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**ENERGY PRICE REFORM PROJECT IN LITHUANIA**

**FINAL REPORT**

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**USAID EMERGENCY ENERGY PROGRAM  
FOR EASTERN AND CENTRAL EUROPE**

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**RESOURCE MANAGEMENT ASSOCIATES OF MADISON, INC.**

520 University Avenue, Suite 300, Madison, WI. 53703, U.S.A. Telephone: (608)283-2880 Facsimile: (608)283-2881 Telex: 469 453

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Project Scope of Work

## **I. Executive Summary**

This report describes the activities, accomplishments, and recommendations of the USAID Energy Price Reform Project in Lithuania conducted by Resource Management Associates of Madison, Inc. Four major documents, three workshop background documents, and other materials were prepared by RMA as part of the work in the price reform project. In addition, three computer models were prepared and delivered along with two computers and software to counterparts in Lithuania.

During the course of the Energy Price Reform Project, Lithuania has felt the full effect of its energy crisis. At the beginning of the project in early 1992, Lithuania was facing the prospect of uncertain energy supplies and rapidly escalating prices. As of January 1993, Lithuania can not get the energy it requires even at the reduced economic activity levels, and is facing the immediate prospect of paying world prices in hard currency. This situation may be subject to some further negotiation with Russia, but significant relief seems unlikely.

As a consequence of the energy supply situation, Lithuania is not able to provide heat to residences at more than 13 degrees C and is not providing domestic hot water. In addition, some industries, such as the Mazeikiai Refinery, are partially closed due to the lack of fuel. Both natural gas and fuel oil are in short supply. The shortages of energy, particularly of thermal energy, played a role in the overwhelming defeat of the Sajudis Coalition lead by President Landsbergis in the October elections.

To support the movement toward rational energy use it is important that Lithuania continue to move forward with energy price reform. Significant strides have been made in pricing energy on an actual cost basis, although further work is needed on accounting and depreciation procedures. Importantly, the government is also in the process of eliminating the heavy cross subsidies from industrial to residential consumers. The price of electricity, for example is now uniform for residential and industrial users. While residential consumers should ultimately pay more to reflect the higher cost of service, the equalization of prices is a major step in that direction.

Lithuania's energy development strategy should move in a least-cost (also known as integrated resource) planning direction. Such a strategy would include priority investments in demand-side or energy efficiency measures as well as selected Baltic regional supply-side investments. Particularly important regional issues include the use of the Mazeikiai refinery and the Ignalina Nuclear Power Station, operation of the pumped storage facility when justified on cost, an oil import terminal (the least cost choice may be Ventspils) to supply Mazeikiai, and natural gas storage in Latvian natural subsurface repositories.

The RMA team has provided assistance in guiding the Government of Lithuania (GOL) through energy price adjustments and by evaluating the potential for and benefits of efficiency gains. The Energy Price Reform Project also financially and technically supported

analytical efforts at the Lithuanian Energy Institute and the University of Vilnius Department of Economics. These efforts have yielded rewarding results and insights for the Ministry of Energy and the wider energy community. Both institutions have a capability for continued assistance in energy planning and price reform.

A set of recommendations to the GOL (Government of Lithuania), USAID, and other international donors and lenders are included. The recommendations will promote the macro-economic adjustments needed in the energy sector and help rectify the current economic crisis, created in part by the severe difficulties in the energy sector. The principal recommendations include:

1. The implementation of a tariff reform program that will lead to a modern, cost-based tariff structure over a three year period.
2. Privatization of portions of the energy sector.
3. Establishment of demand-side management plans at energy utilities.
4. USAID support of a residential tariff and retrofit demonstration.
5. European Bank and World Bank funding of an industrial efficiency loan program.

## II. Introduction

The Energy Price Reform Project of the USAID Emergency Energy Program for Eastern and Central Europe has a number of objectives. The major objectives are: 1) to provide the Government of Lithuania (GOL) an analytical basis for understanding energy flows in the Lithuanian economy; 2) to identify underlying costs in the provision and use of energy; 3) to explore the major environmental consequences of alternative energy strategies; 4) to identify appropriate price levels and economic responses to energy prices; and 5) to provide needed information to support the transition to a market-based system.

This final report describes the activities, outputs, and accomplishments of the project. It also provides a set of recommendations for USAID and other technical assistance and lending organizations as they seek to assist in the energy sector and market transformation that Lithuania is undertaking.

In reviewing the activities of the project, it is important to note the differences between other Eastern European countries with their own currencies, and Lithuania, that as of October 1, 1992, has established its own interim currency, the talonas. Over the last 12 months the Lithuanian currency (the ruble and talonas) has undergone very high rates of inflation. The lack of a fully established currency and inflation places an enormous additional burden on the Lithuanian economy. Only those investments which are either supported by the state or which have an immediate payoff can be considered under the circumstances.

By the end of the project (December 1992), Lithuania had not fully established international level energy prices for most of its energy. Thus, a central objective of the Energy Price Reform Project has been only partially accomplished: the adoption of market-level pricing for energy. Full cost, stable pricing will only be finally reached with the establishment and the defense of a convertible national currency. Energy price increases are rapidly degraded by inflation of the talonas. It is evident, however, that Lithuania is moving toward an independent currency and cost-based pricing.

Much work remains to be accomplished, including the implementation of least-cost planning, the privatization of portions of the energy market, the establishment of a market-based regulatory institutions.

### A. Project Scope of Work

The project scope of work as provided by USAID is included as Appendix A. The RMA effort addressed each of the seven elements.

## **B. Project Deliverables**

The project scope of work did not specify any required reports. A series of reports were prepared as part of meeting the scope of work and communicating the project results to the GOL and USAID. The reports provided were:

1. Progress (trip) report: Energy Price Reform Reconnaissance Trip Report-Lithuania, RMA/LITH-PR-01, March 1992.
2. Progress report: Energy Price Reform Workshop Trip Report-Lithuania, RMA/LITH-PR-02, June 1992.
3. Background report: Legal and Operational Aspects of Energy Utility Regulation; The Legal Aspects of Energy Utility Regulation in the United States-Legislation and Administrative Codes, Vol. 1, for the April 30-May 7, 1992 Workshop.
4. Background report: Legal and Operational Aspects of Energy Utility Regulation; Public Utility Regulation: Concepts and Methods, Vol. 2, for the April 30-May 7, 1992 Workshop.
5. Models and documentation: Energy Price Reform Workshop, Main Workbook and Model Disks, April 30-May 7, 1992.
6. Final report: Final Report of the Energy Price Reform Project, RMA/LITH-PR-03, January 1993.

In addition to these deliverables, another report was written and provided:

7. Regional Seminar Report: The Need for Regional Cooperation in Energy in the Baltics, presented at the Regional Seminar on Energy Pricing in Estonia, Latvia, and Lithuania, July 17, 1992.

Finally, various other materials were provided to the GOL including:

- A. American Gas Association, Gas Rate Fundamentals, Fourth Edition, American Gas Association, Arlington Va, 1984.
- B. ICF, Inc., Electric Utility Costing and Ratemaking: Methods and Procedures, Costs and Rates Workbook, #93A, Part I: Textbook, prepared for Electric Utility Rate Design Study, Washington D.C., 1981

- C. ICF, Inc., Electric Utility Costing and Rate-making: Methods and Procedures, Costs and Rates Workbook #93A, Part II: Learner's Guide, prepared for Electric Utility Rate Design Study, Washington D.C., 1981.
- D. International Energy Agency, Natural Gas Prospects and Policies, Organization for Economic Cooperation and Development, Paris 1991.
- E. Lebel, Philip, Energy, Economics, and Technology, John Hopkins Press, Baltimore MD, 1982.
- F. Tietenberg, Tom, Environmental and Natural Resource Economics, Harper Collins Publishers, New York, 1992.

In addition to the reports and documents provided by RMA, energy tariff studies were carried out by the Lithuanian Energy Institute, and a macroeconomic impact study was conducted by the University of Vilnius Economics Faculty. The titles of these reports available under separate cover are:

- A. M. Krakauskas and G. Volskis, December 1992, "A New Electricity Tariff Design in the Lithuanian Power System", Lithuanian Energy Institute; Kaunas.
- B. V. Miskinis, R. Stonys, and J Cepmis, December 1992, "Heat Tariff", Lithuanian Energy Institute; Kaunas.
- C. V. Miskinis and A. Juska, December 1992, "Lithuanian Energy Balance", Lithuanian Energy Institute; Kaunas.
- D. A. Vasiliauskas, O. Balsys, S. Girijotiene, A. Misiunas, H. Ziaunys, and V. Maciekus, December 1992, "The Impact of the Fuel and Energy Rise in Prices on the Lithuania's Macroeconomic Indicators in Years 1990-2000" The Economics Consulting Company; Vilnius.

### **III. Energy Price Reform Project Accomplishments**

The accomplishments of the project fall into two interrelated categories:

- Institution Building
- Impact on Energy Policy and Prices.

For market reform to take hold, prices, including energy prices, must be established at market levels and within a market setting. For these levels of prices to be attained and maintained, it is essential that the institutional foundations be established. These foundations include an understanding of market fundamentals by GOL policy makers, the establishment of a constitutional basis for a market economy (including property rights), and the establishment of fair and open regulatory mechanisms for setting energy prices where market forces are not sufficient in themselves.

The technical assistance provided in the project, including reports and other materials, contributed to the progress made in institution building and in energy policy and pricing.

#### **A. Reports Provided**

The programmatic accomplishments of the Energy Price Reform Project, including the various meetings and advising sessions, workshop, briefings, seminars, data collection and database development, and model development and analysis, are identified in Section II.B above. The various program elements were extremely well received by the Lithuanian Energy Price Reform Working Group and more generally among Lithuanian officials, analysts and managers. The specific reports and data bases, included those provided by subcontractors at the Lithuanian Energy Institute and the University of Vilnius, proved to be useful in support of the project goals.

The content of the reports provided in the project are not included in this document, however, a brief summary of each follows:

1. Progress (trip) report: Energy Price Reform Reconnaissance Trip Report-Lithuania, RMA/LITH-PR-01, March 1992. The report describes the broad economic situation in Lithuania and the energy situation both physically and institutionally. The energy trade balance situation is briefly summarized and analyzed. Portions of the data collected during the trip is included and the counterpart working group is identified.
2. Progress report: Energy Price Reform Workshop Trip Report-Lithuania, RMA/LITH-PR-02, June 1992. This report describes the work accomplished

during the April 30-May 7 Workshop. The workshop included presentations by both Lithuanian and U.S. experts. Current and future energy price levels are discussed as are the consequences on economic activity and energy flow. Recommendations resulting from the workshop are presented, including project recommendations and broader (i.e. beyond the scope of the present project) recommendations for 1) tariff design support; 2) district heating metering and controls; and 3) on-call technical advisors.

- 3,4. **Background Reports:** Legal and Operational Aspects of Energy Utility Regulation. These reports are a collection of basic materials on utility regulation, legislation, planning, and pricing.
5. **Models and documentation:** Energy Pricing Reform Workshop, Main Workbook and Model Disks, April 30-May 7, 1992. This notebook includes models and model documentation for the RMA Industrial and Transportation Sector energy demand models; scenario assumptions and results; and background articles in support of the models.
6. **Final report:** Final Report of the Energy Price Reform Project, RMA/LITH-PR-03, January 1993. This report summarizes the project and provides an assessment, including the status of energy prices and issues.
7. **Regional Seminar Report:** The Need for Regional Cooperation in Energy in the Baltics, presented at the USAID Regional Seminar on Energy Pricing in Estonia, Latvia, and Lithuania, July 17, 1992. This report analyzed the power situation in the Baltics to ascertain the need for new capacity in the event that the Ignalina Power Station were closed. The analysis demonstrated that if a regional approach to power planning, and investments is taken additional capacity is unnecessary and the closing of Ignalina or the oil shale plants in Estonia could be dealt with. The need for a regional approach in natural gas supply and storage, and crude oil supply and the related port facilities were also reviewed.

## **B. Institution Building**

At the inception of the Project, there was a critical need in the GOL and in the nation in general to understand the workings of a market economy and the role of prices. More particularly, there was a need to understand the basis for cost-based energy price determination and how such prices would influence the flow of energy, energy infrastructure investments, and industrial activity.

A reasonable understanding of these issues by the public will take considerable time to evolve. Knowledge will be obtained from experience as well as through formal education.

Economic faculties are being re-tooled, but at what appears to be a slower rate than in other Eastern European Nations. Energy policy makers, technical managers and advisors have varying levels of sophistication in market economics, but are expected to pick up knowledge quickly.

A critical contribution of the Energy Price Reform Project was the work done, extensively with key policy makers, analysts and educators in the Working Group, to advance their understanding of energy markets. The head of the Working Group is the Director of the Economics Department in the Ministry of Energy. In addition, the RMA consultants were able to have substantial discussions with the Minister Asmantas (who has been selected to remain in his post under the new Lithuanian Democratic Labor Party government), and his special advisor, Mr. Kutas. The project provided considerable underpinning for the Ministry of Energy and others as they progressed through monthly to month price adjustments. These price adjustments were an attempt to base end-use energy prices primarily on the cost of fuels. The GOL decision to revalue capital was also encouraged by RMA team members. Although the increases were considerably short of what is required, they are a step in the right direction and establishes an important precedent.

The project also provided a workshop for more than 30 other managers, technical analysts, and university faculty. Finally, the project provided, through the use of subcontracts, intensive interaction, assistance, and training for the economics group at the Lithuanian Energy Institute and the Economics Faculty at the University of Vilnius.

It is too early to determine whether the USAID Energy Price Reform Project has had an impact on regional cooperation in energy matters. The call for cooperation on regional energy matters made in July 1992 at the USAID regional seminar has been affirmed by recent World Bank recommendations.

Finally, the USAID Project has played some role in preparing the Ministry of Energy for the recently negotiated emergency loan from the European Bank for Reconstruction and Development for the energy sector.

### **C. Impact on Energy Policy and Prices**

The policy level accomplishments and impact on actual energy prices are extremely interesting but difficult to evaluate. Among the foremost policy questions are:

- How were energy prices changed toward market levels as a result of the effort?
- What actions were taken in utility regulatory reform?
- Has the project influenced investment decisions?

## Energy Price Changes

Lithuania has made significant strides in the area of energy pricing. Prices have been increased enormously by the GOL under the guidance of the Ministry of Energy. The basis for the price increases has been the necessity of recovering the cost of energy purchases, mostly from Russia. Thus, for the fuel cost component of prices, cost-based pricing has been the practice. The consequence on energy prices is evident in Table 1 which shows prices in rubles and subsequently talonas, the interim currency until the litas is established.

It is evident in the table that the prices have exploded. Because other prices and wages are increasing as well, a price index is used to convert nominal prices in table 1 to "real" or inflation adjusted prices in Table 2. Table 2 reveals that real prices have increased, i.e. energy prices have increased relative to other prices in the Lithuanian economy. However, the increases are only by a factor of 2 to 3 between January and the end of 1992. Yet, in comparison to fuel prices in Russia, Lithuania's primary energy supplier, Lithuania is doing a better job at bringing prices to world levels (Table 5.).

When prices are adjusted to dollars, based on the exchange rate (selling) at the Bank of Lithuania, the energy prices show a far larger increase during 1992, but appear to be quite stable when compared to 1990 prices as shown in Table 3. As shown in Table 6, Lithuanian prices in dollars are still considerably below world prices. This is largely due to the fact that as prices are raised to cover fuel purchase costs (and therefore prices approach world levels), the value of the currency continues to erode.

Three conclusions can be drawn from these tables.

1. Real energy prices have increased, thus making energy more costly than other goods and services within the Lithuanian economy. This will encourage consumers to reduce their expenditures on energy. This is both expected under market based pricing and desirable in terms of energy efficiency and macroeconomic adjustment.
2. Because of continuing economic turbulence in Russia, and other parts of the NIS (Newly Independent States), it is important to establish an independent, convertible currency in order to avoid the inflationary pressure on the ruble and the talonas. Until a stable currency is established, it will be extremely difficult to bring Lithuanian prices to world prices. It is impossible to have stable energy prices without a stable, convertible currency.
3. The prices shown in Tables 1-3 are mostly cost-based, but still centrally administered. It would be desirable to free up those prices where competition

is possible and institute an independent regulatory authority where there is no possibility for competition. There is also a need to institute an energy price reform program to account for non-fuel purchase aspects of energy prices.

The USAID Emergency Energy Program can certainly take some of the credit for the progress that has been made in energy price reform. The USAID, European Bank for Reconstruction and Development, World Bank, EC and other efforts should not be viewed as competitive efforts. Rather, the USAID Energy Price Reform Project can be viewed as providing early assistance in moving toward appropriate market-based prices. The project has provided an analytical basis for price reform, and used collaborative interaction to understand price levels and their impact on the Lithuanian economy.

Because of the relatively small number of GOL actors at the top analytical and policy making level in energy, the project was able to reach these players and have an impact on Lithuanian energy policy. A number of these key individuals participated in the workshop, the seminars, or in smaller meetings.

### Energy Sector Investment Decisions

In the area of investment decisions, the USAID Energy Price Reform Project was the first Technical Assistance to demonstrate that energy demand would be falling and remaining at reduced levels for the foreseeable future. While an economic recovery was anticipated beginning in the mid 1990's, energy growth would not rebound sufficiently to reach 1989 levels until well beyond the year 2000. Due to macroeconomic restructuring and efficiency improvements, most energy capacity additions would not be needed for the foreseeable future.

A particularly difficult dilemma faced by Lithuania is the operation and potential further investment at the Ignalina nuclear power station. Lithuania has enormous excess power capacity, but this excess capacity would significantly diminish if the first unit were closed due to safety concerns and disappear if both units were closed. The western capital required to replace even one of the units is enormous, on the order of \$3 billion. The operational costs of operating the existing reactors are extremely low if safety issues are ignored. Furthermore, the utility of the partially operational, massive pumped hydro storage station at Kaisiadorys is dependent on a supply of inexpensive power, of which Ignalina is the only viable option if access is not available to imported nuclear power from Russia through the old Northwest Power System.

Faced with this situation, and other situations unique to the Baltics, including the existence of the only one major refinery in the region, a Baltic-regional cooperative approach is a necessary part of a least-cost strategy.

## **IV. Conclusions and Recommendations**

### GOL Recommendations

There are a number of planning and management actions which would support the transition of the Lithuanian economy to a market economy and improve the efficiency of the energy sector. These are:

#### **1. Tariff Reform Program**

The goal of price reform in Lithuania is to establish cost-based prices, determined using accepted international accounting standards. As the information becomes available, long-run marginal costs should be incorporated in tariff design.

Current Lithuanian tariffs, although significantly cost based, fall short of this goal. The transition from current prices and tariffs to a better designed set of market tariffs will take a few years. What is proposed here is a staged process for setting electric, natural gas and thermal tariffs between now and 1995, taking Lithuania to a reasonable set of market based tariffs.

The particular time frame represents what is needed for a reasonable and deliberate course. The program could not be instituted on a much faster schedule because information needs to be collected at each stage of the program before proceeding with the next. It is possible to stretch the program over a longer time period, but it is important to move as deliberately as possible.

The current economic and energy import upheaval is extremely difficult for the Ministry of Energy to cope with, but it does provide an opportunity to implement an improved tariff design. The extreme devaluation of the ruble and talonas, and the high cost of imported energy (at world prices in hard currency) means that the state budget can not afford to subsidize the import and consumption of energy. Since energy prices will be forced much higher, improved tariff design can be incorporated as imported energy prices escalate.

A practical tariff reform program for electricity (thermal energy and natural gas reform programs would be similar) can be established with four stages as follows:

#### **Cost Recovery Tariffs (Months 1-6)**

The first stage of the program focuses on avoiding further debt accumulation in the power system by continuing to adjust tariffs upward as the cost of purchased fuels rise through 1993. As shown in Tables 1 through 6, Lithuania prices, despite the enormous increases of the last year, are still considerably below international market prices. It is known that imported oil and natural gas costs are on the verge of international levels on a hard

currency basis. Thus, the power system will have little choice but to pass costs through to consumers.

At the present time fuel purchase costs are the dominant component of power tariffs under current accounting rules. As the value of assets are reevaluated, and labor charges increase with inflation, the share will decline to more normal levels.

The second aspect of stage 1 is to increase farm and residential electricity tariffs. At the present time, these tariffs are still cross subsidized by tariffs to industrial users. While some subsidies may be in place for important political and social reasons, the subsidy to residential and agricultural users will eventually need to be eliminated. Industry is unable to carry the burden and be competitive internationally with continued cross subsidies, and the Lithuanian budget will be unable to fund the subsidies from elsewhere. Recently adopted tariffs in Lithuania have significantly reduced the cross subsidies.

### **Accounting Procedures and Embedded Cost Study (Months 6-12)**

The second program stage has the objective of establishing modern, internationally accepted accounting procedures and doing an embedded cost study.

Stage 1 activities will result in a series of tariffs that continue to rise with energy costs and inflation and provide revenues (if enforced) to recoup purchased energy costs. Such tariffs, however, will not be sufficient to provide a reasonable return on capital in place or to fund necessary investments in the Lithuanian power system. Stage 1 tariffs will not include marginal cost elements.

Stage 2 sets the groundwork for addressing these issues by identifying appropriate accounting procedures to determine marginal costs and providing training in those procedures.

Following the transformation of accounting practices, an embedded cost study would be conducted which would be used to determine costs of service to five to ten customer classes. The purpose of the embedded cost study is to allocate total revenue requirement among customer classes based upon actual causal relationships. Potential customer classes are:

- Large Industrial (>200 kW)
- Small Industrial (<200 kW)
- Commercial, including shops
- Farms (equipment operation)
- Residential (urban)
- Residential (rural)
- Street Lighting

In an embedded cost study, costs are allocated according to function, classification, and allocation. Function refers to the following primary elements:

- 1) power production
- 2) transmission
- 3) distribution
- 4) general

Classification arranges the above functions according to the following principle classification:

- 1) energy (i.e. providing kWh)
- 2) demand (i.e. providing kW)
- 3) customer (i.e. providing service to various customers)

Allocation then takes each major element of the power system, e.g. a natural gas fired base load generating station, and allocates, through tariff design, the cost of the system. In this case, for example, perhaps 60% of the production costs would be allocated according to relative customer class consumption (kWh) and 40% might be allocated according to customer class contribution to system peak demand (kW).

At the completion of Stage 2, a preliminary set of tariffs would be established for the customer classes.

#### **Tariff Refinement (Months 13-24)**

The purpose of stage 3 would be to apply the embedded cost study to develop a more refined tariff schedule for the existing customer classes; and to establish new tariffs for higher voltage service and for interruptible service to large industrial users. As these tariffs are developed, meters would have to be installed to support these customer classes. These steps are important for managing the power system in a more efficient manner and for establishing marginal cost elements in the tariffs which would encourage customers to consume power more efficiently.

#### **Ongoing Long-Term Tariff Management (Month 25 with no fixed end date)**

The fourth and final stage of the program would establish an ongoing program for review of tariffs. In addition, it would begin the process of incorporating more long-run marginal cost elements in the tariffs. Important aspects of setting marginal cost tariffs are the establishment of export tariffs and the possible addition of rate classes. There is an existing need to install meters to all users over time.

The Lithuanian Energy Institute, under subcontract to RMA in the USAID Energy Price Reform Program, has already undertaken a first marginal cost study which serves as an

excellent starting point for this work. It is recommended that the Ministry of Energy and the Power Board work with the Lithuanian Energy Institute in carrying out this recommended program.

## **2. Energy Sector Privatization.**

The GOL has the opportunity to introduce competition in various portions of the energy sector. In the power sector, this could be achieved by the introduction of private power through the sale of existing plants to private owners and by the establishment of avoided cost buy back rates from industrial cogeneration. There may also be opportunities for private cogeneration units to feed municipal district heating systems and the power grid.

The two most important advantages of privatization of some of the power sector are that provides an opportunity for capital infusion without the GOL taking on additional debt and it encourages competition. Capital is scarce in Lithuania and the lending processes with international lending institutions such as the European Bank for Reconstruction and Development and the World Bank are lengthy and limited. The most promising area for some near term privatization is power generation. The transmission and distribution systems would be difficult to privatize unless the entire sector were privatized.

Other promising areas for near term privatization include petroleum products distributors and retailers, natural gas storage facilities, wood and wood waste markets, and petroleum and natural gas exploration and development.

## **3. Demand-side Management Plan.**

Considerable industrial energy efficiency improvements can be made at current prices, although even greater improvements are both possible and cost effective at the prices anticipated in the scenarios presented at the May, 1992 workshop. Demand-side management activities should be implemented both within the national electric, natural gas, and thermal utility systems and throughout industries at an individual plant level, in commercial facilities, and in residences. Promotion and implementation of demand-side energy conservation measures should be integrated with utility production and distribution plans, as conserving energy has often proved to be more cost effective than building new energy supply. The state utility systems' charters should be redefined by the GOL to include provision of demand-side management services, in addition to traditional supply-side services. Technical assistance and a loan fund in this area will be required and could be provided by international donor and lending institutions.

## **4. Restructuring of Energy Regulatory Institutions.**

The establishment of an independent regulatory institution would accelerate the rate of economic and price reform. A regulatory framework should be created which includes and

encourages independent power producers to enter the market - particularly municipal and industrial cogenerators as well as integration of demand-side measures into supply plans. Such a regulatory restructuring may involve the establishment of an independent regulatory commission typical of the U.S. and some other market economics. Such commissions, if carefully designed and administered, provide for a greater level of public confidence in the fairness of energy price levels and removes some of the onus of energy prices increases from the government.

## **5. Training.**

Longer-term educational support in the form of visiting professorships in energy economics, management and engineering and the establishment of curriculum in these areas at the University of Vilnius and other universities is recommended. In addition, in-plant training in energy management and the improvement of in-country technical expertise in this area should be considered. Training and local expertise will be greatly enhanced by the provision of microcomputers and software at existing training institutions.

## USAID and International Donor/Lender Recommendations

USAID and other international donors have an enormous potential for assistance in the Baltic states. The recommendations here are limited to those in the area of energy, including the environmental consequences of energy supply and use.

### **1. Tariff and Regulatory Reform Support.**

The path to a reasonably modern set of market-based tariffs is somewhat long and difficult. While major steps have already been taken, it will require many more. The outlines of a tariff reform program are described at the beginning of this section. In addition to tariff reform, there is need for technical assistance to help guide regulatory reform.

The ongoing USAID Regional Program can assist this program by providing ongoing expertise and direction to the work. Such USAID assistance should utilize the in-country expertise from the Lithuanian Energy Institute and other sources which have undertaken initial studies and made recommendations for Lithuanian Tariffs. This initial effort provided promising results. A long term technical assistance advisor on tariffs would be very beneficial. While such a person would not need to be in the country continuously, frequent visits on an "as needed" basis would be extremely useful during the next three years.

### **2. Residential Tariff and Retrofit Demonstration**

The primary barrier to thermal tariff reform for the residential sector is the lack of meters

and controls. A demonstration program that would provide meters, controls, cost-based tariffs, and private provision of thermal envelope improvements is recommended. Until the ability to control energy consumption is put in place, it is quite difficult to implement full tariff reform in residences. Such demonstrations could be funded by USAID's Capital Development Initiative (CDI) Development Cost Support Fund Grant Program, the Office of Energy and Infrastructure Energy Project Development Fund, or other sources.

Such a demonstration(s) would be the starting point for a retrofitting of all centrally heated residential apartment blocks in Lithuania (the program is needed throughout Eastern Europe and the NIS). Since the natural gas savings are estimated to be sufficient to fund the improvements, such a demand-side program can be self-sustaining with some capital investment source.

### **3. Industrial Efficiency Loan Fund**

As cost-based tariffs are implemented for the industrial sector, there is a growing need for capital to fund investments in low-cost and some higher-cost energy efficiency measures to respond to the emerging tariffs. The fund would also be available to economically justified investment in alternative energy sources such as wood, wood waste, and wind. Because of both the small size of some of the firms and/or small size of the loans, direct European Bank and World Bank funding is not possible. Setting up a fund to support smaller loans (i.e. \$50,000 to \$2 million) through domestic lending channels with some technical assistance to review the applications and advise firms, would be an effective means for supporting these kinds of critical investments. These investments are necessary to enable industries to respond to new tariffs. (This recommendation is also noted on page 41 of the Final Report: Industrial Energy Efficiency Policy and Institutional Analysis in Lithuania.)

### **4. Least-Cost Investment Plan**

The initial loan packages that are being assembled appear to be oriented towards critical spare parts, materials, and repairs. As longer term loans packages are developed, it is important that a rigorous, disciplined least-cost approach be taken, within the context of a Baltic regional approach. In light of the excess power and other energy infrastructure capacity in the Baltics, it is essential to identify and fund critical efficiency investment needs in various end users and in portions of the supply system. Because the Baltics have little fossil resources, attention should also be given to investments in wood, wood waste, wind, and other renewable, indigenous resources. Oil exploration in the coastal region of Lithuania, if justified by geologic data and environmental conditions, can be funded privately in conjunction with international firms.

Table 1. Lithuanian Energy Prices in Own Currency, 1990 to 1993 (in rubles or talonas).  
Taxes not included. Source the Lithuanian Ministry of Energy.

Sector	Fuel	Talonas or Rubles*	Per	Comment	1990	1991	January	February	April	September	October 21	November	January
					Rubles	Rubles	1992	1992	1992	1992	1992	1992	1993
							Rubles	Rubles	Rubles	Rubles	Talonas	Talonas	Talonas
<b>Transport</b>													
	Gasoline	liter		1	0.4		4	10	13	40	70		
	Diesel	liter			0.3		3			27	55		
<b>Industrial</b>													
	Gasoline	liter		1	0.2	0.5	4	10	13	41	70		
	Diesel	liter			0.12	0.4	3	8	8	27	55		
	Heavy Fuel Oil	tonne			30	84	1320	3000	4500		33760		
	Electricity	kwh			0.023	0.082	0.35	0.44	1	3.1			
	Natural Gas	1000 m3			22.5	51	1000	1000	3400	13500		22500	29750
	Coal	tonne			12	12	72	88	192			4400	
	Thermal	Gcal		2	14.95	58.8	284.5	407.5	847	2550		7680	8450
<b>Residential</b>													
	Electricity	kwh			0.04	0.06	0.35	0.35	0.5	3.1			
	Thermal	Gcal		2	3.95	12	48	48	48			300	300
	Coal	tonne										3500	

**Comments**

\* - As of October 1, 1992 the Lithuanian interim currency is the Talonas.

1 - 92 octane gasoline

2 - price charged by the Lithuanian Energy System

Table 2. "Real" Lithuanian Energy Prices in Own Currency, from January 1992 to January 1993 (in January 1, 1993 rubles or talonas). Using the consumer price index (see Table 4.) to adjust prices from Table 1.

Sector	Fuel	Talons or Rubles Per	1990	1991	January 1992	February 1992	April 1992	September 1992	October 21 1992	November 1992	January 1993
<b>Transport</b>											
	Gasoline	liter	na	na	4.00	5.56	5.00	8.33	9.46		
	Diesel	liter	na	na	3.00			5.63	7.43		
<b>Industrial</b>											
	Gasoline	liter	na	na	4.00	5.56	5.00	15.77	9.46		
	Diesel	liter	na	na	3.00	4.44	3.08	10.38	7.43		
	Heavy Fuel Oil	tonne	na	na	1320	1667	1731		4562		
	Electricity	kwh	na	na	0.35	0.24	0.38	0.65			
	Natural Gas	1000 m3	na	na	1000	556	1308	2813		3041	3067
	Coal	tonne	na	na	72.00	48.89	73.85			594.59	
	Thermal	Gcal	na	na	285	226	326	531		1062	974
<b>Residential</b>											
	Electricity	kwh	na	na	0.35	0.19	0.19	0.65			
	Thermal	Gcal	na	na	48.00	26.67	18.46			40.54	30.93
	Coal	tonne	na	na						472.97	

Table 3. Lithuanian Energy Prices in US Dollars, from 1990 to January 1, 1993. Using exchange rates from the Bank of Lithuania (see Table 4) to adjust prices from Table 1.

Sector	Fuel	\$US Per	1990	1991	January 1992	February 1992	April 1992	September 1992	October 21 1992	November 1992	January 1993
<b>Transport</b>											
	Gasoline	liter	0.25		0.03	0.09	0.09	0.19	0.27		
	Diesel	liter	0.19		0.02			0.13	0.21		
<b>Industrial</b>											
	Gasoline	liter	0.13	0.28	0.03	0.09	0.09	0.29	0.27		
	Diesel	liter	0.08	0.22	0.02	0.07	0.06	0.19	0.21		
	Heavy Fuel Oil	tonne	18.75	46.67	8.80	28.04	32.14		129.95		
	Electricity	kwh	0.01	0.05	0.002	0.004	0.01	0.01			
	Natural Gas	1000 m3	14.06	28.33	6.67	9.35	24.29	64.87		86.61	108.10
	Coal	tonne	7.50	6.67	0.48	0.82	1.37			16.94	
	Thermal	Gcal	9.28	32.67	1.90	3.81	6.05	12.25		30.25	34.34
<b>Residential</b>											
	Electricity	kwh	0.03	0.03	0.002	0.003	0.004	0.01			
	Thermal	Gcal	2.47	6.67	0.32	0.45	0.34			1.15	1.09
	Coal	tonne								13.47	

Table 4. Lithuanian Exchange Rates and the Consumer Price Index.

Year	Month	Rubles /US\$			Lithuanian CPI	Inflation Adjustment Factor
1990		1.6			na	na
1991		1.8			na	na
1992	Jan	150			100	1
	Feb	107			180	1.8
	Mar	106			210	2.1
	Apr	140			260	2.6
	May	140			280	2.8
	Jun	138			300	3
	Jul	160			330	3.3
	Aug	162.4	Talonas	Talonas	430	4.3
	Sept	208.1	/Ruble	/US\$	480	4.8
	Oct	253.7	1	253.7	640	6.4
	Nov	259.8	1	259.8	740	7.4
	Dec	284.2	0.8	227.4	970	9.7
1993	Jan	344	0.8	275.2	1250	12.5

Sources, Exchange Rates: post 1991 Bank of Lithuania  
 Consumer Price Index: The Baltic Independent and the  
 Lithuanian Statistic and Welfare Department

Comment - As of first of month, for monthly values  
 - Using selling exchange rate, post 1991

Table 5. Energy Price Comparison for Lithuania and Russia, as of September 1, 1992 (in rubles and US dollars).

Fuel	Unit	In Rubles		In \$US	
		Lithuania	Russia	Lithuania	Russia
Naphtha	tonne	19,000	2,000	91.30	9.61
Natural Gas	1000 m3	13,500	1,300	64.87	6.25
Gasoline 76 oct	liter	32	6.8	0.15	0.03
Gasoline 92 oct	liter	40	7.8	0.19	0.04
Diesel	liter	27	6.0	0.13	0.03
Kerosine	tonne	25,750	330	123.74	1.59
LPG	tonne	26,500	4,100	127.34	19.70
Electricity	kwh	3.1	0.24	0.01	0.001

Table 6. Energy Price Comparison of Lithuanian Prices with Eastern Europe, OECD Europe and USA.

Sector	Fuel	Unit	Lithuanian Prices Sept 1992 US\$*	Belarussian Prices May 1992 US\$**	Czechoslova.. Prices Jan 1991 US\$	Romanian Prices Jan 1992 US\$	1991 OECD Prices US\$	1991 US Prices US\$
Transport								
	Gasoline	litre	0.19	0.04	0.66	0.25	0.86	0.29
	Diesel	litre	0.13	0.03	0.55	--	0.58	0.30
Industrial								
	Heavy Fuel Oil	tonne	129.95	13.43	156.48	129.84***	158.29	82.72
	Electricity	Kwh	0.01	0.01	0.022	0.0312	0.0638	0.0475
	Natural Gas	1000 m3	64.87	9.43	122.71	32.79	140.88	94.94
	Steam Coal	tonne	1.37	10.71	11.39	4.43	89.66	41.16
	Thermal	Gcal	12.25	3.86	0.90	1.44	29.76	--
Household								
	Electricity	Kwh	0.01	0.0026	0.0180	0.0036	0.1102	0.0856
	Thermal	Gcal	0.34	0.27	0.19	--	43.65	--

\* Using an exchange rate of 480 talonas/US\$, steam coal and industrial thermal prices of April 1992 and heavy fuel oil price of October, 1992

\*\* Using an exchange rate of 140 rubles/US\$.

\*\*\* January 1991 Price

**Appendix A**  
**Project Scope of Work**

## Scope of Work

1. The contractor will meet with USAID and World Bank officials to develop an understanding and approach to energy pricing issues.
2. The contractor will meet with key host country policy makers and experts concerned with market reforms and energy pricing policy.
3. The contractor will identify the key issues in petroleum price reform as they relate to the following criteria for product pricing in a market economy such as:
  - price impact on efficiency of energy use by consumers
  - price impact on variability and competitiveness of key economic sectors, particularly industry.
  - impact of large short-term fluctuation in world prices on the consumer
  - the extent to which pricing incorporates environmental impacts
  - prices as a resource mobilization mechanism for broader societal goals
  - reliance on market for price setting with limited government role (e.g. taxes and regulation).
4. The contractor will develop and conduct a training course on energy/petroleum pricing for key economic and energy officials.
5. The contractor will review existing models and modify existing or develop a model that would allow consideration of the foreign exchange, end-use consumption, revenue, capital investment, and environmental impacts of different petroleum import scenarios, refinery outputs, ex-refinery prices, petroleum product prices and structure, and vehicle emission standards.
6. Utilizing the model, the contractor will provide training on the model and work with counterparts to analyze different scenarios and consider issues related to the means and feasibility of implementation.
7. The contractor will recommend a program of short and longer-term studies related to price reform as input to national policy discussions and World Bank energy sector investment planning.