoing changes in the economy and show promise for greater economic reform. The election of Leonid Kuchma to the presidency of Ukraine ushered in a new era of economic reform. The power sector restructuring, which languished through most of 1994, was promoted with presidential backing by the fall of 1994. Since the middle of 1994, energy prices in Ukraine have moved toward world levels. Though not at fully international price levels yet, most energy prices are within 50% of world levels. More recently, the government of Ukraine has backed up the pricing reform with the enforcement of "hard" budgets for natural gas consumers. Under this new initiative, gas customers will have to pay, in itself a significant innovation, or face the cutoff of gas services. The Ukraine situation provides an indication of the speed at which reform can proceed, given strong backing at high levels.

USAID's Energy Program Framework

In order to make sense of such an enormous subject, USAID has organized its program into a strategic framework. This framework for energy consists of the following elements:

1. Program Goal
2. Program Components
3. Progress Indicators
4. Targets
5. Tasks

The insert on the following page shows the full USAID strategic framework for the energy program Russia and the NIS countries. There are four strategic assistance areas: economic restructuring, democracy, quality of life/social sector restructuring and special initiatives. Most of the activities of the energy sector programs fall under the rubric of economic restructuring. Each strategic assistance area is further divided into a number of program objectives. The objectives used in this evaluation (i.e., those that were in place as of June 1 1995) that are relevant for the energy program include the following:

1. Transfer state-owned assets to the private sector
2. Establish policy, legal and regulatory frameworks conducive to broad-based competition and economic growth
3. Stimulate development of private sector enterprises
4. Promote fiscal reform

5. Promote sustainable use of natural resources

STRATEGIC FRAMEWORK FOR ENI ENERGY PROGRAMS

Overall Program Goal: *Improve the Efficiency and Environmental Performance of the Energy Systems in CEE and NIS*

Program Components and Impact Indicators:

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   a. Implementation of utility demand-side management and integrated resource planning programs;
   b. Formation of private energy service companies;
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   d. Promulgation of energy standards and legislation that support commercial market development of energy efficiency and related environmental technologies and services;
   e. Improvement in energy efficiency and reduction of emissions at selected demonstration facilities and results widely disseminated.
3. **Restructure, Commercialize and Privatize Specific Energy Subsectors (Power, Oil, Coal)**
   a. Development of effective organizational, legal, and regulatory systems;
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   d. Establishment of contractual and pricing mechanisms for energy trade among CEE and NIS countries;
   e. Development of arrangements for the reliable and efficient export of oil and gas from the NIS to CEE, Western Europe, and other markets.

Each of these objectives subsumes a number of indicators, which provide USAID with some overall measures of the performance of its assistance activities. Key indicators relate to each of the objectives and are discussed in the text and in

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Annex 2. These indicators are then divided further into the targets, which provide specific measurement indices for the tasks which comprise the specific contractor activities.

The Analytical Approach of the Evaluation Team

In order to evaluate the large number of targets and tasks, the evaluation team focused on the targets established by USAID. These targets provide some objective standards against which relative success can be judged and are documented in Annex 2. The two engineering specialists looked at energy efficiency and power plant rehabilitation efforts. The institutional specialist focused on restructuring activities and private sector participation. The energy economist/team leader focused on pricing, financial sector and private sector participation issues. Naturally, there was a certain degree of overlap among the members of the team. The electrical engineer provided most of the input in the coal sector activities and collaborated with the energy economist on power sector rehabilitation and planning activities. The institutional specialist and the team leader collaborated on the targets which relate to the restructuring and establishment of institutional or regulatory arrangements.

In looking at the vast array of activities in the program, the team used not only the individual technical specialties of the team members but also an overall critical path approach that seeks to determine whether and to what extent individual tasks are connected with program objectives and indicators and how their relative successes will affect the target and its indicator. This approach gets to the questions of impacts of tasks, on both a stand-alone and programmatic basis, whether and to what extent various tasks represent building-blocks to future indicators or targets, and whether tasks are in the proper temporal sequence. The next two subsections show how the critical paths of efficiency and restructuring are related to the overall strategic issues of the USAID programs in Russia, Ukraine and Armenia.

Key Considerations in Economic Restructuring

In the economic and enterprise restructuring supported by USAID and the World Bank, there are several important lessons concerning the nature and sequencing of such reforms. The team believes that the USAID and other donor activities can be made more effective through establishing and then following a critical path for reform. There are three areas of activity that are essential in any restructuring process. These are:

1. Establishing markets
2. Expanding private sector activities, and

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3. Promoting investment

Foreign assistance can influence the first two only indirectly, through legislative and regulatory technical assistance. Foreign aid and investment agencies can have their largest impacts on investment promotion, item 3 above. Only after there are some activities initiated and completed that establish markets and secure legal rights, will there be substantial private activity or foreign direct investment. Consequently, the evaluation team believes that USAID needs to bear in mind the sequencing issues when looking at the appropriateness of various proposed tasks in the restructuring and privatization areas. These temporal relationships are brought out in the listing below.

There are specific issues involved in the initial stages of restructuring that are addressed by USAID-sponsored programs. These issues include assignment of assets, corporatization[1] and improved management of existing enterprises. They are addressed in the country sections.

The activities of the new entities in a market setting requires further restructuring. This is referred to in this report as commercialization. Commercialization consists of the following major components:

- spinning off non-core activities and reducing manpower levels
- shifting from technical to market driven focus
- establishment of customer service activities
- implementation of modern MIS and the uniform system of accounts
- improving cash management
- introducing performance based pay
- implementing cost based rates

Key issues in Energy Efficiency and Conservation: A Critical Path Approach

USAID has made improved energy efficiency one of the key indicators of its programs in Russia, Ukraine and Armenia. To this end a number of activities have been initiated which provide equipment, installation, training and consulting for local power plants, factories and district heating enterprises. In many cases the efficiency-oriented assistance has gone to various emergency and short term needs. Increasingly, the energy efficiency assistance has been intended to lead to permanent improvements in energy use efficiency for enterprises or sectors.

Significant amounts of energy will be saved when inbound foreign investment brings Russian, Ukrainian and Armenian industries up to world standards of

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1 By corporatization we mean the establishment of a legal entity which will hold title to the assets and will engage in business using these assets.

performance. Given the enormous needs for investment in residential, commercial and industrial sectors, improved energy efficiency in very large countries such as Russia and Ukraine is more likely to accompany new investment than to comprise new investment in and of itself. For example, restructuring of industrial enterprises and new investment, especially from abroad, might lead to the following types of decisions:

- new machinery built to contemporary efficiency standards
- changes in product specifications to reduce the embodied raw material, and hence energy content of final products
- reengineering production techniques to reduce raw material and energy throughput
- exposure to world standards of process and product efficiency

With such a collection of activities, the resulting total energy use will decline, but as a direct result of improvements in the function of the factory and its equipment. In order for any economically sound investments to be made in efficiency, the enterprise must have incentives to save energy. This means that the following conditions will be required to promote sustainable energy efficiency activities:

- higher energy prices
- hard energy budgets (i.e., service can be shut off for nonpayment of bills)
- competitive market conditions for the final product
- full ownership rights to factory or buildings and legal right to funds saved from reduced energy consumption

When such conditions are the norm, then managers and owners will have the incentive and even the need to economize on energy use. No special programs will be needed. Until that time, pilot programs will seldom see replication or injection of new technology that is not provided specifically by a foreign aid project or by an industrial promotion project. At the same time, the pilot projects may be essential in providing knowledge about and access to improved technology. In addition, demonstrations of energy efficiency technology, especially those that involve overall improvements in factory operations, will show managers and engineers what is possible with new technology and management.

Relationship of USAID's Strategic Issues and Program Indicators

Each of the major energy producing, transforming, transporting or consuming sectors has its own special characteristics and particular issues with which it must grapple. The USAID program has tried to address the peculiarities of the specific

questions that affect the energy sector institutions. At the same time there are several major issues and questions that span the energy sector. Each of these five issues is relevant to one or more of the program objectives and the set of issues forms the framework for the team's evaluation of the energy program in each country. These issues are:

1. **Economic Restructuring and Market Reform** - impacts of USAID activities on pace, form and structure of reform process, institutional issues
2. **Privatization and Private Firm Activities** - expanding private sector activities, establishing contacts with US firms, promoting private investment
3. **Energy Efficiency** - improving operations at project sites, establishment of centers of energy efficiency excellence, building human capital in energy technology, spread of knowledge from efficiency demonstration projects
4. **Resource Mobilization and External Funding** - cooperation with IBRD, EBRD and other entities, including Eximbank and TDA, assistance in project preparation and in preparing preconditions for investments and loans
5. **Focus and Impact of USAID Program** - overall assessment, key success factors, future priorities, recommendations for future focus and program activities

Not every program activity, assigned by USAID, involves each of the issues in a significant way. At the same time, many of the program elements will require success in another area to show significant results. For example, energy efficiency depends critically on certain market reform activities. Indeed, some of the market reform outcomes (indicators in this context) are preconditions for success in energy efficiency - e.g., market based prices for energy. Other outcomes or indicators, for example, the existence of energy service companies, may be seen as objective gauges of success in the strategic area of privatization and private firm activities. In other cases, indicators and strategic issues may be related, but not necessarily in a causal or temporal manner. For example, policies and laws to promote competition may be related to resource mobilization but do not cause it.

Although all of the indicators represent important criteria for judging the program elements, some indicators are related strongly to just about every strategic issue of interest to USAID. Others relate to just a few of the strategic issues. In particular, the restructuring, pricing and legal framework indicators appear to be important for virtually all of the issues. Indeed, success in restructuring is often a precondition for movement in such key interests as improved efficiency and resource mobilization. While market prices and the existence of private energy companies represent objective gauges of success for the entire program, improvements in

efficiency at specific sites are good in their own rights but do not necessarily lead to replication or to other program successes. In other words, activities related to improvements of specific energy using plants are not strongly related to overall program success as measured by the strategic issues.

Organization of this Report

This report and Annex 2 are divided into country-oriented sections. Each section in turn follows the USAID listing of strategic issues as discussed directly above.[2]

The fifth issue, focus and impact is discussed in the concluding section of this report and in each of the country-specific concluding subsections. In each of the four areas, the evaluation team looked at the relevant tasks and targets. The basis for judging the relative success of a project or task was the target and its relationship to program indicators and objectives. The evaluation of each target was performed in the context of the overall USAID and donor program situation. The team tried to make allowances for inevitable and unavoidable delays, difficulties, and changes in focus and purpose. There are some general conclusions which can be drawn regarding pricing reform, enterprise restructuring and energy conservation. These generalities are pursued in the concluding section of this report.

2 The reader should note that these strategic issues differ from the project components but do contain areas of substantial overlap. These components are: (1) pricing and national policy; (2) district heating and energy efficiency; and (3) subsector restructuring

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2 RUSSIA

USAID has focused on Russia's energy sector as one of its key areas, since Russia remains one of the most important energy producers and consumers in the world. The former Soviet Union still produces about 7 million barrels/day of crude oil. This oil production figure, down from more than 12 million b/d in the mid-1980s, is dominated by Russia (about 6 million b/d). Gas production in Russia, now at about 575 billion M^3, makes that country the largest gas producer in the world.[3] Other energy indices are equally impressive. Russia's electric power system is the largest in the world in terms of both generation capacity (>200 GW) and transmission distances. Russia's coal production, at roughly 340 million tonnes/year, puts Russia among the top three producers in the world, after China and the US. The table below shows the production and consumption of key energy products in Russia (all figures in barrels of oil equivalent per day).

Energy Production and Consumption in Russia and the Former Soviet Union, 1994
(in 10^6 b/d oil equivalent)

Fuel Type	Russian Production	Russian Consumption	FSU Production	FSU Consumption
Coal	3.23	3.37	5.59	5.65
Oil	9.19	4.60	10.19	9.19
Gas	10.68	7.57	14.61	11.56
Nuclear	0.63	0.63	1.13	1.13
Hydro	0.98	0.98	1.36	1.36
Total	**24.71**	**17.14**	**32.88**	**28.89**

3 575 billion M^3 is equivalent to more than 61 billion ft^3/day, about 20% more than current US production. Of this total, about 110 billion M^3 is exported outside the former USSR. Other FSU republics, chiefly Turkmenistan and Uzbekistan, produce about 110 billion M^3 annually.

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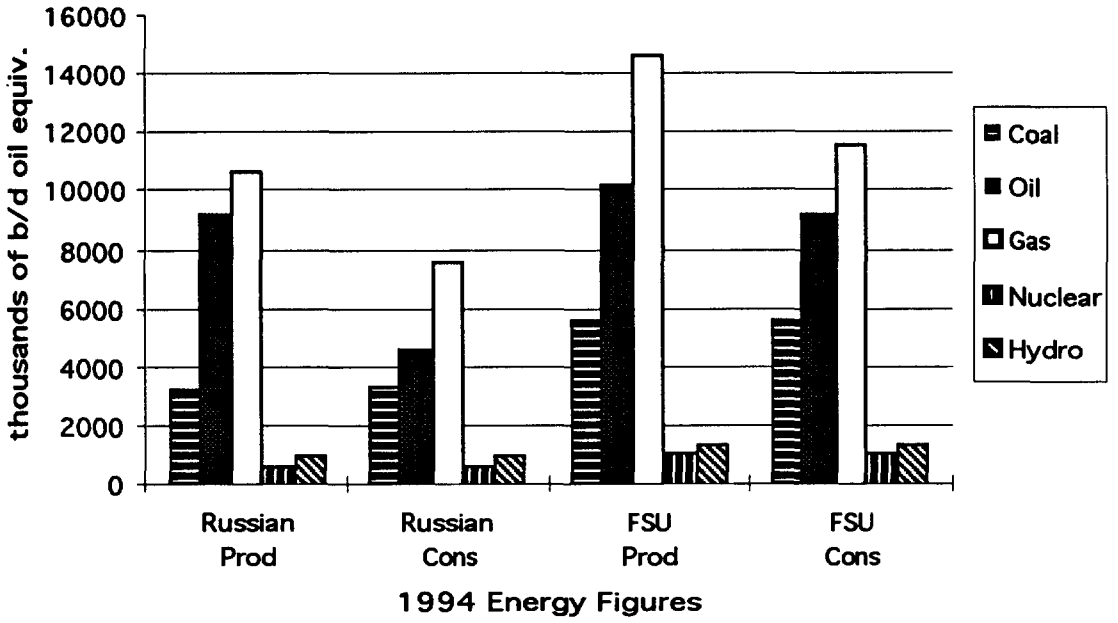
Energy Production and Consumption in Russia and the FSU



This table shows that Russia produces most of the FSU's oil but relatively smaller shares of gas and coal. Russia imports a small volume of coal from other FSU republics while both hydro and nuclear energy are not traded, except to the extent that there are still some electricity transfers among the republics. To put the FSU energy production and consumption in context, overall FSU energy production, now at about 33 million barrels per day of oil equivalent (bdoe), is about 10% above US energy production, while consumption at about 28 million bdoe, is around 20% below current US levels. This output is about 4 million bdoe less than in the late 1980s, while consumption is about 8 million bdoe below late 1980s levels.

At the same time, the old Soviet energy infrastructure is crumbling. Leaks in various pipeline systems are endemic, whether for oil, gas or hot water. Conversion efficiencies in power plants, heating plants and oil refineries are lower than world norms. Industrial products generally contain more embodied energy than their counterparts in the West.

Energy resources were generally subsidized heavily, even after the dissolution of the Soviet Union. This encouraged the attitude that energy was virtually free (indeed, to some consumers it *was* free) and could therefore be used without regard to the consequences on resource stocks or on the environment. In turn, the *economic* inefficiency of such heavy energy use was not apparent to Soviet-era enterprises. It is scarcely surprising, then, that the gradual end of such a system

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of subsidies has left great room for improvement in energy efficiency at virtually all levels of the production, transformation, transportation, transmission and consumption chain.

The deficiencies of the Soviet-era energy system were made clear to Russian managers and officials as some prices moved in the direction of world levels in the early 1990s. Many understood the need for significant changes. To implement the needed changes in production and distribution of energy, the government moved the large energy groups out of the Ministry of Fuel and Energy. The government set up joint stock companies in electricity, natural gas transmission and production, and oil production, transmission and refining. District heating systems have remained in the hands of municipal authorities. Prices for energy resources and products have been rising toward world levels, albeit gradually, since 1990. Progress has been uneven with consumer prices for refined oil products reaching near-market levels while wellhead prices for natural gas are still stuck at Soviet-era levels. Hard budgets for energy users have come unevenly across sectors and products. For electricity, gas and coal, hard budgets are just now being implemented with some dramatic results almost immediately upon implementation.

USAID has responded to these changes with specific programs in electricity, coal, oil and district heating. The gas sector is affected only indirectly by USAID-sponsored efforts in regulation of the energy monopolies.

USAID initiated its activities in Russia with a number of emergency efficiency measures. As the program developed and matured, USAID worked with the Russian government and with the G-7 group to establish emergency assistance and restructuring programs in Russia's energy sector that would improved nuclear safety, reduce the waste of energy in the economy and assist in the restructuring of Russia's energy sector enterprises. These program areas are discussed in detail in sections 2.1-2.5, below.

Most programs in Russia involve multilateral initiatives and efforts. For example, the Joint Energy Alternatives Study (JEAS), which addresses the physical restructuring and rehabilitation of the electric power system, represents a G-7 initiative, although USAID plays the major role among the various foreign participants. In a number of cases, for example, coal and electricity restructuring, USAID works in concert with other donors or multilateral agencies. In such instances, the USAID activities are generally precursors to larger scale project funding by the multilaterals. Indeed, such cooperative efforts represent a key element in USAID's overall assistance strategy by leveraging other funding sources.

The restructuring activities have proved difficult to establish and implement in Russia's electricity sector. This is hardly surprising given the size of the system

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and the lack of consensus among the key Russian institutions about the ultimate desired outcome for that sector. At the same time, there are a number of new developments that may improve the chances for success in assistance to Russia's electricity sector. The locus of restructuring appears to be moving from the Unified Electric System (RAO-EES Rossii) to the Ministerial level of the government. The effects of this change on the USAID program are not yet clear.

This section of the Evaluation Report, focusing on Russia, is divided according to USAID's strategic issues

2.1 Energy Efficiency and Interfuel Substitution

2.1.1 Key Issues and Indicators

Critical issues include high energy consumption, self sustainability and replication of efficiency technology and resource mobilization. USAID efforts have involved several important initiatives in power plants, large industry and district heating energy transformation and distribution systems. The activities evaluated in this section correspond to Program Objective 1.6 which directs USAID to promote the sustainable use of natural resources. Included in that objective are the indicators which motivate the specific targets. These are:

1.6.01 - Promulgation of energy standards, policies and legislation that support . . . (b) commercial market development of energy efficiency and related environmental technologies and services.

1.6.03 - Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere; and

1.6.04 - Utility demand-side management programs in operation and affecting consumer behavior

High Energy Consumption

According to the Russian Center for Energy Efficiency (CENEf) in Moscow, Russia consumes twice as much energy per dollar of national income as western industrial countries.[4] Until recently, few people in Russia thought in terms of

[4] Studies funded by AID and others have investigated and ranked a multitude of conservation opportunities. These studies claim that consumption can be reduced as much as 40% using western technology. The director of the Moscow Energy Office believes that the city's energy consumption can be reduced by 50%.

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energy efficiency. Bigger was better. "Energy engineers" were primarily power engineers. The more energy consumed, the more prosperous the economy was believed to be.[5]

One result of high energy consumption is the devastating effect on the environment, which Russia and the United States wish to preserve. Poor energy efficiency also wastes the country's resources of fuel and labor, better directed toward production of marketable products currently in short supply.

In the FSU, "energy technology" is associated with energy supply, which unquestionably stands to benefit from greater efficiency. On the demand side, however, virtually nobody has thought in terms of end-user energy management until very recently. One challenge is to capture this opportunity for American businesses in the most cost-effective manner. Toward this end, USAID has supplied seed money for studies, training, commodity imports, internships and visits, district heating improvements and promotion of non-governmental organizations.

Absence of "Hard" Energy Budgets

The old Soviet Union operated on a "receivables" economy. That is, inter-enterprise transfers of resources were accompanied by invoices that might or might not be paid. In Russia, the rapid inflation since 1991 has wreaked havoc with the receivables economy. Many enterprises have now accumulated large bills for energy that they cannot conceivably pay ("arrearages"). And still, service is not terminated. In other words, there is little or no consequence to consumers for using energy inefficiently.

Only if consumers must pay, or face service cutoffs, will they have a solid incentive to use only the energy that can be productively employed in whatever the particular enterprise makes. In Russia, these hard energy budgets have yet to be effected. In terms of the elements of energy efficiency's critical path in Russia, one of the keys is missing - hard budgets. World market level energy prices are important but these prices must be translated into budget constraints for energy users. In the two other countries evaluated, hard energy budgets are starting to be enforced, with positive results on energy efficiency and on the incentives to conserve.

Role of US Energy Efficiency Equipment

Many of the people interviewed for this evaluation, particularly Russian energy management officials, thought that energy efficiency was the best technical

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5 There is not even a separate Russian word for "efficiency" in the energy field. They use the term "effektivnost" (effectiveness).

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option for reform in the energy sector.[6] If this is a widely held belief and given the absence of an established energy efficiency industry in Russia, there exists a market potential for American energy efficiency products and services in Russia. The potential is not unlimited, however, and will not be easy to realize.

Although many Russians told the team how they realized only in 1991 how far behind the rest of the world they were in energy technology, this does not translate into open-armed acceptance of foreign technology and management. Russians want to do it themselves, manufacturing their own products and learning how to provide their own services, even if substandard at the outset. Their country needs help in energy efficiency, they admit, but only in the form of "financing" and "joint ventures," which, along with more general commercial concepts, many enterprise managers may not fully understand.

This attitude makes for a cool reception to commodity import programs. Naturally, people will accept gifts. But such gifts may not have the hoped-for effect, namely influencing Russians to buy much more of that type of technology after getting a taste of superior American products.[7] The real inflow of modern energy management technology is going to require far-reaching changes in the economy and government. (These issues are covered in more detail in Section 2.4.) However, several points are worth noting with regard to promoting foreign energy management technology:

- If the Russian companies and energy users are expected to pay world prices for the technology, the value of the energy saved must be commensurable - pricing reform is imperative;[8]
- Enterprise managers and building owners must have the legal right to modify buildings, change technology and reap the benefits of whatever energy savings result;
- The Russian firms cannot continue to rely on captive engineering staffs for their energy management advice - otherwise the "not invented here" syndrome will tend to drown out other voices; and
- Financing must be available for overall renovations and rehabilitiations and property upgrades, of which energy efficiency is only a part.

The team believes that improving energy efficiency is part of an overall economic restructuring and enterprise rehabilitation program. The costs for

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6 It goes without saying that energy efficiency is considered the prime source of additional energy for the economy of Armenia.

7 As an example, Honeywell controls were installed at the Tushino-III district heating plant in Moscow. They work well. Moscow is replicating the success at the new Zhulebenu heating plant, but with Russian controls, not Honeywell ones. The director of the Moscow Energy Office expects that they will not work quite as well, but they are happy to be doing it themselves. In this case there is no cost imperative pushing the Russians to adopt the best technology, merely a desire to do "better".

8 Pricing energy at international levels is still considered "arbitrary" by many Russian energy officials.

improving energy technology are rarely justified on their own but rather in conjunction with higher quality output, higher productivity, more timely production and better comfort/service. In Russia, the JEAS also plays a role in this area to the extent that energy efficiency can be related to overall economic, investment, and environmental goals.

2.1.2 Initial Energy Efficiency Activities

Energy efficiency initiatives were among the first efforts of USAID's Russian program. There have been a few completed efforts at district heating plants. But the main measures of success, replication and self-sustainability, are not yet apparent, nor should they be, since many tasks are not completed. The main USAID efforts have involved the following:

- establishing energy efficiency centers
- studies of improved industrial and power plant efficiency
- demonstration projects in district heating plants and factories
- training in energy efficiency

NGO Energy Centers and Professional Associations

The Center for Energy Efficiency in Moscow (CENEf) is the focal point for efficiency information and competence in Russia. Its activities need more direction and resources. CENEf has the potential to become a national force that can position the energy service industry to spring into action when the economy matures. The center has published a number of reports on conservation under the USAID program in conjunction with the contractor RMA.

Some things CENEf is doing well. Its appliance labeling program, so essential for consumer awareness, is right on target. The Center has drafted codes and energy legislation. It publishes a free newsletter, conducts seminars, and is working on establishing one professional association. CENEf also has created a data base of energy efficiency products and services. One thing CENEf does not do so well is spin-off commercial results from its efforts and knowledge base. The organization appears ill- suited for acting in a commercial capacity, for example, as a broker of energy savings performance contracts.[9]

The data base is an excellent start, but it could use more American entries, and more exposure around Russia. Other things need improvement. In particular,

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9 Eleven of twelve energy management performance contracts brokered by CENEf have failed completely.

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the following items will need to be resolved successfully before a self-sustaining energy service industry can exist in Russia:

- CENEf efforts to accelerate the development of professional associations which to date have been slow and restricted;
- CENEf needs to become self-supporting through association with manufacturers and/or consulting engineering groups;
- CENEf needs to develop professional relationships, not rivalries, with RAO-EES Rossii and the Moscow Energy Office;
- CENEf needs to make contact with US professional associations, including the American Society of Heating, Refrigeration and Air Conditioning Engineers, Association of Energy Engineers and the National Association of Energy Service Companies. Both CENEf and the Russian analogue to ASHRAE, AVOK, will receive more than they can give from such associations;[10] and
- CENEf needs to work with a US trade association, such as the American Gas Association, to improve standard setting.

On the US side there is little apparent contact between other US government entities and Russian entities such as CENEf. As USAID curtails some of its activities in Russia, other US entities, including the Foreign Commercial Service and USEA, among others, will need to take up some of the slack of maintaining some of the contacts with conservation groups and associations built up by this project.

Energy and the Environmental Connection: The Role of CENEf

Throughout its two weeks of meetings and investigations in Russia, the AID-EEMR evaluation team found almost no signs of attention to environmental issues. Damage to the environment is roughly proportional to the rate of energy consumption, yet except for EPA's ESOX program and a few pieces of CIP hardware, it seemed to most people that environmental consequences were a separate issue for another time and another place. Coal, for instance, is the dirtiest of fossil fuels, yet PIER in Moscow appears to have had little contact with the US Clean Coal Coalition.

The notable exception was discovered at CENEf in Moscow. As manifested by several published papers, the researchers at CENEf fully realize that environmental protection is a driving force in the quest for energy efficiency.

How can US AID capitalize on this nucleus of awareness? The CENEf staff understands the nexus of environmental and energy issues. These professionals already possess the skills to teach and disseminate the technical knowledge about

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10 In addition, the activities of such professional associations in the US demonstrate how voluntary organizations can act to set professional and technological performance standards without a large government bureaucracy.

realistic alternatives available to ameliorate some of the conditions. A perfect match to CENEf's skills would be a task to quantify the environmental externalities of energy use, and work with regulatory commissions to incorporate these costs into tariffs.

2.1.3 Large Enterprise Energy Conservation: Electricity Generation and Heavy Industry

USAID has supported studies of mechanical power transmission, lights, insulation and motors. This work has had yet to lead to significant replication beyond the enterprises studied. However, the pace of implementation makes replication in the present period difficult or impossible. Replication can only be judged after the fact. That is why getting the preconditions for true self-sustainability are so important. The larger institutional issues discussed above in Section 1 highlight the reasons that widespread adoption of improved energy productivity is not yet likely in Russia. At the same time, some improvements in energy measurement will assist in the identification of targets of opportunity for conservation technologies to be adopted once the institutional situation becomes more conducive to conservation. The targets for the Russian program reflect an understanding of the difficulties inherent in making such activities self-sustaining, looking at limited replication *only* by the middle of 1997.

In the Russian electric power area, many opportunities exist for effecting great improvements in electricity generation efficiency. One of the US prime contractors, Burns & Roe, has studied the potential as a part of the JEAS activities. As a result of the JEAS study, all power plants, including Central Heating Plants as well as nuclear plants, were placed on a common cost basis for the first time.

The joint US and Russian team for JEAS has identified and analyzed a number of thermal and hydro power plant upgrade options which are listed in the JEAS reports. On the transmission side the joint effort has identified load flow software and its requisite hardware that will allow upgrades to the transmission system.

Demonstration equipment from US manufacturers is already installed and operating in selected sites. One, the Tushino district heating plant in Moscow, has been discussed above in footnote 7.[11] This program can be successful as a part of an overall system planning and rehabilitation activity. In particular, older, less capable (for upgrading) power plants should be phased out without using excessive

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11 USAID can claim limited replication of the Tushino district heating plant instrumentation, but only at the expense of the US firms that supplied equipment for the demonstration program since the replication has taken the form of locally fabricated controls which are not quite as good as the Honeywell equipment.

analytical or rehabilitative resources. Adding new transmission lines will improve dispatch and should be compared to various generation options with regard to cost-effectiveness. To systematize such planning activities, the team suggests new activities, oriented explicitly at electricity system planning and investment (see below).

The JEAS cannot be yet considered complete with respect to identifying all of the relevant and cost-effective rehabilitation options for Russia. The JEAS bases its conclusions on two basic scenarios, both based on expansion of demand at historic levels. Neither scenario, one with nuclear power plants, the other without, provides a hard assessment of the savings in the electric energy sector from the reduction of electrical demand as electricity in Russia climbs to world market prices and as its industrial economy restructures.[12] Such a scenario represents an essential third element in the JEAS analysis.

2.1.4 Improved Electricity System Planning[13]

There are no specific tasks or activities related to load research and forecasting in the power sector or in the areas of demand management and resource planning. However, the team added this to the listed targets since both items are integral parts of achieving improved efficiency in resource use as well as easing the adaptation to market-based prices for both electricity and fuels. This is especially important in Russia.

Two of the subtasks in the JEAS relate to the proposed improvement in electricity system planning and resource management, though that is not the main purpose of either of the tasks. These are the integration task and the transmission and non-nuclear alternatives study. The JEAS work will serve to identify a number of possible options for the power system beyond investments in new capacity. These include:

- Investments in energy efficiency
- Upgrading existing thermal and hydro power stations
- Upgrading of transmissions systems

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12 One useful addition to the discussion is the assumption of embedded costs of existing facilities. By imputing a value to the capital equipment, the system planners will be able to compare fairly the various alternative facilitates. Once the kilowatt-hour cost of generation is determined, then each unit can be ranked in the order of increasing cost of generation. This ranking will precipitate further discussion concerning whether the replacement or upgrading of a particular unit is economic. By implication, such analysis will help establish the marginal utility of expending funds on any particular unit with respect to the funds necessary to perform this work. Each unit would then be classified in relationship to the replacement or upgrading of other generating units.

13 Italicized subheadings indicate targets added by the team.

The JEAS report will become the general plan for the power system and detailed resource plans will be required as the economic evolution of the country unfolds. In the efficiency area, the report will be augmented by changes in the market. For example, further efforts to enforce collections may result in the decrease in net generation demand as consumers and/or industry begin to curtail energy use. In the case of industry, the option of passing increasing costs from pricing reforms on to the consumer may not continue to be possible indefinitely without reducing demand for the final products or services. Other industrial facilities with more efficient technologies and methods will produce the same goods but at a lower cost, increasing their shares of the market. Simply put: the more efficient factories will drive out the less efficient ones.

If the aforementioned net decrease in electric power generation and/or energy demand does occur, the necessity to continue to build additional electric power generation could be reduced and, perhaps, some less efficient plants could be retired rather than renovated. This would affect the amount of donor funds required from the World Bank, the EBRD and other multilateral institutions. Such a scenario should be examined in greater detail and updated regularly.

A related activity is system planning for district heating. It is not certain that all district heating systems should be renovated and upgraded. Other heating options should be included in the overall picture. In Russia, the weight of USAID recommendations on this point is less than overwhelming, given the resources devoted to the issue relative to probable rehabilitation costs. At the same time, USAID consultants should make their counterparts aware of technical and organizational alternatives to current heating systems.

2.1.5 Conclusions

The USAID programs in energy efficiency have shown the cooperating Russian institutions the capabilities of US technologies to save energy, reduce emissions, and promote more efficient overall operations. At the same time, these activities cannot sustain themselves without further outside funds. Whether the target is improved building energy use or reduced fuel consumption in power plants, the issues are largely the same. The team has seen repeatedly that energy is not saved if enterprises lack hard energy budgets. Without the discipline provided by such hard budgets, many of the key indicators of success will not come about. Without hard energy budgets, the following outcomes are should be expected:

- service is not terminated for nonpayment;
- prices do not reach world levels, because nothing in particular propels them in that direction;

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- independent service firms are not widely available to assist in designing optimal efficiency programs because there is little effective demand for their services;
- financing is not available for new machinery since the paybacks from such investment are uncertain or absent; and
- the enterprise lacks the ability to keep for itself the gains from improved efficiency in energy use.

In Russia the connection is less pressing given the country's abundant supplies, with most energy supplies at low (local currency) prices.

Several USAID programs address these very issues. In the energy program itself, USAID contractors are working with enterprises to improve their accounting and information systems, while other consultants are assisting in price reform. Other USAID activities in the overall Russian program promote legal titling of property and the creation of user-friendly financial institutions. With such a panoply of assistance, it is reasonable to look at which tasks need to be done first. The team has concluded that the construction of the *capitalist infrastructure* is the top priority. This infrastructure consists of the following:

- enterprise commercialization,
- price reform,
- financial institution reform, and
- improved information systems and accounting.

With such infrastructure in place, the kinds of investments that are required in new products and technologies, or in rehabilitating residential/commercial space, will bring with them substantial improvements in energy efficiency that are typical of new technologies in the West. To help Russia prepare for the new world, the team believes that a cadré of efficiency specialists should be supported to form the core of energy service firms operating in a contract market, a distinct change from enterprise self-sufficiency in technology, which is typical of the current situation. Several USAID-supported tasks contribute to this end. In particular, the support for CENEf and the ongoing audit programs and equipment transfers will build up capabilities in efficiency outside the captive engineering staffs of current enterprises.

Continuing the current approach of small demonstrations in Russia may save energy at particular institutions. However, given the size of the country, significant accomplishments in energy efficiency will require massive replication of the USAID-backed efforts. The heavy commitments of time and resources required to put demonstration projects into operation need to be weighed against the opportunity costs of such programs in the program as a whole. If the demonstration program is very small relative to the overall economy, then the likelihood of spread effects is

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low. If there are too many demonstrations to be implemented properly, then the impacts are reduced further. Targeting the recipients of such assistance is vital. To have a positive demonstration and spread effect in large economies, such programs should follow these general guidelines:

1. Choose factories or power plants that are in full operation;
2. Make sure that there is real market demand for the factory's product;
3. Consider examples of how such modifications can be put into other operating units - prepare financial and economic comparisons that use the prices and costs faced by factory and plant managers for their decisions and use border prices for the World Bank projects. Make the demonstration project a real showpiece; and
4. Leave enough money in the budget to bring in visitors and show them the technology and management.

In the arena of energy investment planning, the team has concluded that scenarios cognizant of conservation, and changes in industrial structure and technology need to be internalized into the planning process of JEAS and its successor activities.[14]

2.2 Market Reform, Restructuring & Legal Framework

2.2.1 Critical Issues and Indicators in Economic Restructuring.

This section of the evaluation report addresses the relationship of regulatory activities to the accompanying economic restructuring activities. The intent is to show how the USAID and other donor activities can be made more effective through establishing and then following a critical path for reform. The constellation of activities required is roughly the following:

1. Establishing markets
2. Expanding private sector activities, and
3. Promoting investment

The specifics of this critical path are discussed in greater detail in Section 1. This subsection of the report is concerned specifically with the plan for restructuring

14 This suggestion implies adoption of the "scenario planning " technique used by several of the international oil majors in which a variety of operating environments are suggested, along with proposed responses by the company.

in electricity as well as support for regulatory activities. This set of targets and activities relates to Program Objectives 1.2: Establish a policy, legal, and regulatory framework conducive to broad-based competition and private sector growth; and 1.6: Promote sustainable use of natural resources. Specific indicators which are relevant to the electricity and other energy restructuring and regulatory activities include the following:

1.2.01 - Establishment of policy, enactment of legislation and development of regulatory procedures necessary to break-up or control monopolies, establish markets, expand the private sector and strengthen competitiveness in key economic sectors

1.2.03 - Competitive pricing for efficient use of energy resources

1.2.04 - Development of contractual arrangements and pricing mechanisms for the reliable and efficient trading of energy among NIS, CEE, Western Europe and other markets

1.6.01 - Promulgation of energy standards, policies and legislation that support (a) subsector restructuring . . .

2.2.2 Plan For Electricity Sector Restructuring

This target, one of the key elements of the entire USAID and IFI program, aims to accomplish the following:

- Produce a jointly agreed comprehensive time-phased investment plan for the Russian power sector; and
- Define an electricity market structure that will ensure the emergence of a competitive, efficient and market oriented power sector.

Meeting this target in Russia involves elements of the JEAS, and other electricity activities, as well as implementation of regulatory reform and privatization. This activity was one of the early targets of opportunity in the USAID program. At that time, the Ministry of Fuel and Energy and its electricity spinoff, RAO-EES Rossii, were among the only institutions that USAID could work with for electricity sector reform. The USAID consultants as well as teams from the UK, France and Austria, have defined a number of structural alternatives for RAO-EES Rossii. Before any of them can be implemented properly, a number of specific steps must be undertaken to set up the asset structure and entry and exit conditions that will govern the electricity market.

RAO-EES Rossii, like other Russian privatized monopolies, was set up from assets previously owned by a government ministry, in this case the Ministry of Fuel and Energy. RAO-EES Rossii remains a quasi vertically integrated monopoly and has both ownership and managerial control of generation and distribution, as well as its

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transmission assets. The particular form of this "corporatization" of the MFE electricity assets does not assure the viability of the various generation and distribution entities that were established, independently from direct control by RAO-EES Rossii. Moreover, there are different capabilities in management and regional growth so that some of the entities are doubtless slated to fail while others will grow.

USAID's program of technical assistance to RAO-EES Rossii has produced a number of plans for a wholesale electricity market involving RAO-EES Rossii as the market operator and the owner of the transmission system. However, RAO-EES Rossii will still own significant shares in both generation and distribution assets as well, a fundamentally non-competitive structure. Other ideas exist that would promote greater decentralization of decisions. The team found that such ideas were not considered within the confines of the technical assistance being provided to RAO-EES Rossii.

The team believes that the work done for RAO-EES Rossii has been of high quality, but that USAID needs to step back and consider the various elements of a well-functioning electricity market. These include:

- Limitations on monopoly ownership of network assets (the transmission system) accompanying participation in the other segments of the market.
- Specification of the assets and liabilities of the various generation and distribution companies in such a way as to prevent the emergence of regional monopolies.
- Establishment of a forum for making decisions on market entry and exit and competition.
- Establishment of wholesale and retail tariffs for the transition period.

Successful restructuring of the electricity sector will require establishment of a regulator of the market, so that the current path pursued by Gazprom is not replicated in the electricity sector. The team believes that a well-functioning Federal Energy Commission (see below) can promote a smoother transition to a competitive electricity market.

2.2.3 Privatization Legislation for Electricity Generation and Transmission

The USAID project has devoted resources to providing RAO-EES Rossii with assistance on privatization, corporatization, and the legal structure of the Russian electricity market. This effort is intended to produce the legal framework for a wholesale power market, retail price regulation and independent power production. These efforts have achieved mixed results, thus far. Where the goal is clear and the client is willing, the legal technical assistance has proved beneficial and would be

truly useful if it were completed. In Russia, the lack of unanimity among various interested parties has thwarted the precision of the legal work.

At this time, the results of the legal work are inconclusive. Direction from RAO-EES Rossii has been changing, inconsistent and irregular. As a result, the legal consultants, Latham & Watkins, have prepared numerous memos and work plans that were vitiated by subsequent changes in direction by the client and by other USAID contractors.

This type of activity does not greatly advance the cause of providing Russia with workable electricity law. At the same time, US-type legal principles are indispensable for the establishment of IPPs, settlement of disputes and basic commercial law involved in corporatizing the state's electricity assets. In other words, some sort of completion of this activity is essential to a functioning market.

The expertise of the legal advisors is not being exploited effectively by this project. The advisors would be better able to assist the Russians as advisors, not drafters of legislation and regulations. At the present time L&W drafts and the Russians and their US advisors react. L&W would be more effective if the direction of the information flows was reversed. In other words, the L&W lawyers should be advising the various Russian entities on the legal aspects of *their own* conceptions of structure, prices, entry and exit, geographic extent, and other issues. Such a change in the role of L&W would also allow them to provide assistance to other Russian entities, including the FEC, as well as to RAO-EES Rossii.

2.2.4 Creation of an Independent Electricity Authority

This target was established in the recognition that some type of regulation, during the transition and at the retail level, would be required as a part of electricity sector restructuring. The consultants to the World Bank and USAID, PHB and RCG, have included the regulatory activity within the overall restructuring report. The RCG report for Russia recommends a minimalist approach to regulation which is appropriate in the context of a functioning competitive market. Given the conditions which currently prevail in that country's electric system, care must be taken to make sure that the regulatory authority has the power to restrain arbitrary use of market power. In addition, the regional aspects of electric power regulation and market activity (through Regional Energy Commissions) have yet to be worked out fully.

Up to this time the establishment of a regulatory authority has taken a back seat in both Russian and USAID priorities. The consultant will need to devote more attention to the activities of the FEC and RECs and the impact of the recent presidential decree strengthening FEC's staff and activities. As a first order of

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business, the consultant will need to prepare various alternative models for regulatory oversight. Key issues that will arise in the short term include the following:

1. Independence of the Commissioners;
2. Financial autonomy of the FEC;
3. Method of resolving disputes - order/decree v. open hearing process;
4. Neutrality of the FEC as an arbiter of competing interests; and
5. Flexibility to accommodate both technological and organizational change in the affected enterprises.

If these steps are not taken and issues are not resolved in the short term, there is little to assure the establishment of a truly competitive market in electricity.

At the present time some consultants are also involved in the creation of the FEC staff capabilities. It is in the interest of USAID to avoid the type of fractured situation that has prevailed at RAO-EES Rossii with advisors working at cross purposes to one another. In this respect, USAID has a particular advantage in that two of its advisors, through a non-energy program, are already working with both the FEC and the Anti-Monopoly Committee.[15] Such synergy should be exploited further.

2.2.5 Establishment of Market-Based Prices for Electricity

USAID has supported efforts to introduce marginal cost pricing to the electricity sectors in all three of its aid recipients. In Russia the RCG team has completed reports which explain the concept of marginal cost pricing in the context of a wholesale market for electricity. The team has also introduced the time of day pricing principle to the RAO-EES Rossii counterparts. These principles are less well understood in the regional AO Energos and in the power plants themselves.

Pricing reform is probably not achievable without a joint program between USAID and the World Bank to provide the AO Energos, RAO-EES Rossii and potential private entrants to the market with a view of a market in which allocation is determined by competitive prices, or at least prices that are roughly comparable to those prevailing elsewhere in the world. With the importance of electricity in the economy as both a fuel purchaser and a market for equipment, a number of other prices will need to come into competitive balance at about the same time for electricity prices to show significant improvements to the allocation of resources.

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15 These are the IRIS program and the Harvard Institute for International Development. It appears that there are imminent changes in the Russian government's approach to restructuring its electricity sector that may comport better with the recommendations given in this evaluation report.

Finally, the arrearages problem will need to be solved before economically efficient prices can be established and enforced.

The competitive market price for electricity will vary regionally and to the degree that new generation capacity is required by the system. Using simulated competitive prices, consultants should work with the Russians to make explicit the various tradeoffs between price levels and different demand and supply scenarios as well as the interdependence of energy prices with other prices. If it is not yet clear to the target audience, both USAID and the World Bank need to continue to educate on the subject of energy pricing reform. Though such reform is sometimes seen as a "magic bullet," and while appropriate prices are necessary for efficient resource allocation, they are not sufficient (see Section 5.2). Other pieces need to be in place as well, especially alternative products, financing for efficiency and fuel substitution, and the ability to reorganize.

2.2.6 Transparent Prices for Oil & Gas Pipeline Services

This target was added by the team as a necessary support for the oil pipeline access reform. It is an important element of the work that has been completed by the Boston Consulting Group for the Russian Ministry of Fuel and Energy for the World Bank under the USAID/World Bank Cooperative Agreement. The efficient transport of liquid fuels is vital to the Russian economy and to its ability to make reasonable choices regarding different energy sources. This work focused on the oil sector as a whole. The specific work by BCG for Transneft has not yet started.

In a larger sense, an oil transmission company that exists as a private monopoly reinforces some of the less desirable trends in the Russian economy at present. In particular, interfuel substitution decisions cannot be made on a reasonable economic basis as long as access to fuel is still an administrative decision, not a market outcome. Moreover, the inability of pipeline users to invest in alternative routes reinforces the allocative inefficiencies of the current Transneft monopoly.

2.2.7 Model Bid Packages for Oil and Gas Exploration

USAID, under its Cooperative Agreement with the Department of the Interior's Minerals Management Service (MMS), has presented workshops on evaluating oil and gas properties, preparing bid packages for concessions, and incorporating environmental analysis into the development process. These workshops are intended to assist in overall oil industry restructuring as well as mobilization of foreign investment.

The Russian oil industry counterparts believe that they possess sufficient industry sophistication to preclude the need for bidding demonstration projects or assistance. The reality is that considerable potential investment is delayed due to inappropriate legislative and tax policies.

USAID can assist the process of improving the efficiency of Russia's upstream oil sector by continuing to press for open information markets and open bidding and tax procedures. As with many other aspects of this project, there is a difference of perception between the Russian and US participants. The proposals that are contained in the MMS activity are fundamentally alien to the traditional techniques used in the past. Given the resistance of the Russians to assistance in bid procedures it may make some sense to reorient the MMS activities into the areas of taxation and legislation. These two activities, fundamental to successful bidding and leasing, can also form a part of the policy dialogue with the IFIs, unlike bidding procedures, *per se*. In this way, the USAID activity can complement other loans and conditions by the IFIs, improving the likelihood of success for the taxation and leasing activities.

2.2.8 Conclusions: Key Restructuring Elements for USAID's Russia Program

The common thread of the targets examined in this section is the need to proceed carefully with corporatization, restructuring, regulation and commercialization. Getting these elements of the market designed and implemented correctly allows the entire process to proceed more smoothly and makes the ultimate outcome more compatible with USAID's objectives of decentralized competitive markets in the energy sector.

Privatizing state monopolies will not achieve the objectives that USAID has set for Russia's energy sector. In order to prevent this there are two programs that must precede the formal restructuring of the sector and the establishment of wholesale markets. The first is a careful look at the asset bases of various enterprises that were established in the sector. The second is the enforcement of regulations governing entry and exit for the industry, to encourage competition and restrain the current monopolists. The experience of the UK in this regard is instructive. Several of the privatizations of the 1980s set up private monopolies in gas, telecoms and air travel. These firms remain entrenched in their markets with minimal competition. In Russia, with larger and more powerful monopolies, the potential power of such entities should not be underestimated. In addition to the competitive issues, privatization of the current RAO-EES Rossii, Transneft and Gazprom assets via simple transfer to workers and managers will lead to large rents for the current employees and management and will defeat the goal of widespread ownership of such companies.

Once the corporatization and restructuring activities are under way, it will be appropriate to promote competition and decentralized resource allocation decisions. Intelligently commercialized enterprises will be able to participate in the new markets. A light hand on the regulatory tiller could enforce entry and exit conditions that prevent a reversion to private monopolies in electricity.

2.3 Commercial Activities & Privatization

2.3.1 Key Issues, Indicators and Concerns

Commercially viable private sector capability, developed to provide energy services including production and distribution, is one of the prime objectives of the USAID energy program. Initial activities have focused on making the Russian entities familiar with Western management methods and organization along with typical commercial practices. In 1993 and 1994 much time was spent on arranging trips to the US for members of the various government entities and joint stock companies for participation with US utilities, US government agencies, and other US interests such as NGOs, corporations, foundations, think tanks, financial institutions, and utility/industry regulators. Participation at joint seminars with US counterparts also led to additional opportunities for interchange between private industry in the US and enterprises from the Russian Federation. These efforts provide an important, if intangible, means of promoting new ways of looking at the world. Such activities address some of the USAID concerns about creating opportunities for US firms.

Other issues vital to the success of the USAID program in the former Soviet Union include the *methods* of corporatization of oil and gas production companies, creation of open markets, and introduction of commonly accepted management tools and techniques of accounting, information systems and telecommunications. One key element of such open and transparent elements in energy markets is the creation of markets in geological and technological information, in addition to the commercial service firms mentioned above. This evaluation sought to determine whether USAID assistance has promoted the commercial and private market forces which must accompany restructuring and resource mobilization.

The targets and tasks evaluated in this subsection relate to Program Objectives 1.3: Stimulate Development of Private Sector Enterprises; and 1.6: Promote sustainable use of natural resources. The specific indicators which are relevant to these objectives are:

1.3.06 - Increasing number of joint ventures involving foreign partners

1.6.01 - Promulgation of energy standards, policies and legislation that support . . . (b) commercial market development of energy efficiency and related environmental technologies and services

1.6.02 - Commercially viable private sector capability developed to provide energy services, including production and distribution

2.3.2 Creation of Commercial Oil Sector Entities (Transneft, Sidanco) - Replicability & Resource Mobilization

The creation of a competitive oil market is believed by the Minister of Energy, Mr. Shofranak, to be achievable by the end of 1995. USAID efforts, implemented through the World Bank Cooperative Agreement, are intended to create viable corporate entities in Sidanco and Transneft. It is anticipated that the creation of additional entities will provide the basis of a free market in oil eventually. During the transition period from a centralized planned system to a free market, there will remain a significant amount of government supervision of this important sector of the Russian economy.[16]

Before such entities as Sidanco can operate in a transparent and reasonable energy market, it will be necessary to review the status of the legal and beneficial ownership of its assets. The team found that the Sidanco assets were arbitrarily assigned to various entities. Moreover, although the refining and production assets were owned by the same entity, the location of the Sidanco refinery is such that refining Sidanco's oil there is impossible. Given the overcapacity of the Russian refining sector, it is not likely that this refinery will be used for contract refining either. Therefore, the asset is both useless and of little value to Sidanco. The only real option is sale of the refinery to some Volga region producer.

Clearly, the entity does not necessarily make commercial sense. Given the basic problems with the status of the asset base of the company, the consultants found it necessary to work at the corporate level on activities that Sidanco could undertake at that level under current conditions, including improved management, spinning off non-core assets and adoption of international standard accounting practices. A formal legal organization to secure the status of the assets, corporatization, was not possible at the time Bain did its work. Sidanco does not yet operate as a unified company with more than one of the local production companies

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16 The vertically integrated structure of the oil companies is driven more by the shortage of managerial and financial resources than by such normal economic factors as coordination of exploration activity with that of production, refining, marketing, and distribution.

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pursuing its own capital-raising activities.[17] This work was performed well and may provide a model for the Russian oil industry once the asset situation is put in order.

The other major activity in this area concerns the commercialization of Transneft, the oil pipeline company. The Boston Consulting Group work with Transneft, not yet under way, will explore particular forms of enhancing the market value of that enterprise. The previous work for the Ministry of Fuel and Energy was considered important in order to set the stage for the types of advice that BCG will provide on the operations and organization of Transneft. At the present time Transneft still operates as a government entity. By this we mean that allocation decisions for space on the system are made by the Ministry of Fuel and Energy. Certain elements of simple corporatization have not yet been worked out either. For example, the production associations and vertically integrated oil companies cannot invest in Transneft itself or in alternative systems. However, foreign oil companies have been able to invest *with* Transneft in new or upgraded lines and terminals. In sum, USAID efforts, through the Cooperative Agreement with the World Bank, have not yet led to transparency in oil market operations or in oil transport.

2.3.3 Information Exchange, Training & Establishment of Working Relationships Between US Utility Companies and Russian Electric & Gas Companies

The program with the US Energy Association provides FSU energy companies with information exchange and other types of working relationships with US utility companies. The training program is run by the Institute for International Education (IIE) and involves short courses in a variety of subjects for Russian in-service professionals.

Partnership Programs

In 1993 a group of Russian energy executives participated in a conference in Tucson, AZ. At the end of 1994 a list of proposed partnerships was finalized. Included in this activity are partnerships between RAO-EES Rossii and the Edison Electric Institute and between Gazprom and the American Gas Association.

The program has little in the way of accomplishments to date, owing to a late startup, but it is intended to play a key part of introducing Russian utilities to new management techniques, technology, and financial methods. In the future this information exchange program should be able to move to a private funding basis if

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17 One of the key assets of Sidanco, Purneftegaz, was abruptly removed from the corporate structure during 1994.

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there are tangible advantages for each side. Under such circumstances, the Russians might receive internships at their US partners in exchange for the US partner receiving management contracts for some operations in Russia or possible participation in system expansion activities. The precise nature of cooperation with the US utilities is unlikely to be further specified without additional commercialization of the Russian entities.

One of the difficulties with the partnership program is that there must be tangible rewards for each side. Otherwise interest can flag. The evaluation team has looked at such programs in Russia, Ukraine and elsewhere in the world and has concluded that there are a number of important elements in a successful partnership program. These include the following:

1. consistent staffing from both sides;
2. real resource commitments from both sides for both local and foreign costs;
3. a workplan and timetable with specific milestones and accomplishments; and
4. an investment opportunity for the US firm in a restructured partner or sector.

Without this kind of discipline and structure, the program can quickly disillusion both sides and lead to more ill will than transfer of technology and skills.

In-Service Training

The activities of the International Institute of Education (IIE) are also included in this target. The IIE has offered courses in a variety of subjects, as agreed by their Russian counterparts. At the present time the upper management of the RAO-EES Rossii and some regional companies are participating in the program. At some stage, the project will need to be broadened to regional managers and white collar staffs. After 1995 the project will need to be evaluated to determine whether the Russian power industry entities are capable of taking over the activities, albeit with some technical assistance from IIE specialists.

In the education and training area the program in Russia has succeeded in many of its activities. Hundreds of Russian enterprise managers and engineers have been trained in and exposed to new skills and new ways of looking at the world. The program has brought exposure to new techniques, technologies and thinking to a generation of Russian engineers and managers. The IIE has brought a high level of professionalism to its training activities. The program is an integral part of the change in attitudes that must accompany economic reform in Russia. However, the levels of resources provided to this task seem to be unsuited to the objectives of the

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activity. In a situation where tens of thousands must see their skills upgraded, the IIE program can reach hundreds at most over its lifetime.

Bridging the gap between the needs and the resources available is the key to an effective long term professional training program. USAID must face this gap squarely and look at the problems with the program to see what they imply about alternatives. Consider the problems of the Russian program - difficulties in selecting students, lack of replication and spread outside the target group and high expense relative to the number of people trained. In this program, too few people of uncertain provenance are supplied to a high-quality training program with little follow up to ensure that this upgraded human capital benefits the enterprise and the country.

There are alternatives. Effective training should rely on the country's own highly developed educational establishment as well as the desires of many Russians to upgrade their own skills to match the demands of a restructuring economy. The World Bank's Economic Development Institute has provided one model where Russians are trained and then supported by the EDI for a short while as they develop fee-for-service courses around the country. The team leader of this evaluation effort has participated in the World Bank's program and has found it to show great promise to spread the gospel of market reform as well as specific skills upgrading in accounting, finance, engineering and management. Another model is to train faculty at local business colleges in the types of skills transmitted in the IIE program currently. The participants would be business college or polytechnic faculty members. These people would then work the course materials into their regular offerings. There are two great advantages to this second approach. First, the ultimate beneficiaries of such teachings will take those course when they want to and will pay their own money for it. Consequently, the message will be more valuable to them than if it is a gift. Second, this builds a more permanent intellectual infrastructure in the country to support other changes in the countries.

2.3.4 Improved Performance in Coal Industry - Alternative Models of Reform

Under the cooperative program with the World Bank and with the funding of Partners in Economic Reform (PIER), USAID has worked to reform the coal industry. USAID has supported the PIER program to address the organizational, managerial, health and human issues in Russia's coal sector. This industry faces unique problems. Much of the industry is located in remote areas so that local employment options for the displaced workers are few. In many cases the mine workers represent a legacy of the former regime, an enterprise established for political and penal reasons as much as for economic ones. With less than 10% of

total energy production, coal is a secondary energy resource in Russia, vital only in certain uses such as metallurgy and in some power and district heating plants. At the same time, improved performance of the coal sector provides a model of human-oriented change that may provide an example for other enterprises in remote areas.

In the near term, there is a need for closer participation with US miners, unions and US government bodies (EPA, OSHA) on vital issues of workplace safety and technology. These efforts should be continued, particularly in mine safety.

Coal is presently at a competitive disadvantage due to its own high costs from the imposition of high rail transport costs and because of low priced natural gas. Without some intervention and/or modernization, wholesale mine closures are likely. Widespread mine shutdowns may lead to political and fuel supply disruptions. The coal industry is, in a word, tragic. Any attempt to reform the coal sector of the Russian system should be viewed at all levels as one that is a most complicated problem.

In the longer run, the focus of foreign assistance needs to shift to an orderly restructuring of the industry. Such an activity will be funded by one or more IFI, but a resource like Russia's coal could draw on international private investments as well. The viability of the coal industry in the longer term will depend in part on the adoption of better production and combustion technology as well as on significant downsizing. The special circumstances that surround much of the formation of the Russian coal industry and its projected shrinkage[18] argue for a significant *social* program to assist in relocation and retraining. Further contact between US coal companies, labor unions, and other US government entities may help pave the way for resolution of mine safety issues, improve mine productivity, and foster close ties that will endure after this transition period is completed.

The PIER program has succeeded mostly because it has paid attention to the human dimension of the industry's problems. Indeed, even the World Bank representatives contacted by the evaluation team admitted that PIER makes it possible to bring together the disparate groups who must find a *modus vivendi* that promotes and effects sectoral reforms. The PIER representative in Russia is virtually the only person who can get everyone together. This represents a unique contribution for which the program can be justly proud.

The efforts of PIER represent a genuine example of effective low cost impact in Russia. The PIER representative is generally acknowledged to be at the center of

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18 The World Bank predicts a decline in production of more than 100 million tonnes/yr. from the current (1990) level of about 250 million tonnes/yr. to under 150 million tonnes/yr. by 1997. Under such circumstances, there will be many mine closures with certain mining regions becoming economically redundant by 2000.

reform efforts in that sector, even though most of the resources are put in by others. The PIER representatives appear to make good use of resources produced by the World Bank and others and have been far better than the IBRD in playing to the human side of the industry's restructuring problems.

2.3.5 Improved Oil and Gas Information and Exploration and Bidding Packages

USAID has promoted the organization of oil/gas data to facilitate greater foreign investment. This activity, funded under the Cooperative Agreement with the Department of the Interior and executed by the US Geological Survey, is scheduled for completion in early 1996. Another element of this activity, executed by the Minerals Management Service, is the development of contractual arrangements and pricing mechanisms for the reliable and efficient leasing of exploration, development and production rights in Russia's oil sector. Such activities promote more transparent and efficient trading of energy among NIS, CEE, Western Europe and other markets. The USAID activities also promote a more environmentally benign form of exploration and production by introducing environmental impact analyses as a part of the bidding program.

The Russians are beginning to recognize that in order to attract investment in the oil and gas sub-sectors, they will need to release information vital to mounting any exploratory work. Such information will form the basis of a self-sustaining market in geological prospect information that should lower the transactional costs for all firms entering the Russian market, especially for the smaller ones. Much of this is unprecedented. In effect, Russia is being asked to release information that in the past had been guarded closely for allegedly strategic reasons.

This information center has had little or nothing to do with Gazprom, the gas exploration, transmission and distribution monopoly. Gazprom apparently intends to remain the sole manager of all natural gas within the Russian Federation.[19] In this respect, the oil industry is finding USAID assistance of value in creating an alternative market structure to the former model still typified by Gazprom.

The opening of an oil and gas center by the US Department of Energy, funded through a Participating Agency Services Agreement with USAID, to promote commercial exchanges between US and Russia by early 1995 is nearly complete. A conference to inaugurate the center was scheduled for Spring 1995. It was proposed that 14 oil and gas centers be opened to provide a means for commercial and informational exchange in the oil and gas regions throughout Russia. While the

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19 It now has the distinction of being the largest utility in the world and voices no intention of downsizing or spinning off various business units.

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creation of oil and gas centers is a noteworthy effort, there appears to be little benefit to individual US companies to fund such an effort. One suggestion is that an industry association, such as the American Petroleum Institute, pick up the funding for these centers that will benefit their members in a broad sense.

2.3.6 Commercial Energy Service Companies

The existence of private energy service companies is one of the objective gauges of success of the overall energy program in the Former Soviet Union.[20] Such companies give tangible proof that the following issues are already resolved or are on their ways to resolution:

1. market-based energy prices
2. hard budgets (including active collection efforts) for energy distribution companies
3. restructuring of captive engineering operations at power plants and industrial enterprises
4. availability of finance for new firms
5. legal titling and other rights allowing property owners and plant owners/managers to keep their savings from energy efficiency or new investments
6. expenditures from factory owners or mangers indicating that the factory produces *salable* output in a market environment.

Service companies in the former Soviet Union may pose unusual problems. Presently, the plant managers have engineering, construction and plant maintenance staffs under their purview. They will likely resist any change in this arena. At the same time, restructuring will create redundancies among engineering, maintenance and construction workers in the energy sector, as it has in other industries. Such workers will be forced to find jobs elsewhere. Some of the professionals will start new firms based around what they know, and should promote the development of private contracting and service firms.

By promoting competition in the market place, the creation of separate service industries will encourage plant management to divest itself of inefficient and/or non-producing subsidiaries. In other words, such service companies can provide timely services while improving the power plant bottom line.

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20 This infrastructure-building component, often taken for granted in a capitalist country, is *the sine qua non* of an advanced economy. The adaptability of such firms allows the clients, be they oil refineries, power plants, commercial buildings, factories, or petrochemical enterprises, to allocate resources to new ventures, adapt to changing markets or make clear the various repair, buy or build decisions with which such firms are faced each day.

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The establishment of private energy service companies is predicated on the desire and/or necessity of the present plant managers to, in essence, set their people free to pursue work as individuals or in independent firms in the service sector of the economy. The adaptability of individuals to adjust to this new way of thinking may cause tremendous transitional problems. The formation of new service entities contradicts the way in which they were raised and embraced by the communist system. The timetable for the creation of this industry is neither clear nor certain.

USAID efforts can have little direct impact on such events. At the same time, the types of efforts promoted in the efficiency area, preparing a core cadre, providing information and technical exchange, and strengthening voluntary professional associations, will assist such firms as they come into existence and as the economy restructures and enterprises modernize.

2.3.7 Implementation of International Accounting Standards at RAO-EES Rossii

USAID, through its contract with Price Waterhouse, is changing the accounting and financial management at RAO-EES Rossii. This effort, first at the company headquarters, and then in the regional distribution and generation companies, is an essential component in the construction of a "capitalist infrastructure" in Russia's electricity sector.

In order to prepare an enterprise to operate effectively in a market economy (commercialization), certain components of managerial control are essential. These components include management and financial information systems using internationally accepted accounting standards, internal financial controls and regular auditing activities. The USAID activity has sought to introduce these activities throughout the electricity sector. As one of the key building blocks of a market in electricity, the distribution enterprises require attention from this task. Local distribution companies must become fully capable of operating in a market environment. USAID and other donors can assist in this effort. Without thoroughgoing preparation for market conditions (commercialization), attempts to operate a wholesale electricity market will founder on the differential understanding, capabilities and management systems of various market participants, making operations on a level footing difficult or impossible. This activity is, in a word, vital.

The team endorses this activity and believes that regionalization to the AO Energos is essential in the near term. As the points of contact with the customer, the regional distribution companies will be the ones to enforce the "hard budgets" that must be part of true commercialization of the electricity sector. In that case they must be capable of making appropriate managerial and financial decisions.

2.3.8 Conclusions - Results of Commercialization Activities, Training Efforts in Market Operations and Management.

The commercialization area has two main foci. The first is the mobilization of Russia's energy resources in a market context. The second is the leveraging of investment and trade. The focus of this section has been the direct cooperation between Russian entities and US companies.[21]

The main conclusions with respect to commercial activities and privatization are dependent on the industry in which the activities take place:

- **Oil & Gas**: Creating vertically integrated oil companies may initially foster competition within Russia in all segments of the industry including exploration, transportation, refining, and distribution. Continued creation of competing commercial oil sector entities appears both useful and necessary. Vertically integrated companies can partner with or even compete with international majors (as has Lukoil) in Russia and abroad. Eventually, a diversified oil industry can work out its own optimum structure.
- **Oil and gas exploration** activities and the exchange of technology may now be best left to private industry. USAID should continue to monitor the activities of US companies and others and work with the World Bank so that US firms can benefit from the policy and financial leverage provided by Bank activities.
- **Utility Companies**: Information exchanges between US utility companies and Russian electric and gas companies should be continued, but they do not appear to need much further funding from USAID. Perhaps some sponsorship by US companies and trade organizations will prove sufficient to allow this to be a stand alone activity with USAID providing a monitoring or focusing function to these activities.
- **Coal**: The coal industry should be viewed as a special case and continued support to this sub-sector of the Russian economy should be considered vital for humanitarian reasons, though not necessarily as a part of the energy program.
- **Energy Service Companies**: Establishing private energy service companies is an essential part of economic restructuring. This activity should be supported in its human capital development so that as market opportunities arise, the new firms can take advantage of them.
- **General**: Constructing the capitalist infrastructure - accounting standards for transparency and control, contractors for flexibility - will be a key element of overall enterprise and sector restructuring. These efforts should receive high priority.

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21 The following section deals with mobilization of financing from international financial institutions.

2.4 Resource Mobilization for Investment

One of the key results of the USAID work in the Former Soviet Union will be the mobilization of investment resources for those countries' energy sectors. A plan for investment along with activities that accompany the initial stages of investment, is seen by many, especially those in the power sector, as one of the primary benefits of the current cooperation with USAID and the international agencies. To that end, one of the major themes of the JEAS and of the assistance to RAO-EES Rossii is investment analysis and planning. At the present time USAID is supporting two of its contractors to study the technical and financial attractiveness of constructing a large gas-fired combined cycle (GCC) power plant in the capacity-short Krasnodar region in the Northern Caucasus.

The Krasnodar study, performed under World Bank management for USAID, is intended to investigate the technical and economic attractiveness of the proposed project. When completed, the study will fulfill one of the targets of the program, at an initial stage at least. If the results of the study are positive then further investigations of financial feasibility will be undertaken, including possibly the study of various private funding and ownership options. Such private ownership alternatives would meet another of the targets of the investment mobilization indicators and objectives. At the present time private investments do not exist in the power sector, though there is considerable activity by private firms in oil and gas, oil pipelines, and captive generation at industrial complexes.

A third target of this portion of the program is the investment by private firms in both energy efficiency and services. There appears to be little progress to date in this area and there are a variety of reasons for this outcome. However, there is a constellation of factors which stands behind most of the energy projects that fail to progress in Russia, and efficiency is no exception. This constellation of factors includes the following:

- Insufficient movement of energy prices toward world levels
- Soft budgets for domestic enterprises, especially for space and water heating, leading to the
- Inability to finance or to justify the financing of domestically-oriented efficiency projects due to arrearages, and finally
- Lack of managerial freedom and ability to implement and install new energy technologies

To break through this logjam of difficulties, the team concluded that placing financial reforms as an additional target would serve as a reminder of the degree of dependence of the energy program's success on other USAID and donor activities in the financial area and of the need for large scale restructuring and reform of state enterprises.

The targets and tasks evaluated in this subsection relate to Program Objectives 1.2: Establish a policy, legal, and regulatory framework conducive to broad-based competition and private sector growth; 1.3: Stimulate Development of Private Sector Enterprises; and 1.6: Promote sustainable use of natural resources. The specific indicators that are relevant to this subsection include the following:

1.2.02 - Competitive pricing for efficient use of energy resources

1.2.04 - Development of contractual arrangements and pricing mechanisms for the reliable and efficient trading of energy among NIS, CEE, Western Europe and other markets

1.3.06 - Increasing number of joint ventures involving foreign partners

1.6.01 - Promulgation of energy standards, policies and legislation that support . . . (b) commercial market development of energy efficiency and related environmental technologies and services

1.6.02 - Commercially viable private sector capability developed to provide energy services, including production and distribution

1.6.05 - Private and public financing mobilized for specific investment projects in energy and environment

2.4.1 Investment Studies for Power Plants and TDA Activities

As part of its continuing cooperation with the World Bank, USAID has engaged Burns and Roe and RCG/Hagler-Bailly to study the attractiveness of a large gas-fired combined cycle power station in Krasnodar, North Caucasus region. This study is not yet completed. One of the main problems in this area is simply one of scope. The JEAS has identified literally dozens of proposed new power plants or those requiring rehabilitation. A great many investment studies of the type to be completed in this task will be performed in the future. The resources need to be allocated well. In particular, this means looking at the entire range of resources available to pay for such studies. These sources include the USAID program in the broad sense, including IBRD and TDA elements. It also means considering the OPIC and Eximbank resources that may be available for such studies. Eventually, if the investment climate improves, the developers will finance investment studies themselves.

As a preliminary step to making sure that the "soft" resources are applied properly, the list of proposed investment projects will require some trimming so as to minimize expenditures on plants that are not financeable. This screening process

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will need to include both new capacity and fuel substitution, putting those options on a comparable basis with efficiency and demand management.[22]

The investment studies represent one step in the project development framework. At first, they should be targeted at only the most promising opportunities since the foreign technical assistance will give the investment appraisals a credibility that is vital to initial success. Eventually, the USAID and IFI financing can focus on the projects for which commerciality is not immediately apparent, and where intervention of some sort may be needed to establish whether a proposed project can be financed either through IFIs or privately..

In addition to the work in the power sector, USAID has supported engineering studies which assisted two World Bank gas distribution loans.

The activities conducted by the Trade and Development Agency have, for the most part, been independent of USAID support. USAID provided $3 million support for some studies, including one which aimed at developing a dual-fueled (diesel and natural gas) engine for use in buses. This engine design development was performed at the request of Gazprom and the Moscow Energy Office. The development of the engine is to proceed as a joint venture of ZIL and Caterpillar.

Continued support from USAID for future TDA activities should be considered on a case by case basis. While TDA has shown substantial results from the funds invested by USAID, sufficient funding of TDA activities from other sources could obviate the need for further funding from USAID.

2.4.2 Private Investments in Power Sector Entities

This target seeks to encompass activities that will establish a competitive and market oriented power system that will attract both domestic and foreign investment. At the present time the thrust of the consultant activities in this vein has gone to the design of a target model of sectoral restructuring. The objectives of RAO-EES Rossii itself seem to be focused on obtaining foreign investments and loans in the context of a quasi vertically integrated monopoly.

For potential investors the uncertainty as to permanence of the current structure represents a substantial risk and serves to weaken the business case for investment, especially for entities obtaining sufficient external debt financing to

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22 Activities that ought to be excluded immediately include those which will require the maintenance of low fuel prices, concessional financing, or exclusion of other competitors for viability. Projects that can be studied by the developers or vendors include those which can yield an attractive financial return under a variety of fuel and electricity prices. Projects in the middle, ones that look good under most conditions but are sensitive to certain policy or economic parameters, are the candidates for studies supported by USAID and the World Bank.

cover the rehabilitation needs of the various entities which comprise the electricity system.[23]

A major issue which affects the financeability of the power sector, especially outside the Western regions is that of population shifts and industrial restructuring. In large parts of the country the local AO Energos exist to serve isolated pockets of industrial activity supporting urbanized populations that may not survive economic restructuring in their current forms.

2.4.3 Private Investments in Energy Efficiency and Conservation

This target is not supported by any of the tasks specified in the energy program. In that sense it is not possible to assess the progress of the relevant activities. However, achievement of significant levels of private investment in energy efficiency must await the same types of basic changes in the economy as do investments in power sector and other energy activities.

Given the enormous needs for investment in residential, commercial and industrial sectors, energy efficiency is more likely to accompany new investment than to comprise new investment in and of itself. For example, restructuring of industrial enterprises and new investment, especially from abroad, might lead to the following types of decisions:

- new machinery built to contemporary efficiency standards;
- changes in product specifications to reduce the embodied raw material, and hence energy content of final products;
- reengineering production techniques to reduce raw material and energy throughput; and
- exposure to world standards of process and product efficiency.

In such an instance, the resulting total energy use will decline, but as a direct result of improvements in the function of the factory and its equipment. It is not likely that a factory producing substandard goods would warrant the expenditure of funds to purchase new equipment. In such cases, the low or no cost approach is the more likely one. In order for any investments to be made, the enterprise must have incentives to save energy. This means, *inter alia*:

- higher energy prices;
- hard energy budgets (i.e., service can be shut off for nonpayment of bills); and
- full ownership rights to factory equipment and buildings and legal right to funds saved from reduced energy consumption.

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23 Note that if the quasi-monopolistic structure were thought by investors and lenders to be permanent, then external financing and suppliers credits would likely be readily available.

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When such conditions are the norm, then managers and owners will have the incentive and even the need to economize on energy use. No special programs will be needed. Until that time, pilot programs will seldom see replication or injection of new technology that is not provided specifically by a foreign aid project.

2.4.4 Financial Sector Reforms and Improvements

The constellation of reform described above includes the establishment of basic market infrastructure in both the central and peripheral offices of the energy enterprises. The major elements of the infrastructure, addressed by the various enterprise projects, include the following:

- Management and financial information systems;
- Accurate accounting for both assets and liabilities and, hence, a new balance sheet;
- Clear demarcation of the boundaries of an enterprise in terms of its control, asset structure and responsibilities; and
- Establishment of basic commercial and banking law such that private lending can take over from grants, foreign loans and "sweat" equity.

USAID projects in financial and enterprise restructuring have initiated their work mostly at the headquarters offices of the relevant enterprises. However, it was apparent to the evaluation team in a number of interviews that ultimately, the push for true reform will have to come from the enterprises that have direct customer contact, in other words, the local branches and commercial offices. The team believes that the efforts of USAID to move their commercialization projects to local enterprises are an essential step in establishing properly functioning markets with demand signals that relate operational issues to prices and investments.

2.4.5 Conclusions

The USAID energy program provides a set of initial activities that is critical for further development and implementation of reforms. An example of this is the USAID support for preinvestment studies for new power plant investments. Such studies provide potential investors with an internationally standard investment appraisal. They introduce the Russian side to Western investment criteria as well as an overall approach that can readily be replicated in other cases. The work in the current study has proved valuable in terms of breaking the ice with regard to investment alternatives in the power sector.

In order to make this activity more useful to the objectives of the overall program, some triage will be needed on the proposed list of investment projects. Those proposed investments that are clearly outstanding should be covered by one or more the entities that stand to benefit from such power plant construction or rehabilitation (this includes TDA, OPIC, Eximbank and the IBRD). The undesirable

projects should be eliminated from consideration by foreign lenders and investors. If RAO-EES Rossii wishes to invest in such low return projects, then by all means they should. However, the existence and continued promotion of a large number of marginal projects to foreign financial entities will consume time and resources that can be spent better elsewhere. For the middle group of proposed projects, a quick screen type of preinvestment study, funded by USAID, should prove useful for determining the disposition of the attractive but not overwhelming project proposals.[24]

The provision of private and foreign money to RAO-EES Rossii depends on greater progress toward a true devolution of the enterprise. The success of such a devolution depends in turn on two activities that can be provided under the auspices of this program. The first is the effective commercialization of the local energy companies and the second is an appropriate regulatory structure over the transitional period that gives investors and lenders confidence that a viable market structure is in the process of formation. In the first case, the activities supported by USAID in enterprise restructuring form the core of the key tasks. In the second case, support to regulatory bodies, including the Federal Energy Commission, is vital to establishing the rules of the transition, including pricing, entry and exit, and asset shuffling.

Private energy service firms do not yet exist in Russia. It is possible that some of the government energy institutes may evolve into that form of enterprise but no true market yet exists for such services. In order for that market to come into existence, there will need to be a number of changes in the overall situation facing firms with respect to their energy expenditures. These changes include higher prices, hard budgets, the legal ability to capture the benefits of efficiency investments, and the ability to finance such investments. Until the market infrastructure is in place, demonstration projects are likely to show scant impact. Alternative uses for some of the conservation funds exist in promoting professional activities in energy efficiency and engineering and should be encouraged.

2.5 Recommendations for the Russian Aid Program

As the FSU aid program enters a period of declining resources, the USAID missions will need to maximize the accuracy with which they target their activities. In general, the team has found that the effectiveness of the energy program efforts

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24 Such an activity is commonly undertaken by US firms in new markets and results in the firm obtaining a more appropriate set of objectives and priorities in the new environment. One of the authors of this report has participated in such activities in the US and in East Asia for power sector investments and has found such exercises useful and, indeed, necessary for rational investment appraisal activity.

could be enhanced through synergies gained by working more closely with activities in other areas, including overall economic restructuring, financial market development, environmental damage mitigation and building intellectual capital. The recommendations are made with some of the important resource tradeoffs in mind. In particular, the evaluation team saw the funding for energy efficiency as large relative to the entire budget if the purpose is to fund additional demonstrations. Even at 15-20% of total USAID resources in Russia's energy sector, these funds are not sufficient to make much of an impact quantitatively on the country's energy use. At the same time, this level of funding can provide selected "showpiece" demonstrations, with high standards of operational and economic efficiency. The team recommends that USAID consider the opportunity cost in terms of public relations and impact of imperfectly-implemented efficiency demonstrations. In the restructuring area, the team concluded that the funding was adequate, provided it was not dissipated on an inefficient cycle of proposal and modification. Further focus, perhaps provided by recent changes in Russia itself, may assist USAID's restructuring program. Throughout this subsection there are specific recommendations for focusing the technical assistance program to improve its effectiveness.

ENERGY EFFICIENCY: The initial efforts of USAID in this area focused on demonstrations of technology. The second step was the buildup of intellectual and human capital in this specialty. The third step will be a business segment inhabited by information centers, professional organizations and service companies. Steps one and two need to be completed. Results have not yet been measured in more than a few sites. Demonstration activities require little additional funding. The funds that have been appropriated need to be put into place, documented, and demonstrated to enterprise managers and energy professionals.

Energy efficiency centers are an inexpensive way to provide a base of knowledge for the future commercial efficiency and service firms. Three relatively inexpensive activities should continue in Russia. These are:

- Technical assistance in the energy efficiency area should go to professional energy associations with subsequent provision for micro enterprise loans to new energy service firms.
- The existing and soon-to-be-completed demonstration projects should be the basis for proof of concept for IFI loans and future private investments in efficiency.
- Relationships between US professional and trade associations and new or existing national counterparts should make use of work already done in the US on professional and equipment standards.

Energy service companies that come into existence in Russia will provide complements to the commercialization of the state enterprises there. The captive

engineering, installation and design staffs will generally be impossible to retain in their entireties once hard budgets become the norm - i.e., the distribution companies will have to pay for electricity or gas received, the generator or transmission company will have to pay for fuel - and service termination becomes possible. Other technical staffs will also come from manufacturing enterprises undergoing commercialization and engineering institutes that have been cut off from their ministries and captive industries.

The role of installing equipment in specific factories should be distinguished from equipment that is used to build institutional capability for future efficiency efforts.[25] In the latter case, the equipment, usually relatively inexpensive analyzers and monitoring devices, is necessary to equip the energy efficiency centers and their trainees with the types of hardware that will be required for larger scale energy efficiency efforts. This equipment then forms the core set of tools for the energy service companies that will start operations as the economy restructures. Such expenditures are different in nature and impact from individual factory retrofits using immovable hardware.

In a necessarily messy process, the energy service companies will take over many of the functions formerly carried out by the captive staffs and engineering institutes. These functions will include technical assessment and analysis of rehabilitation and renovation, evaluation of new equipment and processes, environmental impact analyses, and improved efficiency and housekeeping measures. Such firms can be assisted with micro enterprise loans as the markets come into existence. But the key here is that the preconditions for such firms will need to come into existence. As discussed before, this means not only commercialization of enterprises with shedding of non-core activities but also market-based energy prices, legal rights to keep the benefits of energy-saving technologies, and access to finance.

ECONOMIC RESTRUCTURING AND MARKET REFORM: Examine the critical path of reform and restructuring efforts and move technical assistance tasks to the priority efforts that are needed now. These include the following:

- Provide high level and high quality focused technical assistance for the regulatory institutions and related institutions in pricing, asset valuation, market structure, legislation and competition policy. This program should include both direct TA and a continuing professional education component consisting of some structured activities in-

25 Another key element is the selection of sites for demonstrations. If these demonstrations are to work, they must be at factories that operate on a regular basis, produce goods that people will pay for, and show clearly demonstrable paybacks at current energy prices and costs of equipment and installation.

country, some study tours, and directed real work for the regulatory bodies.

- Assist the AO Energos and local distribution companies on asset valuation procedures, management information systems and other activities that will lead to full commercialization of the enterprises that maintain contact with customers.
- Continue to support and encourage the World Bank efforts to obtain greater transparency in oil and gas transmission systems.
- Provide technical assistance on an as-needed basis for the State Property Commission and the Anti-Monopoly Committee to participate in transition decisionmaking in electric power and gas transmission.
- Let the US legal technical assistance be oriented at the legal aspects of the recipients' proposals, not the creation of alternative market and legal structures that may not be of ultimate interest to the Russians
- Continue assistance to the coal industry in Russia. The PIER program seems to provide a relatively inexpensive means of working with the IFIs to mobilize additional resources for restructuring in that sector.

A concerted and focused effort in regulation is needed now to consolidate gains that restructuring activities have brought about. In Russia, this means working with the FEC through a joint donor vehicle. This vehicle should provide coordination of funding, areas of emphasis, and policy dialogue. The donor group should establish goals and timetables to ensure that its efforts have some identifiable end products. Efforts to reform RAO-EES Rossii should be downplayed in this program of regulator assistance.

The recommendation on the electricity sector legal work is clear. The current approach of providing alternatives to RAO-EES Rossii while awaiting their responses does not work well and should be changed so that the experts can work in response to specific requests by the client. If USAID wants to obtain agreement from RAO-EES Rossii on the shape of reform, then this should be done through policy papers, not proposed laws. RAO-EES Rossii is not synonymous with the Russian government.

In the electricity distribution area USAID should continue the assistance to the local distribution companies in commercialization. However, this program should be shifted over to a loan basis and eventually can be funded entirely by the AO Energos themselves. USAID should devise an exit strategy and timetable for this set of projects.

The PIER program in Russia has been an outstanding success at very low cost. The program should be continued and efforts in Ukraine and elsewhere should be modeled on the Russian one.

PRIVATIZATION AND PRIVATE SECTOR ACTIVITIES/RESOURCE MOBILIZATION: Projects and efforts in these areas need to be based on

opportunities created by the restructuring and reform processes. In all likelihood, these private activities will be concentrated in three areas: energy service and conservation companies, independent power producers-rehabilitators, and oil service firms. All three are direct byproducts of the commercialization stage of enterprise restructuring - shedding of non-core activities and staff. At the same time, some of these firms cannot come into existence without the appropriate legal framework and property rights. Thus the USAID-funded legal programs will be essential to success in this area. USAID technical assistance should be synchronized with expected progress in restructuring. The existence of private firms is closely tied to resource mobilization issues so that recommendations affecting one will generally be important to the other. The following programs will be key contributors to overall success.

- Work with other donors to create a stable legal environment for investment in the power sector through legislation
- Reinvent the energy partnership programs so that both sides contribute something tangible and thus have incentives to commit more fully to a particular partnership. This done, USAID should then promote the partnership program aggressively as a vehicle for enterprise restructuring and professional education where relevant.
- Support investment options studies that mobilize new sources of capital for the power sector. These are of great importance in Russia to mobilize urgently-needed investments in modernization and upgrading of the power system.

The energy partnership program seems to be a good idea whose time never quite comes (with the notable exception of the Pennsylvania Power & Light program in Kiev - see the Ukraine discussion). This does not have be the case. We suggest that the program be restructured in the following ways:

1. Make the US firm come up with a diagnosis of the key operational and management problems in the utility along with suggested improvements in these areas;
2. Give the US firm targets and timetables for certain identifiable accomplishments to be negotiated at the partnership's initiation. Examples of this might include accounting/MIS systems, emission controls and combustion efficiency improvements;
3. Require the recipients to pay for some of the local and foreign costs of the partnership; and
4. Tie each partnership to a means of improving cash flow so as to pay for implementation of the suggested operational and management improvements

With this kind of focus and discipline, the partnership program could prove to be highly beneficial to the recipients and could bring them along the path toward privatization and investment. USAID would need to obtain agreements from the

cooperating ministries and utilities that permit the US partner to make investments and participate in joint ventures.

The implementation of investment analysis will need to be modified to be more responsive and effective in the future. In particular, the US firms providing services and advice to the World Bank or EBRD will need to treat those project officers as clients. Second, the current hierarchy of contractors and subcontractors, provided for the management needs of USAID, is highly inefficient in a project investment analysis activity. The cooperating organization should have direct access to the relevant US experts without excessive administrative and contract management burdening as now occurs. The evaluation team found that there were positive examples of USAID provision of assistance to the IFIs. Much of the efficiency and success seems to depend on the specific management of USAID and IBRD/EBRD project officers, as well as to the institutional arrangements themselves.

FOCUS AND IMPACT: The market restructuring efforts will take far longer than is commonly admitted by either the recipients of USAID efforts or their US technical helpers. The final forms for the network monopoly markets have probably not been agreed upon in Russia and may be the subjects of considerable internal contention, given the high stakes involved. USAID should not spend a lot of money building ever-more refined structures to satisfy ephemeral and distant targets. Success should be measured in incremental steps toward a more open economy. In other areas, refocusing should take the forms suggested in the specific recommendations discussed immediately above. Specific refocusing might include the following:

- Help RAO-EES Rossii with transmission planning but focus primarily on the generating enterprises and the AO Energos, to build efficiency, environmental sustainability and economic use of resources into a structured planning process. Such an effort, in effect Integrated Resource Planning, will continue and even institutionalize the work started by JEAS on alternative supply scenarios and investments.
- Refocus professional education efforts on local business colleges and technical institutes.
- Engage USAID staff at the highest levels possible to explain and promote the projects and activities included in the programs

While transferring valuable tools of resource planning to RAO-EES Rossii, *et al*, the program would fulfill one of the goals of USAID, namely more effective resource planning oriented toward market values. Proposals to work for the electricity company in Russia on planning should be seen as follow ups to JEAS. The Russians should contribute significantly to this effort since their power monopoly is now in the possession of significant operating resources. However, USAID needs to reconsider the level at which this work is carried out. The Russian

engineers are generally highly trained and accomplished in their own system. USAID consultants should be of a similar level in the US system. Where this is not the case and where remedies are not possible within USAID payment standards, USAID should consider additional cooperative agreements with the World Bank or EBRD to obtain appropriate technical assistance.

The technical education component of the program has been a continuing problem. By definition it cannot reach enough people to be truly effective and yet much of what it does is vital to restructuring and other key program indicators in one way or another. The team recommends that this activity be refocused over a two year period so that local technical and business colleges and institutes can take over the specific course content.

Private colleges are a growing feature of the landscape in Russia, teaching English, accounting, computer programming and other skills to people who are struggling for some ways to propel themselves into the market economy. Under the proposal suggested above, the recruitment standards for the courses would change so that instructors at these institutes and colleges would get first crack at the IIE courses. IIE would then work with the "graduates" to write curricula for courses in accounting, finance, small business planning, environmental impact analysis and the like. USAID could bolster these programs with class visits by USAID officials, USAID technical consultants, FCS officers and other visiting experts and resources. By collecting tuition from ordinary citizens these courses could automatically select out those whose interest lies primarily in perks and a week or two off from work. Such courses could prove invaluable in providing a means to amortize the investment in intellectual capital made in energy efficiency and other technical areas.

In general, the evaluation team found that most of the projects undertaken within this program were appropriate for the period in which they were started. If nothing focuses the mind like the hangman's noose, then the impending budget cuts show that choices will need to be made and priorities set in the energy assistance program. The team believes that USAID should work wherever possible on those activities and issues that are preconditions to economic restructuring and market reform. These include enterprise restructuring, regulatory assistance, pricing reform, and introduction of commercialization assistance. Wherever possible, the USAID assistance should focus on the downstream or distribution part of an enterprise since its cash flows will prove to be vital for whatever reforms are undertaken. In its desire to cooperate with the international financial institutions for leverage in lending, USAID should not forget that legislative reform in oil and gas can create opportunities for significant US direct investment in energy production, refining and distribution. Often, private firms will be every bit as tough as the IFIs

in demanding various institutional reforms as preconditions for investment. As long as such reforms promote market reforms, USAID should be pleased to work in such areas, mindful that large inflows are leveraged this way.

The critical path of reform activities should remain a guiding light to USAID's electricity sector undertakings. In particular, USAID should consider forming a donor coordination group, such as the one in Ukraine, to oversee the restructuring efforts. Such groups can also be useful in preventing the clients from playing off one donor against another to obtain lessened conditionality in loan programs. In addition, with such coordination, activities that are off track or out of phase can be noticed and mitigated more readily than in a less directed program.

Finally, there is no substitute for direct engagement by USAID personnel in the restructuring activities. In particular, the USAID officers are the key to raising the level of interest and oversight on the other side. Imposing conditionality is effective if USAID works with people who have the authority to make decisions.

3 UKRAINE

Since its separation from the Soviet Union, Ukraine has found its energy sector to be a particularly troublesome component of the economy. With industry and energy demand patterns formerly fully integrated into the USSR's system and with low energy efficiency in most final uses and in the transformation of energy, the country's economy was designed to thrive on low energy prices and abundant supplies.

Ukraine has virtually no oil and gas resources of its own that are now exploited commercially. Its only significant resource is coal, currently produced at an annual rate of 100-150 million tonnes (~1-1.5 million bdoe). Virtually no oil or gas is now produced. The country consumes 57 billion M^3 of natural gas currently (just under 1 million bdoe), of which 80% comes from Russia and the remainder from Turkmenistan.[26] Oil imports, virtually all from Russia, now run at an annual rate of 16-17 million tonnes (300-350 thousand bdoe), down from almost 50 million tonnes/year (~1 million bdoe) in the late 1980s. The country still imports as much as 2-3 million tonnes annually of refined products from Russia, mostly gasoline and diesel fuel, though these imports have fallen dramatically in the last two years. Ukraine's refining sector is sized to the former levels of energy use, at over 1.2 million b/d of capacity. Most of the country's refining capacity is unused.

The other major energy source is nuclear power, now providing the largest share of the country's electricity supply. Little hydroelectric power has been developed, though there is some resource in the western part of the country.

In Ukraine, energy efficiency is said to be among the lowest of any country on earth. While probably overstated, the evaluation team's energy efficiency specialist found that the situation was alleged by Ukrainian engineers to be even worse than in Russia. With few energy resources and high demand for energy, the country faced a drastic situation in 1991. USAID initiated its emergency efforts in Ukraine in 1992 based on some short term targets in conservation and efficiency. These activities involved rehabilitation of district heating systems and some power plants and factories. The power plant and factory efforts are still under way while the district heating work has been completed.

Unlike Russia, Ukraine has little financial or resource cushion for its energy consumption. As a result, the country has taken steps in restructuring and pricing that are bolder than those currently active in Russia. In the restructuring area, the country has moved on an ambitious schedule toward a full market in the electricity

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26 This is equivalent to 5.5 billion ft^3/day or 1 million bdoe.

system. In the oil sector prices have moved up toward world levels and there is a new initiative to institute hard budgets for natural gas.

One of the most important precursors of successful energy efficiency programs has recently been instituted in Ukraine. Consumers of natural gas can now be curtailed for non-payment of bills. This revolutionary step should have an important impact on the care with which gas is consumed and in the prognosis for replicable energy efficiency programs. With hard budgets and prices approaching world levels, the other necessary components of a conservation or efficiency program, redesign of products, improved transportation and process improvement, can now start to be implemented by individual enterprises in a manner that makes financial sense to them.

This section of the evaluation report is organized according to USAID's strategic issues.

3.1 Energy Efficiency and Interfuel Substitution

3.1.1 Key Issues and Indicators

Critical issues include high energy consumption, self sustainability and replication of efficiency technology and resource mobilization. USAID efforts have involved several important initiatives in power plants, large industry and district heating energy transformation and distribution systems. The activities evaluated in this section correspond to Program Objective 1.6 which directs USAID to promote the sustainable use of natural resources. Included in that objective are the indicators which motivate the specific targets. These are:

1.6.03 - Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere; and

1.6.04 - Utility demand-side management programs in operation and affecting consumer behavior

High Energy Consumption

According to the Arena-Eco Center in Kiev, energy efficiency in Ukraine is even worse than in Russia, which itself consumes twice as much energy per dollar of

national income as western industrial countries.[27] As with Russia, there was no incentive in the past to improve energy efficiency, since supplies were abundant and apparently cheap.

One result of high energy consumption is the damage to the environment, visible wherever power plants and industries are located. Poor energy efficiency also wastes the country's resources of fuel and labor, better directed toward production of marketable products currently in short supply.

Role of US Energy Efficiency Equipment

Many of the people interviewed for this evaluation, particularly Ukrainian energy management officials, thought that energy efficiency was the best technical option for reform in the energy sector.[28] If this is a widely held belief and given the absence of an established energy efficiency industry in Ukraine, there exists a market potential for American energy efficiency products and services in Ukraine. The potential is not unlimited, however, and will not be easy to realize.

Although many Ukrainians told the team how they realized only in 1991 how far behind the rest of the world they were in energy technology, this does not translate into open-armed acceptance of foreign technology and management. They want to do it themselves, manufacturing their own products and learning how to provide their own services, even if substandard at the outset. This country needs help in energy efficiency, they admit, but only in the form of "financing" and "joint ventures," which, along with more general commercial concepts, many enterprise managers may not fully understand.

This attitude means that foreign technology, though accepted as superior, is not necessarily welcomed. Naturally, people will accept gifts, and the Ukrainians have expressed their appreciation at the role that US equipment has played at the Kiev power plant #5. But such gifts may not induce the Ukrainians to buy much more of that type of technology as a matter of course, just because it is technically superior. The real inflow of modern energy management technology is going to require far-reaching changes in the economy and government. However, several points are worth noting with regard to promoting foreign energy management technology:

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27 Studies funded by AID and others have investigated and ranked a multitude of conservation opportunities.

28 This is not a universally held opinion in Ukraine.

- If the Ukrainian companies and energy users are expected to pay world prices for the technology, the value of the energy saved must be commensurable - pricing reform is imperative;[29]
- Enterprise managers and building owners must have the legal right to modify buildings, change technology and reap the benefits of whatever energy savings result;
- The Ukrainian firms cannot continue to rely on captive engineering staffs for their energy management advice - otherwise the "not invented here" syndrome will tend to drown out other voices; and
- Financing must be available for overall renovations and rehabilitiations and property upgrades, of which energy efficiency is only a part.

The team believes that improving energy efficiency is part of an overall economic restructuring and enterprise rehabilitation program. The costs for improving energy technology are rarely justified on their own but may be so justified in conjunction with higher quality output, higher productivity, more timely production and better comfort/service. The role of installing equipment in specific factories should be distinguished from equipment that is used to build institutional capability for future efficiency efforts.[30] In the latter case, the equipment, usually relatively inexpensive analyzers and monitoring equipment, is necessary to equip the energy efficiency centers and their trainees with the types of hardware that will be required for larger scale energy efficiency efforts. This equipment then forms the core set of tools for the energy service companies that will start operations as the economy restructures. Such expenditures are different in nature and impact from individual factory retrofits using immovable hardware.

3.1.2 Initial Energy Efficiency Activities

Energy efficiency initiatives were among the first efforts of USAID's Ukrainian program. There have been a few completed efforts at district heating plants. But the main measures of success, replication and self-sustainability, are not yet apparent, nor should they be, according to the listing of program objectives, indicators and targets. The main USAID efforts have involved the following:

- establishing energy efficiency centers
- studies of improved industrial and power plant efficiency
- demonstration projects in district heating plants and factories

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29 Pricing energy at international levels is still considered "arbitrary" by some Ukrainian energy officials. However, the nation's importer status has sensitized more people to the true cost of energy use than is the case in Russia

30 Another key element is the selection of sites for demonstrations. If these demonstrations are to work, they must be at factories that operate on a regular basis, produce goods that people will pay for, and show clearly demonstrable paybacks at current energy prices and costs of equipment and installation.

- training in energy efficiency

NGO Energy Centers and Professional Associations

USAID has sponsored the emergence of ARENA-ECO, an energy conservation center that is similar to CENEf in Russia. As with CENEf, the center operates with a director and a technical staff. The center's director was found to be highly competent and entrepreneurial. He and his staff could provide one nexus of improved energy efficiency in the Ukrainian economy. At the same time, the evaluation team found that ARENA-ECO was often unaware of energy efficiency initiatives elsewhere in the Ukrainian economy. Such a situation is not conducive to ARENA-ECO becoming a key player in an emerging market in energy efficiency.

The activities and operations of ARENA-ECO relate to overall USAID targets as regards voluntary activities and professional association growth, though ARENA-ECO is not currently tasked with promotion of such other NGOs as professional associations. The evaluation team believes that it would be extremely cost-effective to leverage the efforts of such groups. They use mostly volunteer labor, they are effective tools for rapid dissemination of information, and they offer training, professional certification and equipment standards. They bring manufacturers, service providers and end-users together in large networks. Best of all, they can teach and perpetuate private initiative in service to the profession of energy management.

There is far to go before Ukraine shows the level of promotional activity by US firms that is typical of Central Europe or even Russia. A far as the team could determine, only GE and Honeywell were active in this country, with offices in Kiev to sell lights (GE), manufacture lighting ballasts (GE) and manufacture thermostats (Honeywell).

3.1.3 Large Enterprise Energy Conservation: Electricity Generation and Heavy Industry

The power plant efficiency activities in Ukraine represent a singularly successful commodity assistance program. At the same time, the limitations of the activity point out some of the weaknesses of this approach. The tasks undertaken by Burns & Roe provided Kiev 5 Combined Heat and Power Plant with modern regenerative resins for demineralization of boiler makeup water and for softening makeup water for the district heating system. The project also provided Kiev 5 CHP plant with instrumentation to improve performance and general hardware to improve plant operations.

Demonstration equipment from US manufacturers has already been placed in operation. Some of the equipment is being used to monitor the Kiev #5 power plant and was subsequently moved to another plant. The concepts of continuous

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stack monitoring and maximizing plant efficiency were foreign to the Ukrainians. In spite of this unfamiliarity, the Ukrainians expressed interest in replicating this effort at other plants, but will require assistance to purchase any additional equipment. That is, even with increasingly "hard" budgets for fuel, the recipients are not yet ready to commit their own funds to activities that are clearly cost-effective from a financial standpoint. Perhaps the coming wholesale electricity market will provide additional incentives for power plant operators to take more seriously the low cost options for improving generation efficiency and plant reliability.

Other aspects of large enterprise energy efficiency show the need to select carefully the industrial plants that are to be demonstration sites. The team visited two sites in Ukraine that were recipients of energy efficiency demonstration funds. Only one of these plants was operating. A cold plant does not show off technology, nor does the new equipment save energy in such circumstances. Such demonstrations do not spread the message of the technology or of the changes in management that are required to achieve widespread adoption of improved technologies.

USAID's demonstrations should be just that, as the Kiev #5 program has shown. Technologies that are used in operating units that exhibit demonstrable energy and money savings will spread the message. It is better to have one Kiev #5 demonstration than a dozen hardware drops at cold plants. Not only are there real energy savings, but the technology can be demonstrated to visitors - energy savings are tangible and measurable. The team believes that USAID could profitably refocus some of the efficiency demonstration funds on the choice of plants (must be operating at or near full capacity) and in setting up exhibits and seminars that truly spread the message of improved technology and energy management. A showpiece should live up to its promise. It should be clean, environmentally benign and safe for its workers.

3.1.4 Conclusions

The USAID programs in energy efficiency have shown the cooperating Ukrainian institutions the capabilities of modern technologies and management to save energy, reduce emissions, and promote more efficient overall operations. At the same time, the programs founder on the self-sustainability issue. Whether the target is improved building energy use or reduced fuel consumption in power plants, the issues are largely the same. The team has seen repeatedly that energy is not saved if enterprises lack hard energy budgets. Without the discipline provided by such hard budgets, many of the key indicators of success will not come about. Without hard energy budgets, the following outcomes are typical:

- service is not terminated for nonpayment;

- prices do not reach world levels, because nothing in particular propels them in that direction;
- independent service firms are not widely available to assist in designing optimal efficiency programs because there is little effective demand for their services;
- financing is not available for new machinery since the paybacks from such investment are uncertain or absent; and
- the enterprise lacks the ability to keep for itself the gains from improved efficiency in energy use.

In Ukraine the connection is pressing given the country's scarce energy supplies with most imports, and even domestic coal, now denominated in international currencies at world prices.

Several USAID programs address these very issues. In the energy program itself, USAID contractors are working with enterprises to improve their accounting and information systems, other consultants are assisting in price reform. Other USAID activities in the overall Ukrainian program promote firm titling of property and the creation of user-friendly financial institutions. With such a panoply of assistance, it is reasonable to look at which tasks need to be done first. The team has concluded that the construction of the *capitalist infrastructure* is the top priority. This infrastructure consists of the following:

- enterprise commercialization;
- price reform;
- financial institution reform; and
- improved information systems and accounting.

With such infrastructure in place, the kinds of investments that are required in new products and technologies or in rehabilitating residential/commercial space, will bring with them substantial improvements in energy efficiency that are typical of new technologies in the West. To help Ukraine prepare for this world, the team believes that a cadré of efficiency specialists should be supported to form the core of energy service firms operating in a contract market, a distinct change from enterprise self-sufficiency in technology, which is typical of the current situation. Several USAID-supported tasks contribute to this end. In particular, the support for Arena-Eco and the ongoing audit programs and equipment transfers will build up capabilities in efficiency outside the captive engineering staffs of current enterprises.

The power sector planning issue is far different from what is typical in Russia. In Ukraine, the coming wholesale market is likely to sort out the least efficient power plants. This effort, discussed in subsection 3.2, will let the pricing system work to determine which power plants are worth saving and rehabilitating.

Continuing the current approach of small demonstrations in Ukraine may save energy at particular institutions. However, given the size of the country, significant accomplishments in energy efficiency will require massive replication of the USAID-backed efforts. The heavy commitments of time and resources required to put demonstration projects into operation need to be weighed against the opportunity costs of such programs in the program as a whole. If the demonstration program is very small relative to the overall economy, then the likelihood of spread effects is low. If there are too many demonstrations to be implemented properly, then the impacts are also slight. Targeting the recipients of such assistance is vital. To have a positive demonstration and spread effect in large economies, such programs must follow these general guidelines:

1. Choose factories or power plants that are in full operation;
2. Make sure that there is real market demand for the factory's product;
3. Consider examples of how such modifications can be put into other operating units - prepare financial and economic comparisons that use the prices and costs faced by factory and plant managers for their decisions, use border prices for the World Bank projects. Make the demonstration project a real showpiece; and
4. Leave enough money in the budget to bring in visitors and show them the technology and management.

The recent introduction of hard budgets into the calculus of energy demand at all levels is the single greatest innovation affecting energy efficiency and conservation. It is not necessary that prices actually reach world levels before *any* self-sustaining efficiency activities occur. Rather, movement to within striking distance (50-60%) of world prices will render the worst of the energy demand excesses uneconomic and will induce some conservation. Once the motivation for saving energy exists, a good demonstration project puts such technology within the realm of comprehension, and perhaps acquisition, for enterprise managers. This is where the quality of the demonstration is critical and is where industrial, but not power generation, demonstration projects have exhibited less-than-ideal examples of sustainable energy efficiency activities.

This change in the overall environment for reform buttresses the role of USAID in training specialists, making available new technologies and equipment, and supporting institutional restructuring. The adoption of hard budgets in the gas sector highlights the likely value of such budgets as a motivator for replication of assistance already provided by USAID.[31]

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31 One of the consistent problems of energy efficiency programs has been the use of international prices in calculating the payback periods for expenditures. Such calculations assume that such prices rule and that the bills are actually paid. Where local currency bills are not paid at all, then

3.2 Market Reform, Restructuring & Legal Framework

3.2.1 Critical Issues and Indicators in Economic Restructuring.

This subsection of the evaluation report addresses the relationship of regulatory activities which must precede or accompany economic restructuring. The intent is to show how the USAID and other donor activities can be made more effective through establishing and then following a critical path for reform. The constellation of activities required is roughly the following:

- Establishing markets
- Expanding private sector activities, and
- Promoting investment

The specifics of this critical path are discussed in greater detail in Section 1. This subsection of the report is concerned specifically with the plan for restructuring in electricity as well as support for regulatory activities. This set of targets and activities relates to Program Objectives 1.2: Establish a policy, legal, and regulatory framework conducive to broad-based competition and private sector growth; and 1.6: Promote sustainable use of natural resources. Specific indicators which are relevant to the electricity and other energy restructuring and regulatory activities include the following:

1.2.01 - Establishment of policy, enactment of legislation and development of regulatory procedures necessary to break-up or control monopolies, establish markets, expand the private sector and strengthen competitiveness in key economic sectors

1.2.03 - Competitive pricing for efficient use of energy resources

1.6.02 - Commercially viable private sector capability developed to provide energy services, including production and distribution.

3.2.2 Plan For Electricity Sector Restructuring

In Ukraine the evaluation team found a different situation from the one in Russia. The government of the country is committed to power sector reform. The foreign assistance teams are working toward one goal and the assignment of assets to generation and distribution entities has already started. The regulator, the

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investment studies using international prices may give a false impression of paybacks and overestimate the relative desirability of such projects for investors using local currency.

National Energy Regulatory Commission (NERC) has been established. A "test" market for generators will start this summer (June, 1995).

Given the good organization of efforts in Ukraine, the team believes that this effort can succeed if the necessary pieces are put into place before the pool is started. Unfortunately, a key element of the system is missing. The distribution entities were supposed to receive aid from the EU's TACIS program. That aid has not yet started, leaving the distribution entities on less-than-firm footing vis-à-vis the generation and transmission systems. To allow this imbalance to imperil the overall reform would be tragic, a fact recognized by USAID. Its short term program to provide some assistance to distribution companies is an important step in assuring that the reform program has the best possible chance for success.

The willingness to innovate and reform that has been exhibited in electricity is not matched in oil and gas (see subsection 3.3.5). In this area, the lack of legislation impairs reform and effectively maintains the status quo.

3.2.3 Creation of an Independent Electricity Authority

This target was established in the recognition that some type of regulation, during the transition and at the retail level, would be required as a part of electricity sector restructuring. The regulatory situation facing Ukraine is different from that in Russia in a number of important ways. First, the regulator is dealing with a reduced set of responsibilities. Second, only electricity is covered at the present time. Third, the form of the electricity system reform is largely cast.

Unlike a US regulator, the NERC in Ukraine will simply regulate the conditions of competition and market entry/exit. This means that there will be little need to have detailed parallel oversight of the activities of the regulated entities. At the same time, the NERC will have an important role in the establishment and early management of the power pool. For the proposed power pool to be effective, it will not only be necessary to phase its introduction as planned, but provide adequate training to the staff that will be called upon to manage this process. The NERC urgently needs to define its level of autonomy with respect to the Ministry of Energy as well as the Council of Ministers. To safeguard autonomy it needs an unambiguous funding source, and to this end, a clear and detailed licensing procedure needs to be established. In addition there is an urgent need to bring closure to the structure and level of competence of the regulatory body, reconciling competing models and adapting them fully to the particular Ukrainian situation, where in the initial period subsector assets will remain in public hands and only subject to privatization in a subsequent stage.

Key issues that will arise in the short term include the following:

1. Independence of the Commissioners
2. Financial autonomy of the NERC
3. Method of resolving disputes - order/decree v. open hearing process
4. Neutrality of the NERC as an arbiter of competing interests
5. Flexibility to accommodate both technological and organizational change in the affected enterprises

If these steps are taken and issues resolved in the short term, there is good reason to believe that the establishment of a truly competitive market in electricity is institutionally possible.

At the present time some consultants are also involved in the creation of the NERC staff capabilities. It is in the interest of USAID to avoid the type of fractured situation that has prevailed in Russia with advisors working at cross purposes to one another.

3.2.4 Establishment of Market-Based Prices for Electricity

USAID has supported efforts to introduce marginal cost pricing to the electricity sectors in all of its aid recipients. In Ukraine there has already been significant movement in electricity prices, with current levels at about half what a market might yield. The pool arrangements this summer will likely complete the educational process of price adjustment that has already been simulated by one of the consultants (PHB) in its dispatch model.

Pricing reform is probably achievable *without* a large scale program involving a host of foreign advisors. This is because the market in electricity is intended to be self-regulating. With significant overcapacity in power generation, there is little need to move forward on the types of elaborate investment-oriented programs that USAID has supported in Russia's electricity sector. Given the importance of electricity in the economy as both a fuel purchaser and a market for equipment, a number of other prices will need to come into competitive balance at about the same time for electricity prices to show significant improvements to the allocation of resources. Finally, the arrearages problem will need to be solved before economically efficient prices can be established and enforced.

Using simulated competitive prices, consultants should work with the Ukrainians to make explicit the various tradeoffs between price levels and different demand and supply scenarios as well as the interdependence of energy prices with other prices. If it is not yet clear to the target audience, both USAID and the World Bank need to continue to educate on the subject of energy pricing reform. Though

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such reform is sometimes seen as a "magic bullet," and while appropriate prices are necessary for efficient resource allocation, they are not sufficient. Other pieces need to be in place as well, especially alternative products, financing for efficiency and fuel substitution, and the right to go bankrupt. A competitive market, freely operated, should move electricity prices to full LRMC levels over the next five years.

3.2.5 Oil and Gas Data Systems and Law

The organization of geological data and the creation of a legal framework for oil and gas development were carried out under pass through arrangements with the US Geological Survey and the World Bank, respectively. These projects aim to create the conditions for foreign firms to invest in Ukraine's upstream oil and gas sector. Neither task is completed. Tests of the USGS system indicate that the data gathering, transfer and analysis can work well and the USGS has proposed that USAID provide the PASA with an additional $6 million to compete this activity.

The U.S. Geological Survey activities are intended to provide improved assessment and management of geological data. Trials of this program have proved successful. Any real implementation must await institutional reform of the oil and gas sections of the country's Ministry of Fuel and Energy. Until this restructuring occurs and there is a completion of the proposed oil and gas exploration law, the energy resources will remain unproved and unexploited.

USAID has supported the efforts of the US law firm, Akin Gump, to write an upstream oil and gas law for Ukraine. Their efforts, implemented through the another cooperative program with the World Bank, are not yet completed. As a result, it is impossible to assess the impact of such work. The incomplete draft law requires additional effort to finalize it and help the parliamentary committee to shepherd the legislation through. Without such a legal framework, there is little likelihood of attracting foreign investment to the country's oil and gas resources. In other words, a good start was made, but there can be no results without continued activities in this vein.[32]

In Ukraine some sort of regulatory authority will be needed in the oil and gas area to regulate leases and settle disputes. Perhaps these functions can be added to those of the NERC, once the oil and gas law is completed. At the present time, with all production and distribution still firmly in the hands of the Ministry of Fuel and Energy, there is no need for regulatory oversight.

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32 In the downstream area, there is a similar absence of legal structure. A number of foreign refining companies are said to be interested in investment in Ukraine's refining sector. They will not so do without a law stating their rights and responsibilities.

3.2.6 Coal Industry Restructuring

In Ukraine the coal industry is far more important to the energy economy than in Russia. Domestic coal production is roughly equivalent to total demand for all other energy resources, at more than 1 million bdoe. Production has dropped in the past two years and the country now imports some coal from Russia, Poland and Hungary. This is unfortunate given the magnitude of the coal reserves in the country.

Due to mine closings, it is anticipated that approximately 50,000 workers will be forced to leave or find new work. According to the Ukrainian specialists, they anticipate having to produce 150 to 140 million tonnes of coal (other estimates of future production lie in the 100 million tonne/year range). They also expect the government to be in control of this industry and of its restructuring process.

The USAID coal program has sponsored a number of seminars, conferences and study tours for local coal officials. These activities have centered on the themes of safety, efficiency and labor-management relations. Another area of emphasis has been the clean coal initiative, carried out by the US Department of Energy, funded through a Participating Agency Services Agreement with USAID. This effort has identified methods of beneficiation and preparation that could improve considerably both the efficiency and cleanliness of coal use in Ukraine.[33]

Without a specific target beyond the social safety net (Target UKR45), the achievements of the Ukrainian coal program cannot be measured against a specific standard. At the same time, it is important to place this activity into context. Coal is the only significant domestically produced fuel in Ukraine. Restructuring and improved efficiency in the coal sector has tremendous importance for the country given that coal output, even under current circumstances, is roughly 40% of domestic energy demand, far different from that fuel's 10% market share in Russia. Potential direct investment in the country's coal sector cannot move ahead due to the lack of an appropriate underground minerals law. The same type of problem that restrains oil and gas exploration also restricts the discovery and exploitation of new, higher quality coal mines.

The USAID program in Ukraine lacks the type of visibility and Mission support that the PIER program enjoys in Russia. This lack of support manifests itself in a relative absence of coordination with the World Bank and with others involved in sector restructuring. This cooperation is vital to meeting the stated target of stimulating IFI expenditures in the country's coal sector. Given the importance of

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33 The World Bank is preparing a loan to the coal sector of more than $200 million, based on this clean coal work.

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coal to the country's economic and political security, this may be a mistake. Ukraine contains the kernel of a viable, if smaller coal industry, one that is capable of producing more than one million barrels/day of oil equivalent energy.

3.2.7 Conclusions

Some of the lessons learned in Russia seem to have been applied in Ukraine, where the restructuring goals are both more sweeping and more focused. By completing the activities under a unified direction, in a logical sequence, USAID, the World Bank and other principal donors will have a better chance of achieving a market-based outcome than is likely without such efforts. One key to a positive outcome is the willingness of USAID to pick up the slack left by another donor in the distribution area.

Not all of the Ukraine efforts have succeeded, though. The oil and gas legislation was abandoned in mid-effort. USAID needs to revisit this issue to determine how much time and effort is needed to obtain the upstream legislation. Without such a framework, not only will the previous moneys have been wasted but there will no inbound foreign investment in Ukraine's oil and gas production. Analogously, the involvement of foreign and private firms in oil refining and distribution will not occur until there is some legislation providing the legal basis for such activities. USAID needs to reconsider its current position on funding this task.

Constructing the legal framework for oil and gas costs at least one order of magnitude less than improving the data analysis. It remains incomplete and in effect puts at jeopardy the USGS expenditures as well as the previous activities in the legal area.

As was previously mentioned, the electricity restructuring program in Ukraine appears to be far more successful than the one in Russia. Much of this may be due to differences in size, no doubt, but the way that the activity has been implemented has also promoted success. In Ukraine there was an overall restructuring plan, agreed-to by the Ukrainians and implemented by a coordinated program of technical assistance. By giving the effort one brain, PHB in this case, it has been easier to see where parts of the program are out of step and need to be augmented, as took place recently with the missing EC distribution company assistance.

In the coal sector, the USAID program can play the type of constructive role that it does in Russia, with PIER becoming the interface between technical, financial, labor and health & safety restructuring concerns. PIER is the only honest broker that exists for the coal sector, since it receives no benefit from recommending any one path of reform. At the same time, it is the only group that can get the respective

parties talking the same language. At the present time, the coal effort consists of a series of independent activities by PIER and the World Bank, largely unsupported by the Kiev USAID Mission and lacking a unified focus. Given the importance of the coal sector in Ukraine, it is scarcely overstating the case to point out that the country's only major source of fuel needs to play a part in the significant restructuring of electricity. In particular, an appropriate legal framework for the coal industry is missing and is thus far not addressed in the USAID strategic framework.

3.3 Commercial Activities & Privatization

3.3.1 Key Issues, Indicators and Concerns

Commercially viable private sector capability, developed to provide energy services including production and distribution, is a secondary goal of USAID in Ukraine. There are no program objectives or indicators that promote private sector energy activities in any particular manner. At the same time, there are several activities, included in this section, that promote contacts between private US companies and Ukrainian energy entities. These programs are the Utility Partnership and the training activities of IIE.

3.3.2 Training & Exchange Programs

Utility Exchange Programs

The current work plan calls for the establishment of six utility partnerships by mid-1996. So far one has been established, between Kievenergo and Pennsylvania Power and Light. A second partnership, with Donbassenergo, will be established at the end of 1995. The PPL/Kiev cooperation is an outstanding example of how such a program can work to improve both technical and managerial performance. The PPL team is accomplishing much of what the consultant-directed technical assistance is intended to do for other entities. In particular, the partnership involves real commitments of time and resources by both sides, sets incremental goals for specific areas of cooperation, produces tangible improvements in operations and/or management, and contains a true two-way communication of intentions and knowledge.

The PPL program is not perfect but it indicates the direction that the partnership program must head if it is to be successful. In particular, the program must require that each party give tangible resources and receive tangible benefits.

Without this kind of discipline, the program can quickly disillusion both sides and lead to more ill will than transfer of technology and skills.

Training and Continuing Education

In the education and training area, the program in Ukraine has succeeded in many of the same ways as has the Russian training program. The program has brought exposure to new techniques, technologies and thinking to a generation of Ukrainian engineers and managers. The IIE has brought a high level of professionalism to its training activities. In particular, the program is a part of the change in attitudes that must accompany economic reform in Ukraine. However, the level of resources provided to this task seems to be unsuited to the objectives of the activity. In a situation where tens of thousands must see their skills upgraded, the IIE program can reach hundreds at most over its lifetime.

Bridging the gap between the needs and the resources available is the key to an effective long term professional training program. USAID must face this gap squarely and look at the problems with the program to see what they imply about alternatives. The problems of the Ukrainian program - difficulties in selecting students, lack of replication and spread outside the target group and high expense relative to the number of people trained - are not as severe as some similar problems with the training program in Russia. However, the fundamental problem of a mismatch between needs and resources remains, as in Russia.

There are alternatives. Effective instructional programs should rely on the country's own highly developed educational establishment as well as the desires of many Ukrainians to upgrade their own skills to match the demands of a restructuring economy. The World Bank's Economic Development Institute has provided one model in Russia and Ukraine where people are trained and then supported by the EDI for a short while as they develop fee-for-service courses around the country (thus far only in Russia). The team leader of this evaluation effort has participated in the World Bank's program and has found it to show great promise to spread the gospel of market reform as well as specific skills upgrading in accounting, finance, engineering and management. Another model is to train faculty at local business colleges in the types of skills transmitted in the IIE program currently. The participants would be business college or polytechnic faculty members. These people would then work the course materials into their regular offerings. There are two great advantages to the second approach. First, the ultimate beneficiaries of such teachings will take those course when they want to and will pay their own money for it. Consequently, the message will be more valuable to them than if it is a gift. Second, this builds a more permanent intellectual infrastructure in the country to support other changes in the countries.

3.4 Resource Mobilization

There are no program objectives or indicators which promote inbound investment or financing by IFIs in Ukraine, with the exception of the coal program, described above in subsection 3.2.

3.5 Recommendations

The recommendations in Ukraine relate to a smaller set of activities than was the case in Russia. However, the tradeoffs among different priorities and activities are at least as sharp as in Russia. In particular, the funds supplied for energy efficiency appear to be inadequate to support a great number of retrofits and demonstrations. Therefore, USAID may want to look at new priorities with regard to the mix of hardware, training and publicity for its efforts. With such a limited budget, the expenditure on hardware must produce tangible savings at operating factories which visitors can see and from which object lessons can be learned. The limited funding for oil and gas activities points out the tradeoffs between completing the legal framework and proceeding with further data and technical activities. The team recommends that USAID give serious considerations to the potential benefits from the two types of activities and set priorities accordingly.

ENERGY EFFICIENCY: Examine the current set of activities and estimate the tradeoffs between future adoption of improved technologies versus energy saved today. Specific recommendations for this area include the following:

- Reexamine the choices of factories for demonstration projects with current impact, "proof of concept" for IFIs and spread or demonstration effects firmly in mind;
- Give priority to building up capabilities of Ukrainian professionals. Such efforts include not only training but also involvement in audits, retrofits, plant cleanups and the like. These are more important than specific reductions in factory energy use at any one demonstration site;
- Provide Arena-Eco with access to US professional energy engineering societies; and
- Though the restructuring activities, encourage power companies and factories to shed in-house engineering that is better employed in energy service companies.

These suggestions should be carried out in such a way as to complement the increased use of hard energy budgets for gas. If appropriate, USAID should look at shifting resources out of other combustion technologies and toward efficient gas technology.

ECONOMIC RESTRUCTURING AND MARKET REFORM: Examine the critical path of reform and restructuring efforts and move TA tasks to the priority efforts that are needed now. These include the following:

- Provide high level and high quality focused technical assistance for the regulatory institutions and related institutions in pricing, asset valuation, market structure, legislation and competition policy. This program should include both direct TA and a continuing professional education component consisting of some structured activities in-country, some study tours, and directed real work for the regulatory bodies.
- Assist the local distribution companies on asset valuation, procedures, MIS and other activities that will lead to full commercialization of the enterprises that maintain contact with customers.
- Work with the ad hoc group, led by PHB, to provide the appropriate assistance to all phases of the power industry - but make sure that the USAID energy office is engaged and that they insist on keeping the activities on their appropriate critical path.
- Work through PIER to promote the humane restructuring of the sector, to be funded largely by the World Bank.

A concerted and focused effort in regulation is needed now to consolidate gains that restructuring activities have brought about. USAID needs to make sure that the other donors maintain their commitments to restructuring and reform in electricity and pricing. The recent decision to enforce collections in natural gas distribution is an opportunity that USAID should exploit and support.

Downgrading the coal projects in Ukraine is probably counterproductive. The importance of the coal resources in quantitative terms (> 1 million b/d oil equivalent), combined with the political importance of the populations in the coal basins, will make that sector of key importance for the foreseeable future. After all, if Hungary, with its small and low grade coal reserves, can export its coal to Ukraine, probably with subsidies, then certainly Ukraine can identify those coal mines which are able to function without such subsidies and encourage more efficient production there. PIER is an inexpensive entrée to a significant role for USAID energy personnel in working with World Bank coal project officers to devise programs that mitigate some of the socially significant effects of sector restructuring and commercialization. This is a low cost solution to a continuing and vexing problem. USAID should investigate the possible role of legal technical assistance in the restructuring and development of the country's coal industry to determine the possibility that mineral law reform can give some impetus to inbound investment or financing for that fuel.

PRIVATIZATION AND PRIVATE SECTOR ACTIVITIES/RESOURCE MOBILIZATION: Projects and efforts in these areas need to be based on opportunities created by the restructuring and reform processes. In all likelihood,

these private activities will be concentrated in energy service and conservation companies. This is a direct byproduct of getting an enterprise ready to compete in the market by shedding of non-core activities and staff. At the same time, some of these energy service firms cannot come into existence without the appropriate legal framework and property rights. The USAID-funded general commercial legal programs will be essential to success in this area. USAID technical assistance should be synchronized with expected progress in restructuring. The existence of private firms is closely tied to resource mobilization issues so that recommendations affecting one will generally be important to the other. The following programs will be key contributors to overall success.

- The upstream oil and gas legal framework;
- Creation of a stable legal environment for investment in the power sector through legislation; and
- Reinvention of the energy partnership programs so that both sides contribute something tangible and thus have incentives to commit more fully to a particular partnership. This done, USAID should then promote the partnership program aggressively as a vehicle for enterprise restructuring and professional education where relevant. This program can be of particular value in Ukraine, where the utilities are more tractable and less able to purchase outside assistance than is the case in Russia.

It goes without saying that there will be no private activity in Ukraine's oil sector without appropriate legislation. In addition to the obvious energy security and balance of trade implications of a completed upstream energy law, there are particular advantages for US oil firms. US firms are now active in Bulgaria's offshore oil plays and are thus familiar with the geology of the Western Black Sea region. This advantage could be built upon by support for legislation. Downstream, the absence of a legal framework has thwarted the investment activities of a US oil major and has prevented the much needed rationalization of the refining industry in Ukraine. Appropriate legal assistance by USAID could bolster efforts to reform the oil sector and improve its operational efficiency and investment outlook

Working on the good example set by the Pennsylvania Power & Light program in Kiev, the team suggests that the program be restructured in the following ways:

1. Make the US firm come up with a diagnosis of the key operational and management problems in the utility along with suggested improvements in these areas;
2. Give the US firm targets and timetables for certain identifiable accomplishments to be negotiated at the partnership's initiation. Examples of this might include accounting/MIS systems, emission controls and combustion efficiency improvements;

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3. Require the recipients to pay for some of the local and foreign costs of the partnership; and
4. Tie each partnership to a means of improving cash flow so as to pay for implementation of the suggested operational and management improvements

With this kind of focus and discipline, the partnership program could prove to be highly beneficial to the recipients and could bring them along the path toward privatization and investment. USAID would need to obtain agreements from the cooperating ministries and utilities that permit the US partner to make investments and participate in joint ventures.

4 ARMENIA

Armenia is in a vastly different situation from the other two countries discussed thus far. Faced with hostile neighbors, Armenia has had to cope not only with the political and economic discontinuities engendered by the end of the Soviet Union but also with a sheer lack of fuel and other resources. In 1990 Armenia, which has no oil refineries, imported about 3 million tonnes of light oil products, gasoline, diesel fuel, heating oil and jet kerosine, from the rest of the Soviet Union. By 1993, these figures had fallen below 75,000 tonnes annually, with the exception of a special import of 200,000 tonnes of middle distillates in 1992. It is likely that actual current consumption exceeds the 75,000 tonne/year figure but confirmation is impossible since virtually all gasoline supplies come in through the informal sector.

USAID responded to this crisis situation in two ways. The first was emergency humanitarian supplies of fuel, mostly heating oil and kerosine. The second was to work on the emergency repair and rehabilitation of heat and electricity distribution systems.

In general, the team found that the efforts in Armenia have helped the country through a difficult transition and energy emergency period. The team was told repeatedly how USAID had provided tangible assistance where other donors had failed to produce. In particular, the humanitarian assistance which provided fuel for the winters since 1992 has been an outstanding success. These activities set the stage for well-received efforts in energy supply and restructuring. Correspondingly, the team focused on those activities in its interviews and research.

Many of the issues affecting energy are not unique to that sector. Rather, the emergency in energy supply has obscured the degree to which overall economic restructuring and privatization is a necessary component of improved energy efficiency and investment. Indeed, one or two of the recommendations do not involve energy, *per se*, but may be addressed by some other USAID program.

4.1 Energy Efficiency and Interfuel Substitution

4.1.1 Key Issues and Indicators

The key issues in this area are failing distribution systems for heat, electricity and natural gas, and the role of sound incentives and institutional arrangements promoting energy efficiency. At this time, energy efficiency seems to be considered by the government as a subset of generating plant or supply efficiency.

Institutional difficulties in saving energy have been about the same as in the other former Soviet republics. This is natural given the country's technological, industrial and organizational genesis in the Soviet system. However, the country's emergency has spawned a series of "hard" budgets in state energy supply "concerns". This action has laid the basis for real improvements in efficiency as the emergency is resolved.

In terms of the USAID Strategic Framework, the Program Objective relevant to this set of activities is 1.6: Promote sustainable use of natural resources. The relevant indicator is the following one:

1.6.03 - Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere.

There are five targets under this indicator. These are discussed in detail in Annex 2. In general, the situation in Armenia differs from those in Russia and Ukraine in terms of impact. The ability of USAID to affect meaningfully the overall level of energy efficiency is bolstered by the country's small size and the active role of USAID in working with Armenian government institutions and enterprises. In this country, thermal efficiency improvements at as few as five power generation or district heating stations can show tangible results in the country's overall energy economy.

The other activity covered in this subsection is the emergency mining of coal by the US contractor Burns and Roe. There is no indicator or specific target which encompasses this activity.

4.1.2 Emergency Weatherization and Repairs to District Heating Systems

USAID's energy efficiency program has focused on immediate improvements in energy use and distribution to make the best of an emergency situation. Sixteen of nineteen sites selected for weatherization improvements have already been completed. Other tasks connected with the emergency weatherization program included the delivery of kerosine heaters and the fuel to use in them as well as training one dozen teams in weatherization of houses and buildings. These programs have had short term positive impacts and were mentioned by virtually every Armenian interviewed by the evaluation team. One US contractor, RMA, has trained ten teams in weatherization techniques.[34] These efforts have been greatly praised

[34] There is some anecdotal evidence of a niche market for weatherization services. If this is true, then the program can be said to have achieved self-sustainability, if even at a minor initial level.

by the Armenians. Indeed, the only apparent problems with the program involve insufficient supply of rehabilitation services. Both the weatherization program and the kerosine relief program are tremendous successes. Practically everybody affected expressed deep gratitude. The last three weatherization projects for FY 95 are heading toward completion.

Hospitals are warmer. In apartments, temperatures are 6° C (11° F) warmer than before weatherizing. Weatherization crews were innovative. They created roll-up insulation curtains out of insulation blanket stock and Velcro. They pieced together window panes from used glass for lack of new glass. They fabricated steel doors from scratch to replace missing wooden doors (many stolen for firewood).

Almost all of the weatherization crews' insulation was to combat convection (infiltration) losses and, to a small extent, radiation losses. They experimented with insulation against conduction losses in one room of one hospital building by attaching 2" thick perlite panels to the exterior wall and sealing the surface. The experiment was so successful that the previously uninhabitable room is now a nursery for premature newborn babies. The weatherization crew learned in the process which materials and techniques work and which ones do not.

In addition to the emergency weatherization efforts, USAID has supported activities to rehabilitate parts of the Yerevan district heating system as well as some oil distribution pipelines and power distribution lines. At the present time, these efforts have resulted in restored service in several parts of the capital, with six of fourteen systems now operating to some degree. The distribution systems are generally in dreadful condition, especially in district heating. USAID needs to consider the extent to which it wishes to assist in the reconstruction of these district heating distribution systems. Even in Yerevan, it is not certain that all district heating systems should be renovated and upgraded. The average life expectancy of Soviet-era distribution pipes is just seven years. So with fours year of inactivity, many of these distribution systems have already surpassed their useful lifespans. Other heating options should be included in the overall picture. This issue is of particular concern to USAID in Armenia given the important US role in mitigating that country's energy sector emergency.

4.1.3 Large Enterprise Energy Conservation: Electricity Generation and Heavy Industry

The current program puts USAID-funded contractors in charge of rehabilitating power plants at Hrazdan and Yerevan along with rehabilitation of hydro facilities and application of industrial energy conservation measures at selected sites. With regard to power plant activities, the current efforts are just now bearing fruit with some equipment yet to be installed. Measurable savings in the

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power plants are not yet significant. This situation will change once the Hrazdan and Yerevan plant rehabilitations are completed, though the former is two years from full operation. Even under partial loads, flue gas monitoring at Yerevan and Hrazdan has already improved combustion at the two plants. The Ministry of Fuel and Energy is pleased with the USAID provision of new equipment for the hydro facilities. At the same time, there have been some significant delays in providing equipment and consumables by Burns and Roe. This situation is being addressed with changes in the B&R staff in Yerevan, though the locus of difficulty may not lie in Yerevan.

The major large industrial enterprise efficiency activities in Armenia have been in a brewery and in factories. Thus far this project has proceeded from selection of plants to audits to specification of equipment needs and installation activities. The choice of a brewery appears to be a good one. This is due in large measure to its consonance with the critical path of conservation laid out in Section 1. That is, there is a market demand for the final product. Savings of energy can be realized immediately in terms of lowered costs and improved profits. The saved energy can be paid for at market prices. The brewery operates at about its design capacity. With all of these factors in its favor, it is small wonder that the activity promises to be a success.

As in Ukraine, hard budgets for electricity promise to motivate the kind of consciousness that USAID and its contractors have hoped for from the efficiency projects and technology transfers. There has not yet been much evidence of replication outside of activities funded by USAID. Even in a relatively small country, the private sector will need to carry out most of the efficiency improvements. In the case of the Yerevan brewery, the demonstration effect should be substantial.

4.1.4 Emergency Coal Mining

To help mitigate the effects of the disruption of fuel supplies, USAID has supported efforts to mine coal at previously identified sites. The country's coal reserves are believed to exceed 10 million tonnes, including reserves at 8 new sites. The Ministry of Underground Resources appears to be anxious to obtain additional USAID assistance for further resource identification and delineation. On the other hand, the Ministry of Energy has taken the position that further coal exploration is pointless, since the deposits are small and of poor quality. According to the Ministry of Energy, Armenia's energy future lies in gas. Clearly, Armenia could benefit from assistance in drawing up an energy resource policy. Using the results of such a policy study, the government can examine the possibility of further coal activities.

The coal project was marred by a late start that meant that only a portion of the intended quantity was mined. Although coal demand will no doubt rise before

this coming winter, there is limited opportunity to make use of the coal by urban residents as they neither have the stoves nor the places in their buildings to store coal. In addition, the existing distribution system for coal leaves much to be desired and would need to be strengthened. Perhaps the development of additional coal reserves to supply that fuel to industries or district heating plants will be of more significance.

Current coal output is in the range of 4,000-7,000 tonnes monthly, at the most. However, in fuel-starved Armenia, even this small contribution of about 750-1,250 barrels/day of oil equivalent energy is meaningful. It is unlikely that coal can ever occupy a significant role in the country's energy picture but at this time, the contribution of any energy source is valuable. The US Geological Survey has undertaken a coal resource mapping of the country. At this time, the USGS specialists believe that the role of coal can increase in importance in the future.[35] However, oil and gas are still likely to remain the dominant fuels, even after there is substantial exploitation of domestic coal.

4.1.5 Conclusions

USAID's efforts in Armenia work off a tremendous reservoir of good will. In weatherization, emergency fuel supplies, transmission system repairs and other areas, USAID's quick response and commitment made the difference between a semblance of normalcy and another season of hardship for many Armenians. Now that the program is entering a new phase, marked by an emphasis on longer term projects and commitments, USAID can reassess its program to decide which parts to emphasize and which to move to the background.

Efficiency and Fuel Substitution: The short term measures to weatherize have been successful and should be completed. Initial choices of industrial conservation targets show good likelihood for success since they follow the guidelines for high impact conservation projects presented in Section 1.

It is impossible to assess the overall impacts of the power plant rehabilitation programs. The gas analyzers at the two thermal power plants, Yerevan and Hrazdan, have made improved combustion efficiency possible. More important has been the improvement in the reliability of the Yerevan power station, greatly improving the delivery of electricity in the capital.

The coal mining efforts underwritten by USAID represent an important symbol, though different Armenian government entities disagree over the actual significance of the volumes of coal mined. If coal output can go over 10,000 tonnes

35 Who would mine such coal is the subject of an entirely different investigation.

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monthly, then this activity will start to make a real contribution to fuel supplies. Smaller amounts are likely to be of a more local and short run nature. In any event, it is worthwhile to further delineate the resources and to determine whether further policy and legal measures are necessary to mobilize external sources of funding for coal exploration and production.

The key medium term conservation measures, pricing, metering, allowing savers to capture the benefits of their demand reductions, are largely absent from the current contractor programs. It is significant that the gas "concern" believes that just installing meters and shut-off valves could cut gas use by half.[36] The team believes that some resources should be shifted over to these medium term measures as soon as is feasible to set the stage for longer term efficiency efforts. Another area of high priority is rehabilitation of gas transmission and distribution. The team believes that USAID could give not only short term assistance, but might want to consider project preparation assistance for IBRD lending of the sort that is intended for the electric power sector.

USAID has an excellent example of the value of hard budgets in the operations of electric distribution "concerns" in Armenia. The hard budgets have been imposed from the top, through government fuel acquisition, in order to pay for imported fuel. At successive stages of generation, transmission and distribution each concern is required to pay for the energy that is transmitted to it. This has meant that a substantial fraction of electricity, perhaps as much as 75%, is now paid for by the consumers. Such hard budgets affect consumer attitudes toward energy efficiency and help to promote an environment in which investments to improve energy efficiency are seen as important parts of consumer choice.

4.2 Restructuring of Electric Power, Legal Framework for Energy Sector

4.2.1 Key Issues and Indicators

The proposed restructuring of the electric power system is just now getting under way in Armenia. Unlike Russia and Ukraine, there is just one generating entity for now while the assets of the Ministry of Fuel and Energy have already been distributed to various generation, transmission and distribution "concerns". The Project Objectives that governs the restructuring activities are 1.2: Establish a policy, legal, and regulatory framework conducive to broad-based competition and private

36 See section 4.2 for a discussion of "concerns".

sector growth; and 1.6: Promote sustainable use of natural resources. The following indicators are relevant to the restructuring targets and activities:

1.2.01 - Establishment of policy, enactment of legislation and development of regulatory procedures necessary to break-up of control monopolies, establish markets, expand the private sector and strengthen competitiveness in key economic sectors.

1.6.01 - Promulgation of energy standards, policies and legislation that support (a) subsector restructuring, and (b) commercial development of energy efficiency and related environmental technologies and services;

4.2.2 Restructuring and Legislative Framework

The Armenian government has undertaken some significant efforts on its own to financially separate the state enterprises from the Ministry of Energy and Fuel. The assets have been shifted into entities called "concerns" which have the right to use the assets and operative the relevant facilities. These concerns are the entities enforcing the hard electricity budgets.

Two advisors have been appointed in Armenia to advise on restructuring and on energy law. The energy law advisor has already drafted a suggested framework law for the energy sector, focusing on electricity.

The government has apparently had great success in imposing hard budgets on energy consumers, making the best of a very bad situation in fuel supply and financing. However, there are a number of important issues that the USAID consultants will need to grapple with as they start work in earnest. These issues include the sequencing of the various activities: assignment of assets, drawing up appropriate corporate legal structures, operational restructuring and preparing the entities to operate in a market. At the same time, USAID consultants must assist in the setup of a regulatory body under the proposed new energy law. The team found that these restructuring and regulatory activities were not fully understood or supported by the relevant Armenian government ministries (Economy and Energy and Fuel) or enterprises. Indeed, the Minister of Energy was under the impression that the independent regulator had already been rejected, contrary to the understanding of the USAID-supported drafter of the energy law. Previously, financial separation of an entity such as gas or electric from its parent ministry was considered "restructuring".

Thus far, no government consensus has emerged with regard to either regulation of the energy monopolies or commercialization or privatization of the separated entities. The proposed energy law appears to be in a similar situation,

with major government participants far from consensus on the key elements of the law. The World Bank office in Yerevan has expressed reservations which are not reflected in the current draft of the law. The Ministry of Economy, due to lose significant powers under the proposed energy law, has not been involved in the drafting of the legislation thus far. As it now stands, the team believes that the law needs more specification in some clauses, as well as references to regulatory legislation intended to operationalize the principles enumerated in the proposed law.

The proposed legislation to create a market in electricity has been drafted by a USAID consultant. This document provides an outline of the principles of energy policy. Indeed, it is more a policy statement than a law, *per se*.

Certain parts of the proposed law, especially the regulatory body, may be premature when the government has not yet made up its mind concerning the restructuring of the energy sector and has taken few steps to corporatize and commercialize state enterprises. Once restructuring is in full swing and each entity has clear title to assets and has begun to implement commercially oriented reforms, then there will be need for a regulator to monitor and regulate the newly emerging and hopefully competitive marketplace. On the other hand, if the energy law is to act as a catalyst for reform in the sector, then it needs to lay out more explicitly the stages in the restructuring process, the end goals and set up a group which is charged with the responsibility of managing the process. At the present time, there still seems to be extensive controversy and disagreement within the Armenian government concerning the broader aspects of energy policy and restructuring. Perhaps the bargaining over this proposed legal framework can lead to resolution of some of these issues.

Once the legislation nears its final form in a general sense, certain specific clauses can be added to bring out some of the necessary implementation steps. At that time it may be useful to attach a series of annexes to the law specifying in more detail the following:

1. Nature of market-based energy sector
2. Regulatory body's tariff setting procedure
3. Regulatory body's licensing procedures and specific fees
4. Regulatory body's rule making procedures

In any event, the benefits of the draft law will only be observed when the sector restructuring process is underway, and subsector companies are operating as commercialized entities. At that point and with the draft energy recommendations it will be possible to draw up master plans for respective companies, perform fea-

sibility studies and seek assistance from IFIs in the form of lending to encourage new investment.

The team believes that restructuring and utility corporatization and commercialization should take place at least in step with or prior to the drawing up of energy legislation and regulatory development. Another target of the USAID assistance is legal support for efficiency and renewable energy. There is no evidence of any activity in this vein.

4.3 Commercialization, Private Sector Activities and Resource Mobilization

USAID has set out two Project Objectives and their indicators for mobilizing resources and establishing commercial entities in the country's energy sector. These activities are just now starting. The Program Objectives are 1.3: Stimulate development of private sector enterprises; and 1.6: Promote sustainable use of natural resources. The following indicators are relevant to the commercialization and resource mobilization targets and activities:

1.3.06 - Increasing number of joint ventures involving foreign partners;

1.6.02 - Commercially viable private sector capability developed to provide energy services, including production and distribution;

1.6.05 - Private and public financing mobilized for specific investment projects in energy and environment; and

1.6.06 - Percent of total volume of electricity and heating produced and distributed by privatized sources.

Some of the USAID-assisted activities may promote the furtherance of small consulting or energy service firms. As was discussed in section 4.2, there are some indications that the USAID-supported weatherization activities have spawned a market niche for such services in private dwellings. If this proves to be the case then indicator 1.6.02 will have been met.

The biggest obstacles to private activities are institutional, not financial. There appear to be private companies that are willing to explore for oil and gas and perhaps geothermal energy, but there is no appropriate legal framework in which they can operate. More broadly, there is not yet a legal framework for foreign direct investment. The domestic company law also appears to be weak. As a result, the inbound financial resources will have to come from public entities, such as the IBRD and EBRD, until the legal environment for foreign investment is cleared up.

Key issues in this area include cooperation and coordination between USAID and the IBRD/EBRD, a legal framework to encourage private investments, technical

assistance by USAID-funded contractors for project preparation and satisfaction of IBRD/IMF conditions for prices and operations of the "concerns". Progress in satisfying IBRD/IMF conditionality is not guaranteed under current conditions, a particular problem if the World Bank is likely to remain the major source of energy sector capital for some time.

The team found that the assistance furnished thus far has been useful in identifying rehabilitation targets in the public energy enterprises. Items that have received little or no attention include small thermal power and heat plants (including CHP), and technological restructuring of district heating systems with new prime movers and smaller distribution distances. Such projects will provide ideal, small scale projects for new private firms, once the right to operate and engage in business is established legally. In the geothermal area, the focus on large scale development for power generation ignores the potential to use such energy for local heating and crop production in greenhouses. Again, there is no legal framework that would enable such activities to proceed at the current time.

4.4 Recommendations

The recommendations in Armenia are considered for efficiency and fuel substitution and for the newer activities in restructuring and resource mobilization. However, given the immature status of many of the restructuring and resource mobilization activities, the recommendations are largely independent of particular evaluation conclusions. A number of the recommendations connect activities in energy efficiency with resource mobilization, as a means to broaden the impact of USAID's program.

Energy Efficiency and Fuel Substitution

- Rehabilitate more power plants by providing up front support for IBRD rehabilitation funds through preinvestment studies;
- Continue the emergency programs instituted by USAID for as long as the fuel emergency exists. The are a good effort and should be continued;
- Move to improve both the technical and commercial functions of electricity distribution entities; and
- Advertise the weatherization program better as it can reduce the expenditures required in distribution systems and fuel.

Restructuring and Market Reform

- Explain the various stages of restructuring more completely to relevant Government and enterprise officials and promote full restructuring of the gas and electric industries;
- Engage the Government in a dialogue about energy regulation and the value of independence therein;
- Work with the USEA project to provide the gas "concern" with a US gas utility partner;
- Support commercial training activities at a local business college to allow energy and non-energy businesses to understand certain basic aspects of business and fund raising that are relevant to success of USAID programs. Cooperate with course instructors by providing guest lecturers from US Embassy commercial section, visiting foreign businessmen and consultants and World Bank personnel;

Resource Mobilization

- Provide pre-investment technical assistance for small hydro and geothermal facilities and in the gas sector. In the latter case, assist the state enterprise in its restructuring as an inducement for substantial IBRD funding for rehabilitation.
- Encourage the government to allow potential investors in CHP facilities to sell both inside and outside the fence, but pay more attention to CHP investors with most heat and power sales inside the fence of an industrial facility;
- Point out to the government in the strongest possible terms the opportunity costs of the current lack of secure legal rights for investors and natural resource production and exploration companies.

Key Resource Constraints and Tradeoffs

One useful exercise in Armenia would be the preparation by outsiders of an energy sector rehabilitation budget. Such a budget would show the government the difficulties inherent in obtaining enough money from donor and IFI sources to provide adequate energy services to the populace and to industry. In this way, USAID might be able to convince the government that they need to make use of foreign technical assistance to provide them with the type of legal framework that will encourage inbound investment and mobilize some domestic capital that may already have fled the country.

Current USAID budgets still show a substantial amount, more than 25% of the total, for commodities connected with emergency rehabilitation and repair activities. USAID needs to consider whether such funds should be reallocated in the future toward investment appraisal and preparation tasks that leverage far greater volumes of inbound funding. In addition, USAID should look at the costs of

providing the desired energy service companies with loans and assess the tradeoff with equipment grants.

In the restructuring area, USAID needs to decide whether to continue to support the legal and technical assistance efforts in the absence of a government consensus. The evaluation team recommends that USAID consider slowing down its activities in this area to conserve the funds for use when they can be more productive. The current level of funding can easily be exhausted before a proper consensus is reached among the relevant Armenian government entities.

5 JOINT ENERGY PROGRAM COMMENTS

One of the challenges of this evaluation was to look at each country and project situation with a fresh eye. At the same time, it is important to keep in mind the similar conditions that dominated each of the countries prior to the dissolution of the Soviet Union. In this section, the team raises some common observations and issues that affect the overall environment in which program decisions are made. In section 5.1, important issues and questions, not addressed directly in the evaluation framework, are raised. In particular, there is explicit consideration of the focus of USAID activities and also the impacts of such activities on attitudes within the recipient countries.

Section 5.2 contains a discussion of the relationship between energy pricing, pricing reforms, and economic efficiency. The role of institutional reform is shown to be crucial in allowing market prices to promote efficient allocation of resources.

5.1 Questions of Focus, Attitudes and Impact

In addition to the indicators and targets provided by USAID, the evaluation team concluded that there are at least five subsidiary questions that are important to address for the three countries. These are:

1. Will USAID's program assist in providing an appropriate context in which the more modest energy resources of Ukraine and Armenia can make cost-effective contributions to their energy supplies?
2. Which investment flows should USAID seek to leverage, those of the IFIs or those of private US energy companies?
3. How do the program activities affect the overall level of emissions from energy conversion and use?
4. What is the *critical path* of sector reforms and adjustments that will lead to transparent, viable and efficient markets in electricity, natural gas and energy technology?
5. How have USAID programs affected the attitudes of energy decision makers and consumers in the three countries?

The evaluation team does not claim to have final answers to these questions. However, they are important to the ultimate success of efforts in the energy sectors of these three countries.

With respect to the first two questions, the team was particularly interested in the role of the oil and gas legal framework project in Ukraine as it relates to the exploitation of domestic energy resources. The activities undertaken in Armenia to boost coal and hydro output were also relevant to this question. The second question

relates to possible differences in interest and focus between outside private investors and IFI lenders. This may be especially important in the cases of oil and electricity sector developments in Russia.

A third question relates to environmental impacts of energy conversion and use. To the extent that improved efficiency leads to reduced emissions and or the use of cleaner fuels, the energy program may show substantial benefits in cleaner air. However, since this is not a strategic issue for the energy program, there are no targets which are directed at environmental improvement, *per se*. The team notes that the current USAID activities do not contain sufficient financial resources and incentives to induce greater adherence to Western environmental standards. Tangible environmental benefits may have to await more significant funding by IFIs for enterprise restructuring and rehabilitation or renovation projects. In general, the evaluation team found that the energy and environment programs were conducted independently from one another in the overseas Missions.

The fourth question relates to the sequencing of activities. The success of many USAID-supported activities depends on proper sequencing. As the discussion in Section 1 shows, not all activities can proceed simultaneously, if there are to be tangible results from the program. For example, success in energy conservation relies on a number of prior steps which provide necessary, but not sufficient, preparation for improvements in efficiency. These steps include the following:

- Energy prices based on market values;
- Property ownership rights such that owners and managers can keep the savings from energy efficiency gains;
- Financing for efficiency investments based on market values for commercial properties and factories;
- Shifts to manufacturing goods that can be sold in the market without subsidies; and
- Knowledge of and access to appropriate energy efficiency technology.

USAID needs to be concerned with such sequencing as its financial resources dwindle. In sections 2-4, the report gives several instances of activities that are operating out of phase with one another, thereby blunting their potential impacts and spending more money than is desirable for a given goal. Particular examples of this include the oil and gas legislation in Ukraine versus the USGS data program and the legal assistance to RAO-EES Rossii in Russia on restructuring.

Ultimately, the goal of USAID's activities is to change what seventy years of Soviet governance has taught Russians, Ukrainians and Armenians about resource allocation problems. The USAID program can have a profound effect on attitudes.

There are several USAID-supported activities that promote healthy change toward decentralized resource allocation. These include:

- working with professional associations to establish voluntary standards;
- promoting the growth of private energy service firms operating in a market in place of captive enterprise or plant staffs;
- promoting the establishment of a market in baseline geological information and data; and
- promoting the concept of enabling legislation, not decrees, to put the energy sector on a firm footing under law.

The ability of such activities to effect change in the way business is done in Russia may be substantial. As PIER has shown, a small effort may reap substantial benefits if it is focused appropriately. USAID should continue to support activities that promote attitudinal changes.

5.2 Pricing Reforms and Institutional Change: Their Roles in Energy Efficiency

One theme that ran throughout the evaluation team's fieldwork was the absence of a "magic bullet" of reform and restructuring via pricing changes. It is the experience of the team that market-based energy prices are a necessary, but not sufficient basis for achieving greater efficiency and other desired outcomes.

Energy price reform is an essential element of overall economic restructuring in many countries, not just those of the former Soviet Union. Because the energy sector is a key element of the economy, usually the largest consumer of investment resources and foreign exchange, the decisions made to consume in or invest in energy affect almost all sectors of the economy. This leads to the fundamental asymmetry of energy pricing reform: "good" energy prices, those based on sound market principles, cannot create prosperity; "bad" energy prices, those based on subsidizing and taxing one's way around fundamental scarcity and technology issues, can certainly destroy an economy, especially one that is heavily dependent on energy.

With the "wrong" set of energy prices, the wrong goods are produced using the wrong technologies. For example, where energy prices are too low, goods may be produced that are too heavy (they use too many other energy-extensive resources in their manufacture) and may use too much energy in their ultimate applications - e.g., airplanes that are too heavy, consisting of too much energy-extensive

aluminum, and therefore lack range and consume too much fuel. The technology used to produce them may also consume too much energy. Other economic damage may follow. With excess demand on certain energy resources, there may be incentives to produce more of a given fuel than can be economically produced. This amounts to forcing yields and operations in the energy sector, especially at oil refineries, leading to further waste of resources of all types.

With the "right" set of energy prices *and* with institutional (i.e., legal rights) reforms allowing those who make efficient decisions to reap the benefits therefrom, it may be possible to improve the efficiency of energy use substantially in Russia and in other NIS countries. However, the institutional aspects are crucial to the effectiveness of price signals. That is, the pricing reforms provide an essential component of reform but they must be coupled with institutional and legal reforms that make it possible for those making consumption and production decisions to make their choices according to the market-based prices rather than being dictated by allocation rules of the old system.

ANNEX 1: DESCRIPTION OF PROGRAM AND TARGET PROCESS

EVALUATION OF USAID RUSSIA-NIS ENERGY PROGRAM

U.S Agency for International Development

Washington, D.C.
May 30, 1995

[redacted]

BOOZ·ALLEN & HAMILTON INC.

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Annex 1: Description of Program and Target Progress

1 INTRODUCTION

The USAID energy program in the former Soviet Union started in 1992 as a response to an emergency situation following the breakup of the USSR. The program focused initially on targets of opportunity that might be expected to show immediate results and that were consistent with probable future activities in the energy sector. These immediate targets included emergency repairs to energy distribution systems. In a practical sense, some of the short term remedies from the Eastern and Central Europe program were adapted, *mutatis mutandis*, to the former Soviet Union. The program contained an early stress on energy conservation and efficiency measures, as well as seminars on pricing and restructuring. The Project Memorandum authorized an immediate expenditure of $1.8 million, largely for identification of problems, pricing and policy seminars and implementation of low and no cost efficiency improvements. By 1992-1993, the focus of the overall program had shifted to longer term concerns, with significant increases in funding levels. Life of Project funding was increased to $250 million with 50% to be spent in Russia, 20% in Ukraine and 10% in Armenia. In all three countries, and in Belarus, Kazakhstan and Kyrgyzstan (10% each), the initial focus was on emergency energy supply issues - district heating and power plant rehabilitations, gas pipeline repairs, electric transmissions system repairs and the like. In Armenia, the program focused at first on mitigating the effects on the populace of a war and consequent shutoff of energy supplies during the winter of 1992. That focus for Armenia has stayed on the emergency and short term measures until just the past few months.

As the political situations started to stabilize, USAID program planners had time to formulate additional program activities and to extend the initial tasks to a longer time frame with significant increases in resources. In Russia and Ukraine, there was an explicit link between the energy program and overall goals for the country, including enterprise restructuring, improving nuclear safety and turning around adverse trends in energy production, distribution and use. Life of Project funding for Russia alone was increased to $250 million following the 1993 G-7 meetings. In Armenia, a new set of projects, aimed at restructuring of the energy sector, has begun.

The USAID program is inevitably affected by the political climate in each of the countries in which it operates. In the case of Ukraine, the changes in the political

system have sped up the ongoing changes in the economy and augur well for economic reform. The election of Leonid Kuchma to the presidency of Ukraine ushered in a new era of economic reform. The power sector restructuring, which languished through most of 1994, was promoted with presidential backing by the fall of 1994. Since the middle of 1994, energy prices in Ukraine have moved toward world levels. Though not at fully international price levels yet, most energy prices are within 50% of world levels. More recently, the government of Ukraine has backed up the pricing reform with the enforcement of "hard" budgets for natural gas consumers. Under this new initiative, gas customers will have to pay, in itself a significant innovation, or face the cutoff of gas services. The Ukraine situation provides an indication of the speed at which reform can proceed, given strong backing at high levels.

This Annex focuses on the key elements of the program in each of the three countries. There are some general conclusions which can be drawn regarding pricing reform, enterprise restructuring and energy conservation. However, for institutional issues, privatization and particular tasks (e.g., district heating rehabilitation in Armenia), it is only logical to look at the countries as constituting distinct programs and challenges. Most recommendations in this annex relate to the operational and timing aspects of the relevant projects. In a few cases, the evaluation team has recommended changes in direction or emphasis and even funding sources.

To accommodate the similarities as well as the differences among the three countries, this annex describes the findings, conclusions and recommendations for each of the countries. The following annex (Annex 2) contains the detailed evaluations of each of the targets for the three countries. This annex and the following one are divided into sections that follow the USAID listing of strategic issues.[1] These are:

- Energy efficiency
- Subsector restructuring and institutional reform
- Private sector activities
- Resource mobilization

In each of the four areas, the evaluation team looked at the relevant tasks and targets. The basis for judging the relative success of a project or task was the target. In some cases the targets do not apply to any particular tasks and in other cases there are tasks that do not contribute to a listed target. The team has tried to point out these discrepancies wherever possible.

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1 The reader should note that these strategic issues differ from the project components but do contain areas of substantial overlap. These components are: (1) pricing and national policy; (2) district heating and energy efficiency; (3) subsector restructuring

2 IMPROVED EFFICIENCY OF ENERGY USE & INTERFUEL SUBSTITUTION

2.1 Listing of Critical Issues - High Energy Consumption, Self Sustainability & Replication of Efficiency Technology, Resource Mobilization

High Energy Consumption

According to the Russian Center for Energy Efficiency (CENEf) in Moscow, Russia consumes twice as much energy per dollar of national income as western industrial countries.[2] Until recently, almost nobody in Russia thought in terms of energy efficiency. Bigger was better. "Energy engineers" were primarily power engineers. The more energy consumed, the more prosperous the economy was believed to be.[3] In Ukraine, the situation is allegedly even worse; energy efficiency is among the lowest of any country on earth.

One result of high energy consumption is the devastating effect on the environment, which Russia, Ukraine and the United States wish to preserve. Poor energy efficiency also wastes the country's resources of fuel and labor, better directed toward production of marketable products currently in short supply.

In the former Soviet Union, "energy technology" is associated with energy supply, which unquestionably stands to benefit from greater efficiency. On the demand side, however, virtually nobody has thought in terms of end-user energy management until very recently. One challenge is to capture this opportunity for American businesses in the most cost effective manner. Toward this end, USAID has supplied seed money for studies, training, commodity imports, internships and visits, district heating improvements and promotion of non-governmental organizations.

Importance of "Hard" Energy Budgets

One of the most important precursors of successful energy efficiency programs has recently been instituted in Ukraine. Consumers of natural gas can now be curtailed for non-payment of bills. This revolutionary step should have an important

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2 Studies funded by AID and others have investigated and ranked a multitude of conservation opportunities. These studies claim that consumption can be reduced as much as 40% using western technology. The director of the Moscow Energy Office believes that the city's energy consumption can be reduced by 50%.

3 There is not even a separate Russian word for "efficiency" in the energy field. They use the term "effektivnost" (effectiveness).

impact on the care with which gas is consumed and in the prognosis for replicable energy efficiency programs. With hard budgets, the other necessary components of a conservation program, redesign of products, improved transportation and process improvement, can now start to be implemented by individual enterprises in a manner that makes financial sense to them.

The intent of the USAID conservation and efficiency programs is for these efforts to gain enough momentum to sustain their own continued expansion. When an initiative continues to grow with the support of resources mobilized outside of AID, preferably in the private sector, it will be deemed successful.

In Armenia the government has forced the acceptance of hard budgets through its rearrangement of assets in the energy sector. Government "concerns" now hold the relevant assets and are responsible to pay the government for fuel. These concerns must therefore collect from their customers - exactly as it should be in a reformed economy.

Role of US Energy Efficiency Equipment

Many of the people interviewed for this evaluation, particularly Russian and Ukrainian energy management officials, thought that energy efficiency was the best technical option for reform in the energy sector.[4] If this is a widely held belief and given the absence of an established energy efficiency industry in Russia, there exists a market potential for American energy efficiency products and services in Russia. The potential is not unlimited, however, and will not be easy to realize.

Although many Russians (and Ukrainians) told the team how they realized only in 1991 how far behind the rest of the world they were in energy technology, this does not translate into open-armed acceptance of foreign technology and management. They want to do it themselves, manufacturing their own products and learning how to provide their own services, even if substandard at the outset. This attitude is evident even in Armenia, where some engineers look to using domestic engineering and technology as a path to improved performance. These countries need help in energy efficiency, they admit, but only in the form of "financing" and "joint ventures," which, along with more general commercial concepts, many enterprise managers may not fully understand.

This attitude makes for a cool reception to commodity import programs. Naturally, people will accept gifts. But such gifts may not have the hoped-for effect, namely influencing Russians and Ukrainians to buy much more of that type of technology

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4 It goes without saying that energy efficiency is considered the prime source of additional energy for the economy of Armenia.

after getting a taste of superior American products.[5] The real inflow of modern energy management technology is going to require far-reaching changes in the economy and government. (These issues are covered in more detail in Section 5.3.) However, several points are worth noting with regard to promoting foreign energy management technology:

- If the FSU companies and energy users are expected to pay world prices for the technology, the value of the energy saved must be commensurable - pricing reform is imperative[6]
- Enterprise managers and building owners must have the legal right to modify buildings, change technology and reap the benefits of whatever energy savings result
- The FSU firms cannot continue to rely on captive engineering staffs for their energy management advice - otherwise the "not invented here" syndrome will tend to drown out other voices
- Financing must be available for overall renovations and rehabilitiations and property upgrades, of which energy efficiency is only a part.

The team believes that improving energy efficiency is part of an overall economic restructuring and enterprise rehabilitation program. The costs for improving energy technology are rarely justified on their own but rather in conjunction with higher quality output, better total factor productivity, more timely production and better comfort/service. In Russia, the JEAS also plays a role in this area to the extent that energy efficiency can be related to overall economic, investment, and environmental goals. The role of installing equipment in specific factories should be distinguished from equipment that is used to build institutional capability.[7] In the latter case, the equipment, usually relatively inexpensive analyzers and monitoring equipment, is necessary to equip the energy efficiency centers and their trainees with the types of hardware that will be required for larger scale energy efficiency efforts.

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5 As an example, Honeywell controls were installed at the Tushino-III district heating plant in Moscow. They work well. Moscow is replicating the success at the new Zhulebenu heating plant, but with Russian controls, not Honeywell ones. The director of the Moscow Energy Office expects they will not work quite as well, but they are happy to be doing it themselves. In this case there is no cost imperative pushing the Russians to adopt the best technology, merely a desire to do "better".

6 Pricing energy at international levels is still considered "arbitrary" by many Russian energy officials.

7 Another key element is the selection of sites for demonstrations. If these demonstrations are to work, they must be at factories that operate on a regular basis, produce goods that people will pay for, and show clearly demonstrable paybacks at current energy prices and costs of equipment and installation.

Energy Efficiency: Its Importance in Armenia's Energy Emergency

Unlike Russia and Ukraine, Armenia is not a "normal" post-Soviet state. With its current state of war and consequent fuel supply cutoff, Armenia finds itself in a tragic situation, still facing all of the other challenges of restructuring but without significant resources. The country is not at all energy self-sufficient. It is at the mercy of several hostile neighbors and is suffering badly from its lack of fuel and efficiency. Its low quality Soviet-era infrastructure is mostly collapsed.

Superseding all issues in Armenia is market reform. Until prices become incentives and payment streams become reliable, other reforms can move forward only with difficulty and subsidy. More than in Russia and Ukraine, the country cannot afford to subsidize its energy consumers under the current supply conditions.

Steps initiated in Armenia to raise energy prices and to cut off non-paying users of electricity and gas represent a welcome and effective change in priorities.[8] Throughout the field work, the team interviewed energy users who admitted that most delinquent customers choose not to pay. These non-payers still believe the old Soviet philosophy that their labor had already paid for the energy, and now they are entitled to it. They feel no obligation to compensate utilities financially, especially not at world prices. Most customers have money for utility bills. As long as they can get away with it, they will spend it elsewhere.

In a nutshell, the biggest technical problem Armenia faces is lack of fuel. The technical solution is threefold: a) develop alternatives, b) tighten up on efficiency and c) build a new infrastructure.

Many energy officials, left over in positions of power from the old days, resist change and see only traditional solutions like central control and throwing money at the old infrastructure. On the other hand, there are plenty of innovative people in the Armenian energy sector, most of whom are not in high positions. The challenge is to channel tools and opportunities to the forward thinking people and convince officials to follow their technical lead.

Most AID technical activities in Armenia are replicable technically, but not financially. That is to say, a small core of technicians is or will be prepared to continue doing what it has learned, but is not yet prepared to run an unsubsidized business. Efforts at further technical demonstrations should be redirected to business training.

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8 The team was told that simply metering gas customers could result in as much as a 50% drop in gas demand (their estimates). Whatever the actual figure, this certainly represents the possibility of a significant change from the old era.

The remainder of this section highlights target areas and shows the factors which have contributed to their successes or failures. Much of the Russian-oriented discussion applies to Ukraine as well but less so in the case of Armenia. The important differences are covered in each subsection.

2.2 NGO Energy Centers and Professional Associations

Russia

The Center for Energy Efficiency in Moscow (CENEf) is the beacon on a sea of efficiency illiteracy. Its light needs more power and focus. CENEf has the potential to become a national force that can position the energy service industry to spring into action when the economy matures. The center has published a number of reports on conservation under the USAID program in conjunction with the contractor RMA.

Some things CENEf is doing well. Its appliance labeling program, so essential for consumer awareness, is right on target. The Center has drafted codes and energy legislation. It publishes a free newsletter, conducts seminars, and is working on establishing one professional association. CENEf also has created a data base of energy efficiency products and services. At the same time, CENEf does not look routinely at commercial spin-offs from its efforts and knowledge base. The organization may not itself be suited for acting in a commercial capacity, for example, as a performance contractor on energy savings[9]

The data base is an excellent start, but it could use a) more American entries, and b) more exposure around Russia. Other things need improvement. In particular, the following items will need to be resolved successfully before a self-sustaining energy service industry can exist in Russia:

- CENEf efforts to accelerate the development of professional associations date have been slow and restricted
- CENEf needs to become self-supporting through association with manufacturers and/or consulting engineering groups
- CENEf needs to develop professional relationships, not rivalries, with RAO-EES Rossii and the Moscow Energy Office
- CENEf needs to make contact with US professional associations, including the American Society of Heating, Refrigeration and Air Conditioning Engineers, Association of Energy Engineers and the National Association of Energy Service Companies. Both CENEf and

9 Eleven of twelve energy management performance contracts initiated by CENEf have failed completely.

the Russian analogue to ASHRAE, AVOK, will receive more than they can give from such associations.[10]

- CENEf needs to work with US trade association, such as the American Gas Association, to improve standard setting.

On the US side there is little apparent contact between other US government entities and Russian entities such as CENEf. As USAID curtails some of its activities in Russia other US entities, including the Foreign Commercial Service and USEA, among others, can take up some of the slack of maintaining some of the contacts with conservation groups and associations built up by this project.

Energy and the Environmental Connection: The Role of CENEf

Throughout its two weeks of meetings and investigations in Russia, the AID-EEMR evaluation team found almost no signs of attention to environmental issues. Damage to the environment is roughly proportional to the rate of energy consumption, yet except for EPA's ESOX program and a few pieces of CIP hardware, it seemed to most people that environmental consequences were a separate issue for another time and another place. Coal, for instance, is the dirtiest of fossil fuels, yet PIER in Moscow had never heard of the US Clean Coal Coalition.

The notable exception was discovered at the Center for Energy Efficiency (CENEf) in Moscow. As manifested by several published papers, the PhDs at CENEf fully realize that environmental protection is a driving force, right up there with money and humanitarian concerns, in the quest for energy efficiency.

How can US AID capitalize on this nucleus of awareness? The CENEf staff understands the nexus of environmental and energy issues. These professionals already possess the skills to teach and disseminate the technical knowledge about realistic alternatives available to ameliorate some of the conditions. A perfect match to CENEf's skills would be a task to quantify the environmental externalities to energy use, and work with regulatory commissions to incorporate these costs into tariffs.

Who wants to know about the environmental connection, and how does one find an interested audience? Sometimes, opportunities reveal themselves subtly in conversations. At MFE, for instance, the Ecological Director did not know that clean waste-to-energy and biomass technology existed. Lenenergo displays open pride in its clean, new generating station. Can this pride be leveraged to help establish standards for all plants? In both of these cases, CENEf can work to provide this important knowledge to other Russian energy users.

10 In addition, the activities of such professional associations in the US demonstrate how voluntary organizations can act to set professional and technological performance standards without a large government bureaucracy.

Ukraine

USAID has sponsored the emergence of ARENA-ECO, an energy conservation center that is similar to CENEf. As with CENEf, the center operates with a director and a technical staff. The center's director was found to be highly competent and entrepreneurial. He and his staff could provide one nexus of improved energy efficiency in the Ukrainian economy. At the same time, the evaluation team found that ARENA-ECO was often unaware of energy efficiency initiatives elsewhere in the Ukrainian economy. Such a situation is not conducive to ARENA-ECO becoming a key player in an emerging market in energy efficiency.

Many of the activities of ARENA-ECO relate to overall USAID targets as regards voluntary activities and professional association growth, though ARENA-ECO is not currently tasked with promotion of such other NGOs as professional associations. The evaluation team believes that it would be extremely cost-effective to leverage the efforts of such groups. They use mostly volunteer labor, they are effective tools for rapid dissemination of information, and they offer training, professional certification and equipment standards. They bring manufacturers, service providers and end-users together in large networks. Best of all, they can teach and perpetuate volunteerism in service to the profession of energy management.

There is far to go before Ukraine shows the level of promotional activity by US firms that is typical of Central Europe and even Russia. A far as the team could determine, only GE and Honeywell were active in this country, with offices in Kiev to sell lights (GE), manufacture lighting ballasts (GE) and manufacture thermostats (Honeywell).

Armenia

In Armenia USAID's energy efficiency program has focused on immediate improvements in energy use and distribution to make the best of an emergency situation. Sixteen of nineteen sites selected for weatherization improvements have already been completed. Other tasks connected with the emergency weatherization program included the delivery of kerosine heaters and the fuel to use in them as well as training one dozen teams in weatherization of houses and buildings. These programs have had short term positive impacts and were mentioned by virtually every Armenian interviewed by the evaluation team. One US contractor, RMA, has trained ten teams in weatherization techniques.[11]

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11 There is some speculation in Armenia that there is a niche market for weatherization services. If this is true, then the program can be said to have achieved self-sustainability, if even at a minor initial level.

Institutional difficulties in saving energy have been about the same as in the other former Soviet republics. The country's technological, industrial and organizational genesis in the Soviet system implies that there are institutional problems similar to those in Russia and Ukraine that must be resolved before energy efficiency can improve much on an ongoing basis. However, the country's emergency has spawned a series of "hard" budgets in state energy supply "concerns". This action has laid the basis for real improvements in efficiency as the emergency is resolved.

2.3 Large Enterprise Energy Conservation: Electricity Generation and Heavy Industry

USAID has supported studies of mechanical power transmission, lights, insulation and motors. This work, though informative and interesting, has had little effect in Russia and Ukraine beyond the enterprises studied. The larger institutional issues discussed above in Section 2.1 highlight the reasons that widespread adoption of improved energy productivity is not likely at this time in Russia and Ukraine. Some improvements in energy measurement will assist in the identification of targets of opportunity for conservation technologies. In Armenia the ability of USAID to affect meaningfully the overall level of energy efficiency is bolstered by the country's small size and the active role of USAID in working with Armenian government institutions. In that country, thermal efficiency improvements at as few as five power generation or district heating stations can show tangible results in the country's overall energy economy.

Russia

In the Russian electric power area, many opportunities exist for effecting great improvements in electricity generation efficiency. One of the US prime contractors, Burns & Roe, has studied the potential as a part of the JEAS activities. As a result of the JEAS study, all power plants, including Central Heating Plants as well as nuclear plants, were placed on a common cost basis for the first time.

The joint US and Russian team has identified and analyzed a number of thermal and hydro power plant upgrade options which are listed in the JEAS reports. On the transmission side the joint effort has identified load flow software and its requisite hardware that will allow upgrades to the transmission system.

Demonstration equipment from US manufacturers is already installed and operating in selected sites. One, the Tushino district heating plant in Moscow, has been discussed above in a footnote. This program can be successful as a part of an overall system planning and rehabilitation activity. In particular, older, less capable (for upgrading) power plants should be phased out without undue analytical or rehabilitative resources. Adding new transmission lines will improve

dispatch and should be compared to various generation options with regard to cost-effectiveness. To systematize such planning activities, the team suggests new activities, oriented explicitly at electricity system planning and investment (see below).

The JEAS cannot be yet considered complete with respect to identifying all of the relevant and cost-effective rehabilitation options for Russia. The JEAS bases its conclusions on two basic scenarios, neither of which provides a hard assessment of the savings in the electric energy sector from the reduction of electrical demand as electricity in Russia climbs to world market prices and as its industrial economy restructures.[12]

Ukraine

The power plant efficiency activities in Ukraine represent a singularly successful commodity assistance program. At the same time, the limitations of the activity point out some of the weaknesses of this approach. The tasks undertaken by Burns & Roe provided Kiev 5 Combined Heat and Power Plant with modern regenerative resins for demineralization of boiler makeup water and for softening makeup water for the district heating system. The project also provided Kiev 5 CHP plant with instrumentation to improve performance and general hardware to improve plant operations.

Demonstration equipment from US manufacturers have already been placed in operation. Some of the equipment is being used to monitor a power plant and are subsequently moved to another plant. The concepts of continuous stack monitoring and maximizing plant efficiency were foreign to the Ukrainians. In spite of this unfamiliarity, the Ukrainians expressed interest in replicating this effort at other plants, but will require assistance to purchase any additional equipment. That is, even with increasingly "hard" budgets for fuel, the recipients are not yet ready to commit their own funds to activities that are clearly cost-effective from a financial standpoint. Perhaps the coming wholesale electricity market will provide additional incentives for power plant operators to take more seriously the low cost options for improving generation efficiency and plant reliability.

Other aspects of large enterprise energy efficiency show the need to select carefully, the industrial plants that are to be demonstration sites. The team visited

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12 One useful addition to the discussion is the assumption of embedded costs of existing facilities. By imputing a value to the capital equipment, the system planners will be able to compare fairly the various alternative facilitates. Once the kilowatt-hour cost of generation is determined, then each unit can be ranked in the order of increasing cost of generation. This ranking will precipitate further discussion concerning the replacement or upgrading of a particular unit is economic and the marginal utility of each unit with respect to the funds necessary to perform this work. Each unit would then be classified in relationship to the replacement or upgrading of other generating units.

three factories in Ukraine that were recipients of energy efficiency demonstration funds. Only one of these plants was operating. A cold plant does not show off technology, nor does the new equipment save energy in such circumstances. Such demonstrations do not spread the message of the technology or of the changes in management that are required to achieve widespread adoption of improved technologies.

USAID's demonstrations should be just that, as the Kiev #5 program has shown. Technologies that are used in operating units that exhibit demonstrable energy and money savings will spread thee message. It is better to have one Kiev #5 demonstration than a dozen hardware drops at cold plants. Not only is there a real energy savings, but the technology can be demonstrated. The team believes that USAID could profitably refocus some of the efficiency demonstration funds on the choice of plants (must be operating at full capacity) and in setting up exhibits and seminars that truly spread the message of improved technology and energy management. A showpiece should live up to its promise. It should be clean, environmentally benign and safe for its workers.

Armenia

The power plant efficiency and rehabilitation activities in Armenia relate to the emergency supply of electricity. USAID contractors have installed flue gas monitoring equipment at two power plants. This equipment seems to work well and has saved energy and improved performance. The delivery of the complete complement of equipment has not proceeded smoothly, with significant delays hampering the improvements in efficiency promised in one of the two power plants (Yerevan thermal power plant).

The direct energy savings from these installations have contributed materially to the improvement in system operation for both district heating and electricity. The greatest impact has been in system reliability. Customers now receive increased hours of electricity service. In the district heating system, the generation improvements were secondary to USAID-supported activities in distribution. Six of fourteen parts of the Yerevan district heating system were repaired enough to operate, unreliably, during the winter of 1994-95. In combination with the emergency kerosine supply program, these rehabilitation activities were sufficient to prevent the worst of the suffering experienced in previous years.

One example of useful intervention in industrial energy efficiency was the Yerevan brewery. This case, discussed in detail in Annex 2, shows how improvements in operations at one working factory can more effectively demonstrate the gospel of energy efficiency than many installations at cold plants.

2.4 *Improved Electricity System Planning*[13]

There are no specific tasks or activities related to load research and forecasting in the power sector or in the areas of demand management and resource planning. However, the team added these to the listed targets since both items are integral parts of achieving improved efficiency in resource use as well as easing the adaptation to market-based prices for both electricity and fuels. This is true in all three countries but is especially important in Russia. In Ukraine, the coming wholesale market is likely to sort out the less efficient power plants. In Armenia, the shortage of capacity and the small size of the system make the concerted planning effort discussed in this subsection largely unnecessary.

Two of the subtasks in the JEAS relate to the proposed improvement in electricity system planning and resource management, though that is not the main purpose of either of the tasks. These are the integration task and the transmission and non-nuclear alternatives study. The JEAS work will serve to identify a number of possible options for the power system beyond investments in new capacity. These include:

- Investments in energy efficiency
- Upgrading existing thermal and hydro power stations
- Upgrading of transmissions systems

The JEAS report will become the general plan for the power system and detailed resource plans will be required as the economic evolution of the country unfolds. In the efficiency area, the report will be augmented by changes in the market. For example, further efforts to enforce collections may result in the decrease in net generation demand as consumers and/or industry begin to curtail energy use. In the case of industry, the option of passing increasing costs from pricing reforms on to the consumer may not continue to be possible indefinitely without reducing demand for the final products or services. Other industrial facilities with more efficient technologies and methods will produce the same goods but at a lower cost, increasing their share of the market. Simply put: the more efficient factories will drive out the less efficient ones.

If the aforementioned net decrease in electric power generation and/or energy demand does occur, the necessity to continue to build additional electric power generation could be reduced and, perhaps, some less efficient plants could be retired rather than renovated. This would affect the amount of donor funds required from the World Bank, the EBRD and other multi-lateral institutions. Such a scenario should be examined in greater detail and updated regularly.

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13 Italicized subheadings indicate targets added by the team.

A related activity is system planning for district heating. In Armenia, USAID has focused on the rehabilitation of old systems for emergency heating supplies. However, even in Yerevan, it is not certain that all district heating systems should be renovated and upgraded. Other heating options should be included in the overall picture. This issue is of particular concern to USAID in Armenia given the important US role in mitigating that country's energy sector emergency. In Russia and Ukraine, the weight of USAID recommendations on this point is less than overwhelming. At the same time, USAID consultants should make their counterparts aware of technical and organizational alternatives to current heating systems.

2.5 Conclusions

The USAID programs in energy efficiency have shown the cooperating Russian, Ukrainian and Armenian institutions the capabilities of US technologies to save energy, reduce emissions, and promote more efficient overall operations. At the same time, the programs founder on the self-sustainability issue. Whether the target is improved building energy use or reduced fuel consumption in power plants, the issues are largely the same. Energy is not saved because enterprises lack hard energy budgets - service will not be terminated, prices have not yet achieved world levels, independent service firms are not widely available to assist in designing optimal efficiency programs, financing is not available for new machinery and the enterprise lacks the ability to keep the gains from improved efficiency in energy use. The introduction of hard budgets in electricity and gas in Armenia and Ukraine, respectively, shows that the precondition for energy saving is well understood. In Russia the connection is less pressing given the country's abundant supplies most energy supplies at low (local currency) prices.

Several USAID programs address these very issues. In the energy program itself, USAID contractors are working with enterprises to improve their accounting and information systems, other consultants are assisting in price reform. Other USAID activities in the overall Russian program promote firm titling of property and the creation of user-friendly financial institutions. With such a panoply of assistance, it is reasonable to look at which tasks need to be done first. The team has concluded that the construction of the *capitalist infrastructure* is the top priority. This infrastructure consists of the following:

- enterprise commercialization,
- price reform,
- financial institution reform, and
- improved information systems and accounting.

With such infrastructure in place, the kinds of investments that are required in new products and technologies or in rehabilitating residential/commercial space, will bring with them substantial improvements in energy efficiency that are typical of new technologies in the West. To help Russia and Ukraine prepare for the new world, the team believes that a cadre of efficiency specialists should be supported to form the core of energy service firms operating in a contract market, a distinct change from enterprise self-sufficiency in technology, which is typical of the current situation.

Continuing the current approach of small demonstrations in Russia and Ukraine accomplishes little in the overall scheme of energy use. The heavy commitments of time and resources required to put such demonstrations into effect need to be weighed against the opportunity costs of such programs in the program as a whole. If the demonstration program is very small relative to the overall economy, then the likelihood of spread effects is low. If there are too many demonstrations to be implemented properly, then the impacts are also slight. Targeting the recipients of such assistance is vital. To have a positive demonstration and spread effect in large economies, such programs must follow these general guidelines:

1. Choose factories or power plants that are in full operation
2. Do not modify factories for which the product demand is small
3. Consider examples of how such modifications can be put into other operating units - prepare financial and economic comparisons that use the prices and costs faced by factory and plant managers for their decisions, use border prices for the World Bank projects. Make the demonstration project a real showpiece.
4. Leave enough money in the budget to bring in visitors and show them the technology and management.

In the arena of energy investment planning, the team has concluded that scenarios cognizant of conservation, and changes in industrial structure and technology need to be internalized into the planning process of JEAS and its successor activities.[14]

Ukraine

The recent introduction of hard budgets into the calculus of energy demand at all levels is the single greatest innovation affecting energy efficiency and conservation. It is not necessary that prices actually reach world levels before *any* self-sustaining efficiency activities occur. Rather, movement to within striking distance (50-60%) of world prices will render the worst of the energy demand excesses

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14 This suggestion implies adoption of the "scenario planning" technique used by several of the international oil majors in which a variety of operating environments are suggested, along with proposed responses by the company.

uneconomic and will induce some conservation. Once the motivation for saving energy exists, a good demonstration project puts such technology within the realm of comprehension, and perhaps acquisition, for enterprise managers. This is where the quality of the demonstration is critical and is where industrial, but not power generation, demonstration projects have exhibited less-than-ideal examples of sustainable energy efficiency activities.

This change in the overall environment for reform buttresses the role of USAID in training specialists, making available new technologies and equipment, and supporting institutional restructuring. The adoption of hard budgets in the gas sector highlights the likely value of such budgets as a motivator for replication of assistance already provided by USAID.[15]

Armenia

As in Ukraine, hard budgets for electricity promise to motivate the kind of consciousness that USAID and its contractors have hoped for from the efficiency projects and technology transfers. There has not yet been much evidence of replication outside of activities funded by USAID. Even in a relatively small country, the private sector will need to carry out most of the efficiency improvements. In the case of the Yerevan brewery, the demonstration effect should be substantial.

The next section of the report covers restructuring issues, with suggestions for an implementation strategy which USAID and other donors can support.

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15 One of the consistent problems of energy efficiency programs has been the use of international prices in calculating the payback periods for expenditures. Such calculations assume that such prices rule and that the bills are actually paid. Where local currency bills are not paid at all, then there is little likelihood of replication in the equipment projects.

3 MARKET REFORM, RESTRUCTURING & LEGAL FRAMEWORK

3.1 Critical Issues in Economic Restructuring.

This section of the evaluation report addresses the relationship of regulatory activities must precede or accompany economic restructuring. The intent is to show how the USAID and other donor activities can be made more effective through establishing and then following a critical path for reform. The constellation of activities required is roughly the following:

- Establishing markets
- Expanding private sector activities, and
- Promoting investment

Concurrently, the USAID-supported activities must seek the establishment of the necessary legislative background and regulatory bodies and procedures in order to safeguard new market entrants as well as ensuring the establishment of a level playing field. Perhaps the most crucial issue is the establishment of transparent and competition-enhancing rules for the three network monopolies, oil, gas and electricity.

The timing question is critical for the success of USAID's efforts. At the present time the thrust of USAID contractors has been toward the structure of the future market and the entities that will operate in that market. Before such a market can come into being, USAID and the Russian energy entities will need to take a hard look at the existing corporatization, restructuring and commercialization activities to ensure that the resultant entities are capable of participating in a competitive market.

A desirable outcome is one in which different types of private participation are possible, including:

- service contracts.
- management contracts
- leasing
- concession/BOT
- joint venture etc.

However, before that can happen, a number of corporatization and commercialization activities will need to be well under way. These include the following:

- Subsector restructuring completed (assignment of assets).
- Corporatization of entity
- Commercialization of entities to include the following:
    1. spinning off non-core activities

2. shifting from technical to market driven focus
3. establishment of customer service activities
4. implementation of modern MIS
5. application of uniform system of accounts
6. improving cash management
7. reducing manpower levels
8. introducing performance based bonuses
9. implementing cost based rates

In this section, the activities that promote such structural change are addressed.

3.2 Plan For Electricity Sector Restructuring

This target, one of the key elements of the entire USAID and IFI program, aims to accomplish the following:

- Produce a jointly agreed comprehensive time phased investment plan for the Russian and Ukrainian power sectors.
- Define an electricity market structure that will ensure the emergence of a competitive, efficient and market oriented power sector

Russia

Meeting this target in Russia involves elements of the JEAS, and other electricity activities, as well as implementation of regulatory reform and privatization. This activity was one of the early targets of opportunity in the USAID program. At that time, the Ministry of Fuel and Energy and its electricity spinoff, RAO-EES Rossii, were among the only institutions that USAID could work with for electricity sector reform. The USAID consultants as well as teams from the UK, France and Austria, have defined a number of structural alternatives for RAO-EES Rossii. Before any of them can be implemented properly, a number of specific steps must be undertaken to set up the asset structure and entry and exit conditions that will govern the electricity market.

RAO-EES Rossii, like other Russian privatized monopolies, was set up from assets previously owned by a government ministry, in this case the Ministry of Fuel and Energy. RAO-EES Rossii remains a quasi vertically integrated monopoly and has both ownership and managerial control of both generation and distribution, as well as its transmission assets. The particular form of the "corporatization" of the MFE electricity assets does not assure the viability of the various generation and distribution entities that were established, independently from direct control by RAO-EES Rossii. Moreover, there are different capabilities in management and regional growth so that some of the entities are doubtless slated to fail while others will grow.

USAID's program of technical assistance to RAO-EES Rossii has produced a number of plans for a wholesale electricity market involving RAO-EES Rossii as the market operator and the owner of the transmission system. However, RAO-EES Rossii will still own significant shares in both generation and distribution assets as well, a fundamentally non-competitive structure. Other ideas exist that would promote greater decentralization of decisions. The team found that such ideas were not considered within the confines of the technical assistance being provided to RAO-EES Rossii.

The team believes that the work done for RAO-EES Rossii has been of high quality but that USAID needs to step back and consider the various elements of a well-functioning electricity market. These include:

- Limitations on monopoly ownership of network assets (the transmission system) accompanying participation in the other segments of the market.
- Specification of the assets and liabilities of the various generation and distribution companies in such a way as to prevent the emergence of regional monopolies.
- Establishment of a forum for making decisions on market entry and exit and competition.
- Establishment of wholesale and retail tariffs for the transition period.

Successful restructuring of the electricity sector will require establishment of a regulator of the market, so that the current path pursued by Gazprom is not replicated in the electricity sector. The team believes that a well-functioning Federal Energy Commission (see below) can promote a smoother transition to a competitive electricity market.

Ukraine

In Ukraine the evaluation team found a different situation. The government of the country is committed to power sector reform. The foreign assistance teams are working toward one goal and the assignment of assets to generation and distribution entities has already started. The regulator, the National Energy Regulatory Commission (NERC) has been established. A "test" market for generators will start this summer (June, 1995).

Given the good organization of efforts in Ukraine, the team believes that this effort can succeed if the necessary pieces are put into place before the pool is started. Unfortunately, a key element of the system is missing. The distribution entities were supposed to receive aid from the EC's TACIS program. That aid has not yet started, leaving the distribution entities on less-than-firm footing vis-à-vis the generation and transmission systems. To allow this imbalance to imperil the overall

reform would be tragic, a fact recognized by USAID. Its short term program to provide some assistance to distribution companies is an important step in assuring that the reform program has the best possible chance for success.

The willingness to innovate and reform that has been exhibited in electricity is not matched in oil and gas (see subsection 3.5). In this area, the lack of legislation impairs reform and effectively maintains the status quo.

Armenia

Electricity sector restructuring in Armenia has not yet started. Initial USAID-funded activities on sector reform have commenced. On its own, the Government of Armenia has assigned the assets of state electricity and gas entities to "concerns". These concerns isolate the state from financial responsibility for the operation of the supply entity. This assignment of assets has also had the effect of forcing hard budgets on the enterprises. Once formal restructuring starts, these concerns may have a jump on other parts of the FSU since they will have resolved the payments and collections issue form the start.

No activity has gone on formally in oil. However, the fuel cutoff effectively forced privatization of refined oil product supplies.

3.3 Privatisation Legislation for Electricity Generation and Transmission

The USAID project has devoted resources to providing RAO-EES Rossii with assistance on privatization, corporatization, and the legal structure of the Russian electricity market. This effort is intended to produce the legal framework for a wholesale power market, retail price regulation and independent power production. USAID has also supported efforts to create market-based electricity sales in Ukraine and now in Armenia. These efforts have achieved mixed results. Where the goal is clear and the client is willing, as in Ukraine, the legal technical assistance has proved beneficial and would be truly useful if it were completed. In Russia, the lack of unanimity among various interested parties has thwarted the precision of the legal work.

Russia

At this time, the results of the legal work are inconclusive. Direction from RAO-EES Rossii has been changing, inconsistent and irregular. As a result, the legal consultants, Latham & Watkins, have prepared numerous memos and work plans that were vitiated by subsequent changes in direction by the client and by other USAID contractors.

This type of activity does not greatly advance the cause of providing Russia with workable electricity law. At the same time, US-type legal principles are indispensable for the establishment of IPPs, settlement of disputes and basic commercial law involved in corporatizing the state's electricity assets.

The expertise of the legal advisors is not being exploited effectively by this project. The advisors would be better able to assist the Russians as advisors, not drafters of legislation and regulations. At the present time L&W drafts and the Russians and their US advisors react. L&W would be more effective if the direction of the information flows was reversed. In other words, the L&W lawyers should be advising the various Russian entities on the legal aspects of *their own* conceptions of structure, prices, entry and exit, geographic extent, and other issues. Such a change in the role of L&W would also allow them to provide assistance to other Russian entities, including the FEC, as well as to RAO-EES Rossii.

Armenia

Proposed legislation to create a market in electricity has been drafted by USAID consultants. There is a problem of correct sequencing. The country faces an urgent need for a clearly articulated energy policy specifying the short run and long run resource strategy. The current proposed energy legislation does that. Indeed, it is more of a statement of the principles of energy policy than a law, *per se*. Certain parts of the proposed law, especially the regulatory body, may be premature when the government has not yet made up its mind concerning the restructuring of the energy sector and has taken few steps to corporatize and commercialize state enterprises. Once commercialization is in full swing and each commercial entity has clear title to assets; has given some measure of autonomy to its board of directors; is operating on full profit and loss accounting and has begun to implement cost based tariffs, then there will be need for a regulator to monitor and regulate the newly emerging and hopefully competitive marketplace. On the other hand if the energy law is to act as a catalyst for reform in the sector, then it needs to lay out more explicitly the stages in the restructuring process, the end goals and be charged with the responsibility of managing the process. In its anxiety to be palatable to government, the proposed energy law if ultimately accepted may well do little other than enshrine a series of broad goals which will later become the subject of extensive controversy and disagreement. It may be useful to attach a series of annexes to the law specifying in more detail the following:

1. nature of market based energy sector
2. Regulatory body's tariff setting procedure
3. Regulatory body's licensing procedures and specific fees
4. Regulatory body's rule making procedures

In any event, the benefits of the draft law will only be observed when the sector restructuring process is underway, and subsector companies are operating as commercialized entities. At that point and with the draft energy recommendations it will be possible to draw up master plans for respective companies, perform feasibility studies and seek assistance from IFIs in the form of lending to encourage new investment.

The team believes that restructuring and utility corporatization and commercialization should take place at least in step with or prior to the drawing up of energy legislation and regulatory development.

3.4 Creation of an Independent Electricity Authority

Russia

This target was established in the recognition that some type of regulation, during the transition and at the retail level, would be required as a part of electricity sector restructuring. The consultants to USAID have included the regulatory activity within the overall restructuring report. The consultant's report for Russia recommends a minimalist approach to regulation which is appropriate in the context of a functioning competitive market. Given the conditions which currently prevail in that country's electric system, care must be taken to make sure that the regulatory authority has the power to restrain arbitrary use of market power. In addition, the regional aspects of electric power regulation and market activity (through Regional Energy Commissions) have yet to be worked out fully.

Up to this time the establishment of a regulatory authority has taken a back seat to establishing the model for RAO-EES Rossii restructuring. The consultants will need to devote more attention to the activities of the FEC and RECs and the impact of the recent presidential decree strengthening their staff and activities. As a first order of business the consultant will need to prepare various alternative models for regulatory oversight. Key issues that will arise in the short term include the following:

1. Independence of the Commissioners
2. Financial autonomy of the FEC
3. Method of resolving disputes - order/decree v. open hearing process
4. Neutrality of the FEC as an arbiter of competing interests
5. Flexibility to accommodate both technological and organizational change in the affected enterprises

If these steps are not taken and issues resolved in the short term, there is little to assure the establishment of a truly competitive market in electricity.

At the present time some consultants are also involved in the creation of the FEC staff capabilities. It is in the interest of USAID to avoid the type of fractured situation that has prevailed at RAO-EES Rossii with advisors working at cross purposes to one another. In this respect, USAID has a particular advantage in that two of its advisors, through a non-energy program, are already working with both the FEC and the Anti-Monopoly Committee.[16] Such synergy should be exploited further.

Ukraine

The regulatory situation facing Ukraine is different from that in Russia in a number of important ways. First, the regulator is dealing with a reduced set of responsibilities. Second, only electricity is covered at the current stage. Third, the form of the electricity system reform is largely cast.

Unlike a US regulator, the NERC in Ukraine will simply regulate the conditions of competition and market entry/exit. This means that there will be little need to have detailed parallel oversight of the activities of the regulated entities. At the same time, the NERC will have an important role in the establishment and early management of the power pool. For the proposed power pool to be effective, it will not only be necessary to phase its introduction as planned, but provide adequate training to the staff that will be called upon to manage this process. The NERC urgently needs to define its level of autonomy with respect to the Ministry of Energy as well as the Council of Ministers. To safeguard autonomy it needs an unambiguous funding source, and to this end, a clear and detailed licensing procedure needs to be established. In addition there is urgent need to bring closure to the structure and level of competence of the regulatory body, reconciling competing models and adapting them fully to the particular Ukrainian situation, where in the initial period subsector assets will remain in public hands and only subject to privatization in a subsequent stage.

Armenia

In spite of the fuel supply emergency in the country, prospects for energy enterprise restructuring are good in the medium term. The current practice of enforcing hard budgets encourages the development of companies, whether state owned or otherwise that begin to operate in part according to market principles. Legislation may then be designed to promote a competitive marketplace while regulation will safeguard a level playing field. The early introduction of former enterprise managers to managerial accountability and the need for efficiency and profitability is the best guarantor that subsequent technical and commodity assistance with

16 These are the IRIS program and the Harvard Institute for International Development.

rehabilitation and new investment will be used wisely. Of course the presumption is that it is desirable to promote the greatest degree of autonomy and self sufficiency as soon as possible.

3.5 Establishment of Market-Based Prices for Electricity

USAID has supported efforts to introduce marginal cost pricing to the electricity sectors in all three of its aid recipients. In Russia the RCG team has completed reports which explain the concept of marginal cost pricing in the context of a wholesale market for electricity. The team has also introduced the time of day pricing principle to the RAO-EES Rossii counterparts. These principles are less well understood in the regional AO Energos and in the power plants themselves.

In Ukraine there has already been significant movement in electricity prices, with current levels at about half what a market might yield. The pool arrangements this summer will likely complete the educational process that has already been simulated by one of the consultants (PHB).

In Armenia the most radical step of all has been taken - real time implementation of willingness-to-pay for electricity. In the process of improving collections, Armenergo has received bids from consumer groups about their willingness-to-pay cash for electricity supply of a certain quality and duration. Once the reality of electricity cost is implanted, it should be relatively easier to generalize this to the whole energy economy than it may be in other members of the FSU.

In Russia, pricing reform is probably not achievable without a joint program between USAID and the World Bank to provide the AO Energos, RAO-EES Rossii and potential private entrants to the market with a view of a market in which allocation is determined by competitive prices, or at least prices that are roughly comparable to those prevailing elsewhere in the world. With the importance of electricity in the economy as both a fuel purchaser and a market for equipment, a number of other prices will need to come into competitive balance at about the same time for electricity prices to show significant improvements to the allocation of resources. Finally, the arrearages problem will need to be solved before economically efficient prices can be established and enforced.

The competitive market price for electricity will vary regionally and also with respect to the degree of new generation capacity that is required by the system. Using simulated competitive prices, consultants should work with the Russians to make explicit the various tradeoffs between price levels and different demand and supply scenarios as well as the interdependence of energy prices with other prices. If it is not yet clear to the target audience, both USAID and the World Bank need to continue to educate on the subject of energy pricing reform. Though such reform

is sometimes seen as a "magic bullet," and while appropriate prices are necessary for efficient resource allocation, they are not sufficient. Other pieces need to be in place as well, especially alternative products, financing for efficiency and fuel substitution, and the right to go bankrupt.

3.6 *Transparent Prices for Oil & Gas Pipeline Services*

This target was added by the team as a necessary support for the oil pipeline access reform. It is a part and parcel of the work now under way by the Boston Consulting Group for the World Bank under the Cooperative Agreement. The efficient transport of liquid fuels is vital to the Russian economy and to its ability to make reasonable choices regarding different energy sources. The critical path for achieving the target leads through proper setup of the Federal Energy Commission and the commercialization of Transneft.

In a larger sense, an oil transmission company that exists as a private monopoly reinforces some of the less desirable trends in the Russian economy at present. In particular, interfuel substitution decisions cannot be made on a reasonable economic basis as long as access to fuel is still an administrative decision, not a market outcome. Moreover, the inability of pipeline users to invest in alternative routes reinforces the allocative inefficiencies of the current Transneft monopoly.

3.7 Model Bid Packages for Oil and Gas Exploration

USAID, under its Cooperative Agreement with the Department of the Interior's Minerals Management Service, has presented workshops on legislation and taxation in the oil industry. These workshops are intended to assist in overall oil industry restructuring as well as mobilization of foreign investment.

Russia

The Russian oil industry counterparts believe that they posses sufficient industry sophistication to preclude the need for bidding demonstration projects or assistance. The reality is that considerable potential investment is delayed due to inappropriate legislative and tax policies.

USAID can assist the process of improving the efficiency of Russia's upstream oil sector by continuing to press for open information markets and open bidding and tax procedures. As with many other aspects of this project, there is a difference of perception between the Russian and US participants. The proposals that are contained in the MMS activity are fundamentally alien to the traditional techniques used in the past. Given the resistance of the Russians to assistance in bid procedures it may make some sense to reorient the MMS activities into the areas of taxation and legislation. These two activities, fundamental to successful bidding

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and leasing, can also form a part of the policy dialogue with the IFIs, unlike bidding procedures, *per se*. In this way, the USAID activity can complement other loans and conditions by the IFIs, improving the likelihood of success for the taxation and leasing activities.

Ukraine

USAID has supported a program by the U.S. Geological Survey to provide improved assessment and management of geological data. Trials of this program have proved successful. Any real implementation must await institutional reform of the oil and gas sections of the country's Ministry of Fuel and Energy. Until this restructuring occurs and there is a completion of the proposed oil and gas exploration law, the energy resources will remain unproved and unexploited.

Armenia

This country is in virtually the same position as Ukraine with regard to oil and gas exploration and production. Modest resources (about 6 billion barrels of oil and 5-7 trillion ft^3 of natural gas) will remain in the ground until the legal status of foreign oil companies is sorted out.

3.8 Creation of an Independent Oil and Gas Regulatory Authority

This target is mandated by the IMF/World Bank program in Russia as a part of establishing transparency in the oil market. The work is currently on hold pending further discussions between the World Bank and the Russian Government. This activity could be added to the portfolio of the FEC, once that institution has been established as an effective force in the electricity market.

In Ukraine some sort of authority will be needed, or perhaps the functions will be added to those of the NERC, once the oil and gas law is completed. At the present time, with all production and distribution still firmly in the hands of the Ministry of Fuel and Energy, there is no need for regulatory oversight.

3.9 Conclusions: Key Restructuring Elements for USAID

The common thread of the targets examined in this section is the need to proceed carefully with corporatization, restructuring, regulation and commercialization. Getting these elements of the market correct allows the entire process to proceed more smoothly and makes the ultimate outcome more compatible with USAID's objectives of decentralized competitive markets in the energy sector.

Privatizing state monopolies will not achieve the objectives that USAID has set for Russia's energy sector. In order to prevent this there are two programs that must precede the formal restructuring of the sector and the establishment of wholesale markets. The first is a careful look at the asset bases of various enterprises that were established in the sector. The second is the enforcement of regulations governing entry and exit for the industry to encourage competition and restrain the current monopolists. The experience of the UK in this regard is instructive. Several of the privatizations of the 1980s set up private monopolies in gas, telecoms and air travel. These firms remain entrenched in their markets with minimal competition. In Russia, with larger and more powerful monopolies, the potential power of these entities should not be underestimated. In addition to the competitive issues, a simple privatization or the current RAO-EES Rossii, Transneft and Gazprom assets will lead to large rents for the current employees and management.

Once the corporatization and restructuring are under way, it will be appropriate to promote competition and decentralized resource allocation decisions. Intelligently commercialized enterprises will be able to participate in the new markets. A light hand on the regulatory tiller could enforce entry and exit conditions that prevent a reversion to private monopolies in electricity.

Some of these lessons seem to have been applied in Ukraine, where the restructuring goals are both more sweeping and more focused. By completing the activities under a unified direction, in a logical sequence, USAID, the World Bank and other principal donors will have a better chance of achieving a market-based outcome than is likely without such efforts. One key to a positive outcome is the willingness of USAID to pick up the slack left by another donor in the distribution area.

Not all of the Ukraine efforts have succeeded, though. The oil and gas legislation was abandoned in mid-effort. USAID needs to revisit this issue to determine how much time and effort is needed to obtain the upstream legislation. Without such a framework, not only will the previous moneys have been wasted but there will no inbound foreign investment in Ukraine's oil and gas production. Analogously, the involvement of foreign and private firms in oil refining and distribution will not occur until there is some legislation giving the legal basis for such activities. USAID needs to reconsider its current position on funding such activities.

Armenia finds itself in a position similar to that of Ukraine. Without a legal framework, in this case including corporate law, there will be no inbound investment in hydrocarbon or geothermal energy resources. The latter represent immediate, if low quality, opportunities for Armenia to bolster domestic energy supply.

4.0 COMMERCIAL ACTIVITIES & PRIVATIZATION

4.1 Key Issues and Concerns

Commercially viable private sector capability, developed to provide energy services including production and distribution, is one of the prime objectives of the USAID energy program. Initial activities have focused on making the Russian, Ukrainian and Armenian entities familiar with Western methods and organization along with typical commercial practices. In 1993 and 1994 much time was spent on arranging trips to the US for members of the various government entities and joint stock companies for participation with US utilities, US government agencies, and other US interests such as NGOs, corporations, foundations, think tanks, financial institutions, and utility/industry regulators. Participation at joint seminars with US counterparts also led to additional opportunities for interchange between private industry in the US and enterprises from the Russian Federation and utilities in Kiev and Yerevan. In the latter case, the partnership efforts have been exploratory and desultory, unlike the strikingly successful activity in Kiev. These efforts provide an important, if intangible, means of promoting new ways of looking at the world. Such activities address some of the USAID concerns about creating opportunities for US firms.

Other issues vital to the success of the USAID program in the former Soviet Union include the *methods* of corporatization of oil and gas production companies, creation of open markets, and introduction of commonly accepted management tools and techniques of accounting, information systems and telecommunications. Key elements of such open and transparent elements in energy markets include markets in geological and technological information, in addition to the commercial service firms mentioned above. This evaluation sought to determine whether USAID assistance has promoted the commercial and private market forces which must accompany restructuring and resource mobilization.

4.2 Creation of Commercial Oil Sector Entities (Transneft, Sidanco) - Replicability & Resource Mobilization

The creation of a competitive oil market is believed by the Minister of Energy, Mr. Shofranak, to be achievable by the end of 1995. USAID efforts, through the World Bank Cooperative Agreement, are intended to create viable corporate entities in Sidanco and Transneft. It is anticipated that the creation of additional entities will provide the basis of a free market in oil eventually. During the transition period from a centralized planned system to a free market, there will remain a significant

amount of government supervision of this important sector of the Russian economy.[17]

Before such entities as Sidanco can operate in a transparent and reasonable energy market, it will be necessary to review the actual commercialization of that enterprise. The team found that the Sidanco assets were shuffled around by the MFE in a rather arbitrary manner. As a result, the entity does not necessarily make commercial sense.[18] Given the basic problems with the asset base of the company, the consultants found it necessary to work at the corporate level on commercialization, not corporatization. This work was performed well and may provide a model for the Russian oil industry once the asset situation is put in order. Sidanco does not yet operate as a unified company with more than one of the local production companies pursuing its own capital-raising activities.[19]

The other major activity in this area concerns the commercialization of Transneft, the oil pipeline company. At the present time Transneft still operates as a government entity. By this we mean that allocation decisions for space on the system are made by the Ministry of Fuel and Energy. Certain elements of simple corporatization have not yet been worked out either. For example, the production associations and vertically integrated oil companies cannot invest in Transneft itself or in alternative systems. However, foreign oil companies have been able to invest with Transneft in new or upgraded lines and terminals. In sum, USAID efforts, through the Cooperative Agreement with the World Bank, have not yet led to transparency in oil market operations or in oil transport. There have been no comparable activities in Ukraine or Armenia.

4.3 Information Exchange, Training & Establishment of Working Relationships Between US Utility Companies and Russian Electric & Gas Companies

The program with the US Energy Association provides FSU energy companies with information exchange and other types of working relationships with US utility companies.

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17 The vertically integrated structure of the oil companies is driven more by the shortage of managerial and financial resources than by such normal economic factors as coordination of exploration activity with that of production, refining, marketing, and distribution.

18 There is a lack of correspondence between the production and refining assets of the company.

19 One of the key assets of Sidanco, Purneftegaz, was abruptly removed from the corporate structure during 1994.

Russia

In 1993 a group of Russian energy executives participated in a conference in Tucson, AZ. At the end of 1994 a list of proposed partnerships was finalized. Included in this activity are partnerships between RAO-EES Rossii and the Edison Electric Institute and between Gazprom and the American Gas Association.

The program has little in the way of accomplishments to date, owing to a late startup, but is a key part of introducing Russian utilities to new management techniques, technology, and financial methods. In the future this information exchange program should be able to move to a private funding basis if there are tangible advantages for each side. Under such circumstances, the Russians might receive internships at their US partners in exchange for management contracts for some operations in Russia or possible participation in system expansion activities. The precise nature of cooperation with the US utilities is unlikely to be further specified without additional commercialization of the Russian entities.

The activities of the International Institute of Education (IIE) are also included in this target. The IIE has offered courses in a variety of subjects, as agreed by their Russian counterparts. At the present time the upper management of the RAO-EES Rossii and some regional companies are participating in the program. At some stage, the project will need to be broadened to regional managers and white collar staffs. After 1995 the project will need to be evaluated to determine whether the Russian power industry entities are capable of taking over the activities, albeit with some technical assistance from IIE specialists.

Ukraine

The current work plan calls for the establishment of six utility partnerships by mid-1996. So far two have been established, one between Kievenergo and Pennsylvania Power and Light and the second with Donbassenergo. The PPL/Kiev cooperation is an outstanding example of how such a program can work to improve both technical and managerial performance. The PPL team is accomplishing much of what the consultant-directed TA is intended to do for other entities. In particular, the partnership involves real commitments of time and resources by both sides, sets incremental goals for specific areas of cooperation, produces tangible improvements in operations and/or management, and contains a true two-way communication of intentions and knowledge.

The PPL program is not perfect but it indicates the direction that the partnership program must head if it is to be successful. In particular, the program must require the following if it to be useful to the recipients and more than executive tourism to the US firm:

1. consistent staffing from both sides
2. real resource commitments from both sides for both local and foreign costs
3. a workplan and timetable with specific milestones and accomplishments
4. an investment opportunity for the US firm in a restructured partner or sector.

Without this kind of discipline, the program can quickly disillusion both sides and lead to more ill will than transfer of technology and skills.

In the education and training area the program in Ukraine has succeeded in many of the same ways as has the Russian training program. The program has brought exposure to new techniques, technologies and thinking to a generation of Russian and Ukrainian engineers and managers. The IIE has brought a high level of professionalism to its training activities. In particular, the program is a part of the change in attitudes that must accompany economic reform in Russia and Ukraine. However, the levels of resources provided to this task seem to be unsuited to the objectives of the activity. In a situation where tens of thousands must see their skills upgraded, the IIE program can reach hundreds at most over its lifetime.

Bridging the gap between the needs and the resources available is the key to an effective professional training program. USAID must face this gap squarely and look at the problems with the program to see what they imply about alternatives. Consider the training program in Ukraine, which has suffered from the same kinds of problems as the one in Russia - difficulties in selecting students, lack of replication and spread outside the target group and high expense relative to the number of people trained. In this program, too few people of uncertain provenance are supplied to a high-quality training program with little follow up to ensure that this upgraded human capital benefits the enterprise and the country.

There are alternatives. Effective alternatives should rely on the country's own highly developed educational establishment as well as the desire of many Russian and Ukrainians to upgrade their own skills to match the demands of a restructuring economy. The World Bank's Economic Development Institute has provided one model where Russians are trained and then supported by the EDI for a short while as they develop fee-for-service courses around the country. The team leader of this evaluation effort has participated in this program and has found it to show great promise to spread the gospel of market reform as well as specific skills upgrading in accounting, finance, engineering and management. Another model is to train faculty at local business colleges in the types of skills transmitted in the IIE program currently. The participants would be business college or polytechnic faculty members. These people would then work the course materials

into their regular offerings. There are two great advantages to this approach. First, the ultimate beneficiaries of such teachings will take those course when they want to and will pay their own money for it. Consequently, the message will be more valuable to them. Second, this builds a more permanent intellectual infrastructure to support other changes in the countries.

4.4 Improved Performance in Coal Industry - Alternative Models of Reform

Under the cooperative program with the World Bank and with the cooperation of Partners in Economic Reform (PIER), USAID has worked to reform the coal industry. This industry faces unique problems. Much of the industry is located in remote areas so that local employment options for the displaced workers are few. In many cases the mine workers represent a legacy of the former regime, an enterprise established for political and penal reasons as much as for economic ones.[20]

In the near term, there is a need for closer participation with US miners, unions and US government bodies (EPA, OSHA) on vital issues of workplace safety and technology. These efforts should be continued, particularly in mine safety.

Coal is presently at a competitive disadvantage due to the imposition of high rail transport costs and low priced natural gas. Without some intervention and/or modernization, wholesale mine closures are likely. Widespread mine shutdowns may lead to political and fuel supply disruptions.

In the longer run, the focus of foreign assistance needs to shift to an orderly restructuring of the industry. The viability of the coal industry in the longer term will depend in part on the adoption of better production and combustion technology as well as on significant downsizing. The coal industry is, in a word, tragic. Any attempt to reform the coal sector of the Russian system should be viewed at all levels as one that is a most complicated problem. The special circumstances that surround much of the formation of the Russian coal industry and its projected shrinkage[21] argue for a significant *social* program to assist in relocation and retraining. Further contact between US coal companies, labor unions, and other US government entities may help pave the way for resolution of mine safety

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20 In Armenia USAID is directly involved in the mining of coal. With production now up to several thousand tonnes monthly, the project represents a modest, though positive, contribution to the country's energy security.

21 The World Bank predicts a decline in production of more than 100 million tonnes/yr. from the current (1990) level of about 250 million tonnes/yr. to under 150 million tonnes/yr. by 1997. Under such circumstances, there will be many mine closures with certain mining regions becoming economically redundant by 2000.

issues, improve mine productivity, and foster close ties that will endure after this transition period is completed.

The PIER program has succeeded mostly because it has paid attention to the human dimension of the industry's problems. Indeed, even the World Bank representatives contacted admitted that PIER makes it possible to bring together the disparate groups who must find a *modus vivendi* that promotes and effects sectoral reforms. The PIER representative in Russia is virtually the only person who can get everyone together. This represents a unique skill for which the program can be justly proud.

Ukraine

In Ukraine the coal industry represents an even more important element of the energy economy. Due to mine closings it is anticipated that approximately 50,000 workers will be forced to leave or find new work. One critical effect is that some of the better people are leaving. According to the Ukrainian specialists, they anticipate having to produce 150 to 140 million tonnes of coal (other estimates of future production lie in the 100 million tonne/year range). They also expect the government to be in control of this industry and of its restructuring process.

The USAID program in Ukraine lacks the type of visibility and Mission support that the PIER program enjoys in Russia. This lack of support manifests itself in an absence of coordination with the World Bank and with others involved in sector restructuring. Given the importance of coal to the country's economic and political security, this may be a mistake. Ukraine contains the kernel of a viable, if smaller coal industry, one that is capable of producing more than one million barrels/day of oil equivalent energy.

4.5 Improved Oil and Gas Information and Technology Exchange, Exploration Bidding Packages

Russia

USAID has promoted the organization of oil/gas data to facilitate greater foreign investment. This activity, funded under the Cooperative Agreement with the Department of the Interior and executed by the US Geological Survey, is scheduled for completion in early 1996. Another element of this activity, executed by the Minerals Management Service, is the development of contractual arrangements and pricing mechanisms for the reliable and efficient leasing of exploration, development and production rights in Russia's oil sector. Such activities promote more transparent and efficient trading of energy among NIS, CEE, Western Europe and other markets.

The Russians are beginning to recognize that in order to attract investment in the oil and gas sub-sectors, they will need to release information vital to mounting any exploratory work. Such information will form the basis of a self-sustaining market in geological prospect information that should lower the transactional costs for all firms entering the Russian market, especially for the smaller ones. Much of this is unprecedented. In effect, Russia is being asked to release information that in the past had been guarded closely for strategic reasons.

This information center has had little or nothing to do with Gazprom, the gas exploration, transmission and distribution monopoly. Gazprom apparently intends to remain the sole manager of all natural gas within the Russian Federation.[22] In this respect, the oil industry, with the current exception of Transneft, is finding USAID assistance of value in creating an alternative market structure to the former model still typified by Gazprom.

The opening of an oil and gas center to promote technology and commercial exchanges between US and Russia by early 1995 is nearly complete. A conference to inaugurate the center is scheduled for Spring 1995. It was proposed that 14 oil and gas centers be opened to provide a means for technology exchange in the oil and gas regions throughout Russia. While the creation of oil and gas centers is a noteworthy effort, there appears to be little benefit to individual US companies to fund such an effort. One suggestion is that an industry association, such as the American Petroleum Institute, pick up the funding for these centers that will benefit their members in a broad sense.

Ukraine

The organization of geological data and the creation of a legal framework for oil and gas development were carried out under pass through arrangements with the US Geological Survey and the World Bank, respectively. These projects aim to create the conditions for foreign firms to invest in Ukraine's upstream oil and gas sector. Neither task is completed. Tests of the USGS system indicate that the data gathering, transfer and analysis can work well and the USGS has proposed providing the PASA with an additional $6 million to compete this activity.

Constructing the legal framework costs one order of magnitude less than improving the data analysis. It remains incomplete and in effect puts at jeopardy the USGS expenditures as well as the previous activities in the legal area. The team believes that USAID needs to reconsider its refusal to complete the legal

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22 It now has the distinction of being the largest utility in the world and voices no intention of downsizing or spinning off various business units.

framework in upstream oil and gas activities given its impacts on the rest of the hydrocarbons activities.

4.6 Commercial Energy Service Companies

The existence of private energy service companies is one of the objective indicators of success of the overall energy program in the Former Soviet Union. Such companies give tangible proof that the following issues are already resolved or are on their ways to resolution:

1. market-based energy prices
2. hard budgets (active collection efforts) for energy distribution companies
3. restructuring of captive engineering operations at power plants and industrial enterprises
4. availability of finance for new firms
5. legal titling and other rights allowing property owners and plant owners/managers to keep their savings from energy efficiency or new investments
6. expenditures from factory owners or mangers indicating that the factory produces *salable* output in a market environment.

Service companies in the former Soviet Union may pose unusual problems. Presently, the plant managers have engineering, construction and plant maintenance staffs under their purview. They will likely resist any change in this arena. At the same time, restructuring will create redundancies among engineering, maintenance and construction workers as it has in other industries. Such workers will be forced to find jobs elsewhere. Some of the professionals will start new firms based around what they know, and the spirit of entrepreneurship, along with this program, is intended to promote the development of private contracting and service firms.

Energy service companies are necessary in a free market economy. A commercially viable private sector capability must be developed to provide energy services, including engineering, maintenance, design, procurement, installation and management.[23]

By promoting competition in the market place, the creation of separate service industries will encourage plant management to divest itself of inefficient and/or non-

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23 This infrastructure-building component, often taken for granted in a capitalist country, is *the sine qua non* of an advanced economy. The adaptability of such firms allows the clients, be they oil refineries, power plants, or petrochemical enterprises, to allocate resources to new ventures, adapt to changing markets or make clear the various repair, buy or build decisions with which such rims are faced each day.

producing subsidiaries. In other words, such service companies can provide timely services while improving the power plant bottom line.

The establishment of private energy service companies is predicated on the desire and/or necessity of the present plant managers to, in essence, set their people free to pursue work as individuals or in independent firms in the service sector of the economy. The adaptability of individuals to adjust to this new way of thinking may cause tremendous transitional problems. The formation of new service entities contradicts the way in which they were raised and embraced by the communist system. The timetable for the creation of this industry is neither clear nor certain.

USAID efforts can have little direct impact on such events. At the same time, the types of efforts promoted in the efficiency area, preparing a core cadre, providing information and technical exchange, and strengthening voluntary professional associations will assist such firms as they come into existence and as the economy restructures and enterprises modernize.

4.7 Implementation of International Accounting Standards at RAO-EES Rossii

USAID, through its contract with Price Waterhouse, is changing the accounting and financial management at RAO-EES Rossii. This effort, first at the company headquarters, and then in the regional distribution and generation companies, is an essential component in the construction of a "capitalist infrastructure" in Russia's electricity monopoly.

In order to commercialize an enterprise in a market economy, certain components of managerial control are essential. These components include management information systems, internationally accepted accounting standards, internal financial controls and regular auditing activities. The USAID activity has sought to introduce these activities throughout the electricity sector. As one of the key building blocks of a market in electricity, the distribution enterprises require attention from this task. Without a thoroughgoing commercialization, attempts to operate a wholesale electricity market will founder on the differential abilities of various market participants to operate on a level footing. This activity is, in a word, vital.

The team endorses this activity and believes that regionalization to the AO Energos is essential in the near term. As the points of contact with the customer, the regional distribution companies will be the ones to enforce the "hard budgets" that must be part of true commercialization of the electricity sector. In that case they must be capable of making appropriate managerial and financial decisions.

4.8 Conclusions - Results of Commercialization Activities, Training Efforts in Market Operations and Management.

The commercialization area has two main foci. The first is the mobilization of each country's energy resources in a market context. The second is the leveraging of investment and trade. The focus of this section has been the direct cooperation between Russian, Ukrainian, Armenian entities and US companies.[24]

The main conclusions with respect to commercial activities and privatization are dependent on the industry in which the activities take place:

- **Oil & Gas**: Creating vertically integrated oil companies may initially foster competition within Russia in all segments of the industry including exploration, transportation, refining, and distribution. Continued creation of competing commercial oil sector entities appears both useful and necessary. Vertically integrated companies can partner with or even compete with international majors (as has Lukoil) in Russia and abroad. Eventually, a diversified oil industry can work out its own optimum structure.
- **Oil and gas exploration** activities and the exchange of technology may now be best left to private industry. USAID should continue to monitor the activities of US companies and others and work with the World Bank so that US firms can benefit from the policy and financial leverage provided by Bank activities.
- **Legal Framework**: In Ukraine, the completion of an upstream legal framework is essential to further development of that sector.
- **Utility Companies**: Information exchanges between US utility companies and Russian electric and gas companies should be continued, but they do not appear to need further funding from USAID. Perhaps some sponsorship by US companies and trade organizations will prove sufficient to allow this to be a stand alone activity with USAID providing a monitoring or focusing function to these activities.
- **Coal**: The coal industry should be viewed as a special case and continued support to this sub-sector of the Russian and Ukrainian economies should be considered vital for humanitarian reasons, though not necessarily as a part of the energy program.
- **Energy Service Companies**: Establishing private energy service companies is an essential part of economic restructuring. This activity should be supported in its human capital development so that as market opportunities arise, the new firms can take advantage of them.
- **General**: Constructing the capitalist infrastructure - accounting standards for transparency and control, contractors for flexibility -

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24 The following section deals with mobilization of financing from international financial institutions.

will be a key element of overall enterprise and sector restructuring. These efforts should receive high priority.

5 RESOURCE MOBILIZATION FOR INVESTMENT

One of the key results of the USAID work in the Former Soviet Union will be the mobilization of investment resources for those countries' energy sectors. A plan for investment along with activities that accompany the initial stages of investment, is seen by many, especially those in the power sector, as one of the primary benefits of the current cooperation with USAID and the international agencies. To that end, one of the major themes of the JEAS and of the assistance to RAO-EES Rossii, and of the electricity sector restructuring in Ukraine is investment analysis and planning. At the present time USAID is supporting two of its contractors to study the technical and financial attractiveness of constructing a large gas-fired combined cycle (GCC) power plant in the capacity-short Krasnodar region. Other activities may commence in Ukraine and Armenia. However, absent some of the legal foundations and compelling resources found in Russia, the focus of investment activities will remain with Russia, not Ukraine and Armenia.

USAID has set specific targets for private investment in power and district heating in Armenia. However, these targets are only realistic within the context of legal and institutional reform of energy enterprises. There is no unambiguous or completed legislative movement in that direction as yet in Armenia, though the USAID-supported electricity law represents a first step therein.

In Ukraine, the lack of movement on ownership of energy assets has dimmed the potential for investment, especially given the large overcapacity of the power system (counting Chernobyl). In oil and gas, there can be little movement until the upstream law is completed. In the refining and marketing area, investment cannot take place without a similar legal framework. The country has refining overcapacity of about 100% relative to domestic demand. Therefore, the refining sector requires a good deal of rationalization. Private firms will not invest in such activities without clear institutional and legal protection, currently absent in Ukraine.

The Krasnodar study, performed under World Bank management for USAID, is intended to investigate the technical and economic attractiveness of the proposed project. When completed the study will fulfill one of the targets of the program, at an initial stage at least. If the results of the study are positive then further investigations of financial feasibility will be undertaken, including possibly the study of various private funding and ownership options. Such private ownership alternatives would meet another of the targets of the investment mobilization indicators and objectives. At the present time private investments do not exist in the power sector, though there is considerable activity by private firms in oil and gas, oil pipelines, and captive generation at industrial complexes.

A third target of this portion of the program is the investment by private firms in both energy efficiency and services. There appears to be little progress to date in this area and there are a wide variety of reasons for this outcome. However, there is a constellation of factors which stands behind most of the energy projects that fail to progress in Russia, and efficiency is no exception. This constellation of factors includes the following:

- Insufficient movement of energy prices toward world levels
- Soft budgets for domestic enterprises, especially for space and water heating, leading to the
- Inability to finance or to justify the financing of domestically-oriented efficiency projects due to arrearages, and finally
- Lack of managerial freedom and ability to implement and install new energy technologies

To break through this logjam of difficulties, the team thought that placing financial reforms as an additional target would serve as a reminder of the degree of dependence of the energy program's success on other USAID and donor activities in the financial area and of the need for large scale restructuring and reform of state enterprises.

The following three subsections show how the targets have been met or not under various program activities.

5.1 Feasibility Studies for Power Plants and TDA Activities

Under the USAID Cooperative Agreement, the World Bank has engaged Burns and Roe and RCG/Hagler-Bailly to study the attractiveness of a large gas fired combined cycle power station in Krasnodar, North Caucasus region. This study is not yet completed. One of the main problems in this area is simply one of scope. The JEAS has identified literally dozens of proposed new power plants or those requiring rehabilitation. A great many feasibility studies of the type to be completed in this task will be performed in the future. The resources need to be allocated well. In particular, this means looking at the entire range of resources available to pay for such studies. These sources include the USAID program in the broad sense, including IBRD and TDA elements. It also means considering the OPIC and Eximbank resources than may be available for such studies. Finally, if the investment climate improves, the developers will finance investment studies themselves.

As a preliminary step to making sure that the "soft" resources are applied properly, the list of proposed investment projects will require some trimming so as to minimize expenditures on plants that are not financeable. This screening process

will need to include both new capacity and fuel substitution and put those options on a comparable basis with efficiency and demand management.[25]

The feasibility studies represent one step in a critical path of investment project development. Initially, they must be targeted at only the most promising opportunities while eventually the USAID and IFI financing will focus on the projects for which commerciality is not immediately apparent.

In addition to the work in the power sector, USAID has supported engineering studies which will assist two World Bank gas distribution loans.

The activities conducted by the Trade and Development Agency have, for the most part, been independent of USAID support. USAID provided $3 million support for one study, that of developing a dual-fueled (diesel and natural gas) engine for use in buses. This engine design development was performed at the request of Gazprom and the Moscow Energy Office. The development of the engine is to proceed as a joint venture of ZIL and Caterpillar.

Continued support from USAID for future TDA activities should be considered on a case by case basis. While TDA has shown substantial results from the funds invested by USAID, sufficient funding of TDA activities from other sources could obviate the need for further funding from USAID.

5.2 Private Investments in Power Sector Entities

This target seeks to encompass activities that will establish a competitive and market oriented power system that will attract both domestic and foreign investment. At the present time the thrust of the consultant activities in this vein has gone to the design of a target model of sectoral restructuring. The objectives of RAO-EES Rossii itself seem to be focused on obtaining foreign investments and loans in the context of a quasi vertically integrated monopoly.

The current thrust of consultant assistance is to design the target model of sectoral restructuring. The objectives of RAO-EES ROSSII appear to be focused on stimulating greater investments. For potential investors the uncertainty as to permanence of the current structure represents a substantial risk and serves to weaken the business case for investment, especially for entities obtaining sufficient

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25 Activities that ought to be excluded immediately include those which will require the maintenance of low fuel prices, concessional financing, or exclusion of other competitors for viability. Projects that can be studied by the developers or vendors include those which can yield an attractive financial return under a variety of fuel and electricity prices. Projects in the middle, ones that look good under most conditions but are sensitive to certain policy or economic parameters, are the candidates for studies supported by USAID and the World Bank.

external debt financing to cover the rehabilitation needs of the various entities which comprise the electricity system.[26]

A major issue which affects the financeability of the power sector, especially outside the Western regions is that of population shifts and industrial restructuring. In large parts of the country the local AO Energos exist to serve isolated pockets of industrial activity supporting urbanized populations that may not survive economic restructuring in their current forms.

Ukraine

In Ukraine, the current power sector restructuring envisions continued government ownership of all of the relevant generation, transmission and distribution assets. Some of the consultants and advisors participating in the restructuring believe that successful operation of the power pool will provide incentives to look at different ownership options in the power sector.

Armenia

The lack of a legal framework for investments in the power sector makes this target a distant one for Armenia. However, of the three countries in the evaluation, Armenia is the one that would benefit most from private investment in additional power generation capacity.

5.3 Private Investments in Energy Efficiency and Conservation

This target is not supported by any of the tasks specified in the energy program. In that sense it is not possible to assess the progress of the relevant activities. However, achievement of significant levels of private investment in energy efficiency must await the same types of basic changes in the economy as do investments in power sector and other energy activities.

Given the enormous needs for investment in residential, commercial and industrial sectors, energy efficiency is more likely to accompany new investment than to comprise new investment in and of itself. For example, restructuring of industrial enterprises and new investment, especially from abroad, might lead to the following types of decisions:

- new machinery built to contemporary efficiency standards
- changes in product specifications to reduce the embodied raw material, and hence energy content of final products

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26 Note that if the quasi-monopolistic structure were thought by investors and lenders to be permanent, then external financing and suppliers credits would likely be readily available.

- reengineering production techniques to reduce raw material and energy throughput
- exposure to world standards of process and product efficiency

In such an instance, the resulting total energy use will decline, but as a direct result of improvements in the function of the factory and its equipment. It is not likely that a factory producing substandard goods would warrant the expenditure of funds to purchase new equipment. In such cases, the low or no cost approach is the more likely one. In order for any investments to be made, the enterprise must have incentives to save energy. This means, *inter alia*:

- higher energy prices
- hard energy budgets (i.e., service can be shut off for nonpayment of bills)
- full ownership rights to factory or buildings and legal right to funds saved from reduced energy consumption

When such conditions are the norm, then managers and owners will have the incentive and even the need to economize on energy use. No special programs will be needed. Until that time, pilot programs will seldom see replication or injection of new technology that is not provided specifically by a foreign aid project.

5.4 *Financial Sector Reforms and Improvements*

The constellation of reform described above includes the establishment of basic market infrastructure in both the central and peripheral offices of the energy enterprises. The major elements of the infrastructure, addressed by the various enterprise projects, include the following:

- Management and financial information systems
- Accurate accounting for both assets and liabilities and, hence, a new balance sheet
- Clear demarcation of the boundaries of an enterprise in terms of its control, asset structure and responsibilities
- Establishment of basic commercial and banking law such that private lending can take over from grants, foreign loans and "sweat" equity

USAID projects in financial and enterprise restructuring have initiated their work mostly at the headquarters offices of the relevant enterprises. However, it was remarked to the evaluation team in a number of interviews that ultimately, the push for true reform will have to come from the enterprises that have direct customer contact, in other words, the local branches and commercial offices. The team believes that the efforts of USAID to move their commercialization projects to local enterprises are an essential step in establishing properly functioning markets with demand signals that relate operational issues to prices and investments.

5.5 Conclusions

The USAID energy program provides an initial activity that is critical for further development and implementation of reforms. An example of this is the USAID support for preinvestment studies for new power plant investments. Such studies introduce the Russian side to Western investment criteria as well as an overall approach and can be readily replicated in other cases. The work in the current study has proved valuable in terms of breaking the ice with regard to investment alternatives in the power sector. The absence of such activities in Ukraine and Armenia slows down the overall reform programs given the role of potential new investment in providing a powerful incentive for further cooperation and reform.

In order to make this activity more useful to the objectives of the overall program, some triage will be needed on the proposed list of investment projects. Those proposed investments that are clearly outstanding should be covered by one or more the entities that stand to benefit from such power plant construction or rehabilitation (this includes TDA, OPIC, Eximbank and the IBRD). The undesirable projects should be eliminated from consideration by foreign lenders and investors. If RAO-EES Rossii wishes to invest in such low return projects, then by all means they should. However, the existence and continued promotion of a large number of marginal projects to foreign financial entities will consume time and resources that can be spent better elsewhere. For the middle group of proposed projects, a quick screen type of prefeasibility study, funded by USAID, should prove useful for determining the disposition of the attractive but not overwhelming project proposals.[27]

The provision of private and foreign money to RAO-EES Rossii depends on greater progress toward a true devolution of the enterprise. The success of such a devolution depends in turn on two activities that can be provided under the auspices of this program. The first is the effective commercialization of the local energy companies and the second is an appropriate regulatory structure over the transitional period that gives investors and lenders confidence that a viable market structure is in the process of formation. In the first case, the activities supported by USAID in enterprise restructuring form the core of the key tasks. In the second case, support to regulatory bodies, including the Federal Energy Commission, is vital to establishing the rules of the transition, including pricing, entry and exit, and asset shuffling.

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[27] Such an activity is commonly undertaken by US firms in new markets and results in the firm obtaining a more appropriate set of objectives and priorities in the new environment. Two of the authors of this report have participated in such activities in the US and in East Asia for power sector investments and have found such exercises useful and, indeed, necessary for rational investment appraisal activity.

Private energy service firms do not yet exist in Russia, Ukraine or Armenia. It is possible that some of the government energy institutes may evolve into that form or enterprise but no true market yet exists for such services. In order for that market to come into existence, there will need to be a number of changes in the overall situation facing firms with respect to their energy expenditures. These changes include higher prices, hard budgets, the legal ability to capture the benefits of efficiency investments, and the ability to finance such investments. Until the market infrastructure is in place, demonstration projects are likely to show scant impact. Alternative uses for some of the conservation funds exist in promoting professional activities in energy efficiency and engineering and should be encouraged.

ANNEXES 2, 3, & 4

EVALUATION OF USAID RUSSIA-NIS ENERGY PROGRAM

U.S. Agency for International Development

Washington, D.C.
May 31, 1995

This report is confidential and intended solely for the use and information of the client to whom it is addressed.

BOOZ·ALLEN & HAMILTON INC.

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ANNEX 2.1: RUSSIA

Target	Model bid packages for oil and gas exploration.
Relevant Indicators & Objectives	Assist the MFE and regional governments in restructuring the oil industry in Russia, and establish a business environment supporting private sector growth and promoting the sustainable use of natural resources.
Tasks Required to Meet Target	7A.3 Oil sector legislation, taxation and tendering support.
Achievements to Date	Ecology and Environment performed an environmental assessment for Yuganskneftgas and Amoco of the Priobske field in Western Siberia. Presentation of a workshop on legislation and taxation for Russian oil industry and government officials, 1994.
Achievements Required in Future	Discussions with Russian counterparts have suggested that the industry possesses a level of maturity that precludes the need for demonstration of bidding procedures, *per se*. On the other hand the current turmoil caused by the on going process of restructuring in the oil sector and the establishment of the VIC's without adequate asset safeguards, suggests the need to focus urgent attention on open procedures. In addition, the following items should receive greater emphasis: Resolution of asset ownership accompanying the process of corporatization. Cost benefit studies of integrating upstream exploration, refining and distribution companies.
Relationship to Other Targets, Critical Path for Meeting Target	Formation of adequate bidding skills is linked to improved information for oil and gas exploration activities. However, since it seems clear that the Russians possess adequate bidding skills, the objective of encouraging private sector growth in the oil industry will tie in with other targets concerning pricing for oil pipeline services, and the creation of an oil regulatory authority
Relationship to Other USAID & Donor Activities	Work on biding packages tied into the activities of Bain and Co. in their project to commercialize Sidanco, one of the newly, but not wholly established VIC's, on behalf of the World Bank.
Comments/Qualitative Evaluation	Given the wealth of existing collaboration between Russian VIC's and foreign investors in upstream oil i.e. Amoco, Royal Dutch Shell, AGIP, BP, ELF, STATOIL, etc., there is every evidence that the Russians do not require further assistance with the establishment of bidding packages.

Target	Electricity Generation Efficiency Improvements
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere.
Tasks Required to Meet Target	Task 1B.2 Thermal Power Plant Rehabilitation
Achievements to Date	Identification and analysis of energy efficiency improvement options in the use of power and the development of an investment plan. Joint identification and analysis of thermal and hydro power plant upgrade options in terms of technology and costs. Joint identification and analysis of transmission upgrades following the introduction of the latest state-of-the-art load flow software and computer hardware. Demonstration equipment from US manufacturers is already in operation. Some power plants are already utilizing equipment from US manufacturers with additional demonstration projects to come later. Most notably, the Tushino III district heating plant is utilizing Honeywell controls. The Russians are replicating this effort at other plants, but with Russian controls.
Achievements Required in Future	Results of these demonstration projects will be assessed with a positive evaluation of these results to provide guidance for future planning of activities.
Relationship to Other Targets, Critical Path for Meeting Target	Additional improvements in electricity generation that may be considered for future planning include the phaseout of older, less efficient power plants, the addition of transmission lines to improve dispatch, and the modification of electric distribution systems to reduce electric energy losses.
Relationship to Other USAID & Donor Activities	The JEAS is addressing these issues and recommendations will be forthcoming when the final draft of the JEAS is approved and distributed.

Comments/Qualitative Evaluation	This result is based on various assumptions made in the study. While filled with large volumes of information, the JEAS bases its conclusions on two basic scenarios. Neither scenario provides a hard assessment of the savings in the electric energy sector from the reduction of electrical demand as electricity in Russia climbs to world market prices. It must be noted that without an assumed imbedded cost of facilities, one should be assumed so that replacement cost is reflected in the cost of generation from each power plant unit (the Long run Marginal Cost of each unit). Once the kilowatt-hour cost of generation is determined, then each unit must be ranked in the order of increasing cost of generation. This ranking will precipitate further discussion as whether the replacement or upgrading of a particular unit is economic and the marginal utility of each unit with respect to the funds necessary to perform this work. Each unit would then be classified in relationship to the replacement or upgrading of other generating units. The remaining plant life expectancy may cause some of these units to be "grandfathered" much as some units in the US were with respect to EPA regulations since their remaining useful lives did not warrant the cost of modification. It was stated that the results of the JEAS study places all power plants (including Central Heating Plants as well as nuclear plants) on a common basis for the first time.

Target	Load Research and Forecasting
Relevant Indicators & Objectives	Development of contractual arrangements and pricing mechanisms for the reliable and efficient trading of energy among NIS, CEE, Western Europe, and other markets.
Tasks Required to Meet Target	1A Overall Integration of the Results of the Joint Energy Alternatives Study (RCG/Hagler Bailly) 1B Transmission and Non-Nuclear Alternatives Joint Alternatives Study (JEAS) - (Burns and Roe) Completion of JEAS study and the creation of ranking between power plants/power sources (oil, gas, coal & nuclear) will determine future energy consumption between sub-sectors.
Achievements to Date	Identification and analysis of energy efficiency improvement options in the use of power and development of an investment plan. Joint identification and analysis of thermal and hydro power plant upgrade options in terms of technology and costs. Joint identification and analysis of transmission upgrades following the introduction of the latest state-of-the-art load-flow software and computer hardware. First results and recommendations from the JEAS will form the basis for future analysis, recommendations and planning.
Achievements Required in Future	Analysis will be needed to determine production needs in all forms of energy. Analysis will also determine the necessity for additional electric transmission lines and/or gas and oil supply pipelines based on the location of energy supply. Refinement of the recommendations made in the JEAS study as to where investments are to be made and the participation by Western firms and institutions that will shift as a result.
Relationship to Other Targets, Critical Path for Meeting Target	Results of future studies will determine the number and dollar amount of future energy related projects. Strong shifts in energy transport costs, and sector demand may result in significant changes in the relative pricing of oil, gas and coal. Nuclear energy costs should remain constant in real terms with the exception of cost increases due to proposed safety modifications.
Relationship to Other USAID & Donor Activities	The desirability of projects to attract funds will be significantly affected by shifting energy costs. Fuel pricing increases in all energy subsectors are likely to change ***repeatedly*** the least cost expansion ranking of proposed new power plant projects.
Comments/Qualitative Evaluation	The Russian energy sector is experiencing many changes including the raising of energy costs to world levels. Substitution of fuels will cycle as each fuel adapts cost-effective methods of production. The amount of cycling will be influenced by the electric power restructuring plan that is scheduled to be approved by the Executive by mid-1995.

Target	Demand Management/Integrated Resource Planning at Utilities
Relevant Indicators & Objectives	Energy efficiency
Tasks Required to Meet Target	none indicated
Achievements to Date	Identification and analysis of energy efficiency improvement options in the use of power and development of an investment plan. Joint identification and analysis of thermal and hydro power plant upgrade options in terms of technology and costs. Joint identification and analysis of transmission upgrades following the introduction of the latest state-of-the-art load-flow software and computer hardware. Little effort appears to be directed toward demand management at this time.
Achievements Required in Future	Something is now just being done to improve collections. This action alone may achieve more in the arena of demand management than any typical American-style program that could be utilized.
Relationship to Other Targets, Critical Path for Meeting Target	Electricity costs do not presently reflect true market value. In addition, collections from customers range from 40 to 50 per cent of delivered generation. Therefore, the electric energy sub-sector is operating at a growing deficit.
Relationship to Other USAID & Donor Activities	Further effort to enforce collections may result in the decrease in net generation demand as consumers and/or industry begin to curtail energy use. In the case of industry, the option of passing these increasing costs onto the consumer may no longer be possible. Simply put: The more efficient factories will drive out the less efficient ones.
Comments/Qualitative Evaluation	If the aforementioned net decrease in electric power generation and/or energy demand does occur, the necessity to continue to build additional electric power generation could be minimized and, perhaps, some less efficient plants could be retired rather than renovated. This would affect the amount of donor funds required from the World Bank, the EBRD and other multi-lateral institutions.

Target	Coal Industry Restructuring
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	6A Coal Mine Efficiency, Safety and Restructuring - (PIER) 6B Coal Subsector Program - (World Bank)
Achievements to Date	Study on Subsidies and Employment in the Coal Sector (PIER) Final Report approved by the World Bank in August 1994. Restructuring the Coal Industry in the Russian Federation World Bank, December 1994. Study on Financial Performance of Coal Sector (Paul Weir Co.). Draft Final Report in April 1994. This activity is complete. Initiated dialogue on coal industry restructuring and provided continuing support, assistance and substantive in-put into the preparatory work on the restructuring program. Conducted US study tours and seminars for 100 Russian labor, management, and government representatives in conjunction with restructuring talks in Washington, DC.
Achievements Required in Future	Rosugol General Director to visit the US to address NCA meeting. Continuation of UMWA "miner-to-miner" program. Increased linkages between the US private sector and counterparts in Russia. Model Mine program to demonstrate technical/managerial aspects of US coal mining industry.
Relationship to Other Targets, Critical Path for Meeting Target	This is best regarded as a stand alone activity. Considerable effort should be invested in the continuation in all areas, particularly mine safety.
Relationship to Other USAID & Donor Activities	Effectively, this activity must be regarded as stand alone, although the interrelationships with other energy sub-sectors must be considered.
Comments/Qualitative Evaluation	Attempts to reform the coal sub-sector of the Russian system are viewed at all levels as a set of most complicated problems. The World Bank was involved in discussions in 1993. The ideas proposed by the World Bank were agreed upon by the Russian commissions. The Russians, however, made some different proposals. In terms of costs the Russian figures were higher than that of the World Bank, but were lower than those of the miners.

Target	Information exchange, training & establishment of working relationships between US utility companies and Russian electric & gas companies
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	5B Utility Partnerships - (USEA) 7E Natural Gas Partnerships - (USEA)
Achievements to Date	A conference for senior executives of the Russian power sector at Tucson, Arizona (August 1993) Study tour of US Electric Power Facilities. Proposals received from six Russian electric utilities for partnership in EIPP (December 1994) Partnership established between EEI and RAO EES Rossii. During the 1993-1994 time frame much was done to arrange trips to the US for members of the various government entities and Joint stock companies for participation with US utilities, US government agencies, and other US interests such as NGOs, corporations and other interested foundations, think tanks, etc. Participation at joint seminars with US counterparts also drove additional opportunities to have an interchange between private industry in the US and the Russian Federation.
Achievements Required in Future	Clean coal technological conference and study tour - March 1995. Initial exchange visits by 3 utilities: March - June 1995. IFI project finance workshop - August 1995. Study tour on gas quality and prices - September 1995.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	This program may become self-sustaining if the two sides receive some tangible benefits. For the US side this could include new investment and technology opportunities. For the Russians, this could involve internships and technology transfer, as well as introduction to Western financial techniques.

Target	Improved information for oil and gas exploration, activities through improved organization & presentation of data. Establishment of information market in baseline geological data.
Relevant Indicators & Objectives	Development of contractual arrangements and pricing mechanisms for the reliable and efficient trading of energy among NIS, CEE, Western Europe, and other markets.
Tasks Required to Meet Target	7A.4 Project Preparation and Technical Assistance Management - (World Bank) 7B Oil and Gas Resource Assessment and Exploration -(USGS -PASA)
Achievements to Date	The Russians are beginning to recognize that in order to attract investment in the oil and gas sub-sectors, they will need to release information vital to mounting normal exploratory efforts.
Achievements Required in Future	As the Russians keep creating the private sector of their oil economy additional information will come available to other offshore firms that are interested in the information generated both past and future. Russia is being asked to release substantial information that in the past has been closely guarded for strategic reasons.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	This activity is related to overall legal reform efforts associated with USAID support to HIID and IRIS.
Comments/Qualitative Evaluation	It must also be noted that Gazprom, the gas exploration, transmission and distribution system of Russia, has no apparent desire to split into separate entities. It intends to remain the sole manager of all natural gas within the Russian Federation. It currently has the distinction of being the largest utility in the world and has no intention of becoming less than it is.

Target	Technology exchange through oil and gas center
Relevant Indicators & Objectives	Development of contractual arrangements and pricing mechanisms for the reliable and efficient trading of energy among NIS, CEE, Western Europe, and other markets.
Tasks Required to Meet Target	7D Oil and Gas Technology Center (DOE-PASA)
Achievements to Date	
Achievements Required in Future	Equip Center and hire staff. Conference to Open Center : Spring 1995. Recruit and Appoint Industry Representatives to Board.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	It was proposed that 14 oil and gas centers be opened to provide a means for technology exchange in the oil and gas regions throughout Russia. While the creation of oil and gas centers is a noteworthy effort, there appears to be little benefit to individual US companies to continue this effort. It has been suggested that USAID no longer fund this program. Instead, the program objectives may well be better served by industry or US associations, such as the Petroleum Institute, on either a cost-sharing basis with USAID or on a fully funded (by industry) basis.

Target	*Establishment/existence of private energy service companies*
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution. Creation of separate service industries will promote competition in the market place.
Tasks Required to Meet Target	Plant management will be encouraged through incentives to divest themselves of inefficient and/or non-producing subsidiaries which affect plant accounting balance sheets. This is a part of the ongoing USAID-supported restructuring program.
Achievements to Date	None yet either discussed and/or desired. However, some (independent?) power plants belonging to industries exist. The law on the creation of new independent power producers has not been written and ratified. The service companies coming as spin-offs or newly created companies could be created later.
Achievements Required in Future	Promote the idea of service companies and their ability to provide timely services while improving the power plant bottom line.
Relationship to Other Targets, Critical Path for Meeting Target	This can provide better opportunity to evaluate retrofit projects and their funding and improve their attractiveness to lending and/or donor institutions.
Relationship to Other USAID & Donor Activities	Will depend heavily on financial sector reforms and property retitling.
Comments/Qualitative Evaluation	Service companies in Russia may pose unusual problems. Presently, the plant managers now have engineering, construction and plant maintenance under their purview. They will resist any change in this arena. However, just as in the case of the coal industry, excess workers will find that other industries are paying higher wages and this will induce their relocation to those industries. The spirit of entrepreneurship, combined with USAID programs, may also cause the development of private contracting and service firms. The expectation is that this change is to take place slowly. The creation will be based on need, both technical and financial.

Target	NGO Energy Centers & Professional Associations.
	"NGO Energy Efficiency Center strengthened and effectively operating with additional sources of support by late 1995."
	"NGO Association of Energy Engineers officially registered by late 1996."
Relevant Indicators & Objectives	"Promulgation of energy standards, policies and legislation that support (a) subsector restructuring, and (b) commercial market development of energy efficiency and related environmental technologies and services."
	"Commercially viable private sector capability developed to provide energy services, including production and distribution."
Tasks Required to Meet Target	Task 2 - "Moscow Energy Efficiency Center (DOE/PNL)"
Achievements to Date	Partial list:
	1. Establishment of the Moscow Energy Efficiency Center (CENEf).
	2. Development of appliance labels to raise customer awareness of appliance efficiency from the current 5%.
	3. A data base at CENEf of energy efficiency products from all around the world.
	4. Initial efforts to organize an association of energy efficiency engineers.
	5. Drafting of energy legislation and codes for the federal government.
	6. Publication of studies, policies and a newsletter.

Achievements Required in Future

1. Begin the effort to establish NGOs with a broad-based professional association that brings together generators, consumers, government, manufacturers, contractors, consultants and the transportation sector. Network engineers with legislators, regulators, accountants, managers and educators. Piggyback an existing US NGO to avoid reinventing the wheel. The most comprehensive energy organization in the US is the Association of Energy Engineers (AEE). The current CENEf effort to organize energy professionals is starting from scratch and is restricted to efficiency engineers.

2. Establish one different professional/trade association every year. Learn aggressive recruitment methods and pass them on to NGOs in all sectors. After establishing an umbrella organization first, set up specialized groups of plant engineers, electrical engineers, mechanical engineers, solar engineers, demand-side management (DSM) engineers, etc.

3. Get a lot more American products and services into the data base. Currently, only a few are American.

4. Expand circulation of the data base. Get it into the hands of thousands by identifying energy professionals in government and industry and by creating NGOs. Charge those who can afford it.

5. Expand CENEf's events and publications, and turn them into revenue generators. Currently, they are small and heavily subsidized. Acquire a feel for what prices the market will bear and how to get the right mix of contributing and subsidized participants.

6. Form working alliances with more organizations that could have overlapping goals, including governments and monopolies, since they hold most of the power. Possibilities include the Moscow Energy Office, RAO-EES ROSSII, the Moscow Energy Efficiency Agency and the US Foreign Commercial Service, a branch of the US Dept. of Commerce in Moscow.

7. Work with associations to establish professional standards. Establish an energy manager certification program that incorporates criteria for "trained energy managers" as required in the ***Energy Policy Act of 1992***. Such a program might be used to certify the Moscow Energy Efficiency Agency's auditors.

8. Become self-sufficient within two years.

Relationship to Other Targets, Critical Path for Meeting Target

1. A small number of RAO-EES ROSSII personnel have made it known that they are interested in founding or joining an energy engineers' association. This is opportunity knocking. Inviting them "into the fold" will build a bridge with RAO-EES ROSSII.

2. There is almost no evidence of effective utility-sponsored efficiency programs for customers in Russia at this time. DSM remains only a wish among a small number of the Russians interviewed. Establishing relations with utility personnel would start them thinking about sponsoring demand-side management in preparation for the day when utilities can afford these programs. Funding one staffer for two or three years to help recruit and establish networking associations while building bridges with utilities would be money well spent.

Relationship to Other USAID & Donor Activities	The US & Foreign Commercial Service, an arm of the US Department of Commerce, publishes the ***BISNIS Search for Partners*** to attract US businesses to Russia. It also does background checks on Russian companies, surveys markets, counsels visitors and provides an agent distributor service. It would be a natural match for CENEf and the Service to support each other in the search for energy business opportunities.
Comments/Qualitative Evaluation	By establishing an affiliation with an American professional association, Russian chapters would get much more than they give, as the societies distribute a wealth of information and demand minimal accountability from their chapters. One big reason professional organizations accomplish so much with so little is that they motivate volunteer labor. AEE and ASHRAE, for instance, set extensive, industry-wide standards that are sometimes incorporated into US Federal law, all with volunteer labor. The spirit of organized volunteerism may be new to Russia, but if acquired in the energy sector, it can catapult national energy efficiency accomplishments more quickly into the future. To change the culture, more than one professional society should be established in Russia. It will take a massive public relations program to convince a large number of people to treat energy as a valuable resource and energy systems as profit centers. With their publications, certifications, meetings, seminars, expositions, conventions, American contacts and domestic address lists, professional associations are extremely cost effective. Repeated exposure from associations is an inexpensive means to teach doing more with less. Assuming no overseas travel, the annual cost for full association participation is in the range of hundreds of dollars per individual. CENEf is already working with the strongest energy association known in Russia to date, the Association of Engineers in Heating, Ventilation, Air-Conditioning, Heating Supply & Building Thermophysics (AVOK). It functions much like ASHRAE in the US, but chooses affiliation neither with ASHRAE nor CENEf. Non-profit organizations need to operate like businesses to avoid dependency. Promotion of the next CENEf conference, for instance, is unrealistically late. It takes months to organize a successful conference. A more experienced organization would cancel the event at this point to cut its losses.

Target	Training for Energy Service Companies (n/a)
Relevant Indicators & Objectives	"Commercially viable private sector capability developed to provide energy services, including production and distribution."
Tasks Required to Meet Target	Create a market for energy services.
Achievements to Date	Partial list: 1. Training of 30 people in 1994 in energy auditing. 2. Development of energy efficiency appliance labels. 3. Creation of a newsletter, conferences and energy association to help define the new industry of energy efficiency professionals, previously unknown. 4. Creation of a data base of international energy efficient products as a handy resource for energy managers. 5. Brokering of one performance contract. 6. Assistance in establishing one energy service company (ESCO).
Achievements Required in Future	Suggestions: 1. Expand the auditor training program as fast as the market will bear. Make it self supporting by charging tuition, a la American professional training programs. Finance scholarships with a revolving loan fund or industrial grants. 2. Continue the appliance labeling program until the task is accomplished. 3. Make the newsletter self-sufficient through ads and subscriptions. 4. Make the data base self supporting by charging a fee from the listed firms. Publish it in hard-copy form for wider exposure. 5. Terminate the effort to broker performance contracts. One success in twelve attempts indicates that the economy is not ready. Let the private sector take over the search for contracting opportunities. Broker NGOs to train the private sector in contracting practices.

Relationship to Other Targets, Critical Path for Meeting Target	In the classic context defined by the National Association of Energy Service Companies (NAESCO), energy services are professional energy auditing, design, financing (including performance contracting), maintenance and project management of energy upgrades. In this context, all of CENEf's activities support the development of energy efficiency professionals, and therefore attract investment in a private energy service industry. In a different context energy services will mean fuel delivery, furnace repair, construction or even power plant maintenance. Here, entrepreneurs will invest in private companies staffed with skilled tradesmen. In the building construction and renovation business, the trades will automatically advance as fast as new products enter the market. Vendors will make sure they are trained. Fuel supplies and repair services, however, remain under the monopolies. There are no signs of private enterprise springing up here, and CENEf efforts are not placed in this area.
Relationship to Other USAID & Donor Activities	If the new law passes in the Duma, the Moscow Energy Efficiency Agency knows that customers who do not comply with its recommendations will face higher rates. Such action will move reform forward and begin to create a market.
Comments/Qualitative Evaluation	Formation of a private energy service industry is off to a slow start. Lack of a market, not lack of need, is the real barrier. The Moscow Energy Efficiency Agency, a government spin-off, has no connection to CENEf. It does audits for a price and thus supports itself without public funding. They may be further ahead than CENEf in terms of quantity, but their quality is substandard. With a market, the service industry will create itself. A market for energy services might be created by industrial training in the workplace, introductory education in public schools, energy engineering curricula in the universities, public awareness campaigns on the consequences of emissions. Successful examples of all exist in the US. CENEf would be an excellent means to this end. This plan would prepare the energy service industry for the day when the market is ready.

Target	Private Investments in Energy Efficiency & Conservation "NGO Energy Efficiency Center strengthened and effectively operating with additional sources of support by late 1995." "Five energy service companies and consultants received on-the-job training by late 1995"
Relevant Indicators & Objectives	"Promulgation of energy standards, policies and legislation that support (a) subsector restructuring, and (b) commercial market development of energy efficiency and related environmental technologies and services." "Commercially viable private sector capability developed to provide energy services, including production and distribution."
Tasks Required to Meet Target	Task 2 - "Moscow Energy Efficiency Center (DOE/PNL)"
Achievements to Date	Identified four banks and one insurance company in Moscow interested in investing in energy efficiency. Helped establish one energy service company (ESCO). Established data base of energy efficiency products and services available in Russia from around the world. Brokered one energy savings performance contract at an iron ore pelletizing factory. Conducted energy management seminars, business opportunity workshops and energy expositions.
Achievements Required in Future	1. After 11 failures in 12 attempts to get energy savings performance contracts going, CENEf should quit trying. The timing is wrong, and they do not have the expertise on board. Instead of seeking out contracting opportunities, find someone to teach aspiring energy entrepreneurs how to seek out their own opportunities. 2. Expand the CENEf roles of communicator, training facilitator, organizer of NGOs and builder of alliances. While waiting for markets to be created, position the players, define the industry, set standards and teach self sufficiency and sustainability. Help create the market by working at the grass roots level. Work with energy commissions and corporatized agencies to change their thinking from energy production to energy efficiency. 3. The current CENEf leadership appears to take an academic style approach to its tasks. Keep this and build on it. Balance evaluations with more aggressive implementation. Add an ambitious, results-oriented marketing leader with a mandate to stake out new territory and effect rapid expansion with minimum staff.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	

Comments/Qualitative Evaluation	Although quite a few Russians come out strongly in favor of efficiency as the best planning option for the power sector, the evaluation team found neither strong evidence of action nor the ability for a serious start in this direction. Demand-side management, i.e., end-use efficiency at customer sites, is unworkable at present. There is virtually no demand for demand-side management or ESCOs to provide it. It needs to be driven by market forces, which are still in disarray. Given the uncertainties, most investments would be suicidal. For the time being, the energy service professionals should hone their skills while the market is being prepared.

Target	Agreement on JEAS findings and plans for implementation on power plant fuel substitution and efficiency measures
Relevant Indicators & Objectives	Improved Energy Efficiency
Tasks Required to Meet Target	1.A: JEAS coordination
Achievements to Date	The JEAS report contains information on potential savings in selected power plants through rehabilitation, fuel switching, repowering, coal beneficiation. Burns & Roe identified short term projects. The Russian JEAS report contains goals for energy savings in power plants along with a schedule of intermediate targets for the large fossil power stations.
Achievements Required in Future	There needs to be an explicit system plan and program of triage for power plant investments. Use of sound economic and financial criteria for new capacity is a must. Prefeasibility studies for determining costs and benefits of alternative investments can shorten the list of potential projects from the wanted down to the desirable and eventually to the necessary. In particular, it will be critical to know which plants should not receive additional moneys and should be replaced by improved existing plants or from new capacity. With such a list of investment priorities, both the donors and the Russians can establish a financial plan for the overall program. Such a financing plan for efficiency improvement and fuel switching programs and then be compared in a reasonable manner to the alternative of new plant construction.
Relationship to Other Targets, Critical Path for Meeting Target	Restructuring of power sector must reach point at which it is feasible to set forth a system generation plan which is financially achievable. RAO-EES ROSSII and the generating entities must have agreements from the Federal Energy Commission, other government entities, the World Bank and financial rating agencies that borrowed funds can be paid back. Overall the program requires tariff reform, elimination of arrearages and improvements in foreign exchange regulation for enterprises.
Relationship to Other USAID & Donor Activities	The program on natural monopolies must have input as regards relationships among various state enterprises and regulatory authorities. Relationships between central and regional generating entities must be worked out. Accounting systems must be improved all the way to the distribution level with clear guidance about the financial reporting and management information systems needs of all of the various entities. To make a real difference at the regional level, the program requires substantial progress in USAID financial sector restructuring and regulation programs. As an incentive, the World Bank must have power sector project ready.

Comments/Qualitative Evaluation	Although we have a good idea of the potential for energy savings and fuel substitution in the power sector, more work in financial sector restructuring is necessary. In addition, certain political questions about the relationship between the center and the regional enterprises remain to be resolved. Any viable plan must include a realistic look at the proposed funding and schedule for nuclear power plant construction, completion, and operation. Finally, this activity calls for rigorous integrated resource planning, implying that the generating and distribution companies must be transformed into truly commercial entities prior to effective conservation at the generating end. The activities needed to implement true economic planning have not yet been completed and in some cases have not started. given the high degree of coordination and joint activities required among a number of federal and regional institutions and the financing requirements of the actual efficiency improvements, this activity is properly one in which Russians should take overall leadership with a small consulting input from overseas experts on an as needed basis. USAID might want to think about the MIS needs of the Russian enterprises since any substantial change in planning methods and coordination will require vastly improved data on both operations and finances. Such advice could involve major US firms in both the design phase and in the acquisition of hardware phase. USAID should have a plan to hand off the responsibility of paying for the MIS consultants to the Russians, conserving program funds for export incentives for the heavy hardware costs entailed in the consultants likely recommendations.

Target	Plan for electricity sector restructuring.
Relevant Indicators & Objectives	Produce a jointly agreed comprehensive time phased investment plan for the Russian power sector. Define an electricity market structure that will ensure the emergence of a competitive, efficient and market oriented power sector, which will attract both domestic and foreign investment.
Tasks Required to Meet Target	1A, 5A, Integration of the JEAS study results and implementation of regulatory reform and privatization.
Achievements to Date	Completion and presentation of a report on Restructuring Russia's Electric Power Sector in April 1994, by RCG/Hagler Bailly Various memoranda and reports by legal consultants Latham & Watkins Assistance on financial planning for power sector by RCG/Hagler-Bailly
Achievements Required in Future	Work should proceed to complete the activities of the four technical working groups. At present the consultants are constrained in their efforts to make further progress with the restructuring dialogue because of their close identification with RAO EES and the MFE. They should seek to establish closer ties with the FEC and the REC's as well as the Ministry of Economy with respect to pricing policy. They need to identify a power base outside RAO-EES ROSSII that is interested in advancing the restructuring proposals identified in the 1994 report. Since RAO-EES Rossii's motivation for participation in the project is primarily to stimulate new investment, the consultants should seek to demonstrate the need to finally resolve the ownership and control issues in the sector, move to acceptance of a restructuring strategy that encourages market based outcomes and begin implementation and stress the need to adjust to market based wholesale and retail prices. Once these conditions are satisfied, it will be possible to perform feasibility studies that will be able to demonstrate an adequate and stable revenue stream by independent companies in the sector that will in turn encourage foreign investment.
Relationship to Other Targets, Critical Path for Meeting Target	This activity is closely associated with the privatization legislation, creation of a independent regulatory authority, and is dependent on success in establishing market based pricing for electricity.
Relationship to Other USAID & Donor Activities	This activity is taking place in parallel to the activities of the USAID funded Institutional Reform and the Informal Sector project, the KPMG/Putnam Hayes and Bartlett TACIS study, the World Bank and the British Know How Fund.

Comments/Qualitative Evaluation	Absent an adequate regulatory body to motivate and police the electric power sector during sectoral transition and to establish appropriate rates in the wholesale and retail markets, there is every possibility that RAO EES Rossii will retain its newly acquired vertically integrated characteristics and follow GAZPROM's path. Certainly it would appear that since RAO-EES Rossii's participation in this project is motivated largely by a desire to obtain new investment, the project consultants should rapidly seek new institutional partners e.g. within the FEC, who will seek to advance the restructuring process themselves. Furthermore, given the wealth of resources currently focused on this sector, it is vital that rather than compete with one another, every effort be made to encourage the on going sharing of information by consultants and the establishment of a mutual strategy where possible.

Target	Privatisation legislation for electricity generation and transmission-preparation and presentation.
Relevant Indicators & Objectives	Establishment of policy, enactment of legislation and development of regulatory procedures necessary to break up monopolies, establish markets and strengthen competitiveness.
Tasks Required to Meet Target	5 A Regulatory Reform and Privatisation.
Achievements to Date	The legal consultants, Latham & Watkins, have provided RAO-EES Rossii with various memoranda on a variety of issues relating to operation of a wholesale electricity market, investments in private power plants, fuel supply agreements, power purchase agreements and regulation.
Achievements Required in Future	Rather than devote too much effort on drafting a complex and all-embracing law to govern the subsector, the consultants should focus on the establishment of a regulatory framework that is flexible and can stand up to rapid changes in market structure and technological developments. It should contain certain principles and safeguards to ensure a controlled transition from a monopolistic to a competitive environment, and the creation of a level playing field. It should also make use of abstract definitions and avoid technologically dependent provisions. One approach might be to draft the statutes for the FEC and REC based on anticipated economic outcomes arising from restructuring. These statutes would provide a starting point for the restructuring sector, that would be augmented on an as needed basis as the market develops.
Relationship to Other Targets, Critical Path for Meeting Target	This activity should be conducted in step with the discussions concerning sector restructuring. Two critical paths are possible; 1. Focus on the establishment of a flexible regulatory framework law. 2. Strengthen the activities of the existing FEC by drawing up anticipated statutes on an as needed basis.
Comments/Qualitative Evaluation	Since the consultant's partner is the vertically integrated RAO-EES Rossii, whose primary objective at this point is garnering new investment opportunities, it is not surprising that efforts at legislative change may not progress rapidly. Latham and Watkins may need to seek closer ties with institutional decisionmakers, who may have a more direct interest in seeking legislative and regulatory change.

Target	Establishment of market-based prices for electricity
Relevant Indicators & Objectives	Competitive pricing for efficient use of energy resources
Tasks Required to Meet Target	1.A: Integration of JEAS. 5.A: Regulatory Reform and Privatization
Achievements to Date	The RCG team has completed reports which explain the concept of marginal cost pricing in the context of a wholesale market for electricity. The team has also introduced the time of day pricing principle to the RAO-EES Rossii counterparts. These principles are less well understood in the regional A.O. Energos and in the power plants themselves.
Achievements Required in Future	The pricing work will have to be regionalized and incorporated into standard RAO-EES Rossii training and continuing education for managers. The grid managers will need to familiarize themselves with the concept of avoided cost in order to negotiate effectively with IPP developers. At some stage an implementation plan for pricing reform will be required, probably in conjunction with a World Bank power sector loan.
Relationship to Other Targets, Critical Path for Meeting Target	Given the size and importance of Russia's electricity sector, the achievement of market-based prices is critical to the success of other activities in conservation and investment. In addition, such competitive prices will be required to more fully commercialize the distribution entities, thereby providing the demand for competitively priced electricity from the grid, whatever its generation source. Finally, "hard" budgets will be needed in order to enforce the information and disciplinary functions of electricity prices, whether reformed or not. Without such discipline, there is little likelihood that any system of reformed prices will be taken seriously.
Relationship to Other USAID & Donor Activities	Pricing reform is probably not achievable without a joint program between USAID and the World Bank to provide the A.O. Energos, RAO-EES Rossii and potential private entrants to the market. Each of these parties must share a view of a market in which allocation is determined by competitive prices, or at least prices that are roughly comparable to those prevailing elsewhere in the world. With the importance of electricity in the economy as both a fuel purchaser and a market for equipment, a number of other prices will need to come into competitive balance at about the same time for electricity prices to show significant improvements to the allocation of resources. Eliminating the arrearages problems at generation and distribution is vital to meeting any reasonable economic efficiency goals in electricity markets. However, a solution to such a problem is beyond the energy sector, *per se*, and awaits overall enterprise and fiscal reforms.

Comments/Qualitative Evaluation	The competitive market price for electricity will vary regionally and also with respect to the degree of new generation capacity that is required by the system. Using simulated competitive prices, consultants should work with the Russians to make explicit the various tradeoffs between price levels and different demand and supply scenarios as well as the interdependence of energy prices with other prices. If it is not yet clear to the target audience, both USAID and the World Bank need to continue to educate on the subject of energy pricing reform. Though such reform is sometimes seen as a "magic bullet," and while appropriate prices are necessary for efficient resource allocation, they are not sufficient. Other pieces need to be in place as well, especially alternative products, financing for efficiency and fuel substitution, and the right to go bankrupt.

Target	Creation of independent electricity regulatory authority.
Relevant Indicators & Objectives	Develop the structures suitable for Russian conditions, to ensure the emergence of a competitive efficient and market oriented power sector. Establish policy and develop regulatory procedures necessary to break up monopolies, establish markets, expand the private sector and strengthen competition.
Tasks Required to Meet Target	5A Regulatory Reform and Privatisation.
Achievements to Date	Submission by Hagler Bailly of the April 1994 Restructuring Russia's Electric Power Sector Report, which contains references to necessary regulatory oversight, although the recommendation is for the adoption of a minimalist approach. In practice the Federal government unilaterally established the FEC and REC's back in 1992, but with limited part time representatives. The recent (February, 1995) Presidential decree has attempted to strengthen the activities of the commissions by increasing their staff.
Achievements Required in Future	The primary focus of the consultant has been on establishing the model for electric sector restructuring. In this vein, Latham and Watkins has devoted attention to the needs of a new energy law, while RAO-EES Rossii, the Russian counterpart, has sought to identify new investment opportunities via this program. Thus the consultant will need to devote more attention to the activities of the FEC and REC's and the impact of the recent presidential decree strengthening their staff and activities. As a first order of business the consultant will need to prepare various alternative models for regulatory oversight
Relationship to Other Targets, Critical Path for Meeting Target	Appropriate regulatory activity will safeguard the establishment of market based pricing and will police any sector restructuring plan adopted. The consultant should identify FEC and REC members who are willing to cooperate in better defining the activities of the regulatory commissions and establish a partnership in order to help them to define the structure, functions and personnel requirements of the agency.
Relationship to Other USAID & Donor Activities	Once again coordination is advised with the USAID IRIS program, as well as Latham and Watkins legislative work, and the activities of the Harvard Institute of International Development.
Comments/Qualitative Evaluation	Consultant focus on the target restructuring model, and while RAO-EES Rossii's interest in enhancing investment opportunities have served to keep the requirements for the creation of an independent regulatory authority on the back burner. On the other hand, absent an appropriate and effective regulatory authority, any sectoral restructuring will occur in a piecemeal and non-competitive manner. Only an autonomous regulator, separate from government or monopoly intervention will be able to ensure the maintenance of a level playing field during the period of transition.

Target	*Transparent pricing for oil and gas pipeline services (suggested new target)*
Relevant Indicators & Objectives	Development of contractual arrangements and pricing mechanisms for the reliable and efficient trading of energy among NIS, CEE, Western Europe and other markets. Competitive pricing for efficient use of energy resources.
Tasks Required to Meet Target	7.A.5: Oil Pipeline Access Reform
Achievements to Date	The World Bank has engaged the Boston Consulting Group to assist Transneft in its commercialization activities. BCG has worked with Transneft to establish principles of open access and transparent pricing and to assist the Russians in implementing such reforms. At the present time, the limited space in the pipeline system is allocated administratively. No additional capacity can be constructed by the users of the pipeline due to the structure of the Transneft joint stock company.
Achievements Required in Future	Transneft will need to be freed from administrative control by the Ministry of Fuel and Energy. The use of the pipeline by any user will need to be determined be the willingness to pay principle in *open* transactions. No side payments for administrative approval should be permitted, as they are at present, since this distorts the price signal and may render it meaningless. Users of the pipeline should be allowed to invest in additional line capacity in open transactions with Transneft or other pipeline companies. Finally, an open regulatory régime should be established that determines the tariffs for pipeline use and sets forth means of dispute resolution for users and Transneft.
Relationship to Other Targets, Critical Path for Meeting Target	The efficient transport of liquid fuels is vital to the Russian economy and to its ability to make reasonable choices regarding different energy sources. The critical path for achieving the target leads through proper setup of the Federal Energy Commission and the commercialization of Transneft. In a larger sense, an oil transmission company that exists as a private monopoly reinforces some of the less desirable trends in the Russian economy at present. In particular, interfuel substitution decisions cannot be made on a reasonable economic basis as long as access to fuel is still an administrative decision, not a market outcome. Moreover, the inability of pipeline users to invest in alternative routes reinforces the allocative inefficiencies of the current Transneft monopoly. The issue of entry of new pipeline companies is a critical one that will need to clarified soon, if investment in the oil sector is to be promoted.
Relationship to Other USAID & Donor Activities	The difficulties posed by Transneft for the Russian economy are reflected in the delayed effect implementation of the US-Russia Oil Framework Agreement. In addition, the World Bank is unable to invest significant amounts of money in the oil sector until and unless Transneft can begin to act as an independent commercial entity. Establishment of dispute resolution procedures, through such institutions as the HIID law program, are vital to making the users of Transneft confident that they can make additional investments in oil production capacity in the country.

Comments/Qualitative Evaluation	**The importance of straightening out the oil pipeline transmission situation cannot be overstated. Both the World Bank and the Petroleum Advisory Forum, a private oil industry group in Russia, agree that about $50 billion in new industry investment are hostage to the administrative and technical shortcomings of the current operation of Transneft and other Russian government entities. An important US program, the oil industry framework agreement of Eximbank, is also moving slowly due to difficulties in obtaining appropriate assurances about pipeline access, among other issues. In the case of the Eximbank program, about $1.4 billion in equipment sales awaits a successful resolution of Transneft's organization and operation.**

Target	Creation of independent oil and gas regulatory authority.
Relevant Indicators & Objectives	Establishment of policy, enactment of legislation and development of regulatory procedures necessary to break up monopolies, establish markets, expand the private sector and strengthen competitiveness.
Tasks Required to Meet Target	7 A.5 Oil Pipeline Access Reform
Achievements to Date	Project on hold pending future negotiations between World Bank and Government Bank analysis of decree on oil exports.
Achievements Required in Future	Not applicable
Relationship to Other Targets, Critical Path for Meeting Target	This activity should be established prior to consideration of oil and gas pricing policies, and before the promotion of commercial oil sector entities.
Relationship to Other USAID & Donor Activities	This activity should have preceded the Bain/World Bank Sidanco commercialization study. If project is approved, it should seek to coordinate with the IRIS and HIID activities
Comments/Qualitative Evaluation	In order to avoid duplication, it would be preferable for the project focus to be devoted to extending and strengthening the activities of the existing FEC and REC's to include the regulation of oil and gas.

Target	Creation of commercial oil sector entities(Transneft, Sidanco)-replicability and resource mobilization.
Relevant Indicators & Objectives	Establish a business environment that supports private sector growth; create in a Russian oil company a capability to implement programs independently.
Tasks Required to Meet Target	7A.5. Oil pipeline access reform (Transneft) 7A.2. Oil enterprise corporatization advice for Sidanco
Achievements to Date	Final report on proposed commercialization strategy for Sidanco, Feb. 1995, Bain Link on behalf of World Bank
Achievements Required in Future	Carry out a full audit of the company and develop a management information system. Draw up a corporate governance structure for the company. Begin preparation for a share offering.
Relationship to Other Targets, Critical Path for Meeting Target	This activity should have followed the creation of an independent oil and gas regulatory authority. It is not possible to move forward to achieve the target commercialized entity in a period when the restructuring process is in full swing, and due to the lack of a regulator to police the market, asset grabbing is the order of the day.
Relationship to Other USAID & Donor Activities	This activity has been part of a World Bank initiative seeking to create more attractive conditions for investor interest.
Comments/Qualitative Evaluation	The fact that the restructuring process is still underway, with competing forces seeking to seize assets means that there is no stable set of assets in the vertically integrated oil companies which makes even more difficult the drawing up of a clear and unambiguous governance structure for the company. Thus, corporatization cannot be completed, much less move along to commercialization which is designed to enable the organization to operate efficiently in a market economy. In an environment where ownership and control are not clearly defined, where price controls, commodity controls, and regulatory power have not been clearly established, it is difficult to see first whether there is an example worthy of replication, and whether the conditions will provide fertile ground for foreign investment.

Target	Involvement of private/privatized energy firms in electricity resource planning & implementation-openness and transparency of resource planning process.
Relevant Indicators & Objectives	Generation of demand, supply and transmission related data and forecasts, for all existing and new capacity to be added to the company's system and collating to form an Integrated Resource Plan that will specify additional investment projects that will needed to preserve system integrity.
Tasks Required to Meet Target	No task assigned to date.
Achievements to Date	The Hagler-Bailly Electric Sector study of 1994 has drawn attention to the need for such a plan and the need for a FEC to safeguard transparency and to hold ultimate oversight responsibility over the planning process for an IRP.
Achievements Required in Future	Following completion of electric sector restructuring, techniques for establishing an IRP may be offered as pert of the commercialization assistance.
Relationship to Other Targets, Critical Path for Meeting Target	IRP activities should follow sector restructuring and the establishment of independent regulatory authority.
Relationship to Other USAID & Donor Activities	Not applicable
Comments/Qualitative Evaluation	This technique is designed to improve efficiency by postponing the addition of unnecessary capacity. As such, it will become relevant to the utilities once restructuring is complete. Commercialization accompanied by tariff adjustments in the direction of world energy prices obliges each company to seek efficiency gains.

Target	Preinvestment studies for power plants for international financial institutions and bilateral loans
Relevant Indicators & Objectives	Private and public financing mobilized for specific investment projects in energy.
Tasks Required to Meet Target	1.D: Project Preparation for Institutional Lending
Achievements to Date	Under the USAID contract, Burns and Roe and RCG/Hagler-Bailly have been engaged by the World Bank to study the feasibility of a large gas fired combined cycle power station in Krasnodar, North Caucasus region. This study is not yet completed.
Achievements Required in Future	The JEAS has identified literally dozens of proposed new power plants or those requiring rehabilitation. A great many feasibility studies of the type to be completed in this task will be performed in the future. US firms will need to develop the capability to carry out such work in tandem with Russian energy service firms and independent consultants. As a preliminary step, both the US and Russian teams will need to pare down the list of proposed investment projects in order to minimize expenditures on plants that are not financeable. This screening process will need to include both new capacity and fuel substitution and put those options on a comparable basis with efficiency and demand management. Large US companies routinely perform such screening activities in order to reduce the number of alternative investments to those that are in some sense feasible and to make sure that all possible investments are put on a comparable basis.
Relationship to Other Targets, Critical Path for Meeting Target	Studies of the feasibility of new power plant investments are an integral part of changing the capital structure of the industry. In particular, this target relates to USAID's objective of achieving a substantial private investment in Russia's power sector. Activities such as this one are at the second step of a critical path that may lead to full acceptance of private power in Russia. Before these studies can be taken on effectively, it will be necessary to trim the number of proposed projects in the power development pipeline. This means that some prefeasibility studies may be useful to winnow out the projects that are too costly or not capable of generating enough income to repay their investments. In addition, meeting the target will require that plans for reforming the power sector be implemented in a manner that encourages private capital investment. In general, the private firms will undertake their own feasibility studies. However, proposed projects that cannot pass an initial screening should not be presented to the investment community. Unless the wish list of projects is winnowed down to the truly attractive ones, the feasibility studies funded under this task will be limited to IFI loans and will not leverage other types of funding.

Relationship to Other USAID & Donor Activities	This activity is currently carried out by the World Bank, using USAID funds. However, TDA also funds both prefeasibility studies and full feasibility studies as well. To the extent that this task does not displace TDA activities, it will remain useful. In addition, Eximbank has traditionally provided financing for power plant components and some degree of coordination with their program might be useful. The OPIC feasibility study fund is another source of funds for such studies, paid by USAID funds. Review of the various uses of USAID power sector funds is essential to ensure that only "live projects are put on the table for discussion and that the downstream agencies, OPIC and Eximbank, are involved in the initial power plant selection process so that opportunities for US participation is maximized.
Comments/Qualitative Evaluation	It is difficult to comment on the work product at this stage, since nothing has been produced yet. However, it is important that the US contractors working for the World Bank under this program continue to uphold the highest professional standards. It may be that some other contracting structure could be used to assure that the US firms act in a competitive manner. One possibility is that USAID could give the World Bank a short list of prequalified firms for such studies and that the Bank could request (short) proposals on a work order basis.

Target	Private investments in power sector entities.
Relevant Indicators & Objectives	To establish a competitive and market oriented power system that will attract both domestic and foreign investment.
Tasks Required to Meet Target	5.A Regulatory Reform and Privatisation
Achievements to Date	The current thrust of consultant assistance is to design the target model of sectoral restructuring . The objectives of RAO-EES ROSSII appear to be focused on stimulating greater investments.
Achievements Required in Future	Create a stable and predictable market to minimize risk and encourage private investors.
Relationship to Other Targets, Critical Path for Meeting Target	Private investor activity will normally become relevant once restructuring is complete, regulatory oversight is established, prices are free to move to World levels and the commercialization process has been initiated.
Relationship to Other USAID & Donor Activities	Although not necessarily implicitly stated, the possibilities of encouraging private sector investment lie behind most of the AID activities.
Comments/Qualitative Evaluation	It is too early in the process of systemic transformation to consider encouraging substantial private investment in the sector. Once a greater number of risks and uncertainties have been removed the market will become more compelling for investors. It should be noted that the absence of effective regulatory guidance of the sector has led to the establishment of a quasi vertically integrated company that appears to be in no hurry to separate generation, transmission and distribution activities to stimulate competition. For potential investors the uncertainty as to whether the current structure will be preserved going forward represents a substantial risk and serves to weaken the business case for investment. Under these conditions private investment will be curtailed.

Target	*Financial sector reforms and improvements to provide for private energy service and production firms*
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution
Tasks Required to Meet Target	no specific tasks in this project under USAID Energy Program
Achievements to Date	NA
Achievements Required in Future	Establish an industry structure that permits a competitive environment. Provide a regulatory environment that establishes the rights and obligations of firms operating in the supply and services markets.
Relationship to Other Targets, Critical Path for Meeting Target	This target is one of the essential pieces of USAID's objective to establish an open and competitive market in the energy sector. As such it is primary to the accomplishment of other objectives in the sector, including cost-effective energy conservation, investment in fuel substitution, new capacity and open competition in pipeline systems.
Relationship to Other USAID & Donor Activities	USAID has a major program in financial sector restructuring. This program will clearly affect all of the other sectors of the economy. However, the huge size of Russia's energy economy means that the financial flows to modernize that sector are both large and relatively "lumpy". In other words, the types of investments, power plants, oil refineries, pipelines, etc. tend to require large investments in order to achieve appropriate economies of scale. Such investments will require a healthy domestic financial sector, since the foreign funds available for such uses is necessarily limited. Energy service firms, mostly small, can be assisted by the USAID small enterprise program. Connections to this forum should be explored and can be used to form a beachhead in plant level energy services, fabrication and investments from which more sizable engineering and manufacturing efforts can spring.
Comments/Qualitative Evaluation	The effects of financial restructuring on the orphaned research institutes could be substantial. In particular, financial sector reform will provide a means of obtaining capital for their modernization in association with Western firms. In the realm of large investments, the financial sector reforms should enable Russian firms to access real alternatives to regulated monopolies, especially in gas, oil and electricity transmission. At a minimum, the financial ability to make an alternative investment will act as a brake on the power of the "network" monopolists in gas, oil and electricity. The team recommends that USAID consider the financial instruments that are crucial to effective energy sector restructuring and factor such instruments into its financial sector programs.

ANNEX 2.2: ARMENIA

2.0 Improved Efficiency of Energy Use & Interfuel Substitution

2.1 Listing of critical issues - self sustainability/replication, resource mobilization

Superseding all issues in Armenia is market reform. Until prices become incentives and payment streams become reliable, no other reforms can move forward. In the beginning of this three-country evaluation trip, the problem of non-payment seemed to stem from desperate poverty. Curtailment as a solution seemed cruel and was recommended with reservation.

By the end of the evaluation, at least one member of the evaluation team, the energy efficiency specialist, became convinced that it was more a matter of priorities. With more pointed questions, interviewees stopped making excuses and admitted that most delinquent customers choose not to pay, since they still believe that their labor has already paid for the energy, and now they are entitled to it. They feel no obligation to compensate utilities financially, especially not at world prices. Most customers have money for utility bills and as long as they can get away with it, they will spend it elsewhere.

The biggest technical problem facing Armenia is lack of fuel. The technical solution is threefold: a) develop alternatives, b) tighten up on efficiency and c) build a new infrastructure.

While many old guard energy officials resist change, there are plenty of innovative people in the Armenian energy sector, at more junior levels. The challenge is to channel tools and opportunities to the forward thinking people and convince officials to follow their technical lead.

Most AID technical activities are technically replicable, but not financially. That is to say, a small core of technicians is or will be prepared to continue doing what it has learned, but is not yet prepared to run an unsubsidized business. Efforts at further technical demonstrations should be redirected to business training. The people with promise need to learn independence, self-promotion and how to find niche markets.

Target	Power plant generation at Yerevan Thermal Power Plant improved 10% by 12/96 1. Procure urgently needed spare parts and materials as agreed upon with Armenian organizations for repair and maintenance of district heating networks. (From Task Summary No. 5, "Production and Delivery System Repair/Maintenance") 2. District Heating System restructured to increase its share of heating and reduce load by 20% on electric sector by 3/96. (From Program Objective 1.6: "Promote sustainable use of natural resources") 3. Increased heat and electricity available to the Armenian public by instituting improvements in the district heating... production and delivery systems. (From Program Objective 1.6: "Promote sustainable use of natural resources")
Relevant Indicators & Objectives	1. Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere. (From Task Summary No. 5, "Production and Delivery System Repair/Maintenance") 2. Promulgation of energy standards, policies, and legislation that support (a) subsector restructuring, and (b) commercial market development of energy efficiency and related environmental technologies and services. (From Program Objective 1.6: "Promote sustainable use of natural resources")
Tasks Required to Meet Target	1. Based on the previously prepared parts lists, work with the Government of Armenia (GOA) to re-confirm current priority and needs for spare parts. 2. Procure the spare parts, arranging for shipment and delivery. 3. As the procurement process proceeds, work together with designated Armenian MEF/Armenergo personnel in order to provide them with training in procurement methods for future use. 4. Take delivery/log in goods and distribute to recipient Armenian agencies.
Achievements to Date	Six of 14 sections of the old Soviet district heating system in Yerevan were revived to the point where they could operate unreliably last year.

Achievements Required in Future	There needs to be agreement on a better design for municipal heating and then commence construction. Dr. Zohrab Melikyan, a prominent local engineer, recommends heat pumps and cogeneration to boost efficiency and slash fuel consumption. He has already published a prefeasibility study for one of many possible configurations. USAID may wish to consider local progressive design concepts One design option presented to the team involved packaged terminal heat pumps and/or fan-coil units of local manufacture which could replace radiators in individual apartments. The heat source for the hydronic system would be from the prime mover for a generator, a central combined-cycle geothermal heat pump or a high efficiency central water heater. Potential benefits could include: a) lower system temperatures drastically reduce transmission losses, b) shorter distances drastically reduce transmission losses, c) each apartment would have local control, eliminating the need to waste excess heat through open windows, d) with constant hydronic conditions, heat pump reliability and efficiency can be optimized (the primary heating device would absorb all weather variations) and d) it would drive a local HVAC industry, both manufacturing and service. Assuming an apartment heat pump coefficient of performance of 5.0 (easily achievable with constant hydronic conditions), 1/5 of the system's heat source would be from electricity at the point of use and 4/5 from the central heat source.
Relationship to Other Targets, Critical Path for Meeting Target	Many activities depend upon the timely procurement and shipment of materials into Armenia. Little has been done to improve the slow pace of activity that has characterized this task.
Relationship to Other USAID & Donor Activities	The difficulty in getting materials in a timely fashion affects the performance of all concerned.

Comments/Qualitative Evaluation	Having sat idle for four years, efforts to further repair many parts of the old Yerevan district heating system should be curtailed. The average life span of the old Soviet distribution pipes is only seven years. If a pilot heat pump project is performed in FY 96, it will be at least FY 97 or 98 before the project can have any impact. In the meantime, AID should a) continue offering kerosene, possibly at a scaled-back level, a level to be determined by political expediency; b) use off-the-shelf imported heat pumps for a proof-of-concept pilot project in various settings (apartment, school, hospital, etc.); c) start negotiations on a joint venture to mass produce the equipment locally; and In common with the old system, the heat pump project depends on electric supply, thus success will depend on reliable electric supply, In addition heat pumps and fan coil units are not a fire hazard like electric and kerosene heaters. The team saw plenty of examples of charred outlets in overloaded building wiring and one example of a charred floor where a fire started under a kerosene heater in a school room. Heat pumps and fan coils also do not jeopardize indoor air quality like kerosene heaters. To meet the additional costs, either the municipalities or the manufacturer should be ready to offer an installment plan to customers. RMA reported the procurement of hardware to convert a simple generating electric power plant (operated by Armenergo) to cogeneration by connection to the Yerevan district heating system (operated by the city). Despite the fact that this idea was initiated by Armenergo,. the parts that were delivered five months ago and have still not been installed due to lack of funds. This task has not proceeded as expected. Further investigation in Washington is required to verify the reasons for delays in approval for the expenditure of funds. There is some indication that the Washington office delayed the expenditure of funds so that much of the work could not proceed. Perhaps this was caused by internal difficulties on the part of the contractor in Washington, or the failure in Armenia of local personnel in getting the paperwork in the proper form to get speedy approvals. Considerable investigation should be done to verify that timing and amounts spent to achieve contract goals be verified as realistic in light of the emergency situations that have been in existence since the beginning of the USAID program for Armenia.

Target	1. Facilitate an early and smooth transition of the energy sector in Armenia to a market-based system operated on sound commercial lines. (from Task Summary No. 3D: Energy Training) 2. Promote energy efficiency, greater self-sufficiency and fuels diversification. (from Task Summary No. 3D: Energy Training) 3. Advance the corporatization of the country's energy sector in support of free-market organization. (from Task Summary No. 3D: Energy Training) 4. One energy services company... (to) begin providing energy audits, construction, consulting, weatherization to industry and residences by 12/95. (From Program Objective 1.6: Promote Sustainable Use of Natural Resources)
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	Task 3.D, which includes: 1. Conduct a two-week training needs assessment in Yerevan. 2. Prepare and deliver a program of up to six two or three-week courses to include topics that have already been approved by the concerned parties in the energy ministries and the Mission. 3. Respond to Mission's further training needs. 4. Support other USAID programs in Armenia that require in-country energy training.
Achievements to Date	
Achievements Required in Future	
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	

Target	1. Energy efficiency of 7 selected sites improved by 10-15% from 12/94 to 12/95. (From Program Objective 1.6: Promote Sustainable Use of Natural Resources) 2. Energy efficiency of 15-20 plants improved by 15-20% from 12/94 to 12/96. (From Program Objective 1.6: Promote Sustainable Use of Natural Resources) 3. Demonstrate that savings can be achieved as well as introducing modern energy management principles. (From Task Summary No. 1: Industrial Energy Conservation)
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere.
Tasks Required to Meet Target	1. Develop list of seven critical functioning industries with the Ministry of Energy (including Armenergo), and other organizations that are large consumers of electricity. 2. Develop an implementable action plan for energy savings based on previous experience and energy audits. 3. At each plant, form a core team of local workers who will be trained in industrial conservation techniques. 4. Identify and procure equipment, install and train in O&M needed to improve industrial conservation and efficiency. 5. Establish a monitoring program to track the results of the installed equipment and determine financial benefits of program for appropriate GOA agencies.
Achievements to Date	The industries were identified, the audits were conducted and procurement recommendations were forwarded to AID in Yerevan.
Achievements Required in Future	1. Reach agreement between AID (in conjunction with IDEA) and Burns & Roe in Yerevan on the results of the audits. 2. Begin commodities procurement. 3. Train industrial personnel. 4. Monitor results.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	Correcting low cost/no cost industrial maintenance and safety deficiencies will contribute to the health and welfare of the Armenian population. Ways to cooperate between energy and national health programs might be explored.

Comments/Qualitative Evaluation	USAID, via Burns & Roe, stretched its budget by cooperating with TACIS on this program. TACIS helped with the factory audits, saving money and duplication. The cost to the program was a schedule delay. The beneficiaries, naturally anxious to get the equipment into their plants, complained to the team about the delays. The selected industrial energy conservation measures should be completed expeditiously, then exploited to the fullest as publicity. Armenia does not need further demonstration programs. USAID cannot turn around a country's efficiency problems with hardware for pilot projects. Demonstrations are to be held up as examples and leverage other efforts. Further AID efforts should be spent on publicizing the activity and on training. The choice of plants was wise. Some stand to demonstrate large energy savings. The brewery, although small, is an excellent choice to be held up as a public example, since it is always in operation.. Problems of communication occur such that the salt plant staff were surprised that some of their wishes were screened out by the audit. During the evaluation tour there appeared evidence of tension between donors (TACIS and Burns & Roe) and recipients. The TACIS engineer found the Armenian's priorities less than cost effective and questioned their logic. Plant personnel, however still expressed gratitude for AID help and hoped for more. There is an urgent need to promote attitude change amongst senior Armenian engineers, with potential training focussing on both content and instilling a can do attitude, and adequate employee morale. Maintenance, housekeeping and safety at all tour sites was atrocious, with hazards abounding.. It is within the power of plant managers and their chief engineers to correct low cost problems. If it is within AID's power to put pressure on funding recipients, it would certainly boost employee morale to improve plant conditions and, consequently, health and safety. Simple maintenance actions, like keeping insulation in good repair and fixing doors and windows, will improve energy efficiency. Establishing and implementing formal maintenance and safety programs within a plant's means should be a precondition for assistance.

Target	Power plant generation at Yerevan Thermal Power Plant improved 10% by 12/95.
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere.
Tasks Required to Meet Target	Task 5 Production and Delivery System Repair/Maintenance
Achievements to Date	There have been advances made in the use of flue gas monitoring equipment at both the Yerevan and the Hrazdan power plants. Due to the nature of the power plants themselves, one cannot separate the effects to both the district heating and the electric power production of these plants.
Achievements Required in Future	Further replication of the flue gas monitoring equipment is requested as this is an improvement in the overall efficiency of these plants, and an increase in much needed power generation which is critical due to the lack of fuel imports and the balance of payments that they cause.
Relationship to Other Targets, Critical Path for Meeting Target	These events tie closely to the many issues confronting both existing and further funding of energy efficiency projects, their procurement and administration.
Relationship to Other USAID & Donor Activities	Affects other activities as these issues are interrelated with respect to having the equipment available in a timely fashion
Comments/Qualitative Evaluation	It must be noted that this result is based on an inspection made at the Hrazdan power plant. The installation of gas monitoring equipment has been viewed positively since it helps improve efficiency and performance. Once sufficient fuel is available, there will be an increase in efficiency in the electric energy subsector. A hard assessment of the savings in the electric energy sector from the reduction of electrical demand as electricity in Armenia climbs to world market prices has not been performed, however this issue was mentioned by the Yerevan city power distribution department. Various segments of the economy are now beginning to compete for fuel. However, the effects of restructuring and systemic changes will be realized slowly. Until recently, the electric power industry was almost paralyzed because of uncollectible bills. This problem has been brought under partial control since utilities are only servicing those segments of the market that are paying.. Armenia must seek to develop indigenous resources, i.e. coal, oil and gas, and continue all efforts to find energy within its borders to prevent having a fuel balance of payments problem in the future.

Target	1. Increase heat and electricity available to the Armenian public by instituting improvements in the district heating, thermal power, and gas production and delivery systems. 2. Procure urgently needed spare parts and materials as agreed upon with Armenian organizations for repair and maintenance of district heating, thermal power and gas networks.
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	Task 3 Hydro Rehabilitation Task 5 Production and Delivery System Repair/Maintenance Task 8 Inventory Management Improvement
Achievements to Date	Based on an interview with the Yerevan City Distribution Department, there is now a means of collecting the cost of generation at the local level.
Achievements Required in Future	Continued application of metering to all customers is the next step to billing each customer according to actual use.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	After considerable discussion with the Deputy Head of the Yerevan City Distribution Department, it was apparent that firm control had been established over the distribution system enforcing collections. Now a new methodology has been developed: Districts(i.e. small blocks) buy for the block and collect in turn from each user. The main need now is for meters. The City expects to acquire all its meters from St. Petersburg. The city is now cooperating with TACIS on this project. The transformers and substations that were burned out during overload conditions have been replaced. In addition, during the first two years, over 900 transformers were burned due to overloading. Initially an organization ,Energoservice, provided new transformers from Georgia and Azerbaijan. The city of Yerevan then encouraged the organization to purchase equipment and rehabilitation transformers domestically.

Target	1. Reduce energy losses and costs in critical buildings and develop local potential for carrying on this program. (From Task Summary No. 2: Weatherization of Buildings)
	2. Complete weatherization of critical facilities in Armenia by the winter of 94/95, primarily in hospitals. (From Task Summary No. 2: Weatherization of Buildings)
	3. Achieve the maximum amount of heat loss prevention among the beneficiary groups by the winter of 94/95. (From Task Summary No. 2: Weatherization of Buildings)
	4. Develop local private energy services companies as well as private weatherization materials suppliers. (From Task Summary No. 2: Weatherization of Buildings)
	5. 200,000 families receiving basic heat services by 12/95. (From Program Objective 3.3: Mitigate the Near-Term Negative Impact of Civil War and Natural Disasters)
	6. Privatization support for six microenterprises to continue providing kerosene heaters for schools. (From Program Objective 3.3: Mitigate the Near-Term Negative Impact of Civil War and Natural Disasters)
Relevant Indicators & Objectives	1. Commercially viable private sector capability developed to provide energy services, including production and distribution. (From Task Summary No. 2: Weatherization of Buildings)
	2. Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere. (From Task Summary No. 2: Weatherization of Buildings)
	3. Temporary assistance appropriately targeted. (From Program Objective 3.3: Mitigate the Near-Term Negative Impact of Civil War and Natural Disasters)
Tasks Required to Meet Target	1. Design a weatherization program that includes caulking, insulation, weatherstripping, and door and window replacement for specific priority locations as designated and agreed upon by the Ministry of Energy and Fuels and USAID. (From Task Summary No. 2: Weatherization of Buildings)
	2. Train teams of local workers to carry out weatherization work. (From Task Summary No. 2: Weatherization of Buildings)
	3. Work with the MEF, other relevant entities, and Armenian weatherization personnel to develop a business plan(s) for energy services company(ies) to perform weatherization work and to establish local manufacturing company(ies) to manufacture selected weatherization materials in Armenia. (From Task Summary No. 2: Weatherization of Buildings)
	4. Distribute kerosene and kerosene heaters to selected institutions and residences. (Based on Program Objective 3.3: Mitigate the Near-Term Negative Impact of Civil War and Natural Disasters)
	5. Teach six kerosene-providing microenterprises to become private. (Based on Program Objective 3.3: Mitigate the Near-Term Negative Impact of Civil War and Natural Disasters)

Achievements to Date	1. A dozen teams of weatherization technicians were trained. 2. Sixteen of 19 weatherization sites are completed. 3. Kerosene and heaters were delivered to most targeted recipients in 1994; kerosene was delivered to all targeted recipients in 1995.
Achievements Required in Future	1. Complete the last three weatherization projects, already well underway. 2. Develop a business plan(s) for a private weatherization company(ies). 3. Teach six microenterprises to become private
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	If AID has a program to reduce disease in Armenia, it might collaborate with the energy program. Some public buildings in Yerevan, including the Ministry of Energy and Fuel as well as the school the team toured, have squalid sanitation.

Comments/Qualitative Evaluation

Both the weatherization program and the kerosene relief program are a tremendous success. Practically everybody affected expressed deep gratitude. The last three weatherization projects for FY 95 are heading toward completion.

Hospitals are warmer, in apartments, temperatures are 6° C (11° F) warmer than before weatherizing. Weatherization crews were innovative. They created roll-up insulation curtains out of insulation blanket stock and velcro. They pieced together window panes from used glass for lack of new glass. They fabricated steel doors from scratch to replace missing wooden doors (stolen for firewood).

Almost all of the weatherization crews' insulation was to combat convection (infiltration) losses and, to a small extent, radiation losses. They experimented with insulation against conduction losses in one room of one hospital building by attaching 2" thick perlite panels to the exterior wall and sealing the surface. The experiment was so successful that the previously uninhabitable room is now a nursery for premature newborn babies. The weatherization crew learned in the process what materials and techniques work and what do not. They learned how to avoid condensation problems.

Perlite is an abundant natural resource to be exploited. There is idle capacity in Armenia's building materials industry. There appears to be a tremendous need for insulation in Armenia. Developing this industry is a worthy goal for AID.

After schools received kerosene and heaters, attendance increased by 55%, a clear indication of success. They improved utilization of the heat and heaters by consolidating pupils into half the classroom space, but operating in two shifts. In the future, resources might be stretched even further by having an energy manager review the operation. For example, comfort and fuel efficiency could both be improved by optimizing the ratio of students per room volume. Filling classrooms to capacity (increasing the numerator) was considered unreasonable for scheduling reasons. Reducing classroom size with partition curtains (decreasing the denominator), however, might have worked, had anyone thought of it. Students might gladly have brought blankets to school for this purpose.

The last objective, teaching six microenterprises to become private, is not clear. Peter Davidian, who managed the kerosene program, does not know of it or understand it. The team wonders what is intended by privatizing firms to give away donated commodities.

Target	Hydro output increased by 30 MW by 12/96.
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere
Tasks Required to Meet Target	Task 3B Hydro Rehabilitation (Burns and Roe) Task 6 Mini Hydro Replacement (Burns and Roe) [Started with RMA]
Achievements to Date	Identification and analysis of energy efficiency improvement options in the use of power and development of an investment plan. Joint identification and analysis of thermal and hydro power plant upgrade options in terms of technology and costs. Little effort appears to be directed toward demand side management.
Achievements Required in Future	The six hydro power plant units that are to be completed this year must be monitored closely.
Relationship to Other Targets, Critical Path for Meeting Target	This effort is critical to achieving any use of the existing hydro facilities and minimizing the use of fossil fueled power generating plants.
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	During an inspection trip to Armenelectromash, it was discovered that there was no contract as far as Armenelectromash was concerned. Although Burns and Roe has a contract it appears that this contract is with the Research Institute, not with Armenelectromash. Armenelectromash had a contract with the Research Institute, but stated that it had expired last December. Burns and Roe immediately scheduled a meeting to be held on May 14 with all parties in attendance. The results of this meeting and all further discussions should be closely monitored by USAID. It should be noted that there is much tied to the success of the hydro effort. The licensing and regulatory effort is underway, and the focus now must be on funding. This effort is too small for the World Bank.

Target	Listing of critical issues - critical path of reform activities, relations to other USAID & donor programs
Relevant Indicators & Objectives	Policy, legislation and regulatory procedures to break up monopolies, establish markets, expand the private sector and strengthen competitiveness.
Tasks Required to Meet Target	Energy legislation and regulatory development, utility corporatization, restructuring
Achievements to Date	Due to the unusually difficult conditions in Armenia, the primary focus of AID assistance has been toward immediate needs. Thus legislative, regulatory and restructuring activities are just beginning to gain greater prominence. A notable exception has been the preparation of the draft energy law with its emphasis on the establishment of a regulatory body which is currently awaiting further institutional approval.

Achievements Required in Future	There is a problem of correct sequencing. There is an urgent need for a clearly articulated energy policy specifying the short run and long run resource strategy. In addition, it may be premature to begin to present a draft energy law complete with regulatory body, when the government has not yet made up its mind concerning the restructuring of the energy sector and has taken few steps to corporatize and commercialize state enterprises. Once commercialization is in full swing and each commercial entity has clear title to assets; has given some measure of autonomy to its board of directors; is operating on full profit and loss accounting and has begun to implement cost based tariffs, then there will be need for a regulator to monitor and regulate the newly emerging and hopefully competitive marketplace. On the other hand if the energy law is to act as a catalyst for reform in the sector, then it needs to lay out more explicitly the stages in the restructuring process, the end goals and be charged with the responsibility of managing the process. In its anxiety to be palatable to government, the proposed energy law if ultimately accepted may well do little other than enshrine a series of broad goals which will later become the subject of extensive controversy and disagreement. It may be useful to attach a series of annexes to the law specifying in more detail the following: e.g. nature of market based energy sector NERC tariff setting procedure NERC licensing procedure and specific fees NERC rule making procedures In any event, the benefits of the draft law will only be observed when the sector restructuring process is underway, and subsector companies are operating as commercialized entities. At that point and with the draft energy recommendations it will be possible to draw up master plans for respective companies, perform feasibility studies and seek assistance from IFIs in the form of lending to encourage new investment.
Relationship to Other Targets, Critical Path for Meeting Target	Thus restructuring and utility corporatization and commercialization should take place at least in step with or prior to the drawing up of energy legislation and regulatory development.
Relationship to Other USAID & Donor Activities	By encouraging restructuring at the outset of the AID process, the program encourages the development of companies, whether state owned or otherwise that begin to operate in part according to market principles. Legislation may then be designed to promote a competitive marketplace while regulation will safeguard a level playing field. The early introduction of former enterprise managers to managerial accountability and the need for efficiency and profitability is the best guarantor that subsequent technical and commodity assistance with rehabilitation and new investment will be used wisely. Of course the presumption is that it is desirable to promote the greatest degree of autonomy and self sufficiency as soon as possible.

Comments/Qualitative Evaluation	Correct sequencing is vital to maximize early benefits from the AID assistance. Thus acceptance of a draft 'framework' energy law, without considerable progress with restructuring is unlikely to either have a significant impact on the energy market in the short run, but in fact if the existing restructuring as outlined by the Minister of Energy is sustained will discourage the entry of outside investors who will face a monopsony market, at least in the power sector.

Target	Corporatization & Restructuring of Armenergo
Relevant Indicators & Objectives	Establishment of policy, enactment of legislation and development of regulatory procedures necessary to break up monopolies, establish markets, expand the private sector and strengthen competitiveness in key economic sectors.
Tasks Required to Meet Target	Short-Term and Long-Term restructuring and privatization plans for the power sector, technical assistance with corporatization and commercialization of both power and gas sectors.

Achievements to Date

Recognizing the critical energy needs of Armenia, and assuming a restructured corporatized and commercialized energy sector may represent the fastest way to introduce market efficiency and encourage investment, it is all the more surprising that there has been little progress to date.

Clearly, critical conditions have focused short run attention on power sector needs at the expense of energy alternatives, however, even here the most significant progress has been in drawing up the schema of a draft energy law, whose primary purpose appears to be to gain vague acceptance of the notion of a utility regulatory body. In contrast, Armenergo appears to favor the maintenance of a unified system which comprises both generation, transmission and distribution, with the special exception of the Yerevan City Grid and distribution network. Even in Yerevan there is evidence that Armenergo wishes to take over the management of the local company. Some consultants have chosen to justify this model in terms of the centralizing needs of a war economy, but without arguing the merits of this position, it is clearly a short run solution. While weatherization , fuel deliveries energy conservation and power plant rehabilitation are laudable in a crisis, the absence of a long run strategy for the whole energy sector appears to pervade AID's activities in Armenia, and in the absence of adequate advice, Armenergo is restructuring in the best centrally planned tradition of Gazprom and others. Meanwhile the both the WB and EBRD have also focused on providing lending for energy maintenance, and further lending will have to await the satisfaction of WB conditionalities. WB conditionalities in the power sector traditionally include the following:

Separation of generation, transmission and distribution.

Separate ownership from control, by spinning off the energy sector from direct state control

Implement an effective accounting system based on Uniform System Of Accounts

Establish an autonomous regulatory body.

Implement a phased tariff restructuring strategy based ultimately on LRMC.

Explore options for private sector participation.

While current efforts by TACIS to improve uncollectibles may improve the sector's revenue generating position, at present there is little prospect that new investment may be attracted to the sector since the conditions necessary for even for the implementation of a short term investment plan do not exist. Moreover Armenergo's proposal for a unified system may further discourage potential investment in a sector that badly needs upgrading.

Achievements Required in Future	There needs to be more focus on following a long run restructuring effort that should be sequenced as follows: Restructure the relevant energy subsector. Separate generation from transmission and distribution. Encourage the corporatization and commercialization of the subsector Establish an autonomous regulatory body. Implement phased tariff restructuring ultimately leading to LRMC based rates. Begin the process of corporatizing and commercializing the constituent enterprises. Conduct feasibility studies for short term and long term investment per enterprise. Examine the prospects for private sector participation in the subsector, via management contracts, service contracts, JVs, BOTs and IPPs.
Relationship to Other Targets, Critical Path for Meeting Target	An early decision needs to be made concerning the L-R fate of the district heating systems since they will impact upon power needs. Earthquake damage in Vanadzor and Gumri has rendered those systems useless, thus current district heating repair and rehabilitation centers upon Yerevan. In addition restructuring and corporatization will affect the focus of the new Energy Law. Without adequate restructuring and commercialization it is unlikely that significant IFI investment will flow to Armenia.
Relationship to Other USAID & Donor Activities	Corporatization , restructuring and commercialization of Armenergo is vital to the release WB and EBRD funds for further investment.

Comments/Qualitative Evaluation	There is substantial progress in designing a new energy law, establishing a Ministry of Fuel and Energy data base and some initial tariff recommendations. There have been admirable projects addressing short term energy needs through weatherization, fuel deliveries, and energy conservation strategies. However there is urgent need to accelerate the program of assistance for restructuring, corporatization and commercialization of Armenergo, via the utility corporatization and restructuring tasks, to prevent Armenergo from establishing a unified power system that will not encourage efficiency, enterprise commercialization or a level playing field for IPPs irrespective of the regulatory body. A unified state owned electric company will continue to exhibit monopoly behavior in the market and will receive state protection. In addition, only restructuring and commercialization is likely to meet the WB conditionalities necessary to encourage the urgent inflow of IFI investment. There seems to be confusion within the Armenian government concerning the current level of restructuring of Armenergo. The Ministry of Economy believes that a division has taken place between generation on the one hand, and transmission and distribution on the other. However, within the Ministry of Fuel and Energy it is believed that the division leaves a combined generation and transmission component and a separate distribution element. The evident confusion suggests that there is no clear picture, and may indicate a lack of real understanding of restructuring corporatization and commercialization at a senior level. This will make AID's task in this area all the more daunting. Acceptance of the latter will establish Armenergo as the monopsony buyer of energy in Armenia that does not auger well for potential independent power producers. Furthermore, while AID has placed great store in the establishment of a NERC, the same degree of commitment is not shared by the Energy Minister who in discussion took great pains to distance himself from the draft energy law and its recommendations by suggesting that model solutions from the US may have limited applicability in Armenia. There certainly appears to be considerable dissonance between the activities of the AID teams with respect to institutional policy and restructuring and the perception on the part of senior Armenian officials. This suggests the need for a more systematic dialogue between AID contractors and their Armenian counterparts to bridge the knowledge gap.

Target	Energy laws to promote efficiency & renewables
Relevant Indicators & Objectives	Promulgation of energy standards, policies and legislation that support (a) subsector restructuring, and (b) commercial market development of energy efficiency and related environmental technologies and services.
Tasks Required to Meet Target	Analysis of existing legislative and regulatory situation and help develop new legislation and regulations necessary to bring about reform. Perform engineering and financial analyses and evaluations of renewable energy projects, provide assistance and recommendations for international financing.
Achievements to Date	No action as yet on the alternative energy component. Considerable activity with the drafting of a new 'framework' energy law. However, the main focus of the law has been to establish a regulatory commission and an energy information department with some limited recommendations concerning cost based tariffs. There has been little explicit reference to promotion of efficiency and renewables, except under section 2, with respect to 'policy objectives and purpose', and then only presented as a statement of good intent.
Achievements Required in Future	There will need to be much greater effort placed on harmonizing former Soviet and subsequent CIS standards with those accepted in the developed economies. For renewables to gain credibility, the Minister of Fuel and Energy will need to champion the cause as a declared aim. At present his priorities are focused on geothermal possibilities, metering, and gas and power rehabilitation. His primary aim is to safeguard gas as Armenia's principal fuel resource. With respect to efficiency, the draft law's incorporation of a NERC, an energy data base and the principle of cost-reflective ratemaking may increase energy sector efficiency if the ideas gain universal acceptance as well as the theoretical underpinnings that justify them. In light of evident confusion amongst senior Armenian government officials, it would be most helpful to reinforce these notions with a more extensive and systematic program of focused training using problem solving methodology. Absent adequate attention to the need to restructure, corporatize and commercialize the sector, efficiency gains will be limited in their success since there will be no market mechanism with its concomitant measurement and reward to stimulate efficient behavior. Efficiency cannot be mandated, it must be stimulated!
Relationship to Other Targets, Critical Path for Meeting Target	This activity is directly related to both the broader effort to restructure the sector as well as establish a NERC. In addition legislation to promote the introduction of cost based tariffs in the long run is vital to encourage the promotion of weatherization and energy efficiency initiatives.
Relationship to Other USAID & Donor Activities	Legislative change to promote efficiency is vital for to ensure that all existing programs to rehabilitate embedded energy plant are not subsequently squandered, as well as to encourage new IFI and independent investment.

Comments/Qualitative Evaluation	**Existing efforts have been focused on the establishment of a new energy law which accepts the objective of efficiency but does little to reinforce this notion. The NERC, and cost based tariff recommendations may increase the efficiency of the sector if they are adopted in full. There is some sense that Armenian government agencies are going through the motions of accepting AID recommendations just in case they may be eligible for further funding, but the so called 'strategic needs of a war economy' will continue to be prominent in their thinking, and only when this political question is settled will the government be truly free to focus undivided attention on efficiency gains.**

Target	Draft energy law to Parliament by 9/95
Relevant Indicators & Objectives	Establishment of policy, enactment of legislation, development of regulatory procedures necessary to break up monopolies, establish markets, expand the private sector and strengthen competitiveness.
Tasks Required to Meet Target	Contribute to institutional and regulatory reforms needed to attract the private investor to the energy sector. Analyze the existing legislative and regulatory situation and help develop new legislation and regulations necessary to bring about reform.
Achievements to Date	A draft energy law has been drawn up and awaits acceptance by the Ministry of Fuel and Energy before being presented before Parliament.
Achievements Required in Future	Promote the draft energy law, improve understanding by the Minister of Fuel and Energy and gain the acceptance of the Ministry of Economy and deputy Ministers before being presented before Parliament. In addition the law needs to be redrawn in legal language and carry a set of appendices describing in detail various generally referenced concepts.
Relationship to Other Targets, Critical Path for Meeting Target	The draft law will assist in increasing the potential entry of independent power producers, by establishing an appropriate and autonomous regulatory regime. In addition it may encourage restructuring, corporatization and commercialization of the sector.
Relationship to Other USAID & Donor Activities	Establishment of an appropriate energy law along with an autonomous regulatory body and momentum for restructuring and corporatization may provide the catalyst for outside investment if it is accompanied by a cost based tariff policy and appropriate legislation governing degree of foreign investment and freedom to repatriate profits. It may serve to encourage the establishment of the second World Bank loan to the power sector as well as further EBRD investment.
Comments/Qualitative Evaluation	The drawing up of a draft new energy law is a substantial accomplishment if it gains full acceptance. However there is some concern that in order to ensure its passage, controversial language has been precluded from the document, and the draft law is stated as a series of intentions rather than a clear and unambiguous document. Furthermore, there is evidence that the Minister of Energy who is ostensibly championing the effort to gain acceptance for the law is lukewarm about its content, while the deputy Minister of Economy is under the impression that the notion of a NERC as advanced in earlier iterations of the draft law has been essentially shelved. There is a clear need to perform a much more concerted effort to keep all interested and affected parties advised of its progress as a way of facilitating acceptance.

Target	Market pricing & policies for District Heating by 6/96
Relevant Indicators & Objectives	Promulgation of energy standards, policies and legislation that support subsector restructuring and commercial market development of energy efficiency and related environmental technologies and services.
Tasks Required to Meet Target	Weatherization of critical facilities. Production and delivery system repair and maintenance.
Achievements to Date	The most significant impact has been on district heating customers through the weatherization program. In addition, RMA completed an energy efficiency audit report for the system in November 1992, and a pre-rehabilitation study in July 1994. For the Yerevan district heating system, RMA has provided assistance to Armenergo for the purchase of regulatory valves etc., for the connection of the district heating system to a nearby generating station.
Achievements Required in Future	Due to the 1988 earthquake, the district heating systems in Vanadzor and Gumri were essentially destroyed. Thus the focus of current activity has been Yerevan. In practice only the NE corner of Yerevan's district heating system had been intermittently on line during the winter of 1994-1995, due primarily to the shortage of fuel, but also because of the system's degraded physical condition. Although some reports suggest that boilers and boiler houses are in operable condition, only 2000 out of the city's 9000 buildings had their heat supply networks pressure tested and repaired. In addition, due to leakages in underground channels which house the heat mains, the mains insulation deteriorates quickly and pipes corrode leading to an average life expectancy of seven years. The Ministry of Fuel and Energy needs to consider setting out priorities for a national fuel resource plan. This plan should indicate the anticipated form of energy dependency in the short run. This in turn will enable a true evaluation of the five scenarios outlined in the RMA Yerevan district heating report and will help determine the cost benefit of each option as well as whether the rehabilitation of the existing system is desirable or whether an alternative heating strategy should be considered. Consideration should also be given to the design of a tariff system that would make it possible for the district heating system to plan a program of urgent rehabilitation if that option is the most efficient.
Relationship to Other Targets, Critical Path for Meeting Target	Market prices and policies for the district heating system are dependent on the establishment of a country wide energy policy as well as the short term availability of fuel. In the medium term progress in restructuring corporatization and commercialization of the energy sector as well as the phased introduction of cost-based rates will be vital.
Relationship to Other USAID & Donor Activities	This project is closely tied to the weatherization activity, as well as the industrial plant efficiency activities.

Comments/Qualitative Evaluation	Valuable work has been completed via the energy audit of the Yerevan district heating system as well as in the production of a prefeasibility study. Given the sad state of the existing network, there is a need to build on the existing work of RMA and perform a full feasibility study of the sources of heat, available fuel alternatives, as well as the condition of the full transmission and distribution network to determine what it would cost to rehabilitate the existing system in its present form, or alternatively whether partial rehabilitation is desirable or alternative heating strategies should be considered. Without reaching closure on this issue, the residents of Yerevan will continue to impose extraordinary loads on the electric system when it is operational, as well as seeking to make use of a variety of creative heating alternatives that may be dangerous as well as further damaging to the urban infrastructure.

There has been considerable progress with the drawing up of a draft energy law that contains recommendations concerning an autonomous regulatory body and the implementation of cost reflective rates.

However, the crisis in Armenia has meant that restructuring, corporatization and commercialization have had a lower priority. Meanwhile the Armenians have created 'concerns' along the post Soviet model that do little to separate ownership from control and only serve to consolidate the state's intervention in the economy through the creation of vertically integrated entities, e.g. the current structure of Armenergo. AID needs to quickly accelerate its restructuring and corporatization assistance so that if and when the draft energy law is approved, the newly commercialized entities as well as IPPs will be able to reap the benefits of an increasingly competitive marketplace.

Target	Critical issues - replicability, involvement of US firms
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	Develop local private energy services companies to promote weatherization. Assist in Armenia's institutional and regulatory reforms needed to attract the private sector to the energy market. Fast track coal mining capability, to be expanded to other sites.
Achievements to Date	Weatherization program was of great benefit to Armenia during critical fuel shortages. Coal mining project although late in starting did accumulate 26,000 tons of coal with another 25, 000 held in reserve for this winter. The development of an autonomous regulatory body should serve to safeguard a level playing field in the Armenian energy marketplace in the future

Achievements Required in Future	Absent correct price signals there is limited incentive for the public to use their own funds to implement weatherization as part of a conservation strategy. In the past, the primary motivator for the program has been the uncertain fuel situation in the winter. As this situation normalizes, that incentive will diminish. For program replicability it is vital that the public begin to pay for their energy needs, and that prices are gradually phased to reflect their costs. Once the public has to face higher prices for energy, and will be compelled to pay, then the incentive to conserve energy will encourage the market to develop for energy conservation strategies. Thus AID may wish to focus more attention on implementing cost based rates across the utility. The tariff recommendations included in the draft energy law should be developed in tandem with the power sector uncollectibles program currently being pursued collectively by TACIS and AID. The coal project was marred by a late start that meant that only a portion of the quantity targeted was mined. However, coal demand will no doubt rise before this coming winter. In this case, there is limited opportunity to make use of the coal by urban residents as they neither have the stoves or a place to store coal. In addition the existing distribution system leaves much to be desired and would need to be strengthened. Perhaps of more significance is the issue of the desirability of developing further coal reserves. There is a lack of congruence in the official positions of various Armenian ministerial bodies. The Ministry of Underground Resources has identified 8 additional coal mining sites with a potential yield of 10 million tons of coal and is anxious to gain AID assistance to investigate these sites further. On the other hand the Ministry of Energy has taken the position that further coal exploration is pointless, since the deposits are of poor quality and in any event, Armenia's energy future lies in gas. Clearly, Armenia could benefit from assistance in drawing up an energy resource policy and then in light of the results the possibility of further coal activities and replicability should be considered. Attracting US firms as suppliers of goods, IPPs or service providers is conditional on the establishment of a pricing and contract structure that enables Armenia to pay for goods and services, and for foreign investors to be able to predict their return on investment and minimize their risk. In this case, the work on the draft energy law and regulatory commission is significant, but needs to be fleshed out in much greater detail to avoid destructive latitude in its interpretation. These efforts should be accompanied by active restructuring assistance to prevent the formation of unified state owned monopolies in the energy sector that will control the market and discourage the benefits of competitive efficiency
Relationship to Other Targets, Critical Path for Meeting Target	Replicability and private sector investment will be conditioned by progress in restructuring, corporatization and commercialization and legislative, regulatory and tariff activities.
Relationship to Other USAID & Donor Activities	Implementing an effective pricing structure based on cost will stimulate demand for conservation services, as well as create the mechanism to pay for new investment in rehabilitating and upgrading existing energy sector capabilities. It is a conditionality for World Bank lending.

Comments/Qualitative Evaluation	Much has been done to alleviate hardship in winter through the weatherization and coal programs. But absent the crafting of an energy resource strategy and the implementation of cost based rates and a mechanism for reducing uncollectibles, it will be difficult to establish domestic sustainable private sector service companies, and will forestall IFI lending and the introduction of foreign investment in the economy.

Target	Establishment of Energy Services Company, Private Coal Company - Postponed.
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution. Creation of separate service industries will promote competition in the market place.
Tasks Required to Meet Target	Plant management will be encouraged through incentives to divest themselves of inefficient and/or non-producing subsidiaries which affect plant accounting balance sheets.
Achievements to Date	None yet either discussed and/or desired.
Achievements Required in Future	Promote the idea of service companies and their ability to provide timely services while improving the power plant bottom line. The Armenians working in the programs funded by USAID do not seem to know how to go out on their own after the USAID funded task ends. Promote the idea of funding instruction to Armenians in how to form and sell their services. Perhaps some Small Business Administration courses would be the best way to approach this. Investigation of what is available in Armenia should be undertaken.
Relationship to Other Targets, Critical Path for Meeting Target	This can provide better opportunity to evaluate retrofit projects and their funding and improve their attractiveness to lending and/or donor institutions.
Relationship to Other USAID & Donor Activities	See Relationship to Other Targets above
Comments/Qualitative Evaluation	Service companies in Armenia are not now even being thought about. Presently, the plant managers now have both construction and plant maintenance under their purview. The spirit of entrepreneurship, if fostered, may stimulate the development of private contracting and service firms. The expectation is that this change will take place slowly.

Conditions in Armenia are very different from the conditions elsewhere in the NIS. Since Armenia has been involved in the war with Azerbaijan, there has been a lack of fuel and therefore electricity. This has led to energy dependency.. Some gas was available this past winter following an explosion in a Georgia power plant, that freed up the gas for utilization in Armenia.

The main conclusions with respect to commercial activities and privatization are:

At present Armenia is not moving to attract any of the major oil exploration companies. It may be possible to attract oil companies and to subsequently foster competition within Armenia once the proper legal framework is approved. Armenia may be too small for consideration by multi-national oil concerns, however the effects of preliminary exploration may yield interest in all areas including further exploration in oil gas and coal, and oil transportation, refining, and distribution.

Information exchanges between US utility companies and Armenian electric and gas companies should be continued, with increased funding from USAID.

The coal industry should be encouraged and developed. Further contact between US coal companies, labor unions, and other US government entities may help pave the way for the creation of this industry as an important component in the energy picture.

The establishment of private energy service companies is predicated on the desire and/or ability of budding entrepreneurs to work as individuals in the service sector of the economy. Given the existing level of private entrepreneurship, this process should encounter few difficulties.

Target	Private investment in 2 CHP plants by 12/97
Relevant Indicators & Objectives	Private and public financing mobilized for energy investments
Tasks Required to Meet Target	3.A.1 - Independent Private Power
Achievements to Date	A draft of energy legislation has been completed and is now under consideration by the Government of Armenia. The law specifies certain conditions under which electric power can be purchased from private producers. Wheeling and system bypass are also enabled in the proposed legislation.
Achievements Required in Future	The energy law will need to be more fully fleshed out with specific regulations governing the transfer of energy through the transmission system by private producers. There will need to be a functioning regulatory commission to set the specific terms of tariffs, backup power (for wheeling customers) and dispute resolution.
Relationship to Other Targets, Critical Path for Meeting Target	This activity depends crucially on the successful completion of the energy law and the full restructuring of Armenergo. In particular, the restructuring of the system will have to allow for the separation of the distribution company from the generation one. Moreover, a full reform of distribution, including collections, will be a prerequisite for providing the funds for buyback of power and energy. On the district heating side, significant reforms in operations and technical improvements to the system will be required in order that a private entity be able to make a go of selling heat to the system. In addition, the private CHP company will need to have powers of condemnation for purposes of repair and rehabilitation of distribution pipes.
Relationship to Other USAID & Donor Activities	This activity depends on adequate progress in corporate law and on the restructuring of Armenergo. In addition, the companies in the industrial facilities to be chosen as the first sites should also be privatized entities so that the power purchase agreement represents a true avoided cost for the purchaser. If residential or office sites are chosen, then they will need to be privatized and commercially run. Such a step will require progress from the housing and property projects of USAID and the World Bank.

Comments/Qualitative Evaluation	It is recommended that industrial facilities be chosen as the first sites for private CHP activity. In this way, the organizational and political problems inherent in the residential heating system will be avoided for the first few CHP companies. If residential sites are to be chosen then the sizing of a CHP unit for residential or commercial sites may represent an uneconomic activity, unless it is a rehabilitation of an existing unit that can be purchased inexpensively by the company. There are a number of sites that are suitable for small and medium sized hydro and geothermal generation. In general, these sites are likely to be attractive to private generation companies. Total capacity in the small hydro and geothermal sites may amount to as much as 300-400 MW. For example, the geothermal exploration and development activities could normally be undertaken by private firms (Chevron and Unocal both have extensive overseas experience with geothermal energy). However, they will not enter into such activities without some legal framework.

Target	$50 M of IBRD financing for power sector rehabilitation by 12/95
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution. Promulgation of energy standards, policies and legislation
Tasks Required to Meet Target	3.A.4 - Utility Corporatization 3.A.5 - Utility Restructuring
Achievements to Date	A draft of a proposed energy law has been completed and has received the support of the World Bank Yerevan office. The legislation is now in the hands of the Armenian government. The contractor RCG has competed a work plan and will soon receive a proposal for a restructuring team from subcontractors Price Waterhouse.
Achievements Required in Future	The legislation will need to be completed and accepted by the government. Restructuring of Armenergo will need to get under way with a separation of generation and distribution. The distribution entities will need to be commercialized and then corporatized by the Price Waterhouse team. This activity will include introduction of internationally accepted accounting systems, management information systems and improved collection of tariffs. As a part of this activity, the contractors will need to restructure electricity tariffs so that all variable costs are covered immediately and LRMC is achieved shortly thereafter.
Relationship to Other Targets, Critical Path for Meeting Target	Corporatization & Restructuring of Armenergo Draft energy law to Parliament by 9/95 Market pricing & policies for District Heating by 6/96 The critical path for meeting this target runs through a successful restructuring of Armenergo and a successful passage of the proposed energy law. In addition to the law itself, a number of regulatory statutes will be needed, specifying tariff goals and methods of determining prices. The reform of district heating prices will be required to provide income to the restructured Armenergo local distribution company.
Relationship to Other USAID & Donor Activities	This activity depends also on the TACIS program's activities in district heating tariffs and collections.
Comments/Qualitative Evaluation	The World Bank has indicated its willingness to cooperate with USAID in this endeavor. As with the programs in Ukraine and Russia, the money provided by the IBRD is a critical element of the program since it provides the means of effecting the reforms outlined in the USAID program. As in Russia, it may be useful for USAID to provide some funds to undertake feasibility studies of proposed IBRD investments. In addition, involvement of US firms via TDA may be appropriate for some of the proposed projects.

Target	Proposals for rehabilitation & new/renewable projects for IFI funding by 6/96
Relevant Indicators & Objectives	No directly relevant indicator.
Tasks Required to Meet Target	Task 3.B - Establish a least cost hydro program to rehabilitate and develop identified hydroelectric projects, and assist in the preparation of necessary project financing documentation.
Achievements to Date	There is no activity at the present time.
Achievements Required in Future	Approximately $1 million is available in the USAID budget for this type of activity. At the present time it not used at all. There are both technical and organizational reasons for this. Beyond technical considerations, long term IFI funding will only become available when the following conditionalities are met: Restructuring of the energy sub sector Separation of ownership from control Corporatization and commercialization of state enterprises. Implementation of cost reflective rates immediately with full LRMC pricing reached on a fixed schedule, to provide for payback of IFI lending Establishment of a regulatory commission to safeguard a level playing field.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	Rehabilitation and new project development is at the core of an Armenian energy strategy. For IFIs to come forward and provide needed lending, work on restructuring, corporatization and legislative and regulatory change needs to advance.
Comments/Qualitative Evaluation	To establish a steady stream of funding for rehabilitation and new investment project development in the energy sector, the economic conditions need to be more favorable to minimize the risk to the IFI lender. While current activity will provide for short term progress for emergency rehabilitation, longer term projects and more complex lending will require that the conditionalities outlined above be satisfied.

It was suggested that these funds be considered for reassignment for the continuation of efforts supporting the installation of the hydro units in Task 6 - Mini Hydro Replacement. The weak link to the installation of this equipment is the approval of the spending of state funds for the civil works for the installation of these units. Therefore Armenergo cannot proceed to install these units without state funding and/or approval. This work could be advanced in a timely fashion by allowing these funds to complete one unit at a time until the funding runs out or until the state funded budget is approved and the work completed. It must be noted that Armenergo has entered a new era as they are now collecting 100% of the electrical energy sold to their regional distributors. This one fact is beginning to make them sound like a going concern.

Target	5% of total kWH produced by private sources by 12/99
Relevant Indicators & Objectives	Private and public financing mobilized for energy investments
Tasks Required to Meet Target	3.A.1 - Independent Private Power
Achievements to Date	See item 5.1. In addition, USAID has supported the identification of small hydro sites as well as the rehabilitation and completion of several thermal plants. These activities are all under way but none is yet near completion.
Achievements Required in Future	In the future, USAID contractors will need to promote private power not only by the restructuring of institutions but also with concrete assistance in defining and promoting private power projects. In this regard, the program will need to move to providing additional assistance for project definition, resource evaluation and project packaging.
Relationship to Other Targets, Critical Path for Meeting Target	See item 5.1.
Relationship to Other USAID & Donor Activities	This activity is closely related to IBRD lending and to possible introduction of TDA and OPIC programs in Armenia.
Comments/Qualitative Evaluation	There are a number of sites that are suitable for small and medium sized hydro and geothermal generation. In general, these sites are likely to be attractive to private generation companies. Total capacity in the small hydro and geothermal sites may amount to as much as 300-400 MW. For example, the geothermal exploration and development activities could normally be undertaken by private firms (Chevron and Unocal both have extensive overseas experience with geothermal energy). However, they will not enter into such activities without some legal framework.

ANNEX-2.3: UKRAINE

Improved Efficiency of Energy Use & Interfuel Substitution

Listing of Critical Issues - Self Sustainability/Replication, Resource Mobilization

Ukraine has the worst energy efficiency of the former Soviet states. It has problems with its nuclear power industry, and it fears that Russia will cut off its energy supply. Something must be done to improve efficiency.

Subsidized demonstration projects have limited value. They demonstrate only the technology, and they probably will not be replicated without further subsidies. The real test is to build a project justified on its own merits and financed with private money, not grants. That demonstrates determination during the adversity of transition, a most valuable "show and tell" for a country trying to shake the former handicap of communism.

Sustainability in the energy sector for Ukraine means moving away from dependence on unreliable neighbors. Total energy independence is too expensive and unrealistic, but Ukraine will not be close to that problem for a long time. Now, the country has to shake the burden of inefficiency and the curse of limited domestic supply.

Efficiency is a resource, and a very accessible one. It has the added advantage of reducing emissions, unlike most other energy resources. The first step is to create a demand for efficiency through market reform. The second step is to prepare an infrastructure of equipment supply and professional services at the same time, so the industry is ready when the market is.

To increase supply, Ukraine must mobilize all safe resources. In addition to efficiency, it must examine fossil and cost effective renewable resources alike. It must exploit all fossil reserves in its soil with modern extraction technology and clean combustion technology. Renewable technologies, although often more expensive, offer the double benefit of reducing emissions. The country must ask itself, what is it worth now to avoid clean-up later? Hopefully, US assistance in these areas will ease the pressure and reduce the Ukrainian desire to upgrade Chernobyl.

NGO Energy Centers & Professional Associations

Target	Short term (from Task Summary No. 3E: "Kiev Energy Efficiency Center"): 1. Support development of energy law and policy. 2. Train utility managers, industrial officials and ministerial officials in least-cost planning. 3. Conduct public education and outreach programs. Long term (from Task Summary No. 3E: "Kiev Energy Efficiency Center" and contract SOW with PNL): 1. Promote domestic and joint venture business in energy efficiency technologies. 2. Undertake energy-efficiency demonstration projects. 3. Attain self-sufficiency.
Relevant Indicators & Objectives	1. Commercially viable private sector capability developed to provide energy services, including production and distribution (from Task Summary No. 3E: "Kiev Energy Efficiency Center"). 2. Economic development and environmental protection (from contract SOW with PNL).
Tasks Required to Meet Target	1. Support the development of an independent, not-for-profit energy efficiency center (ARENA-ECO) in Ukraine similar to those created with financial support of US institutions in Poland, Czech Republic, Russia, and Bulgaria. 2. Employ highly qualified energy technicians, analysts and experts, promote and accelerate the introduction of energy efficiency policy and technology in Ukraine.
Achievements to Date	The Center, ARENA-ECO, is established. The director, Dr. Nikolai Raptsoun, and eight other permanent staff members now function in temporary quarters, soon to be replaced by better permanent quarters. Due to several weeks of funding delays, the Center is only three months old, not five.

Achievements Required in Future	Short term: 1. Summarize energy efficiency legislation and standards in other countries and write proposals for developing the same, appropriate for Ukraine. 2. Conduct workshops on least cost planning for municipalities and local utilities. 3. Provide technical and institutional analyses and advice on steel sector energy savings. Long term: 1. Identify Ukrainian companies interested in doing domestic business in energy efficiency technologies; identify Ukrainian and US companies interested in joint venture business in energy efficiency technologies. 2. Identify potential energy-efficiency demonstration projects and broker contracts between users and providers of energy equipment to make projects happen. 3. Find organizations interested in contracting the services of ARENA-ECO to a level high enough to sustain self-sufficiency.
Relationship to Other Targets, Critical Path for Meeting Target	There is overlap among contractors and between ARENA-ECO and other contractors in the areas of training, auditing, IRP and DSM. Recommendation: AID should brief ARENA-ECO on a regular basis, i.e., bi-monthly or quarterly, on all of its relevant activities. This would uncover areas of overlap between ARENA-ECO's tasks and tasks of other contractors. They could work together to strengthen the effort instead of duplicating efforts separately. In cases when more than one other contractor is involved, ARENA-ECO could act as a communicator and facilitator for their mutual benefit.
Relationship to Other USAID & Donor Activities	ARENA-ECO is not currently tasked with promotion of other NGOs such as professional associations. It would be extremely cost effective to leverage the efforts of such groups. They use mostly volunteer labor, they are effective tools for rapid dissemination of information, and they offer training, professional certification and equipment standards. They bring manufacturers, service providers and end-users together in large networks. Best of all, they can teach and perpetuate volunteerism in service to the profession of energy management. Recommendation: Professional energy associations would serve Ukraine well. Development of such NGOs would be a worthy task to add to ARENA-ECO's list. Assuming no foreign travel, all of the above benefits could be provided to an energy professional for less than $1000/yr. Matching funds might be solicited from co-donors. Then, as the economy improves, beneficiaries could graduate from donor assistance and pay for activities from their own profits and salaries.

Comments/Qualitative Evaluation	The director of ARENA-ECO seems determined to make the Center succeed and become independent. To his credit, he is not placing the academic nature of the Center ahead of the need to generate business and sign contracts to support itself. He is also politically astute. Although his goals are USAID's goals, he is not dogmatic. Only an extremely small number of US companies have expressed an overt interest in doing business in Ukraine. GE and Honeywell have offices in Kiev. GE wants to sell lights and manufacture ballasts in Ukraine. Honeywell wants to manufacture thermostat wells, among other things. Russian-language brochures of an American flow meter manufacturer, Controlotron from New York state, showed up in the ARENA-ECO office. Beyond these examples, almost nobody in the US is beating a path to Ukraine to sell energy products and services. ARENA-ECO's technical administrator at PNL, William Chandler, gave a speech on new opportunities in the former communist states at a major energy congress in Atlanta a year and a half ago. Although the presentation lacked nothing, the subject matter drew only a small audience. It reaffirms the fact that few American companies trust the business environment here and will not invest. For these reasons, ARENA-ECO and USAID personnel state-side will have to work hard to recruit partners and create interest in the future opportunities. This should be done simultaneously with restructuring. Then when the market is ready, the players will be positioned to spring.

Comments/Qualitative Evaluation	As a warning, ARENA-ECO should choose its targets very carefully when trying to negotiate demonstration projects if they cannot be supported by subsidies. Until the market is more mature, the Center should not expect more than one demo per year and should not invest great amounts of time toward this end. As a lesson learned, the Moscow Energy Center, CENEf, tried to broker 12 energy savings performance contracts in two years and only achieved one even weak success. While the new tariffs and regulatory framework are being established, ARENA-ECO should spend its time lining up the players. Together with EEI and others, prepare them with massive training in current technology and contracting practice. Preparation of future partners means introducing organizations on both sides to each other and instigating dialogs. From several of the evaluation team's interviews, it is clear that Ukrainians do not really know what technologies Americans have to offer. They only know they have been told to "restructure" to attract western investment, and the training courses and other AID activities will teach them some of that. It would speed the process up, however, if American suppliers would get to know first-hand their major potential Ukrainian customers and talk them through the process of reform. Let Ukrainians hear what conditions for commerce are expected of them straight from the suppliers who would get their business. It would build confidence on both sides. The task summary issued by USAID for "Task 3E, Kiev Energy Efficiency Center," calls for analyses and advice on steel sector energy savings. While metallurgical industries may be primary in importance, it would be better to reword the expected outputs to include all heavy industry. ARENA-ECO did not mention restricting its activity to steel. The director spoke of all industries.

Training for Energy Service Companies

Target	Facilitate an early and smooth transition of the energy sector in Ukraine to a market-based system operated on sound commercial lines by making managers and senior professionals cognizant of the management, economic, financial and institutional aspects of a competitive market environment.
Relevant Indicators & Objectives	1. Establishment of policy, enactment of legislation, and development of regulatory procedures necessary to break up monopolies, establish markets, expand the private sector and strengthen competitiveness in key economic sectors. 2. Competitive pricing for efficient use of energy resources. 3. Promulgation of energy standards, policies, and legislation that support a) subsector restructuring, and b) commercial market development of energy efficiency and related environmental technologies and services.
Tasks Required to Meet Target	Conduct a series of specialized energy management training courses in support of restructuring the power sector to a competitive generation industry and regulated distribution companies.
Achievements to Date	So far, three courses have been taught on the subject of utility management.
Achievements Required in Future	Ten more courses are scheduled to be taught.
Relationship to Other Targets, Critical Path for Meeting Target	This target supports Task 1, Power Sector Restructuring. The timing of the two tasks should be concurrent. Training utility executives will help "attract foreign investment" and teach them to provide "quality service to the public," as stated in Task 1. Service in this sense, however, means electricity supply and should not be confused with energy management services provided on the demand side by energy services companies (ESCOs).
Relationship to Other USAID & Donor Activities	The USAID emphasis on supply-side development of skills complements the European interest in developing Ukraine's demand-side energy management skills.
Comments/Qualitative Evaluation	This entire task seems directed toward training supply-side personnel and should be renamed to describe that. There is no indication of interest in demand-side efficiency training in implementing this task. Indicator 3B will not be realized and, therefore, should be struck. The quality of the courses was deemed fair to excellent. The make-up of the audience, however, missed the target. Hardly half of the students benefited from the topics. Many were thrown in on short notice to fill the classes. The courses need more lead time and more attention to finding the people who really need the information the most.

Industry Energy Conservation

Target	1. Prepare the groundwork for the coming energy pricing and overall economic reforms that will force industries to be competitive by a) demonstrating the savings that can be achieved in selected industries; and b) introducing modern energy management principles into the organizations. (From Task Summary 3C, Industrial Energy Efficiency) 2. Industry plant energy efficiency improved 5-10% in 5 major industrial facilities by 12/95, and 10-25% in 10 plants by 12/96. (From Program Objective 1.6: Promote Sustainable Use of Natural Resources)
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere.
Tasks Required to Meet Target	1. A cross-sectional energy resource flow analysis of the Donetsk Region. 2. The identification of regional low-cost, no-cost energy conservation measures. 3. Identification of larger investments required at the regional level. 4. Detailed industrial audits at 5 plants as follows: a. Selection of target plants according to pre-established criteria. b. Energy audits within the target plants. c. Installation of instrumentation on energy savings equipment. d. Identification of low-cost, no-cost actions. e. Identification of larger investments required in the target plants. f. Training plant personnel in sound energy management. 5. Expand the program five-fold to meet the 1996 target.
Achievements to Date	Eleven potential project sites were narrowed down to five plants. Field work on the five is underway.
Achievements Required in Future	1. Continue field work, i.e., audits and recommendations. 2. Procure and install required commodities. 3. Follow up with training. 4. Expand the program five-fold to meet the 1996 target.

Relationship to Other Targets, Critical Path for Meeting Target	Training of industrial energy managers concurs with one of ARENA-ECO's long-term targets. If funds from this task were directed to ARENA-ECO's program, the training might be accomplished sooner, as ARENA-ECO is most competent to manage such activity. To understand the urgency for industrial energy training, consider the following anecdote. The energy efficiency specialist from the evaluation team visited one sample plant of the chosen five: the Kiev Combined Construction Materials Industry. Thermal losses were correctly identified as the worst problem at this plant. As a rule, this is true of all energy-intensive industries. Following close behind thermal inefficiencies are mechanical power transmission and speed control losses. These are rarely considered important, but are often worse than low motor efficiency. At this construction materials plant in Kiev, the power transmission and control equipment was 25 to 75 years outmoded, like most of the complex. Deputy director Eduard Dolgiy could not say if there were modern variable speed drives to be found anywhere in the complex, and despite long discussions, he remained at a loss to understand their concept and benefits. This points out the crying need for updating energy management education. It cannot happen fast enough, yet it must happen by the time the market is sufficiently reformed to finance current technologies. Otherwise, the country will suffer further delays in modernization.
Relationship to Other USAID & Donor Activities	Another benefit of American assistance is its influence on the Ukrainian parliament. USAID-provided assistance is helptin to overcome some of the legislators' ignorance on the subject of energy. They will listen to advice coming from American technical experts, but not native engineers.
Comments/Qualitative Evaluation	Deputy general director Eduard Dolgiy, representing the Kiev Combined Construction Materials Industry, seems quite happy with AID efforts to date. The Foster Wheeler engineers assigned to his plant did a good job documenting the energy problems and working with plant personnel. For a proposed AID investment of $79,900, the plant will get a heat recovery system that will cut gas consumption in one smelting operation by 1/2 to 2/3. This is welcome assistance now that the embodied cost of energy in the plant's products has jumped from 2% to 35%.

Comments/Qualitative Evaluation

Mr. Dolgiy's high opinion of native engineers was echoed everywhere the team went, including by Alexey Sheberstov, the first deputy minister of Energy and Electrification of Ukraine. True, engineers educated under the former Soviet system are highly educated. No one can argue the fact. Then why are native engineers not conducting their own energy audits, prioritizing the needs and proposing design solutions?

The answer is not lack of education, but a different value system. Their past practice taught them a different approach. Efficiency and safety were not the concern that they are in the west. Engineers from the free world and from the former communist world saw their work through different eyes. This difference is not apparent to everyone.

The fact that the Ukrainians' understanding of engineering fundamentals is so great will make the task of redirecting priorities easy. They will take to it like ducks to water. Training, both formal and internship, is the best way to change a culture. Training yields a tremendous return in human capital for an investment measured in thousands, not millions of dollars.

On the other side of the coin, some American engineers go in to CIS countries with a narrow point of view that there is only one right way, and they know what it is. Ukrainians and others see through this immediately. AID contractors should screen their employees for the ability to listen, earn respect and develop rapport with their NIS counterparts. The team got the impression more than once that beneficiaries were just tolerating Americans in some cases as long as AID kept giving.

Concerning replication, Mr. Dolgiy is enthusiastic about the future if the first project works out as expected. He claims it will encourage the World Bank to invest in similar projects in other industries. He did not, however, say how other plants would qualify for loans or how the loans would be repaid. His plant would not have been able to repay a loan for its first project. It is only because of USAID's grant money that his plant could short cut the vicious cycle of always trying to catch up on payments. Replication without grants needs innovative financing.

When asked if he thought performance contracting was a possible way out of the no-cash syndrome, he drew a blank. He never heard of the concept. Upon learning, he was fascinated. He sees the day coming very soon when his plant can meet payments reliably. He would like to establish contact with a firm(s) capable of entering into energy savings performance contracts so he can learn how to qualify and start working toward that goal.

The plant tour was unusual because the entire complex of factories, including the boiler house, was as cold as a ghost town. To its credit, management decided to stop operating at partial capacity and work in batch mode, instead. It shut down after stockpiling the warehouse. When it accumulates enough orders, it will reopen at full capacity long enough to replenish its stock. This approach is saving energy and preventing pollution. Unfortunately though, the firm still pays its laid-off work force an average 60% of its wages.

Comments/Qualitative Evaluation	Suggestion: As "down-time maintenance," this construction materials plant might use its idle work force and its own materials to bring the physical plant up to standard. For example: the plant manufactures insulation, but the plant's own insulation was deteriorated or lacking everywhere. It would seem justified to require the labor force to work 60% of the time to collect 60% of its wages. The 1995 goal of 5-10% efficiency improvement in five plants is within reach. That should be a success story. As for the 1996 goal of 10-25% improvement in ten plants, it will only happen if funding is increased proportionately. The 1995 successes can only be replicated if their funding is replicated. The beneficiary plants have not been taught to manage these projects on their own. Given that the Kiev USAID office has made a conscious decision to concentrate on power plants and let industrial efficiency to market forces, it is unrealistic to expect progress after current efforts finish until the market is reformed.

Electricity Generation Efficiency Improvements

Target	Demonstrate power plant generation efficiency improvements of 5%-10% in 5 major industrial facilities by 12/95 and 10-25% in 10 plants by 12/96.
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere.
Tasks Required to Meet Target	Task 3A Kiev No.5 Power/Heat Plant Improvement Task 3B Power Plant Efficiency
Achievements to Date	Provided Kiev 5 Combined Heat and Power Plant with modern regenerative resins for demineralization of boiler makeup water and for softening makeup water for the district heating system. Provided Kiev 5 CHP plant with instrumentation to improve performance. Provided Kiev 5 CHP plant with general hardware to improve plant operations. Provided training to personnel of the plant's Chemical Department on modes of demineralization under various boiler operating conditions and in use of the new chemistry control instrumentation. Demonstration equipment from US manufacturers have already been placed in operation. Some of the equipment is being used to monitor a power plant and are subsequently moved to another plant. The concepts of continuous stack monitoring and maximizing plant efficiency are foreign to the Ukrainians. In spite of this unfamiliarity, the Ukrainians expressed interest in replicating this effort at other plants, but will require assistance to purchase any additional equipment. Money for support of the energy sector is now beginning to move rather quickly. On April 11, 1995 money for hydro-electric power plant rehabilitation was approved. There is also a 200 million USD pipeline loan which is further back in the approval process.
Achievements Required in Future	Results of these demonstration projects will be assessed positively if these results provide guidance for future planning of activities. The city of Lviv is very open to improvements and wants to work with industry and enterprises which make up 65% of energy consumption, which is running 1-1/2 to 2 times that of the consumption of Western Countries.
Relationship to Other Targets, Critical Path for Meeting Target	Additional improvements in electricity generation that may be considered for future planning include the phaseout of older, less efficient power plants, the addition of transmission lines to improve dispatch, and the modification of electric distribution systems to reduce electric energy losses.
Relationship to Other USAID & Donor Activities	While not a part of this evaluation, it must be stated that the Chernobyl nuclear plant is still operating due to the critical need for electrical energy in Ukraine. Chernobyl is planned to be shut down by the year 2000. The nuclear plant located in the Crimea is shut down due to seismic activity.

Comments/Qualitative Evaluation	A hard assessment of the savings in the electric energy sector from the reduction of electrical demand as electricity in Ukraine climbs to world market prices has not been undertaken. 'After rising prices have taken their toll on demand, the "shortage" of generating capacity may be less severe. In addition, calculating the full cost of generation from current, proposed and rehabilitated power plants need to be done in an environment of full cost recovery and hence, more rational demand patterns. All power plants (including Central Heating Plants as well as nuclear plants) should be placed on a common cost basis.

Distribution Company Demonstrations

Target	Two distribution demonstrations completed with electricity savings documented and multilateral funds of up to $25 million committed by 12/96.
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere.
Tasks Required to Meet Target	Task 3B Power Plant Efficiency
Achievements to Date	Six Power plants selected in September 1994 Field visits completed September 14-October 9 Audit reports on six power plants are now preliminary (draft ready to be sent to USAID) Procurement specification for the hardware has been identified. Expect specifications to be complete when USAID grants approval. Burns & Roe has reviseed schedule and issued work plans to USAID.
Achievements Required in Future	Utility demand side management programs in operation. Industrial side may not have appreciation for benefits of energy efficiency. DSM still has to be learned. No initiativee on part of plant personnel.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	None

Pollution Reduction from District Heating Plants

Target	Power and industrial energy efficiency technologies in place in 12 facilities and replication initiated by 6/96.
Relevant Indicators & Objectives	Reduction in pollution due to application of US technology at selected sites.
Tasks Required to Meet Target	Task 3F Residential District Heating
Achievements to Date	Preparation of the technical and economic evaluation to a project grant document for the Global Environmental Fund (GEF) of the World Bank, for the installation of modern technology to connect 30-50 newly constructed apartment buildings and the replacement of obsolete equipment in 30-50 existing apartment buildings to the district heating system. Draft Final Report, submitted: June 1994. Review by GEF World Bank Board: January 1995
Achievements Required in Future	Indications are that grant funding by GEF will be rejected.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	

Power & Industrial Energy Efficiency Technologies in Place (demand side)

Target	1. Demonstrate the feasibility of DSM as a viable electric resource in the fully competitive market that will result from the ongoing restructuring of Ukraine's power sector. 2. Evaluate the costs and benefits of DSM resources to support investment and lending activities. 3. Establish capabilities within the government, utilities, and private sector to implement cost-effective DSM programs.
Relevant Indicators & Objectives	Utility demand-side management programs in operation.
Tasks Required to Meet Target	1. Provide assistance to develop a process and capabilities for the design, implementation, and evaluation of utility demand-side management programs in Ukraine. 2. Simultaneously address the need for management training, DSM data collection, and assessment of DSM potential at the national level, and the need to develop capabilities at the local electric companies to implement DSM and end-use load research programs.
Achievements to Date	1. The National Center of Energy Saving (NCES) was created. 2. Market research and data collection by Gallop, a subcontractor of RCG/Hagler-Bailly, on electric end-use consumption is underway in 400 enterprises. The 400 were chosen on their ability to change demand quickly. 3. NCES planned a three-tiered, time-of-day electric rate structure, which the government has agreed to adopt. 4. NCES has begun negotiations with GE for a joint venture to manufacture electronic lighting ballasts in Ukraine.
Achievements Required in Future	1. Finish market research data on electric end-use consumption. 2. Do a national assessment of DSM potential; choose the best 100 of 400 enterprises to start the DSM scheme; install instrumentation to measure demand; estimate realistic projections. 3. Create end-use load research capabilities at two local electricity companies. 4. Design and implement two DSM pilot programs. 5. Conduct training workshops, seminars, a study and a conference.

Relationship to Other Targets, Critical Path for Meeting Target	This activity relates closely to Task 3B, Power Plant Efficiency, and 3C, Industrial Energy Efficiency, both contracted to Burns & Roe. RCG Hagler-Bailly should communicate with Burns & Roe. They should support each other to avoid duplication and take advantage of what each has learned. If a mediator is required, ARENA-ECO can manage that responsibility. This effort to put power and industrial energy efficiency technologies in place also relates closely to Task 2B, Energy Management Training, contracted to IIE. In the future, if and when the DSM program is expanded to end user efficiency upgrades, this effort will be closely related to ARENA-ECO's efforts to train managers of energy consumption and ESCOs. The USAID Ukraine Energy program manager would like to compete the training program in the future. The evaluation team's suggestion is to let ARENA-ECO handle this function. AID would stipulate the requirements and the budget, and ARENA-ECO would run with the assignment. The ARENA-ECO director has the credentials and the attitude necessary to leverage the most cost effective talents of training organizations.
Relationship to Other USAID & Donor Activities	The AID energy program has overlapping purposes with the AID environmental program, since spent energy ends up as pollution, and the goals are to reduce both. The two programs evidently have little communication and do not work together toward their mutual goals. The evaluation team recommends a coordinated effort to make best use of limited AID resources. They should start meeting on a regular basis and seek areas of common interest and overlapping activity in order to strengthen the impact of both and avoid double work when possible.

Comments/Qualitative Evaluation	The Ukraine USAID office has set a policy of focusing on the power sector. Therefore, the first step in its DSM program is peak-shaving load-curtailment in which the dispatcher notifies major customers of impending peaks. They then either cut back demand for a bonus or do not cut back for a fine. AID in Ukraine reports that RCG Hagler-Bailly is doing a fine job of preparing this program. Although this program is voluntary in the sense that customers have a choice, it is still central planning and control. Western countries, including the United States, have similar curtailment programs. As a first step, this is well suited to former communist countries because they understand command and control, and many former Soviet citizens wish that someone would impose order on the new chaos. As a future action, NCES personnel correctly identified a need for motor speed controls on their district heating pumps, just as Moscow did. However, they mistook this for a demand-side improvement, not the supply-side that it is. NCES personnel told of GE relamping projects, which hints at a more comprehensive scope for the future. NCES clearly has problems with DSM and the DSM program. First, the two gentlemen interviewed at the NCES office declared that the national assessment of the commercial and industrial sectors is bogus. Gallop, the assessment subcontractor, has no energy experts, in their opinion. Second, NCES does not have seem to have a grasp of the concept of DSM. Because of the AID emphasis on power plant activities, NCES representatives confuse DSM with efficiency upgrades in power plants, which are quite necessary, but not DSM. They do not understand that in the broad scope, customer sites are the ultimate focus of DSM. After demand curtailment is in place, NCES could not explain to the team where the program would go next. They are practically clueless about technologies available to implement DSM at customer sites. They know nothing about marketing of efficiency concepts and programs to energy users. They had never heard of energy savings performance contracting, so vital to DSM programs in the absence of rebates.

Comments/Qualitative Evaluation	Third, NCES is the organization managed by Alexey Sheberstov, the first deputy minister of Energy and Electrification of Ukraine, who complained so bitterly about the American consultants burning up the budget and not understanding Ukrainian problems. Although he may be biting the hand that feeds him, his complaints reflect an understandable NIS point of view. Local energy officials perceive a good percentage of American advisors as arrogant know-it-alls who live like kings on American salaries that would be better spent on local program benefits. In any case, the uneasy setting offers little hope of the ultimate success: replicating energy upgrades without subsidies. Some of the deficiencies evident at the interviews might be quickly corrected by sitting down and talking with NCES personnel in a series of meetings. They were so thirsty for knowledge of available technologies that they were hoping to learn from the evaluation team. They would appreciate seeing a vision of the program's future and would benefit from learning how the whole DSM game is played, not just act I, scene I. Contractors might hold costs down by training local professionals to carry out much of the mission, which would also make host countries happy. From what the team could find, there will be no substantial demand for demand-side management until the market is reformed. Concentrating on power plant improvement is good and necessary for supply-side management, but does little to create demand for efficiency downstream. Today, demand-side energy efficiency projects can only move forward if heavily subsidized. <u>Recommendation</u>: Put customer-oriented DSM on the map with at least a token effort. Lay the groundwork now. Let ARENA-ECO manage a shoestring project that heavily leverages training capabilities of qualified NGOs and private companies to prepare major potential customers to qualify technically and financially for privately capitalized efficiency projects.

Power & Industrial Energy Efficiency Technologies in Place (supply side)

Target	Power and industrial energy efficiency technologies in place in 12 facilities and replication initiated by 6/96.
Relevant Indicators & Objectives	Task 3C Industrial Energy Efficiency (Burns and Roe) Task 3D Demand Side Management (RCG/Hagler Bailly)
Tasks Required to Meet Target	See following discussion
Achievements to Date	Identification and analysis of energy efficiency improvement options in the use of power and development of an investment plan. Joint identification and analysis of thermal and hydro power plant upgrade options in terms of technology and costs. Joint identification and analysis of transmission upgrades following the introduction of the latest state-of-the-art load-flow software and computer hardware. Little effort appears to be directed toward demand management at this time.
Achievements Required in Future	14 power plants are in operation with an organization set up to run them. Staffing levels are three times that of the US with very capable people at an average pay of 60 USD per months. The two mains problems are that the plants cannot get fuel and that customers do not pay. Each plant is operating on its own by using barter trade. Something is now just being done to improve collections. This action alone may achieve more in the arena of demand management than any typical American-style program that could be utilized. One concern of the National Center of Energy Savings is that industrial plant motors were not constructed to be efficient as the cost of energy was previously very low. The addition of energy controls to power plants is an expense that cannot be funded at this time. However, the pressure on users of such motors to find more effective ways of using energy is precisely what pricing reform is intended to accomplish.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	If the aforementioned net decrease in electric power generation and/or energy demand does occur, the necessity to continue to build additional electric power generation could be minimized and, perhaps, some less efficient plants could be retired rather than renovated. This would affect the amount of donor funds required from the World Bank, the EBRD and other multi-lateral institutions.

Comments/Qualitative Evaluation	Further effort to enforce collections may result in the decrease in net demand as consumers and/or industry will begin to curtail energy use. In the case of industry, the option of passing these increasing costs onto the consumer may no longer be possible. Other industrial facilities adopting conservation efforts and producing the same goods will produce at lower cost and will be able to increase their shares of the market. Simply put: The more efficient factories will drive out the less efficient ones. As in Russia, restructuring is initially more important to Ukraine than energy efficiency. Both need to move ahead simultaneously, with market reform receiving more attention in the beginning. Unlike Russia, however, Ukraine has a much shorter energy supply, which puts the country at political risk and makes efficiency more critical. It cannot be allowed to lag far behind market reform. Therefore, the current concentration on the power sector needs to be balanced with attention to consumer efficiency. Ukraine needs an investment not necessarily in more subsidized demonstration projects, but in human capital, i.e., teaching Ukrainians how to design and finance energy improvements privately. Thus, by the time reliable payment streams are established, industry will have the tools to improve itself.

Target	Promulgate energy standards, policies and legislation in support of sub sector restructuring and market based energy efficient and related environmental technologies. Create an environment suitable for the corporatization of thermal generation companies.
Relevant Indicators & Objectives	Improve USAID's understanding of Ukraine's short and long term energy situation
Tasks Required to Meet Target	Preparation of weekly briefings, biweekly reports, analytical studies and other studies/research as needed. (RCG)
Achievements to Date	Arrived with no defined work plan, utilized temporary workplan. Preparing two types of report to date: 'What's happening in the energy economy' reports issued for 1st/15th of each month In depth reports for AID Kiev/Washington.(Jim Osborne/Robert Archer) Weekly briefings with AID Kiev. Collaborating with IBRD in preparing a Energy Sector Quarterly for donor agencies. Final workplan submitted in March.
Achievements Required in Future	Currently, primary focus on oil and gas, due to critical impact on power plants. May need to broaden scope into the coal sector where major economic and social questions remain to be addressed.
Relationship to Other Targets, Critical Path for Meeting Target	Due to the complexity of the 12 tasks as identified by PHB, and the urgent need to integrate activities across consultant groups, perhaps the briefings may become the mechanism for keeping everyone advised of progress and activities, so that consultants may confer and dovetail their tasks more with each other. In addition a number of Ukrainian sources complained that there was far too little conferring between foreign consultants and their Ukrainian counterparts. Perhaps this activity may serve to fill that apparent gap and permit AID to augment the coordinating activities currently carried out by PHB.
Relationship to Other USAID & Donor Activities	Clearly, information dissemination about issues and progress with energy sector restructuring is vital not just to keep AID advised on progress but to ensure the integration of the activities of the respective consultant groups. The issuance of a joint energy report with the World Bank is a significant step forward in keeping all donors advised on progress in the energy sector.
Comments/Qualitative Evaluation	There has been significant progress in keeping relevant parties advised about the Ukrainian energy market, but more needs to be done to promote the thorny coal sector and most importantly to let the Ukrainian client be the net beneficiary of all analyses performed.

Note to reader: this next listing is a general evaluation of the key issues in restructuring and does not relate to any particular target or task. Rather, it relates to the overall set of targets and tasks associated with restructuring.

Target	Listing of critical issues - critical path of reform activities, relations to other USAID & donor programs
Relevant Indicators & Objectives	Competitive pricing for energy resources, commercially viable private sector capability, including production transmission and distribution. New policies, laws and regulations supporting shift from command to free market.
Tasks Required to Meet Target	Divide the assets of the relevant energy subsector between a small number of independent competing entities, based on equity. Corporatize and commercialize each enterprise to define the asset base and improve the efficiency of each entity. Safeguard an open and transparent transmission system and construct a power pool to encourage bidding. Corporatize and commercialize the distribution companies to safeguard their assets, encourage the phased introduction of cost reflective ratemaking, address the uncollectibles issue where necessary, and increase the level of energy conservation and efficiency. Establish a national regulatory body that will police the marketplace during the transition, safeguard the public good and ensure a level playing field. Introduce a separate funding mechanism(i.e. licensing) to cover all regulatory costs
Achievements to Date	Much has been achieved. within the electrical energy sector. The Government is in the process of finalizing the four Genco's. The notion of a UK styled power pool has been accepted and the first trial bidding of 10% of available power is due to commence in May. The National Energy Regulatory Commission has been established in name and discussion is on going on the structure and activities of this body, and its degree of autonomy with respect to the Ministry of Energy and the Cabinet of Ministers, as well as its intervention in the restructuring process. The situation in the oil and gas sector is more somber, where initial legislative assistance provided for upstream oil and gas has stalled due to lack of progress at government level There is no law to safeguard foreign investments and repatriation of revenues. There has been no follow up to initial progress. The coal sector has apparently received the least assistance, despite the fact that it is the most politically sensitive and that it is highly likely that coal will be the major energy source for a Ukrainian economy seeking energy independence. Suggestions put forward by foreign consultants to dismantle over 50% of the coal industry and import from overseas have not been viewed positively and have strained the credibility of Western support for this subsector.

Achievements Required in Future	Electrical energy. The process of apportioning the generating plants between Gencos must be completed in a rational manner by ensuring an even distribution of more and less efficient capacity. For the proposed power pool to be effective, it will not only be necessary to phase its introduction as planned, but provide adequate training to the staff that will be called upon to manage this process. The NERC urgently needs to define its level of autonomy with respect to the Ministry of Energy as well as the Council of Ministers. To safeguard autonomy it needs an unambiguous funding source, and to this end, a clear and detailed licensing procedure needs to be established. In addition there is urgent need to bring closure to the structure and level of competence of the regulatory body, reconciling competing models and adapting them fully to the particular Ukrainian situation, where in the initial period subsector assets will remain in public hands and only subject to privatization in a subsequent stage. Oil and gas. One way to increase Ukraine's energy independence will be to examine all existing oil and gas fields that were shut down in the 1970's to see whether modern technology will permit the extraction of hydrocarbons at economic costs. To encourage the process of foreign exploration of these marginal and other potential resources, appropriate legislation on upstream oil and gas exploration and repatriation of profits must be passed through Parliament. In addition there should be encouragement for the establishment of competing oil distribution companies that may enhance the existing limited supply options. Existing AID policy to provide no further support for this subsector needs to be reviewed. Some firms appear to be ready to make some investments in refining and marketing but will not do so in the absence of a law. Coal. Despite the inherent inefficiencies in this sub sector, there is no doubt that Ukraine will seek to increase its dependence on domestic coal for strategic reasons and because of the very substantial social costs that would attend any significant program of mine closures. In light of the above it may be dangerous to wait until the needs of the restructured power sector put pressure on mines to become more efficient. Instead, it may be more prudent to initiate another review of the coal mining sector, one that will focus on restructuring, corporatization and commercialization. Such a proposed effort will not require major dismemberment of the sector in the short run, but will encourage the survival of more efficient mines, phase out the remainder while examining ways to redeploy the redundant mining population.
Relationship to Other Targets, Critical Path for Meeting Target	For the power-sector restructuring project to be successful it cannot ignore the distribution end of the business which after all must provide the revenues to pay for power bidding and ultimately to pay for much needed investment upgrades in the generating end. Thus urgent assistance is needed for the development of a strategy for tariffs and uncollectibles, and this process should occur in parallel with the changes at the generating and transmission level.
Relationship to Other USAID & Donor Activities	This activity brings together all major multilateral actors in Ukraine in a combined 12 task effort focused on restructuring and reform of the power sector.

Comments/Qualitative Evaluation	Progress in power sector restructuring has been impressive, however it must not ignore the distribution end of the business. Absent a restructured, corporatized and commercialized distribution component, the revenues necessary to fuel the development and rehabilitation of generation capacity, and to pay for the power pool and transmission system simply will not be available, placing the whole project at risk. The NERC needs more substantial support in order to develop rapidly a structure, organization and staff along with the necessary independent funding that will be its lifeblood. If licensing is to provide the funding source, effort must be taken to quickly design license contract agreements and tariff taxes to put this mechanism into effect. The concomitant revenues will enable the hiring and training of the necessary staff. Given the great premium attached by Ukraine to energy independence, AID may wish to consider how best to support this effort by the following: Encouraging legislative activities that will promote upstream oil and gas exploration, increase the efficiency of refining capacity and encourage foreign distributors to enter the marketplace. Designing a restructuring plan for the coal sector that will build on the IBRD study, increase the efficiency of selected mines, gradually phase out the remainder while seeking to create socially acceptable alternatives for redundant miners and their communities.

Seismic Processing Facility for Oil and Gas Exploration

Target	Seismic Processing Facility for Oil and Gas Exploration
Relevant Indicators & Objectives	Commercial private sector capability to provide energy services
Tasks Required to Meet Target	4.D - Oil and Gas Resource Assessment 4.E - Oil Exploration/Development Legal Framework
Achievements to Date	The first stage of the resource assessment task has been completed by the USGS. This work involved a trial connection between the USGS project and the central computers in the USA. After a successful test of the quality of the resultant data, USGS has prepared a detailed work plan for additional seismic facilities. Agreement and funding is pending. A draft of the proposed oil and gas legislation has been completed by the contractors working for the project under the USAID-World Bank Cooperative Agreement. Comments from the Ukraine Government are expected in the near future.
Achievements Required in Future	In the future, the oil and gas resource assessment project will need to provide data for commercial oil exploration companies in a packet that can be purchased by potential producers. That is, the project should lay the groundwork for a commercial market in geological information and should be self supporting ultimately. The legal framework task will need to move to an implementation phase in order to be useful to the country. At the present time, there is still no institutional base for petroleum exploration activities and as a result, potential producers might encounter a decided lack of clarity in the government when terms of exploration contracts are broached. This activity will require agreement from the government on terms and then additional technical assistance to move to implementation.
Relationship to Other Targets, Critical Path for Meeting Target	Both of these tasks are unconnected to other parts of the Ukraine program and will stand or fall on their own.
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	In both of these cases there is a task that is partially completed with the real benefits to flow from the next stage of the work. However, the current funding situation in USAID along with implementation difficulties with the Ukraine government imperil the future of the institutional task (4.E). Completion of the USGS work is interesting but of little value without the institutional basis for taking investment decisions based on such work. The team recommends that USAID and the World Bank discuss a completion and implementation of the institutional and legal framework task prior to deciding whether to complete the USGS activities by moving them beyond the pilot phase.

Target	Thermal generation companies corporatized by 6/95.
Relevant Indicators & Objectives	Promulgation of energy standards, policies and legislation supporting subsector restructuring, and commercial market development of energy efficient environmental technologies.
Tasks Required to Meet Target	Corporatization of new joint stock companies, development of power pool and rules of conduct, modification of dispatch software, licenses governing energy market, structure and legislation for regulatory body.
Achievements to Date	PHB's activities in marshaling the resources of various disparate consultants to a single end of restructuring a significant component of the electric generation industry, as well as moving forward with the establishment of a quasi-British power pool and recognition of the need for a regulatory body is impressive. However, there is the sense that the whole process is proceeding with excessive haste, especially given the time devoted to restructuring and privatizing the same sector in the UK. In addition the primary focus appears to have been devoted to the generation end, and to the operation of the power pool, with little consideration of the importance of distribution. Absent the corporatization and commercialization of the 27 distribution companies, a transition toward a cost-based tariff structure, and the implementation of an innovatory tariff methodology designed to decrease the likelihood of non payment, the excellent work at the generation and power pool end with the new NEC transmission company is likely to be endangered. Despite the corporatization and commercialization of the generating capacity and the initiation of a most sophisticated power pool, trading arrangements will be endangered if revenues are not collected from the distribution companies. Furthermore, absent adequate revenue safeguards, there is little likelihood of new investment to upgrade existing power plants. In addition PHB has indicated that the decision to divide the 18 thermal plants in question into the four proposed Gencos has been primarily determined by Ukrainian political and geographic interests and not based on an even distribution of more and less efficient capacity. If this is so and PHB and/or the Ukrainian government chose not to consider the advice of Hagler Bailly in the distribution of generation assets, there is the danger that the competitive dynamic which was to be the cornerstone of the new electrical generation industry will be thwarted in its infancy as one Genco may possess an inordinate number of beneficial assets relative to the others.

Achievements Required in Future	A rational division of generating capacity needs to be determined to promote true competition. Absent extensive training of more junior personnel who will actually be participating in the power pool, there is a danger that the initial trials covering bidding for 10% of the capacity will be a failure. In the absence of a better understanding, existing Ukrainian staff will revert to existing modes of conducting business. The consultants must focus much more attention on the distribution end to increase their efficiency, promote corporatization and commercialization more aggressively, and implement a tariff policy which will generate the funds needed to safeguard the competitive process. In particular, the aid-giving agencies will need to introduce internationally accepted accounting methods to the distribution companies along with proper management information systems and internal controls.
Relationship to Other Targets, Critical Path for Meeting Target	The corporatization and commercialization of the generating capacity must take place in parallel with the distribution end. In addition the success of restructuring will be heavily dependent on the effectiveness of the new National Energy Regulatory Council.
Relationship to Other USAID & Donor Activities	PHB has taken the lead in coordinating the power sector restructuring process on behalf of all donors. Their activity was initiated under the USAID-IBRD cooperative agreement and has been funded since mid-1994 by the UK Knowhow Fund.
Comments/Qualitative Evaluation	There is concern over the following: 1. Emphasis on the Gencos, Pool, and NERC at the expense of the distribution companies. 2. Lack of clarity over the criteria to be used in dividing the generation assets between the four designated Gencos. 3. If 10% of the generating capacity is to be open to competitive bidding in the first instance, it is not clear what will be the incentive for Ukrainian power purchasers to adopt new power pool methods of they can still acquire 90% of needed capacity by traditional and less risky means. 4. Training of middle level management is vital to the success of the restructuring process. 5. PHB's role in coordination is very useful as long as AID is satisfied that there is adequate information exchange, that deadlines are being met, that PHB's pace has not been undermined by compensation delays that other donors have adequate opportunity to contribute to the formulation of policy with Ukrainian governmental authorities at the highest level.

Target	Market and LRMC-based prices for electricity - Establishment of Competitive Retail Market in Electricity by 6/96 - Rise in Retail Prices to LRMC by 2000
Relevant Indicators & Objectives	Competitive pricing for efficient use of energy
Tasks Required to Meet Target	Task 1.B Implementation of Restructuring
Achievements to Date	This phase of the restructuring activity has not yet started.
Achievements Required in Future	
Relationship to Other Targets, Critical Path for Meeting Target	The critical path for meeting both the substance and time targets for the pricing reform involves establishing a trained staff in the NERC, obtaining updated and correct data on various cost elements. Simulating the load profile and projected demand growth of a reformed system will enable NERC staff and its technical consultants to establish a path of pricing reform that is consistent with LRMC and competitive tariffs. If the NERC staff is to play an important role in this work, then they must be engaged and trained soon. If such a staff is not in place, then the ratemaking decisions will tend to become more political. It is the experience of this team that when such decisions become highly political, they tend to be implemented fitfully and incompletely, thereby making this target essentially unreachable.
Relationship to Other USAID & Donor Activities	The successful implementation of price changes is essential in at least three key areas. These are: investment promotion in the power sector; reduction of public sector indebtedness; and true restructuring of the power sector. The pricing reforms will provide the fuel that allows other institutional reforms to work.
Comments/Qualitative Evaluation	The assistance to NERC is off to a slow start. The team recommends that USAID make an agreement with the Ukraine government soon regarding the core staff for the NERC. Without such a core staff, RCG cannot start training staff. Without an initial trained core staff, there will be no one to act as regulator in the market as it first gets under way in the latter half of this year.

Target	Establishment of market-based wholesale prices for electricity
Relevant Indicators & Objectives	Competitive pricing for efficient use of energy resources
Tasks Required to Meet Target	1.A - Power Sector Restructuring Analysis 1.B - Power Sector Restructuring Implementation
Achievements to Date	The PHB team, previously working under a cooperative agreement with the World Bank and now working for the UK Knwohow Fund, has assumed overall management of the various teams that are working on the power sector restructuring. In addition, PHB has prepared the dispatch software and has developed rules which will govern the power pool and trading. On the RCG side, the consultants have started working with the NERC, providing high level assistance to the NERC chairman. RCG has also appointed advisors to the thermal generators and has started providing tariff assistance to the NERC chairman.
Achievements Required in Future	The test market will require a true cash settlement system. This is the only real test of whether the payments system can work. However, a great deal of work is needed on the distribution side. Indeed, without significant reform there, the wholesale market cannot operate since there will be not means to provide the market with its cash from customers.
Relationship to Other Targets, Critical Path for Meeting Target	The electricity reform is a key element in overall economic restructuring. Considering the importance of the electricity sector to the balance of payments and to the economy as a whole, successful reform in this sector is vital to providing industry with reliable and efficient power supplies. The critical path for this target appears to run from generation and power pool establishment through the distribution companies. In this regard, provision of accounting assistance and rules will be essential for the success of this activity. In addition to the key role of the distribution companies, the licensing activity for power generators is essential. Both activities are behind schedule, with the distribution task, an EC responsibility, not yet under way. Just as this task requires successful reform of distribution companies to succeed, so too does the retail tariff reform target require that wholesale price be successfully reformed. Thus this activity is an essential one for reform of retail prices and achievement of price=LRMC, as will be required in power sector loan and grant covenants.
Relationship to Other USAID & Donor Activities	This program is a multi-donor one, coordinated by PHB under the World Bank agreement. Key decisions affecting the success of the program are made by USAID, the World Bank, the EC and other bilateral donors.

Comments/Qualitative Evaluation	This target is a very ambitious and short-fuse one. However, its success is also dependent on the coordination of a large number of participants and donors. In this sense, the timetable may be too short. In particular, the technical assistance to generation and distribution is out of synchronization, with essential reforms in the distribution area not yet under way. The team thinks that this lack of synchronization may have serious negative effects on the likelihood of success, at least to the extent that success means implementation of the wholesale market in a timely manner. If the distribution activity is not reformed quickly then the entire reform effort can run out of momentum, entailing subsequent high startup costs in the future when it is reinitiated. To this end USAID has come up with some short term assistance for distribution that may allow that activity to stay on track until the EC consultants are deployed.

Target	Creation of independent electric regulatory authority
Relevant Indicators & Objectives	Policy and legislation approved promoting markets and regulatory procedures.
Tasks Required to Meet Target	Establishment of policies and procedures for NERC Financial reporting from the power companies to NERC Tariff methodology, procedures for non bill payments. Corporatization of at least four thermal plants Establishment of competitive power pool
Achievements to Date	The collective activities of the donor teams, under the leadership of PHB, have led to the establishment of NERC, acceptance for the establishment of four Gencos covering 14 thermal plants, and the development of the target model for a power pool based on the UK model.
Achievements Required in Future	For the immediate future the following are necesssary: Final division of power plants between Gencos on a rational basis. Completion of the corporatization and commercialization of the Gencos. Establishment of autonomous structure, staff and clear funding, whether via licenses or levy on Genco revenues for the new NERC. Resolution of the structure and operations of the regulatory body, either based on UK, US Federal, or State or hybrid Ukrainian model. Design of a licensing process to be used by NERC and provide sample model licenses for use with respect to the new Gencos. Provision of middle management training urgently needed for Ukrainian power pool and Genco staff. Initiation of the corporatization and commercialization of the distribution companies. Establishment of a phased approach to cost reflective ratemaking. Introduction of tariff methodologies designed to encourage payment, especially by the 'budgetary' sector. Introduction of strategies to deal with substantial bill non-payment.
Relationship to Other Targets, Critical Path for Meeting Target	This program is in part dependent on the success in implementing an adequate wholesale market system and competitive purchases of power, and ultimately, the introduction of LRMC-based pricing policies.
Relationship to Other USAID & Donor Activities	Since the restructuring process is being conducted in such haste there is much interdependence between consultant contributions, e.g. while RCG is providing the fossil fuel and regulatory advisors, their effectiveness will be dependent on the work of Coopers & Lybrand over licensing for NERC, the activities of the Dutch metering team for the power pool , and the corporatization and commercialization activities of such RCG subcontractors as Price Waterhouse.

Comments/Qualitative Evaluation	The overall progress, given such an abbreviated time line, is impressive, and the end product will be a significant contribution to the Ukrainian energy marketplace. However, the following are subjects for concern: Rational criteria for the creation of the four Gencos Absence of competent Ukrainian leadership for the new NERC Absence of staff, funding, licensing procedures and a clear mission for the NERC Potential conflict over the structure and organization of the NERC. Absence of any current effort to corporatize and commercialize the distribution companies. Absence of a clear direction for a cost-reflective tariff strategy No strategy for dealing with uncollectibles. Very little evidence of consultation and training with Ukrainian counterparts at a management level that will be ultimately responsible for implementation. One hopeful sign is the appearance of hard budgets in the gas sector. A translation of such discipline to the power sector will provide much-needed sustenance for the restructuring program.

Coal Industry Restructuring

Target	None listed for Restructuring. Improved coal mine safety guidelines developed by late 1995.
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	Task 4A Clean Coal Technology Program (PASA-DOE) Task 4B Coal Mine Efficiency, Safety and Restructuring (PIER) Task 4C Coal Bed Methane Drilling Design (Burns and Roe)
Achievements to Date	Clean Coal Technology Program: Begun September, 1994, Coal Mine Efficiency, Safety, and Restructuring: Essentially Complete - Remaining Items Listed Below
Achievements Required in Future	Clean Coal Technology Program - completion of projects scheduled for January 1, 1996. Coal Mine Efficiency, Safety, and Restructuring: • Seminars in Donetsk and Kiev on Labor-Management participation in the reform process: May 1, 1995 • Labor-management delegation visits US to study restructuring in the US coal industry: June 1, 1995 • Ukrainian coal management group visits the US: July 1, 1995 • Complete evaluation of project programs and accomplishments: August 1, 1995 Coal Bed Methane Drilling Design - Complete
Relationship to Other Targets, Critical Path for Meeting Target	This is best regarded as a stand alone activity/effort. Considerable effort should be invested in the continuation in all areas, particularly mine safety.
Relationship to Other USAID & Donor Activities	Effectively this activity must be regarded as stand alone, although the interrelationships with all other energy sub-sectors must be considered. It must be noted that while not much information is available, PIER is attempting to construct a database of mines that might have money to spend on equipment. Since Ukraine formerly made all of the coal mining equipment for the Soviet Union, they should be self sufficient in this area.

Comments/Qualitative Evaluation

40% of coal goes for metallurgical uses, 40% to power generation and 7% to consumers. A maximum production of 218 million tonnes was achievable in the 1980s. 16 mines are closing this year and a total of 38 are to be closed by the year 2000. Overall influencing factors have been the problems of quality and timely delivery. Coal prices are free to float and are now about 96% of US prices.

In the Donbass region the are two 800 MW plants originally designed to burn coal. there is a separate building with six coal crusher mills to crush the coal to fed these plants. The coal quality is so bad that all six mills are required to crush the coal for one 800 MW plant. Therefore one 800 MW plant has been converted to burn oil and/or gas. It would be far better to use coal which is an indigenous resource. It would be far better to use coal beneficiation to improve the quality of the coal at the mine mouth, so as to minimize the cost of transport, thus saving additional fuel. The primary reason given for the poor quality of the coal is that as the electric plants do not pay their bills, they are given the poorest quality coal. There is a definite need to beneficiate the coal as it now contains 20-25% ash (can be as much as 35% we are told). One positive effect of the program is that by the use of American made filters to screen out the coal fines, dust suspended in the air has been reduced from 3500 parts per million to 350 ppm.

Any attempt to reform the coal sub-sector of the Ukrainian system should be viewed at all levels as a most complicated problem. This resource is vital to the energy independence of the country, as it is the only true indigenous fuel available in sufficient quantity to promote any form of energy independence. The Ukrainians do not understand many concepts, such as that of mineral rights, leasing land to mine the minerals under it, etc. Ukraine has this past year imported 12 million tonnes from overseas (Poland and Russia). However, 94.5% of all coal is still mined in Ukraine. This year (1995) Ukraine has already imported 7 million tonnes in 3 months. There is a need to open new, more efficient mines and some plans to do so are being considered. One new mine will have the coal at a depth of 600 to 800 meters, and this has the potential to be strip mined. New mines with great potential are not being opened because the minerals rights law has yet to be approved.

One outgrowth of the coal bed methane recovery in the Donbass region is the use of the methane to power trucks and buses locally rather than transport via pipeline to other major cities. The further exploration of uses for this important by product must be considered as an essential opportunity for energy independence in Ukraine. Perhaps there should be a reexamination of the funds allocated to Kazakhstan with an eye to reallocating these funds to Ukraine.

Target	Conclusions: market reform, restructuring and legal framework
Relevant Indicators & Objectives	Competitive pricing for efficient use of energy resources; commercially viable private sector capability for production, transmission and distribution of energy services; national policy and legislation supporting shift from command to free market economy.
Tasks Required to Meet Target	Power and coal sector restructuring and implementation, oil and gas resource assessment, legal framework and exploration; refinery assessment and sector privatization.
Achievements to Date	Considerable progress with power sector restructuring, movement toward adoption of competitive bidding and establishment of NERC. Design of draft legislation governing upstream oil and gas sector. Progress on coal mine safety.
Achievements Required in Future	Extend power sector restructuring to cover distribution companies. Provide funding (licensing methodology and sample contracts) to expand staff, while finalizing the organizational structure, functions and scope of activities of the NERC Promote the implementation of upstream and downstream oil and gas legislation designed to promote foreign investor interest and participation in exploration of formerly abandoned and new fields, safeguard transmission, permit foreign refinery investment and activity at the distribution end. Consider a new coal sector study focusing on restructuring, corporatization and commercialization of selected mines, while designing a gradual program of closure of redundant mines combined with a program of redeployment of excess manpower. Involve TDA in the provision of new equipment and management for the restructured mines.
Relationship to Other Targets, Critical Path for Meeting Target	Progress in eventual privatization and /or other investment will be dependent in success at this stage.
Relationship to Other USAID & Donor Activities	This activity is being concurrently pursued by all donor agencies on a collective basis, with the exception of TACIS, which although nominally tied to the program, has experienced delays in implementing power distribution restructuring etc.

Comments/Qualitative Evaluation	Recommendation for mission focus by subsector: 1. Restructuring, corporatization and commercialization of distribution companies. 2. Finalization of the target scope and structure of NERC, determination of the funding mechanism, and hiring of staff. 3. Promotion of passage of recommended upstream oil and gas legislation to encourage exploration. 4. Encouragement for similar legislative work to promote downstream refining and distribution. 5. Taking into account explicit Ukrainian dependence on domestic coal, assist the Ukrainians in performing a coal sector study designed to augment the World Bank study by identifying the most efficient mines, establishing a plan for phased closure of remaining mines, and devising a strategy for redeploying redundant manpower. Promote the corporatization and commercialization of the sector.

Commercial and Private Market Activities: Critical Issues - Replicability, Involvement of US Firms

Target	Replicability, involvement of US firms.
Relevant Indicators & Objectives	Improved energy efficiency demonstrated by local firms at facilities directly assisted or influenced by USAID activities and replicated elsewhere. Reduction in pollution due to application of US technology at selected sites.
Tasks Required to Meet Target	Replicability: Kiev No 5, Power/Heat Plant Improvement, improvement in efficiency and environmental impact. Coal Mine safety.
Achievements to Date	Kiev No 5 regenerative resins for demineralization in use, instrumentation and equipment installed to improve combustion efficiency. Mine safety equipment purchased, safety program underway.
Achievements Required in Future	Extend the regenerative resin and combustion efficiency program to other plants. Extend the existing mine safety program.
Relationship to Other Targets, Critical Path for Meeting Target	Ability for Ukrainian firms to pay for replicability at other sites of US based technology is in part dependent on the degree of restructuring, corporatization, commercialization and the implementation of cost reflective rates.
Relationship to Other USAID & Donor Activities	Improved efficiency of energy use and information exchange will be accelerated once the restructuring process is under way and each enterprise realizes that its own future will be dependent on the adoption of more efficient technology.
Comments/Qualitative Evaluation	As a result of the assistance provided to Kiev Plant No 5, combustion metering led to an increase in plant efficiency. Use of regenerative resins for demineralization of boiler make up water is underway, but replicability is dependent on resin technology(control instrumentation). if new technology purchased, regenerative resins may be used. elsewhere. In practice the sector is still in the process of restructuring, and until they are compelled to compete on their own, and have the latitude to implement cost based rate structures, it is difficult to envisage the availability of the necessary funds to purchase US-based technology.

Information exchange, training & establishment of working relationships between US utility companies and Ukraine electric & gas companies

Target	Six electric and gas partnerships established between private US and Russian companies by mid 1996.
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	Task 2A Utility Partnerships - (USEA)
Achievements to Date	Kievenergo and Pennsylvania Power and Light partnership signed in Allentown, PA: December 1993 Kievenergo Seminar in Kiev: May 1994 Kievenergo plant safety personnel - one month at PP&L: September 1994
Achievements Required in Future	Donbassenergo partnership established by end of 1994? Dnieproenergo partnership established by end of 1994? (See Will Polen at USEA)
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	The restructuring of the energy sector will start the investment in independent power plants. The Ukrainian specialists know their own local situation and teach this to the US experts. Ukraine desires additional training, with the key people receiving training first. These individuals can train other personnel. The Ukrainians recognize that they need US expertise as they have never been in this position before. the local companies are falling apart and they need investment. The Ministry of Energy and Electrification of Ukraine recognizes that things are still being run from the top down, but there is still a fear of the creation of companies that will try to become a monopoly. The creation of an autonomous regulating board under the Ministry will allow the supervision of these new, independent companies. Once sufficient independent companies exist, then the regulatory board itself will also become fully independent.

Improved Performance In Coal - Social Safety Net

Target	Facilitated through analysis of social safety net needs for multilateral funding, coal restructuring initiated by 12/97.
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	Task 4B Coal Mine Efficiency, Safety and Restructuring - (PIER)
Achievements to Date	See coal restructuring subsection, above.
Achievements Required in Future	See coal restructuring subsection, above. Significant efforts required in mine safety. Need greater, closer participation with US miners, unions and US government bodies (EPA, OSHA). Main suggestion that was made is to run a health and safety center out of a center in Donetsk and to provide more water filters to reduce the particulate matter in the mines. There is an absolute lack of social security for the population - particularly pensioners. Unfortunately the mentality of the people is such that the government must provide for them and should provide jobs for all citizens.
Relationship to Other Targets, Critical Path for Meeting Target	This is best regarded as a stand alone activity/ effort. Considerable effort should be invested in the continuation in all areas, particularly mine safety.
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	The coal industry is, in a word, tragic. The Ukrainians, however, are agreeable to accepting innovative US technology for the use in their mines. They appreciate the increases in productivity that came from the use of water filtration systems in the Kiev power plant but they are not yet ready to realize that increases in productivity pay for the equipment. This basic economic concept is lost upon them. They want to have equipment given to them, rather than pay for it themselves. The Ukrainians do not seem to envision themselves as capable of setting their own destiny. They seem to parrot the same response that was heard in Russia - We donate have the money to by any equipment. We need a free ride. While it may be necessary to lend assistance to prime the pump, there does not seem to be any sense of urgency to purchase equipment and let it pay for itself Perhaps the motivation is one of: Why buy it when someone else will either give it to you or will buy it for you. Due to mine closings it is anticipated that approximately 50,000 workers will be forced to leave or find new work. One critical effect is that some of the better people are leaving. According to the Ukrainian specialists, they anticipate having to produce 150 to 140 million tonnes of coal. They also expect the government to be in control of this.

Improved information for oil and gas exploration activities through improved organization & presentation of data. Establishment of information market in baseline geological data

Target	Organization of oil/gas data to facilitate greater foreign investment by early 1996.
Relevant Indicators & Objectives	Development of contractual arrangements and pricing mechanisms for the reliable and efficient trading of energy among NIS, CEE, Western Europe, and other markets.
Tasks Required to Meet Target	Task 4D Oil and Gas Resource Assessment and Exploration - (USGS PASA) Task 4E Oil Exploration/Development Legal Framework -(Akin Gump Strauss Held - World Bank)
Achievements to Date	The Ukrainians realize that in order to attract investment in the oil and gas sub-sectors, they will need to release of information vital to mounting any exploratory work.
Achievements Required in Future	As the Ukrainians consider creating a zone of private sector participation in their oil economy, additional information will on geology will be necessary.
Relationship to Other Targets, Critical Path for Meeting Target	
Relationship to Other USAID & Donor Activities	
Comments/Qualitative Evaluation	Ukraine has a joint program on the evaluation of resources, local geological information and the methods for processing this information and giving it to foreign firms. This program also reviews the equipment that is furnished via assistance. It must also be noted that Gazprom, the gas exploration, transmission and distribution system of Russia and until now, that of Ukraine, has now no desire to split into separate entities. It intends to remain the sole manager of all natural gas within the Russian Federation. It now has the distinction of being the largest utility in the world and has no intention of becoming less than it is. Although oil is sometimes placed in the position of being thought to be aligned with Gazprom, the oil industry in Russia is resisting being centralized. The Ukrainians desire to expand their ability to produce and deliver as much of their own oil and gas to minimize their dependence on imports. Their main goal at present is to try to double their output in both gas and oil. While the need for oil is 40,000,000 tonnes, their present capability is only 2,000,000 tonnes. It is also important to note that refinery capacity is 80,000,000 tonnes. Other sources interviewed stated that during 1994 20 million cubic meters of natural gas and 4 million tonnes of oil were produced and that Ukraine had to pay Russia 2.3 to 2.4 billion USD. Note: Ukraine also used oil and gas for other purposes as well.

Establishment/existence of private energy service companies

Target	None presently listed, but necessary in a free market economy.
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution. Creation of separate service industries will promote competition in the market place.
Tasks Required to Meet Target	Plant management will be encouraged through incentives to divest themselves of inefficient and/or non-producing subsidiaries which affect plant accounting balance sheets.
Achievements to Date	None yet either discussed and/or desired. However, some (independent?) power plants belonging to industries exist. The law on the creation of new independent power producers has not been written and ratified. The service companies coming as spin-offs or newly created companies could be created later.
Achievements Required in Future	Promote the idea of service companies and their ability to provide timely services while improving the power plant bottom line.
Relationship to Other Targets, Critical Path for Meeting Target	This can provide better opportunity to evaluate retrofit projects and their funding and improve their attractiveness to lending and/or donor institutions.
Relationship to Other USAID & Donor Activities	See Relationship to Other Targets above
Comments/Qualitative Evaluation	Service companies in Ukraine may pose unusual problems. Presently, the plant managers now have both construction and plant maintenance under their purview. They will resist any change in this arena. However, just as in the case of the coal industry, excess workers will find that other industries are paying higher wages and this will either encourage or force the relocation of personnel to those industries. The spirit of entrepreneurship may also cause the development of private contracting and service firms. The expectation is that this change is to take place slowly. The creation will be based on need, both technical and financial. Joint ventures with the Ukrainians usually have the non-Ukrainians providing all the financing. One company - Mine Safety Appliances, Pittsburgh - would like to pursue a joint venture, but safety equipment is not considered a high priority with the Ukrainians.

Target	Implementation of accounting standards at local distribution companies.
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	No tasks currently planned by AID. TACIS responsible for the restructuring of the distribution companies.
Achievements to Date	None since the TACIS contractor not yet identified.
Achievements Required in Future	Not applicable
Relationship to Other Targets, Critical Path for Meeting Target	An integral part of the whole power sector restructuring process, including the creation of NERC.
Relationship to Other USAID & Donor Activities	Part of the 12 task, PHB led multilateral donor power sector restructuring effort.
Comments/Qualitative Evaluation	Urgent need to restructure the distribution companies, then corporatize and commercialize. Introduce USOA as a precursor to LRMC-based ratemaking.

Target	Integrated resource planning and implementation under an open and transparent regime.
Relevant Indicators & Objectives	None.
Tasks Required to Meet Target	None.
Achievements to Date	None.
Achievements Required in Future	Once the power sector restructuring process is under way, and companies have the legislative freedom to operate in a privatized setting, encourage the establishment of integrated resource planning under an open and transparent regime and subject to approval by the NERC
Relationship to Other Targets, Critical Path for Meeting Target	Conditioned by the success in the power sector restructuring and privatization effort currently under way.
Relationship to Other USAID & Donor Activities	Integral part of the PHB led power sector program
Comments/Qualitative Evaluation	IRP will become significant once companies are allowed to operate in a privatized setting.

Conclusions - results of TDA activities, training efforts in financial sector activities.

As stated in the evaluation of USAID activities in Russia, the activities conducted by the Trade and Development Agency have, for the most part, been independent of USAID support. USAID provided $3 million support for one study, that of developing a dual-fueled (diesel and natural gas) engine for use in buses. This engine design development was at the request of Gazprom and Moscow. The development of the engine is to proceed as a joint venture of ZIL and Caterpillar. It is interesting to note that the Ukrainians are utilizing the methane from the mines in the Donbass region to fuel their trucks and buses. Continued demand for this type of dual fueled engine may be of some financial benefit to Zil and Caterpillar.

The total TDA budget for this year was $17 million. TDA has indicated that the of the $42 million spent thus far, it has resulted in $4 billion in trade to US companies. Normally TDA expects a return of 10 to 15 times that of the original expenditure.

Continued support from USAID for future TDA activities should be considered only on a case by case basis. While TDA has shown substantial results from the funds invested by USAID, sufficient funding of TDA activities from other sources should preclude further funding from USAID.

The main conclusions with respect to commercial activities and privatization are:

Continued creation of competing commercial oil sector entities. While not specifically stated, Ukraine will try to attract fully vertically integrated oil companies and will foster competition within Ukraine in all areas including exploration, transportation, refining, and distribution.

Information exchanges between US utility companies and Ukrainian electric and gas companies should be continued, but without further funding from USAID. Perhaps some sponsorship by US companies and trade organizations will prove sufficient to allow this to be a stand alone activity with USAID providing a monitoring or focusing function to these activities.

As previously stated, the coal industry should be viewed as a special case and continued support to this sub-sector of the Ukrainian economy should be considered vital. Coal is presently at a competitive disadvantage due to the low productivity within the mines themselves and the inability to perform coal beneficiation to improve the quality of the final product. The political and social ramifications of mine shutdowns may lead to extreme disruptions. Further contact between US coal companies, labor unions, and other US government entities may help pave the way for resolution of mine safety issues, improve mine productivity, and foster close ties that will endure after this extreme transition period is completed.

Oil and gas exploration activities and the exchange of technology may now be best left to private industry. USAID should continue to monitor the activities of US companies and others, and provide assistance only if specifically requested.

The establishment of private energy service companies is predicated on the desire and/or ability of the present plant managers to, in essence, set their people free to pursue work as individuals in the service sector of the economy. The adaptability of individuals to adjust to this new way of thinking may cause tremendous transitional problems. The formation of new service entities violates the way in which they were raised in and embraced by the communist system. However, it must be noted that the Ukrainians are resourceful in surviving under these difficult conditions and therefore can be assumed capable to adjust to these new conditions. The timetable for this transition is not clear.

Target	Private investment in power sector entities
Relevant Indicators & Objectives	Commercially viable private sector capability developed to provide energy services, including production and distribution.
Tasks Required to Meet Target	Power sector restructuring: transfer state-owned assets to private sector, promote sustainable use of natural resources, develop marketing plans, time lines and competitive corporate strategy, use commercial financing, promote private investor ownership and JVs with US partners.
Achievements to Date	Power sector restructuring program well under way. Generation enterprises corporatized and about to be divided into four Gencos Power bidding strategies being evolved. NERC established.
Achievements Required in Future	Complete the restructuring, corporatization and commercialization of the distribution component of the power sector. Implement competitive bidding for power purchases. Establish NERC. Implement legislation permitting foreign investor activity and the repatriation of outside investor profits.
Relationship to Other Targets, Critical Path for Meeting Target	Dependent on market reform, restructuring and appropriate legal framework and autonomous regulatory body.
Relationship to Other USAID & Donor Activities	The power sector restructuring program brings together the resources of all the multilateral donors involved in sector restructuring within a common program of activities led by PHB
Comments/Qualitative Evaluation	Absent legislation permitting outside foreign investment in the power sector and the repatriation of profits, it will be difficult to attract potential outside investors. Assuming legislative progress, the next stage will be to ensure that outside investors are operating on a level playing field and are free to sell power to the pool under conditions of open access and non discrimination. The effective functioning of NERC will be key to overcoming this step. Finally foreign investor activity will in part depend on how quickly the distribution end of the business is restructured, corporatized and commercialized; and on whether there will be a concerted effort to move toward LRMC-based pricing. Absent the latter, it will be difficult to see how outside investors or even domestic investors, will be able to design a business case capable of supporting plant rehabilitation or new plant investment.

Target	*Private investments in energy efficiency & conservation*
Relevant Indicators & Objectives	Privately financed projects actually constructed.
Tasks Required to Meet Target	1. Teach Ukrainian industries and other end users through training and personal contact how to qualify for private financing of energy upgrades. 2. Find and introduce American firms to future Ukrainian buyers of energy efficiency equipment even before they are ready to buy. 3. Develop technical and management skills in a core of entrepreneurs to start-up private energy services companies (ESCOs).
Achievements to Date	As a start, the five factories selected for the Industrial Energy Efficiency task have had minimal introductory exposure to energy management techniques applied to one specific project.
Achievements Required in Future	All tasks still need to be carried out to meet this target.
Relationship to Other Targets, Critical Path for Meeting Target	ARENA-ECO is interested in training industrial customers in energy management sometime in the future. That role suits an NGO energy center well and should be encouraged. AID may be able to get results with a very small expenditure. If ARENA-ECO brokered energy management courses from experienced training organizations like the Association of Energy Engineers (AEE) and subsidized the first round of students, the program might take off independently. As for training service providers, one source of experience to tap is the National Association of Energy Services Companies (NAESCO). This connection, too, would be brokered well by ARENA-ECO.
Relationship to Other USAID & Donor Activities	At this point, there is no evidence of native Ukrainian ESCOs or training to support their start-up. The only companies to serve energy users were the few foreign companies like Honeywell. The team was told that the European Union and EBRD will support start-up of native ESCOs to do engineering and project management for installing energy efficiency equipment.
Comments/Qualitative Evaluation	AID in Ukraine is focusing its attention on electric generation, transmission and distribution. The energy end users remain largely uninformed. They receive relatively little attention and are left to "market forces." This policy direction will create efficient suppliers selling to inefficient consumers. It makes no sense to create such an imbalance. The demand side should be lifted from its ashes right along with the supply side. To achieve the goal of unsubsidized energy conservation projects, financed only with private investment, a demand for efficiency must first be created. This will happen mostly through economic reforms. Concurrent with these reforms, Ukrainian energy users and potential service providers need to go through a massive learning curve to build a professional infrastructure.

Annex 3: Evaluation of Task Progress Relative to Targets: Russia Energy Program

Subject/Target	Relative Progress	Associated Tasks
Improved Efficiency of Energy Use & Interfuel Substitution	⌘	
NGO energy centers and professional associations	⌘	2
Training for energy service companies	⌘	NA
Industrial energy conservation	⌘	1.B.1
Electricity generation efficiency improvements	⌘	1.B.2
Improved gas distribution	■	compl.
Load research & forecasting,	□	NA
Demand management/integrated resource planning at utilities	Ω	NA
Agreement on JEAS findings & plans for implementation on power plant fuel substitution & efficiency measures	⌘	1.A
Market Reform, Restructuring & Legal Framework	Ω	
Model bid packages for oil and gas exploration	⌘	7.A.3
Plan for electricity sector restructuring	⌘	1.A, 5.A
Privatization legislation for electricity generation and transmission - preparation & presentation	⌘	5.A
Establishment of market-based prices for electricity	⌘	1.5.A
Transparent pricing for oil & gas pipeline services	Ω	7.A.5
Creation of independent electricity regulatory authority	⌘	5.A
Creation of independent oil and gas regulatory authority	Ω	7.A.5
Viable alternative power system investment plans	Ω	1.A.5
Coal industry restructuring	Ω	6.A
Commercial Activities & Privatization	⌘	
Creation of commercial oil sector entities (Transneft, Sidanco) - replicability & resource mobilization	⌘	7.A.5; 7.A.2
Information exchange, training & establishment of working relationships between US utility companies and Russian electric & gas companies	⌘	5.B; 7.E
Improved performance in coal industry - alternative models of reform	■	6.A; 6.B
Improved information for oil and gas exploration activities through improved organization & presentation of data.	■	
Establishment of information market in baseline geological data.	□	7.A.4; 7.B
Technology exchange through oil & gas center	■	7.C
Establishment/existence of private energy service companies	⌘	NA
Implementation of international accounting standards at RAO-EES Rossii	⌘	5.A
Involvement of private/privatized energy firms in electricity resource planning & implementation - openness & transparency of resource planning process	Ω	5.A
Resource Mobilization for Investment	⌘	
Feasibility studies for power plants for IFI & bilateral loans	⌘	1.D
Private investments in power sector entities	□	NA
Private investments in energy efficiency & conservation	□	2
Financial sector reforms & improvements	⌘	other tasks

Key: ■ means good progress ⌘ means some or adequate progress, Ω means inadequate progress, □ means that activity is not yet under way

Note: Items in *italics* represent additional targets that the team thinks would usefully be included in USAID's list of targets for the program.

Ukraine Energy Program

Subject/Target	Relative Progress	Associated Tasks
Improved Efficiency of Energy Use & Interfuel Substitution	✖	
NGO energy centers and professional associations	✖	3C, 3E
Training for energy service companies	✖	3C
Industrial energy conservation	Ω	3C
Electricity generation efficiency improvements	■	3A, 3B
Electricity distribution demonstrations	Ω	3B.
Pollution reduction from DH plants	□	3F
Power and industrial energy efficiency technologies in place	Ω	3C, 3D
DSM activities at utilities	□	3D
Market Reform, Restructuring & Legal Framework	✖	
Seismic processing facility	✖	4D, 4E
Thermal generating companies corporatized	✖	1A
Establishment of market-based retail prices for electricity	□	1B
Establishment of market-based wholesale prices for electricity	✖	1A, 1B
Creation of independent electricity regulatory authority	✖	1B, UK KNOW-HOW FUND
Coal industry restructuring	Ω	4A, 4B, 4C
Creation of independent oil and gas regulatory authority	Ω	1B
Coal industry restructuring	Ω	PIER
Commercial Activities & Privatization	✖	
Information exchange, training & establishment of working relationships between US utility companies and Ukrainian electric & gas companies	■	2A
Improved performance in coal industry - social safety net	✖	4B
Improved information for oil and gas exploration activities through improved organization & presentation of data, legal framework	Ω	4D
Establishment/existence of private energy service companies	□	3E
Resource Mobilization for Investment	□	
Private investments in power sector entities	□	1A, 1B, 4A, 2D

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Armenia Energy Program

Subject/Target	Relative Progress	Associated Tasks
Improved Efficiency of Energy Use & Interfuel Substitution	✖	
Restructuring district heating systems	■	5
Training for energy service companies	□	3D
Industrial energy conservation	✖	1.B.1
Electricity generation efficiency improvements	✖	5
Improved electricity distribution	■	3, 5, 8
Weatherization & short term improvements,	■	2
Demand management/integrated resource planning at utilities	Ω	NA
Increased hydro output	✖	3B, 6
Market Reform, Restructuring & Legal Framework	✖	
Plan for electricity sector restructuring - Armenergo	◗	3A5
Energy legislation for electricity generation and transmission & renewable energy - preparation & presentation	Ω	3A3
Establishment of market-based prices for electricity	✖	1.5.A
Draft energy law to Parliament by 9/95	✖	3A3
Commercial Activities & Privatization	□	
Creation of energy consulting firms	□	NA
Creation of energy services company	□	NA
Resource Mobilization for Investment	□	
Private investments in 2 CHP entities by 12/97	✖	3A1
Private investments in power sector entities	□	3A1
$50 M of IBRD financing for power sector by 12/95	✖	3A4, 3A5
Proposals for IFI funding for new & rehabilitation of power plants by 6/96	□	3B
5% of kWh produced by private sources by 12/99	□	3A1

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Annex 4 Meetings in US, Russia, Ukraine & Armenia

2/21/95	Russia Project Kickoff, meet at USAID
2/21/95	Meetings at USAID
2/22/95	Meetings at USAID
2/23/95	Meetings at USAID/EPA/USGS, K&M Engineering
2/24/95	Meetings at USAID/DOE/World Bank
2/26/95	travel to London
2/27/95	LG & MJ in DCA for meetings at USAID
2/27/95	EBRD: Martin Blaiklock, Heike Noro - Power & Energy
2/27/95	EBRD: Ullrich Kiermayr - Official Cofinancing
2/28/95	EBRD: Ananda Covindassamy
2/28/95	EBRD: Wowinke
3/1/95	BA872 to MOW
3/2/95	USAID: Gene George, Ron Leasburg, Michael Stepanov, Yuri Andrianov
3/3/95	IIE: Edward Ramsey
3/3/95	RCG: Niels de Terra, Caron Cooper, Suzanne Smith
3/3/95	Burns & Roe: Ty Gunusen
3/3/95	IDEA: Charles Moseley
3/3/95	USEA: Gene Fominykh
3/6/95	CENEf for Larry Good
3/6/95	Alexander V. Misulin, First Deputy Director - Foreign Economic Relations, MFE
3/6/95	Alexey Mastepanov, Director, Planning at MFE
3/6/95	Victor Nechaev, Director; Vladimir Mirolubov, Department of Strategy & Control, MFE & Deputy Chief Department of Foreign Economic Relations
3/6/95	Mr. Bolko & Vitaly Kusmin, Chief & Deputy Chief Department of Business Management, MFE
3/7/95	Alexi Markarov: President, Russian Energy Research Institute
3/7/95	Mr. Bashmakov, Executive Director CENEf
3/7/95	IRIS: James Wilson
3/7/95	Oil & Gas Advisory Forum: Ms. Linda Sjoman
3/7/95	Suzanne Smith, RCG
3/7/95	Moscow Energy Office, Messrs. Lapir, Medvedev, Ms. Nirsha
3/8/95	US Foreign & Commercial Service, Mw. Maksimova
3/8/95	Gene George, USAID
3/9/95	ENIN Energy Laboratory: LG & MJ
3/9/95	MFE: Mr. Minayev
3/9/95	RAO: Mr. Muraviev, Director of Personnel
3/9/95	Energy Economics Institute, Mr. Edelman
3/10/95	WB & Bain & Co.: Mr. Voronin & Mr. Burman
3/10/95	Russian Project Finance Bank: Mr. Vezetdinov
3/10/95	Mark Camstra, Price Waterhouse
3/10/95	HIID: Jonathan Hay
3/13/95	Lenenergo - Mr. Nikolaev & Mr. Chernyshev
3/13/95	Mr. Kutavoy - Ministry of Economy - Chief of Main Administration for Energy & Economy
3/13/95	Tom Trimble, Latham & Watkins
3/14/95	Moscow Energy Efficiency Agency, Sergei Fyodrov & Nikolai Mikhailov Moscow Energy Office, Mr. Tsoy
3/14/95	Plant Tour of Tushino III District Heating Plant & Substation
3/14/95	Hod Thornbur & Kirby Owen, PHB
3/15/95	USAID Briefing & departure from Russia
4/19/95	USAID: James Osbourne, First Secretary & Darian Diachok, IDEA; Andriy Kononov Energy Program Manager; Vitaly Plotnikov, Junior Professional/Executive Assistant; Andriy Parinov, M.A., Energy and Natural Resources Program Advisor
4/19/95	PIER: Valeriy Kaydan, Adminstrator & Mark F. Alley, Director, Ukraine
4/19/95	Douglas B. Wood, Area Manager, Burns and Roe
4/19/95	M. Charles Moseley, IDEA
4/19/95	RCG: John D. Clapp, Energy Advisor