DSM in Eastern Europe: Key issues and recommendations

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1. SYNOPSIS

This paper reviews the prospects and opportunities for improving the efficiency and productivity of East European electric energy use. Some of the issues associated with transferring Western approaches to Eastern Europe in the area of least cost planning and demand-side management (DSM), and recommendations for improving assistance to Eastern Europe are identified.

2. ABSTRACT

This paper briefly reviews the state of electricity consumption in Eastern Europe, and suggests the need to re-evaluate the approach of the Western foreign aid to Eastern Europe in the area of electric energy efficiency. The approach used in the paper is a review of secondary documents summarizing North American and European approaches to energy efficiency in Eastern Europe, interviews with senior and mid-level Western and Eastern European energy experts as well as the insights and experiences of the author are relied upon to identify key issues and recommendations for providing assistance to Eastern Europe in least cost planning and DSM.

A terrible waste of energy resources exists in Eastern Europe. This is due to the biases inherent in centralized energy planning, which include the pricing of energy below market value and the omission of external costs associated with the use of solid fuels, and the mixing of social and market controls. This is also exacerbated by the need for hard currency from the exporting of basic raw materials to the West for hard currency. The result has been low productive processes, inefficient equipment stock, infrequent use of low cost/no cost energy efficiency and severe environmental externalities, especially for the industrial sector. A major question is how best can Western economies help the East in improving its heat supply and electrical energy, thereby reducing capital requirements in the years ahead. The inextricable relationship of electricity use and development, as born by earlier traditions, suggests that major capital investments can be eliminated or deferred with conscious programs to decouple energy use and development and to improve the efficiency of current energy producing assents. To do this successfully will require market restructuring, pricing reforms, legal reforms, management, capital and technical assistance.

The successful transfer of market, technical, and management know-how will require not just a simple transfer of what has been successful in the West, but bold, innovative thinking on how best to integrate traditional and new thinking on matters of markets, the role of activist government, the balancing of market and government regulation, improved intergovernmental thinking, and the science and practice of energy efficiency. The misconceptions and biases that Western economies have regarding what Eastern Europe needs, if left unchanged, will limit or doom the potential effectiveness of programs of both recipient and sponsoring countries disillusioned and frustrated. Such frequently stated biases will have to be reassessed, including: "all they need is private capital", "all they want is hardware technology", "they have had enough of comprehensive planning", "market reforms will take care of most of the problems", "we need to find export markets for western technology and consulting experts", "conservation and efficiency can't remove the need for new generation equipment comparable to western standards".

This paper argues that to overcome the many barriers that exist to Western investment into Eastern Europe there will be a need for more comprehensive and organized responses to the energy problems of Eastern Europe. Whether it is the desire to provide new power generation technology, improved transmission capability or DSM, they all must be viewed in the context of an integrated least cost planning framework, and recipient countries must be more aggressive on market reforms and improved cooperation of the various ministries. Infrastructure building, innovative private/public financing partnerships, legal system development, improved organization in approaching the energy needs of Eastern European countries, and improved

management systems are all required. This paper argues that the narrow exporting of capital and hardware by itself is of no value to Eastern Europe unless the requisite market, technical, legal, and management capabilities are also provided. However, again, this expertise must be provided in a least cost planning methods, rather than each technology in the supply, transmission and distribution chain being viewed as separate options. Western approaches to Eastern Europe should be evolutionary and adaptable. Both the substance and process of foreign assistance must be changed from the current approach.

A set of specific recommendations are provided regarding how to improve current Western economic support to Eastern Europe in the area of electricity infrastructure development. Special attention is devoted to least cost planning and demand-side management. A higher value strategic marketing approach that can improve the competitiveness of a nation's technology whether it is in the supply or demand-side is necessary. This framework should be both developmental and have parallel paths in addressing the plethora of market, energy and environmental problems that exist.

3. INTRODUCTION

A review of the literature on energy use in Eastern Europe and for individual former COMECON countries recognizes the following:

- A substantial amount of energy efficiency potential exists both in terms of heat supply and electricity. Yet for some reason much of this potential is being "leaped frogged" and more expensive equipment trade and development opportunities are being considered before less costly options are being incorporated

  - Energy savings of 30 - 50 % have been estimated in different East European country and sectors of each country

  - A significant amount of the energy savings will be from economic restructuring

  - Major sector end-use opportunities are motors, lighting, and compressors

  - There are also additional opportunities including new and retrofit combined heat and power (CHP).

In so far as the former Soviet Union is concerned, the potential for energy efficiency is substantial, with the largest potential residing in the energy and industrial sectors. The estimated energy efficiency benefits would result in a 37 % reduction in CO2, a 29 % reduction in CO, a 37 % reduction in CH4, and 36 % in NOX. An investment of 29 billion rubles would replace 175 million rubles in energy supply, and 35-50 billion rubles of pollution. Full implementation of a wide range of energy efficiency investments in Russia would result in the combined CO2 emission reductions by 200 million t of C in the year 2005 -- which is equivalent to the emissions of Italy and France.

A critical issue for many of the transitional economies of Eastern Europe is how best to realize this potential, in balance with upgrades in the energy producing sector.

Available secondary literature and personal experience identifies a number of major barriers to energy efficiency and DSM. These include:

- Excessive emphasis on centralized energy systems

- Capital shortages

- Deteriorating energy sector performance in the transitional period of market restructuring and economic development

- Increasing costs of unreliable power
- Limited analytical tools for systematically analyzing choices and trade-offs
- Artificially set energy prices not reflecting market value and externality costs
- Limited cooperation among the various ministries in East European countries, and a highly fragmented approach to energy planning
- Conflicting foreign aid programs for the energy sector.

Western economies supporting the economic and market transitions of Eastern Europe must reassess the approach they are taking and recognize that the best type of assistance may be strategic, economic, managerial, followed by hardware. Immediately jumping into expensive supply options without carefully evaluating comprehensively least cost planning opportunities can lead to a higher power supply bill than necessary and less capital to support other important economic and social improvements.

4. METHODOLOGY

The approach used in this paper involved reviewing United Nations, OECD, EC, USAID, various research papers, and interviews of directors and managers of energy efficiency centers in Eastern Europe. In addition the thoughts and insights of the author are also provided after meeting and visiting with many of the country energy and utility experts. The personal experience of the author is also selectively used as a basis of formulating the problem definition of this paper and in formulating the recommendations that follow.

5. RESULTS

To overcome the many barriers that exist and to improve the quality of foreign assistance to Eastern Europe, the following strategies and programs are recommended:

- An innovative approach to energy policymaking, planning and competition is needed for Eastern Europe. The overall management of the energy sector, the policy environment and institutional incentives should be considered. As the World Bank noted in a recent report, " poor performance (i.e., in the power sector) is not just the outcome of external factors..., but can be traced to institutional and human constraints affecting the organization. This bold, new thinking may require consideration of the following:

  - The potential for energy efficiency is quite large in eastern Europe. The real issue is what policies are needed to implement efficient sources of supply and demand. Standards for motor efficiency, industry energy intensity, appliance efficiency and heat losses are important considerations.

  - Excessive emphasis on centralized energy systems -A balanced mix of centralized and decentralized energy resources are necessary. Moderating the need for new generation with improving the productivity of existing investments should be considered. Reducing transmission and distribution losses and improving upstream power station availability are important opportunities. Moreover a new decentralized set of energy resources are needed, including CHP and smaller scale energy technologies

  - Public policies that clearly endorse and require least cost planning are essential, along with demonstrated practice of least cost planning so that such studies once

completed do not simply become reports which gather dust

- Rapidly transferring selected analytical tools for systematically analyzing choices and trade-offs -- this includes data and techniques for analyzing the cost-effectiveness of supply, transmission and distribution options. It seems ludicrous to embark on an aggressive program of all sector energy development when public and private capital is so limited. Much of the foreign aid of the West is developed with limited insight on the energy needs of recipient countries. Thus, embarking on clean coal programs, power plant life extension projects, and other energy development projects without a least cost planning method is more of a disservice than benefit.

- Limited cooperation among the various ministries -- As a precondition of foreign aid and grant approval, demonstrated cross-ministry interaction and collaboration is necessary, and demonstrated integrated energy and environmental energy policy-making should be required, as opposed to foreign aid programs exacerbating the ministerial rivalries and conflict. A new set of institutional alliances should permit the integration of management, finance, commercial and scientific innovation

- The entire approach to transferring market and technology in the energy and electricity industry needs to be reevaluated. Too much of the West's approach to energy problems contain the errors and omissions of their own energy planning which would best be forgotten, and not exported to Eastern Europe. Rather than unleashing the floodgates for open market competition in the energy sector, there is the need for a more deliberate, developmental approach that looks at markets and energy service value, thermodynamics, etc., and competitive positioning. Limited and controlled energy supply plans for selected energy resources may be more appropriate than open market competition across the various fuel sources, at least for the initial term. Government must address many of the immediate problems to energy efficiency. A partnership approach involving government, utilities, and the private sector is needed more than open, unconstrained market competition.

- Capital shortages -- if all of the foregoing recommendations were acted upon the severity of this issue will go away. More capital can and will be made available as energy prices increase, more rational planning activity is underway and as the government becomes more active in regulation, taxation and finance. An energy service industry with abundant capital will not be created unless a more active government role occurs. Without active government leadership, traditional forms of doing business will emerge. Such innovative capital funding mechanisms are needed as shared savings and performance contracting. These new forms of capital will not simply be created unless there is a strong role of government to help create new marketing mechanisms for energy efficiency during this transition period and recognize that market-based prices will only take go so far. A critical balance between market and government induced energy and environmental action programs will be needed.

- Deteriorating energy sector performance in the transitional period -- The transition to a market economy will likely increase energy intensity as certain loads are eliminated and the more intensive loads are retained at least in the short-term, for exportable goods to obtain a more favorable balance of trade. In this case demonstration and pilot programs are needed that just don't provide energy consultancy advice, but also provide the economic and technical wherewithal to make needed improvements.

- Increasing costs of unreliable power. Reliable power comes at a price. There will be a need to balance the cost of unserved power with the cost of power system upgrades. Diversifying power sources, reducing transmission losses, increasing redundancy and backup in transmission and distribution, are important. Using smaller scale generation which provide both heat and power should also be considered as well as the general

strategy of diversifying power supplies.

- Artificially set energy prices not reflecting market value and externality costs -- an immediate program of price reform is necessary so that the cost of power eventually reflects its marginal costs and externality costs. Recipient governments need to be undeterred in their commitment and support in incorporating marginal-cost based tariffs. Improving the tariff design of power systems will also improve the financial and investment quality of the power systems.

- Training, technical assistance and demonstration projects are needed, particularly in the area of infrastructure development, technical assistance, least cost planning, demand-side management, and the use of analytical techniques that, if properly applied, can held reduce the tremendous energy sector upgrade costs and power bill to major energy users. Pilot programs in energy services, including shared savings, and third party financing are needed. The US-supported Energy Center in Prague is aggressively supporting the development of an energy service contractors in the Czech Republic. This is countered with an EC supported technology transfer program (i.e., the OPET network) that creates energy technology transfer centers in many of the former Soviet member states, coupled with a rapid deployment of technology transfer in Eastern Europe using Western European technology. A balanced program of low cost/no cost easily installable measures with more capital intensive measures are also needed. Progress is being made with both EC and USAID providing infrastructure and technical assistance to Eastern Europe. The EC's program seems to be much more substantial and developed both in terms of economic aid and the framework employed. US foreign aid to Eastern Europe is still being sorted out. One success has been the creation of energy centers in Moscow, Prague and Warsaw that is focusing institutional reform and data bases helping to promote private capital investment. However, more collaborative programs could be developed involving each country's foreign aid programs. It would also appear that more aggressive program planning is needed and that each of the centers need to devote much more attention to promoting least cost planning principles to the governments in the host countries because of the deep resistance to change. However, much more progress is needed in terms of transferring analytical approaches to least cost planning and DSM to Eastern Europe. Western companies and governments should recognize the potential for significant improvements in energy use and environmental improvement without energy service sacrifices in Eastern Europe.

- Western governments need to recognize that investments in energy efficiency and environmental improvement in Eastern Europe should qualify as suitable offset investments in a host country. This endorsement alone could dramatically increase foreign investment in Eastern Europe, and save expensive investments in the West, plus transfer needed technology and expertise to Eastern Europe.

A recent OECD conference and paper polled participants regarding high priority areas for technical assistance. The major areas identified included: providing analytical methodologies, strengthening the capacity of government administration, promoting energy and environmental demonstration projects, and the optimization of resource use and the introduction of DSM for the energy industry. Hopefully this view will be embraced more in the years ahead.

6. CONCLUSIONS

The earlier sections of this paper recognized the potential and strategic value of DSM to Eastern Europe. The energy efficiency needs of Eastern Europe were also noted to not only appear as technology requirements, but also know-how in legal, institutional, management, and financial/capital. Thus, based on the earlier discussed general issues, a question arises regarding how least cost planning and DSM can have increased support and how best transitional East European countries can leverage the support that the West

has to offer. The following approach is recommended for improving Western economy support for Eastern Europe:

First, Western economies need to help with pricing and economic reform in terms of how energy prices are set. A steady transition to marginal cost-based pricing should be undertaken. To do this, careful identification of the current short-run and long-run power supply costs are needed and the estimation of alternative power supply costs are needed. The EC is in the process of initiating marginal cost pricing studies in the former Soviet state.

Second, assistance in identifying the necessary legal, regulatory and cooperative mechanisms in the energy sector are needed. Emphasis should be placed on collaboration versus competition, initially. Competition should occur in more mature markets, possibly later as reforms begin to take hold. A formal recognition of and requirement that least cost planning be completed and that all new major power supply options should be carefully screened using cost-effectiveness criteria commonly used by Western utilities. East European governments must make energy policies and laws that communicate its resolve in promoting least cost planning and energy efficiency. Suitable enforcement power will be required. Careful consideration of the appropriate regulatory/oversight mechanisms will be required. US foreign aid approaches have emphasized this approach.

Third, a balance of supply and demand-side resources should be supported, consistent with tariff reform. This will mean that more attention is needed to developing sufficient data on the potential for DSM and the cost of DSM so that these resources can be evaluated accordingly. The development of creative marketing mechanisms should be considered. This may include the creation of a DSM service centers, a utility research and development center on energy efficiency, improved forecasting of future energy requirements, a program that encourages twinning or cross management training with counterparts in Western economies, the aggressive introduction of pilot DSM programs using alternative marketing and delivery techniques for different customer segments. This experience is sorely needed in Eastern Europe.

Fourth, improved metering commensurate with the better rationalized tariffs are critical. There will be a need to search for lower cost metering technology, not just for tariffs but also for improved end-use metering to better understand the dynamic load patterns that exist and how they respond to pricing.

Fifth, there is a need to create prioritized markets for trade and development. Market profiles for energy supply and demand-side trade opportunities are needed. Opportunities also for manufacturing energy technologies should be identified. Supply and demand-side equipment suppliers should support a least cost planning framework and even be advocates for such a framework in order to strategically position their products and services.

Sixth, an aggressive training program is needed for utility management. Training on the techniques of tariff design, marginal costing principles, integrated resource planning, DSM, marketing, evaluation, and training the trainers is needed. This should be done through exchange programs and also by creating partner energy technology, policy, and management curriculums in colleges and universities.

Seventh, improved data collection on energy balances, options, markets and costs are needed and should be carefully designed and collected. Comparative indicators of costs, reliability, market share, market potential of DSM resources and other important information should be collected

Eighth, pilot programs on how best to market DSM resources should be undertaken. A better understanding of end-user decision-making, educational requirements, financial considerations, the performance and transferability of technologies are needed.

Ninth, energy efficiencies and demand-side management priorities need to be specified and communicated broadly.

Tenth, an aggressive commitment to results is needed. Rather than find reasons why certain changes or ways of improving things cannot be implemented, or rather than simply going through the motions and then

lapse into the old way of doing things, there is a need for political leadership, and energy industry leadership to make undeterred progress. This will take time, and some initial success stories will be required. A conscious marketing effort to political leaders, utility industry management, and other energy technology suppliers will be needed. The importance of this activity will increase as progress is made on the earlier elements of the items listed above are completed.

Yes, some limited progress have been made in terms of transferring soft and hard technology from the Western economies to Eastern Europe in the areas of energy efficiency and DSM. Much more progress remains. Prior research by the U.S. Department of Commerce has recognized that the US power technology industry is at a disadvantage is some areas of eastern Europe such as Hungary. Branching out and expanding export products and services in newer developments of the power technology industry including efficient energy technologies will be beneficial such as the areas of environmental controls and end-use technology measures. The US government must recognize this and give comparable support to demand-side as well as supply-side measures. Innovative and cooperative approaches will have higher payoffs for a nation's industry than individualistic and fragmented ones. Also, those of us from the West, will probably grow and learn more about our own biases and limitations, and hopefully, grow accordingly as we support our colleagues in Eastern Europe. Much work remains and the future awaits.

ACKNOWLEDGEMENTS

The author would like to thank the reviewers of this paper for their constructive comments and for the time devoted by Eastern European experts in providing the author useful information regarding Western assistance for energy efficiency and DSM in Eastern Europe.

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