Contributions to Mongolia's Sustainable Energy Strategy

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Forward

This publication represents an important contribution to ongoing discussions on Mongolia's vital energy sector. Energy loans account for nearly half of Mongolia's international debt. Financial sustainability is a growing concern. An efficient energy sector involves much more than simply state – of – the – art engineering. It also entails effective management and a detailed understanding of the full range of economic and financial issues involved.

Government of Mongolia approval of an energy sector strategy in July 2002 marks an important step on the path towards a more efficient and sustainable energy sector. The process involved a range of consultations with Mongolian stakeholders as well as with many international donors. Most importantly, the strategy affirms the importance of financial sustainability, commercialization and market – based approaches to energy development.

The US Agency for International Development (USAID) is pleased to have played a supportive role in developing the Mongolian energy strategy. Over the last decade, approximately half of our more than $ 100 million in grant support for Mongolia has been devoted to energy. Early programs focused on infrastructure improvements and emergency energy supply. More recently, the emphasis has shifted decisively toward long – term sustainability. This shift reflects an explicit understanding that an efficient and effective energy sector can make a vital contribution toward Mongolia's long term development prospects. It has also involved USAID directly in first helping to develop a legal and regulatory framework and then supporting energy restructuring as well as a more commercial approach to Mongolia's energy sector development.

The appendix to this volume includes a series of USAID – funded background studies and documents that were used to Mongolia in the preparation of its energy sector strategy. The intent is to enhance dialogue and increase understanding among the Mongolian public as well as interested foreign observers on the challenges and opportunities facing Mongolia's energy sector. In addition, we hope these contributions will increase awareness about the seriousness of the issues involved and the important impact that they will have on Mongolia's future development. Some of the analysis is perhaps unique to Mongolia. Other elements of the discussion will almost certainly be relevant for other countries, especially those making a similar transition from a centrally planned to a market economy.

Much of the legal and regulatory framework for an effective energy sector is now in place. Similarly, key sections of the Mongolian energy sector that refer to financial sustainability, commercialization and privatization provide a useful framework for making substantial progress in the months and years ahead. At this point, the central challenge is to move beyond the laws, rules, regulations and policy pronouncements and effectively implement a strategy that will benefit all Mongolians.

Jonathan Addleton
Mission Director
United States Agency for International Development
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Acknowledgements

This document is based on the papers that led to Mongolia's Sustainable Energy Sector Strategy. The strategy has evolved from a series of public meetings at which a wide range of Government of Mongolia agencies, non-governmental organizations, international donors, and the private sector participated during 2001 – 2002. As a result, a considerable number of individuals have provided input and/or had direct involvement in the preparation of papers and the discussion of issues. To all named and un-named participants, the editors would like to extend their appreciation.

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Jim Rizer and Garry Vollans

DAI Development Alternatives, Inc.

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Executive Summary

Following the May 2001 Consultative Group meeting in Paris, the Ministry of Infrastructure (MOI) of the Government of Mongolia (GOM), was charged with developing an energy strategy. The Economic Policy Support Project (EPSP) of US Agency for International Development (USAID) was given the task of supporting MOI in this effort. To solicit inputs and comments from the international community and other interested parties during the policy formulation phase, a number of papers on particular issues were presented at the Energy Workshop of December 10-11, 2001, and the Energy Conference of March 28-29, 2002. As a result of these efforts, Mongolia's Sustainable Energy Sector Strategy was developed and approved by Cabinet on 4 July 2002.

The appendix to this report contains all the papers prepared during this policy formulation phase for which USAID/DAI provided input, either as direct authors, in full or in part, or as editors and advisors. This set of papers is interesting in its own right as a historical perspective on the current state of the Mongolian energy sector. More importantly, the papers help identify the specific issues and constraints that must be addressed in developing an energy strategy appropriate to Mongolia and its current state of development.

Based on these papers, this report discusses the Sustainable Energy Sector Strategy in the context of the issues raised by the papers. Specifically, Chapter 3 provides an overview of the energy sector in Mongolia, including resources and potential. Chapter 4 presents key financial constraints facing the sector. Chapter 5 provides the framework for the restructuring processes that are either underway or planned. Chapters 6 and 7 highlight some of the social issues and energy efficiency and conservation initiatives that respectively constrain policy implementation or provide opportunities to improve the overall effectiveness of the energy system. Chapter 8 indicates some of the major capacity building requirements from both a human and capital resources perspective. Lastly, Chapter 9 summarizes the key issues and priorities for the energy strategy implementation process.

The GOM Sustainable Energy Sector Strategy (included as Chapter 2) is medium term (to 2010) and based on five principles:

- **Financial sustainability**
- **Restructuring** (to a market-based system)
- **Access** (to energy products and services)
- **Energy conservation**
- **Institutional capacity building**

The five principles are further disaggregated into objectives and actions to be taken. The strategy represents an evolutionary step by providing a comprehensive development program to 2010, and is in marked contrast to earlier sector documents that were essentially a collection of project proposals. Having stated these positive broad policy goals, it should also be acknowledged that GOM has had some problems enacting specific actions that would have greatly furthered sector restructuring and progress towards financial sustainability.

As noted, the GOM energy sector strategy includes a number of objectives and actions to be taken. A summary of issues and conclusions drawn from the papers and discussions are presented below. More detailed commentary including specific time periods, are provided in the conclusion. Many of the conclusions and analyses are in agreement with those stated in the GOM energy sector strategy. However, because there have been problems implementing concrete actions, attention has also been given to prioritizing actions—and emphasis has been given to highlight those that are considered essential to removing barriers to the sector's continued transformation.

Financial Sustainability

The energy sector has to contribute to economic development without continuing as a financial drain on the central budget—this is a principle of the strategy. Especially important is the effort to limit the accumulation of new debts—that is, **current bills have to be paid**. This is a high priority that is linked to all the other energy strategy objectives, and should be undertaken immediately. Unless the GOM demonstrates an early and determined effort to prevent the accumulation of new debts based on current bills, other objectives will lack credibility. Past debts can be subject to negotiation but henceforth, all current deliveries ought to be paid for on standard terms. Unless this issue is resolved, commercialisation will be retarded; energy sector privatization initiatives (both for existing assets and new investments) will not advance; any tariff increases will be resisted; energy efficiency initiatives will lack credibility; and, financial sustainability will be virtually unattainable. In addition to this effort, other actions are needed:

- **Resolve Inter-company Arrears**
  This action is being negotiated—however, negotiations began in 2001 and have yet to be finalized.
- **Increase Bill Collections**
  Again, discussions have been held but comprehensive steps have not been put in place and should begin immediately.
- **Reduce Technical and Non-technical Losses**
  Programs have been initiated to address losses, and these should be given priority support within the sector.

- **Improve Tariffs**
  To date, a transparent full cost-recovery tariff setting process has not been institutionalized—and it needs to be immediately undertaken.
- **Upgrade Management of International Loans**
  Management of international loans including the handling of currency exchange rates, needs to be improved in the near term.

Restructuring

This strategy principle includes energy sector corporatization, commercialization, and privatization, as well as the corresponding regulatory framework and tariffs. Actions needed include:

- **Complete Corporatization and Commercialization**
  The energy entities have not been fully commercialized, and completion of these efforts should not be delayed.
- **Privatize**
  The energy entities need to operate as private companies, and this requires commitment to energy sector reform.

Energy Access and Affordability

This strategy principle indicates that the energy strategy should take account of social issues such as providing energy products and services to rural and low income consumers. This strategy pillar is a social policy issue and not the responsibility solely of the energy sector. In order to address these social policy issues, a framework needs to be established including the following steps:

- **Identify and Evaluate Subsidy Requirements**
  As discussed in the document, policies and programs should be based on a clear identification of the needs of specific target populations. Broad subsidies and untargeted programs will only waste money, and not yield satisfactory results.
- **Determine Priority Projects/Programs**
  Based on the assessments of target populations, projects and programs need to be prioritized based on available sustainable resources. International funding may provide initial support but has limited duration. This is acceptable for subsidies that will be phased out but not for continuing social welfare programs that are tied to scarce budgetary resources.

Energy Conservation

This strategy principle attempts to accelerate the implementation of energy conservation and efficiency measures throughout the energy system from sources of energy to the ultimate consumer. Needed actions include:

- Pass the Energy Conservation Law. This is anticipated to be completed in 2002.
- Establish the National Energy Management Program (NEMP)
- Determine Priority Projects/Programs.

Institutional Capacity Building

This strategy principle acknowledges the need to acquire and disseminate the skills and knowledge required to implement the other pillars while enhancing financial and energy decision making capabilities at the policy level. Key identified actions include:

- Upgrade Analyses of Proposed Projects/Programs. This should begin immediately.
- Rationalize Functions and Staffing. Focused should be on upgrading performance and ultimately reducing costs.
- Identify Current and Long-term Training Requirements.

Other Issues

In addition to the above actions that are based on the strategy's five principles, there are other priority issues that link several of the pillars. These include:

1) Targets and Follow-up Reports

GOM should determine specific targets (milestones) for each energy strategy objective and annually report to Cabinet on the status of these targets.

2) Public Education

For a range of issues—from tariff changes to energy conservation and efficiency measures, consumers in a market-based system require good sources of accurate information.

3) International Co-ordination

Numerous potential benefits for Mongolia have been identified from possible co-operative energy development and transport initiatives with neighbouring countries. These should be explored when appropriate.

GOM has developed its Sustainable Energy Sector Strategy in order to provide a comprehensive roadmap for the future. Importantly, the strategy articulates the need for the sector to become a much better manager of its resources—including financial and human. Implicit to the strategy is the broad goal that the sector becomes a dynamic force in the economy, instead of one that siphons off resources that are much needed elsewhere. The opportunity costs of continuing budgetary support for an over-staffed and non-rationalized energy sector are tremendous: Tugriks spent on energy by GOM cannot be allocated to health, education, poverty alleviation, and the overall development of the economy.

This means that difficult decisions have to be made regarding fiscal allocations, international borrowing, staffing, general operations, and timetables for implementation. Significantly, implementation timetables have to become more than vague goals—they have to be followed or, if revised, justified. As an example, all segments of the sector have known that bill collections have to be improved, yet there appear to be few concrete results even after several years—current bills are not being collected let alone past due ones. Simply, if the sector continues in a "business as usual" mode, it will jeopardize broader national development goals to transform the economy into a market-based system. There is a need for commitment and leadership to meet these challenges.

1.0. Introduction

Energy has a vital role in economic and social development—it provides lighting in classrooms, refrigeration for medicines in hospitals, and heating for homes. When electricity and fuels are efficiently available at reasonable prices, most people take energy for granted—and forget that it has a central role in business operations, government and their daily lives. But if the last three decades are any guide, when there are rapid energy price increases such as oil price shocks, the world then rediscovers the importance of energy as it finds itself stumbling into an economic recession. The vulnerability of Mongolia’s economy and energy sector to external shocks—which it was not exposed to during its socialist period, sets an important parameter for future development. Other parameters for the energy sector include its financial viability, energy efficiency and conservation, and access to energy for various income groups.

This energy volume,*Contributions to Mongolia’s Sustainable Energy Strategy,* provides an overview of the United States Agency for International Development support for efforts by the Government of Mongolia (GOM) to transform its energy sector from centrally planned non-market operations to a market-based system that encourages private enterprise, initiative and meeting consumer needs. In 2002, GOM developed and approved its Sustainable Energy Sector Strategy—the first sector in Mongolia to develop a strategy, and one that is focused on changing the sector from being a drain on the national economy to one that will become a dynamic engine of growth.

This introductory chapter presents sections on the socioeconomic characteristics of Mongolia, the purpose and background to the report, and the organization of the report.

1.1. Socioeconomic characteristics of Mongolia

Mongolia is a land-locked country in central Asia, with a total land area of 1,564 thousand square kilometers—the seventeenth largest country in the world. Its northern border with Russia is 3,485 kilometers and its southern border with China is 4,677 kilometers. Mongolia is 2,392 kilometers from east to west, and 1,259 kilometers from north to south. The country is known for its steppes and the Gobi desert, but it also includes numerous mountainous areas, rivers and lakes. The average altitude is 1,580 meters above sea level. An important feature of the country is that it has continental weather patterns and four seasons, including winters with temperatures that often fall below C –30.

Mongolia is divided into 21 aimags (provinces), and a further 334 soums (counties). Ulaanbaatar is the national capital, and had a population of 786,000 at the end of 2000.

The national population totaled 2.41 million, with 57 percent living in urban areas and 43 percent in rural areas. Population average annual growth rates have been below 1.5 percent since 1995 but there has been a net loss in rural areas.

Since the collapse of the Soviet Union and COMECON in 1990 (withdrawn Soviet assistance was equivalent to 30 percent of GDP), Mongolia has been faced with restructuring and transforming its previously centrally planned economy into one that is market-based and private sector driven. This formidable task has been met with commitment to change and the results have been impressive. Real (1995 prices) GDP ($1.04 billion in 2000) annual growth rates varied from 2.4 to 4.0 percent during the last half of the 1990s, despite the effects of the 1997-1998 Asian Financial and the Russian Banking Crises. Growth slowed in 2000 and 2001 to 1.1 and an estimated 1.4 percent respectively, largely because of the harsh winters and the intervening drought that resulted in huge livestock losses in the agricultural sector. With an economy that is highly concentrated in export mining (copper, gold and minerals account for roughly 40 percent of exports) and livestock raising and cashmere production (cashmere and other textiles account for approximately 41 percent of total exports), it is obvious that the loss of nearly 20 percent of the assets (livestock) in a key sector over the last two years, would have major negative impacts. The energy sector accounts for roughly 3 percent of GDP, and because of its inefficiencies drains resources away from other economic activities. .

Exports totaled an estimated $533 million in 2000, and imports totaled $679 million. However, the trade deficit has been increasing. Positively, inflation has slowed from 45 percent in 1997 to 8.6 percent by the end of 2000. Although there has been some currency depreciation, it was only 2.3 percent against the US dollar in 2000—far less than for many Asian neighbors. There has also been a positive downward trend in the Bank of Mongolia loan rates (to 8.6 percent at the end of 2000), but commercial lending rates have fallen more slowly and are still over 20 percent.

An important factor in the growth and transformation of the economy over the last decade has been the impact of external assistance, including loans. Public guaranteed external debt totaled an estimated $908 million at the end of 2000, and it has since risen to nearly $1 billion—nearly 100 percent of GDP. Although many of the foreign loans are on concessionary terms (grace periods of 5 to 10 years, and interest rates of 1 to 1.5 percent per annum), the heavy reliance on and high levels of external debt means that there will be limits placed on the Government's ability to borrow over the next decade. In very simple terms, if the economy grows at 7 to 9 percent per year over the next decade, then it would be possible to maintain the recent rate of borrowing. If economic growth is slower, and this is the more realistic scenario, then it will have to restrict borrowing for priority projects. By the end of 2001, the energy sector accounted for roughly $400 million of the total external debt—and, this may not fully reflect all loans to all components of the energy sector.

However, there are other financing options including the conversion of external debt to equity in assets that can be partially or totally privatized. Government has established a set of privatization guidelines for 2001-2004, and has also developed a privatization program for 2001-02. The 2001-02 program includes a list of 27 state owned enterprises and 66 facilities that are to be privatized. In addition, the 2001-02 program includes 25 organizations that are to be restructured. The list of state owned enterprises and facilities includes many from the energy sector, such as power plants, power transmission and distribution networks, and coal mines. This assumes that the proceeds from the sales of partial or total equity in these assets could then be used to decrease the level of external debt.

The Government's budget as a percent of GDP is indicated in Table 1-1. As the table shows, revenues have been increasing in recent years, reflecting Government's efforts to increase tax collections. Expenditures including net lending, have also been increasing. Although there have been improvements in the current balance and reduced levels of deficit in the overall balance, it is possible that the respective balances could move in negative directions because of the current global economic downturn. Government has attempted to pursue prudent fiscal policy but the combined effects of the recent harsh winters and the slowing global and (Asian) regional economies will negatively impact the domestic economy including projected levels of tax receipts and other revenue generating measures.

Table 1-1. Key Components of the General Budget, 1997-2001 (as a percent of GDP)

	1997	1998	1999	2000 (prl.)	2001(est.)
Total Revenue and Grants	25.8	27.6	27.2	33.6	33.6
Current Revenue	24.7	26.5	26.5	33.2	33.1
Total Expend. and Net Lending	34.5	41.9	39.2	40.4	41.1
Current Expenditure	23.1	27.2	26.7	30.2	30.6
Current Balance	1.6	-0.7	-0.2	3.0	2.6
Overall Balance	-9.2	-14.3	-12.0	-6.8	-7.4

Source: The Government's Medium Term Strategy and Policies to Deepen Economic Reform and Restructuring, May 2001.

Poverty is an important issue. Transforming the economy from one that was centrally planned to one that is market-based within the relatively short span of a decade has led to some social dislocation. There are several important characteristics: 1) a considerable portion of the rural population is employed in herding and vulnerable to natural disasters such as the recent harsh winters; 2) although registered unemployment approximates 7 percent, unofficial estimates suggest that real unemployment levels could approximate 18 to 20 percent; and, 3) GDP per capita is roughly $400-450. Taken collectively, these characteristics verify estimates that there is a substantial share of the total population living below the poverty line—36 percent nationally, with 39.4 percent of the total population in urban areas and 32.6 percent of the total population in rural areas.

It is essential that the energy sector rapidly becomes more efficient and self-sustaining so that its subsidies and grants from Government can be reallocated to other initiatives that facilitate economic and employment growth, and thus assist all Mongolians, including those living below the poverty line.

From the above, it is obvious that Government has successfully undertaken many of the essential steps to transforming the economy. However, Mongolia has a small population base and a limited domestic market, it is dependent on a narrow range of exports, and it is subjected to natural disasters. All of these characteristics point to the economy's vulnerability to global and natural events that are beyond Government's control. Recognizing this level of vulnerability requires adopting measures such as prudent fiscal and borrowing policies, to reduce exposure and potentially negative impacts.

Finally, it can be noted that aside from the prospect of privatizing assets, the economy could benefit from other potential opportunities. During 2001, an oil field containing an estimated 300-500 million barrels has been located and, while current production is only 1000 barrels per day, could result in a major increase in Government revenues. Also in 2001, a large (750 million tons) copper deposit with very attractive grades of copper and gold has been discovered. Again, this could provide Government with additional revenue, employment creation, and foreign exchange earnings. Mongolia has a number of resources that can be developed, and these will further assist transforming the economy.

Importantly, a number of these potential developments could become major consumers of energy. Copper mining and its associated processing of the ore into exportable copper concentrate or bars, is an energy intensive industry. There are prospects for the development of additional gold mines that would also consume considerable energy. Thus, the energy sector has to be prepared to seize the opportunities.

1.2. Purpose of and background to the report

The Government of Mongolia (GOM) and the donor community have both recognized the need for the energy sector to rationalize programs, projects, and other activities. As a result, stakeholder meetings were held in December 2001 and March 2002 to discuss issues and options. A specific task has been the development of a Sustainable Energy Sector Strategy that was presented as a draft at the March 2002 meeting. Based on reviews of the strategy, GOM revised and submitted the strategy to Cabinet. Cabinet granted approval of the strategy on 4 July 2002.

The United States Agency for International Development (USAID) played a key role in providing technical assistance for the two meetings as well for other efforts to restructure and transform the energy sector. This report includes various papers provided under USAID technical assistance to GOM.

Importantly, this report provides a vehicle to summarize the issues that have been or need to be addressed as part of the restructuring process. As such, the report is a reference and benchmark for GOM and the donor community—it highlights what has been done, and what problems or barriers remain. Solutions, where applicable, are also discussed. Thus, the report enables an understanding of how and why the Sustainable Energy Sector Strategy evolved, and a context for what it attempts to accomplish.

The Sustainable Energy Sector Strategy is the first sector strategy presented by GOM. It was recognized as such and well-received at the Consultative Group Meeting (all donors and GOM) in July 2002. As with all strategies, the Sustainable Energy Sector Strategy is evolving—it will be adapted and adjusted over time. But it provides both a direction and a framework for the sector's transformation. This report serves as a accompanying document to the strategy.

1.3. Organization of the report

As noted above, this report includes the technical assistance provided by USAID in the development of GOM's Sustainable Energy Sector Strategy. Nearly all of the papers presented in the appendices were either authored, co-authored, or edited by USAID-supported consultants under the Economic Policy Support Project managed by Development Alternatives, Inc.

In addition to USAID-supported technical assistance, there are several other papers that were presented at the March 2002 Donors' Conference that were authored by representatives from other agencies. These papers have been included because of their relevance to specific topics.

The report is organized as follows:

- Chapter 1: Introduction (as above)
- Chapter 2: Mongolia's Sustainable Energy Sector Strategy
- Chapter 3: Energy Supply and Demand

- Chapter 4: Financial Sustainability
- Chapter 5: Energy Sector Restructuring
- Chapter 6: Energy Access and Affordability
- Chapter 7: Energy Conservation and Energy Efficiency
- Chapter 8: Capacity Building
- Chapter 9: Summary and Conclusion: Priorities For Implementation
- Appendixes: Papers organized under the headings of the Chapter 4 through 8

MAP OF MONGOLIAN POWER SYSTEMS

2.0. Sustainable energy sector strategy

Presented below is Mongolia's Sustainable Energy Sector Strategy, prepared by the MOI and approved by Cabinet on 4 July 2002.

MONGOLIA'S STRATEGY FOR SUSTAINABLE DEVELOPMENT OF THE ENERGY SECTOR (2002-2010)

1. Background, Coverage and Implementation Duration of the Strategy

The aim of the "Mongolia's Strategy for Sustainable Development of the Energy Sector: 2002-2010" is to provide sustainable development of the energy sector, reduce the poverty and increase the involvement of the private sector and public interest in the sector by improving effectiveness of the energy supply. It also aims to promote economical efficiency in the energy sector and improve environmental conditions by introducing new technological achievements based on regional energy sector collaboration.

1.1. Background

"Mongolia's Strategy for Sustainable Development of the Energy Sector: 2002-2010" covers the measurements to be implemented in the energy sector during near and middle terms and the Government of Mongolia shall follow this document for guidance of the strategies to be implemented in the energy sector.

1.2. Coverage of the strategy

The implementation of the Strategy shall be organized by the State Central Administrative Authority in charge of energy based on collaboration between the Government of Mongolia, international financial organizations, donors, local and international non-government organizations and energy sector entities.

1.3. Basic principles of the strategy

"Mongolia's Strategy for Sustainable Development of the Energy Sector: 2002-2010" shall be based on 5 main principles:

- To provide a stable and independent financial system for the energy sector

- To complete implementation of the energy sector restructuring
- To improve energy conservation and efficiency
- To improve capacity building within the energy sector
- To improve energy supply in rural areas and introduce price and tariff mechanisms reflecting the payment ability of the consumers.

1.4. Implementing duration of the strategy

"Mongolia's Strategy for Sustainable Development of the Energy Sector: 2002-2010" shall be implemented for near and mid term or from 2002 to 2010.

2. The Objective of the Strategy and Criteria for the Implementation

The objective of the "Mongolia's Strategy for Sustainable Development of the Energy Sector: 2002-2010" is to insure the sustainable development of the energy sector and promote establishment of an independent energy sector.

Criteria for the strategy implementation

- Provision of an independent, viable and self-financing energy sector, with capability to insure financial independent operation of the energy sector State owned entities, with resolution of the old debt and receivables and elimination of international loans and their interest burden.
- Full implementation of the energy sector restructuring process, establishment of an energy sector regulatory framework suitable in a market economy system, and promote the possibility for providing service in the energy market by highly effective and competitive entities after involving private sector investment based entities and local and international companies into the energy market. Further to carry out privatization of selected energy sector State owned entities under certain criteria.
- The provision of the necessary legal framework for the improvement of energy conservation and efficiency shall allow implementation of energy conservation projects in order to insure the public receives the benefits from energy conservation efficiency. The energy entities will begin transition to the private sector with increased involvement of the private sector in the energy sector.
- The improvement of capacity building to develop policies at the regulatory level with increased operational capacity of the energy generation that is suitable to market economy requirements by improving energy sector structural capacity.
- Improvement of rural energy supply and wider utilization of renewable energy sources with the opportunity of equal energy supply for the low-income part of the population by introducing price and tariff mechanism that reflects payment capability of the public.

3. Measures to be Undertaken for the Implementation of the Strategy

Build an independent, viable and self-financing energy sector

Objective 1. Create a stable and viable financial system of the energy sector to promote the improvement of the capability for the energy sector State-owned entities to operate independently in a market economy. A system of financial responsibility between energy entities and consumers will allow reduction of financial burden to the state budget with an independent and self-financing energy sector.

Actions to be taken

1.1. Borrowing capacity of the Government shall be calculated realistically and new investment shall be brought to the energy sector based on a accurate calculation of loan efficiency;

1.2. Rehabilitation and investment projects of the energy sector shall be implemented based on calculation of the return on the investment;

1.3. Issue of a financial source necessary for the new projects in the energy sector shall be resolved by involving private investment;

1.4. To resolve the debt issues between energy sector power plants, coal mines, distribution companies and consumers by introducing appropriate mechanisms for debt resolution;

1.5. Presentation of a mechanism to operate the sector by eliminating undue losses;

- Implementation of adequate policy on price and tariff
- Improvement of the tariff methodology
- Introduction of a load mechanism based on total production cost
- Introduction of a price and tariff mechanism to cover costs
- Commercialization

1.5.1. Improvement of revenue collection
  - Metering
  - Improving the collection system

1.5.2. Reduction of losses
  - To improve the technical efficiency to reduce the current distribution loss of 33% to 15%.

1.5.3. Debt resolution between the entities

Implementation for Restructuring of the Energy Sector

Objective 2. To intensify the restructuring process in the energy sector, establish an independent regulatory environment in the energy market, and to undertake measurements for privatization under certain phases by improving the necessary regulatory environment required for commercialization.

Actions to be taken

2.1. Unbundling according to system operations
- Restructuring the energy sector state-owned entities into independent companies

2.2. Commercialization of the State-owned companies of the energy sector
- To introduce internationally accepted accounting standards and to carry out regular audits
- To implement Management Information Systems
- To improve budget creation of the companies and to operate in compliance with these budgets
- To improve the metering equipment within the Distribution Networks
- To introduce an advanced system of billing and collections for the Distribution Networks
- To introduce an accurate Financial Information System
- To introduce "best practices" for Modeling and Planning
- To improve the legal framework between companies (Law on Investment, Labor Law, Law on Contracts, Law on Dispute Resolution and Law on Nature etc.)

2.3. Privatization of the energy sector companies under certain steps
- To study the privatization experience of other countries with transitional economies
- To develop the Privatization Strategy of the energy sector, structure the privatization process (including the complex issues of legal, regulatory and operations) and duration for the implementation of the strategy
- To carry out the privatization with alternatives under defined steps; including management contracts, open auctions, and trading of shares at the stock exchange.

Improvement of Energy Conservation and Efficiency

Objective 3. Energy conservation, including reduction of air pollution and emission of green house gases. Approval and implementation of the National Energy Conservation Program and improvement of energy efficiency.

3.1 To improve energy efficiency and establish a legal framework for energy conservation
- To approve the Law on Energy
- To approve and implement a National Program for Energy Conservation
- To expand and improve Electric Transmission and Distribution Networks
- To improve efficiency of the heat stations and heat-only boilers and carry out necessary rehabilitation work

- To reduce air pollution by improving stoves in cities and urban establishments
- To make efficiency the priority consideration in licensing and approval of tariffs

3.2. To increase the use of energy by improving energy efficiency
- To support ESCOs and introduce energy saving performance contracts
- To introduce efficient heat-only boilers, electronic equipment and engines

3.3. To reduce air pollution
- To replace diesel generators in soums
- To introduce new types of fuels on a wide scale: LPG, coalbed methane, charcoal, coal briquettes, and coke

Institutional Capacity Building in the Energy Sector

Objective 4. Institutional capacity building to support the transition of the energy sector to a market-based one, to improve regulatory and policy-making capacity of the sector and to create highly competent state-owned and private energy companies.

Actions to be taken

4.1. Improvement of financial and operational capacity of energy entities
- Business administration training for utility managers
- Training in improved co-generation production expenditure estimation for combined heat and power plants
- Training in customer discount and bonus mechanisms
- Time-of use metering devices

4.2. Improvement of regulatory capacity of energy entities
- To improve the tariff and price-setting mechanism and thereby to introduce prices and tariffs at levels higher than the costs
- Electricity and heat pricing
- Customer categories
- Survey on ability to pay

4.3. Improvement of policy planning capacity in the energy sector
- Foreign loans, interest and exchange rate adjustment mechanisms
- Training in the following areas for central government administrative authorities and selected companies:
  - Improve energy infrastructure in aimags and regions
  - Long-term planning for energy sector
  - Overall study and evaluation of the energy sector

- Study possibilities of regional cooperation in the energy sector, participate in them actively and learn from other experiences in regional cooperation

- To study possibilities of attracting foreign investment, and to attract foreign direct investment into the energy sector by creating the necessary environment

Improving Energy Access in Rural Areas and Introducing Lifeline Tariffs

Objective 5. To improve energy supply (electricity and heat), to create a lifeline tariff mechanism and to introduce a new system of energy subsidies

5.1. Improvement of energy supply in the central region

- To conduct a study on ability to pay and to introduce lifeline tariffs
- To study ways of improving access and to resolve them

5.2. Improvement of supply of electricity for 4 aimag centers and soum centers not connected to the grid

- To connect aimag and soum centers, as well as other users to the unified energy system in order to make energy supply cheap and reliable
- To reduce technical and other losses
- To develop energy supply based on renewable energy sources (solar, wind and hydro power)
- To increase the use in aimag and soum centers
- To improve the subsidy system and eventually to create financial capacity to operate without subsidies
- To introduce lifeline tariffs

5.3. Improvement of supply of electricity in rural areas

- To implement a program "100 000 solar gers"
- To attract the private sector and non-government organizations by resolving the necessary regulatory issues
- To resolve financial issues jointly with rural financial institutions
- To establish a fund to implement the program
- To facilitate implementation
- To improve electricity supply in rural areas using wind power
- To cooperate with international environmental protection organizations to introduce wind energy on a wide scale

5.4. Improvement of heat supply and increase in efficiency

- Heat costs of the poor
  - To study possibilities to increase the number of customers and potential customers
  - To conduct a study regarding heat prices and tariffs and ability to pay
  - To introducing lifeline tariffs for heat
- To improve or replace heat-only-boilers used in aimag and soum centers and low-pressure boilers used in rural areas

    - To assess efficiency and impact on the environment of heat-only boilers and small heating grids
    - To study the budget subsidies and to replace inefficient boilers
- Improvement of residential heating
    - To improve stoves of households in ger districts
    - To install new equipment to analyze air pollution in Ulaanbaatar
    - To introduce less smoke, new design stoves in aimags and soums in order to reduce air pollution
    - To study possibilities to supply improved stoves to the population of rural areas and to implement solutions

5.5. Monitoring and assessment

- Improve methodology to monitor achievements in improving access to modern energy services in rural areas
- Improve data collection on access to energy by different categories of customers based on their social status

4. Management, Organization and Funding Required to Implement the Strategy and Expected Results

4.1. Management and organization of strategy

The central government administrative authority in charge of energy issues manage implementation of the strategy jointly with relevant organizations, and shall report on implementation once a year to the Cabinet.

4.2. Funding necessary for implementation of the strategy

The following sources of funds shall be used to finance the strategy implementation:

- The central and local government budgets
- Foreign and domestic investment
- Foreign concessional loans and grants
- Funds of energy companies
- Funds of Mongolian and foreign non-government organizations
- Other

4.3. Expected results of implementation of the strategic plan

Implementation of the "Strategy for sustainable development of the Mongolian energy sector during 2002-2010" will ensure sustainable development of the sector and enable a financially independent energy sector. This will deliver the following results:

- The energy sector will become financially sustainable and independent, and state-owned energy companies will become able to operate independently in financial terms

- Restructuring of the energy sector will be completed and a regulatory framework will be established conforming with market principles
- Highly efficient and competitive domestic and foreign private companies will be able to provide services on the energy market
- State-owned companies of the energy sector will have been privatized in a phased way and with careful consideration.
- Policy formulation and regulation of the energy sector will be improved as a result of institutional capacity building in the sector
- Capacity utilization in energy generation, transmission and distribution will have been increased according to market requirements
- Access to energy in rural areas will have been increased, and renewable sources of energy (solar, wind and hydro) widely used
- Pricing and tariff mechanism adapted to ability to pay will be developed and lifeline tariffs introduced for the low-income population
- A legal framework will be adopted that is necessary for improving energy efficiency
- Energy efficiency programs will have been implemented to increase the benefits from more efficient use of energy
- The private sector will be attracted by encouraging activities of ESCO companies that provide energy efficiency services.

3.0. Mongolia's Energy Sector: An Overview

This chapter presents an overview of the supply and demand characteristics of the energy sector. The chapter is based on the paper, *Energy Sector: Accomplishments and Issues, 1990-2001*, that was provided as a background paper at the donors' workshop held in December 2001 and supported by USAID/DAI. It is included here for background.

3.1. Introduction

Since 1990, Mongolia has attempted to rehabilitate, upgrade and expand its energy systems because it recognizes that without efficient, reliable and reasonably priced electricity and fuels, the economy cannot grow and people's lives and opportunities will be limited. A high priority has been placed on energy by successive governments. And, there have been numerous accomplishments, including:

- Rehabilitation of Ulaanbaatar's #3 and #4 power plants, Dornod and Darkhan power plants.
- Partial renovation and upgrading of Ulaanbaatar's heating system.
- Installation of a new power plant at Dalanzadgad.
- Installation of diesel electric stations in 5 aimag centers and more than 100 soum centers.
- Rehabilitation and upgrades of the Baganuur, Shivee Ovoo and Sharyn Gol coal mines.
- Enactment of the 2001 Energy Law that provides a basis for the restructuring and privatization of the energy sector.

While these accomplishments are significant, much remains to be done with respect to developing the dynamic energy sector that is needed for continued development.

3.2. Energy balance, 2000

Table 3-1 shows the energy balance for 2000. Prominent is the role of coal, accounting for more than 80 percent of primary energy supply. Mainly lignite, the coal is domestically produced at mines some distance from the heat and power plants, and has to be delivered by rail. 85 percent of the coal was used in the heat and power plants. Of the total energy supplied to the heat and power plants, 48.7 percent was lost in the conversion process. A further 11 percent was lost through transmission and distribution and station own use. This results in net electricity and heat supplies of only 40 percent of primary energy supply. Clearly, efforts to improve energy efficiency and reduce losses are essential activities.

Also prominent in the table is the role of transport, accounting for 26 percent of final energy consumption. The need to transport coal has already been mentioned. In addition, all petroleum is imported, and this adds costs. Significantly, Mongolia is a large country with a small scattered population. As a result, road transport plays a vital role in moving goods and services among urban centers and between urban and rural populations.

Table 3-1. Energy Balance 2000 (GWh)

	Coal 1	Petroleum 2	Electricity 3	Heat 4	Total #	Energy %
Primary Energy Supply						
Indigenous Production	19,730	0	0	0	19,730	77
Imports	163	4745	186	0	5094	20
Exports	0	0	(23)	0	(23)	0
Stocks at 1 January	651	0	0	0	651	3
Total	*20,517*	*4745*	*163*	*0*	*25,424*	*100*
Energy Conversion 5,6						
Fuel Consumed	(16,911)	(384)	0	0	(17,295)	-68
Electricity + Heat Generated	0	0	2943	5932	8874	35
Trans/Dist Losses	0	0	(582)	(209)	(791)	-3
Own Use	0	0	(616)	(500)	(1116)	-4
Total	*3606*	*4362*	*1907*	*5222*	*15,095*	*59*
Final Energy Consumption						
Residential	1547	0	465	2280	4292	28
Commercial/Industrial	686	1090	1175	1686	4637	31
Transport	279	3272	81	347	3979	26
Agriculture	12	0	23	23	58	1
Other	384	0	163	884	1431	9
Stocks at 31 December	698	0	0	0	698	5
Total	*3606*	*4362*	*1907*	*5222*	*15,095*	*100*

Source: Draft Final Report for Capacity Building in Energy Planning, Asian Development Bank, March 2002, Table 2.3, page 32.

Notes:

1) *Coal: Mongolian Statistical Yearbook (MSY); Table 11, 9; Average Heat Content (calorific value) according to Energy Authority consumption for 1999 (3328 kcal/kg) and 2000 (3316 kcal/kg).*
2) *Petroleum: MSY Table 14, 6; Final Consumption based on proportional split for 1996.*
3) *Electricity: MSY Table 11, 8.*
4) *Heat: MSY Table 11, 10.*
5) *Energy Conversion based on Energy Authority data.*
6) *1 ton of oil equivalent=10,000 kcal=41.871 GJ=11,631 MWh.*

3.3. Energy Resources and Energy Supply

The current status and operations of energy supply are presented below. Current and potential energy resources, including renewables, are also discussed.

3.3.1. Coal

Mongolia has significant coal resources. Inferred coal reserves are roughly 150 billion tons, of which 20 percent is coking coal and 80 percent is lignite or steam coal. The reserves are located in 240 deposits and occurrences in 12 major coal basins, and approximately 25 percent of these deposits have been confirmed by geological survey.

Table 3-2 shows a coal balance for 1990 to 2000. As the table indicates, current production is well below levels reached earlier in the decade and production can be increased to meet rising demand. The bulk of demand is from the heat and power generating companies.

Currently, there are 32 coal mines operating, of which 13 have been established as joint stock companies and 19 as private companies. Coal accounts for 95 percent of the solid fuel consumed by heat and power generating plants. The small scattered mines provide rural residents with a fuel source for heating and cooking. Recent production has totaled approximately 5 million tons per year.

The bulk of production comes from three mines that supply the combined heat and power generating plants. 125 kilometers east of Ulaanbaatar, Baganuur opened in 1978 with a designed capacity of 6 million tons per year. It is currently producing 3 million tons. The reserves for this open pit mine are 300 million tons. Loans and technical assistance from Japan and the World Bank have led to improvements in operating efficiencies over the last several years.

Sharin Gol open pit mine is located 240 kilometers north of Ulaanbaatar, and near Darkhan. It is producing roughly 700,000 to 1 million tons per year. Shivee Ovoo open pit mine is being upgraded with the assistance of a Japanese loan. It is located 240 kilometers south of Ulaanbaatar. It produced 600,000 tons in 2000, and has reserves of nearly 600 million tons. The other 29 mines produce an estimated 600 to 700,000 tons per year.

Table 3-2. Coal Balance, 1990-2000 ('000 tons)

	1990	1995	1996	1997	1998	1999	2000
Stocks	183	82	106	98	87	193	170
Imports	73	211	23	100	38	30	43
Production	7157	5019	5110	4924	5057	4964	5185
Total Supply	7413	5312	5239	5122	5182	5187	5398
Heat & Power	4324	3883	3925	3673	4193	4127	4449
Other End Users	2325	1321	1214	1362	793	890	763
Exports	490	1	1		3		
Stocks	151	107	99	87	193	170	186
Total Demand	7290	5312	5239	5122	5182	5187	5398

3.3.2. Coalbed methane gas

Over the last 6 years, the coalbed methane gas industry has developed in Canada and the USA, where it now accounts for 6 percent of total natural gas production. In fact, it is the fastest growing source for natural gas in the USA. This is a major achievement because the technology let alone the industry, did not exist until the mid 1990s. The technology is based on drilling a well in a low grade coal field that collects the naturally occurring methane emissions. The methane gas is then pumped to a facility where it is cleaned and then compressed at low pressure levels so that it can be piped into the natural gas pipeline network.

Given Mongolia's considerable coal reserves, this could be another source of fuel for heating and/or power generation. Resource assessments need to be undertaken, and if they indicate financial viability then pilot plants developed. However, it should also be noted that the quality of methane is very site dependent, and this will affect a project's viability. It has been suggested that small scale networks could be economic to supply neighboring soums. The Government will continue to explore this opportunity, and welcomes private sector interest and support for the necessary resource assessments and, if viable, pilot plants.

3.3.3. Liquid fuels and gas

The supply and demand for petroleum products are discussed below. In addition, there are discussions on prospects for trans Mongolian pipelines from Russia to China that would carry crude oil and natural gas. There is also a brief comment on recent initiatives to develop markets for liquified petroleum gas and compressed natural gas in Mongolia.

Petroleum

Mongolia received 95.5 percent of it petroleum products from Russia and 4.5 percent from China in 1999. Table 3-3 shows the volume of petroleum imports for the period 1997-2000, and Table 3-4 indicates projected demand for 2005 and 2010. As the table indicates, gasoline and diesel have been the major imported petroleum products. In 1998, 5.0 percent of diesel imports were consumed by road transport, 22.3 percent by railway transport, 11.3 percent by electricity generators—mostly by the small generating stations in off-grid aimags and soums, 8.1 percent by agriculture, 24.9 percent by mining operations, and 28.4 percent by miscellaneous consumers including construction. It is likely that diesel demand will rise because 1) both the number of soum generating stations as well as their hours of operation are expected to increase, and 2) railway and vehicle traffic will continue to grow. With respect to gasoline demand, it is also expected to rise because of a growing vehicle fleet: car imports were 6,210 in 1995, 4,862 in 1999 and 11,509 in 2000. The expanding vehicle fleet has meant a marked increase of A-93 gasoline from under 2 percent of gasoline's total share to over 13 percent in 1998.

Table 3-3. Volume of Petroleum Product Imports, 1997-2000 ('000 tons)

Products	2000	2000 (%)	1999	1998	1997
Gasoline	233.6	52.5	193.2	199.9	194.2
Diesel	161.7	36.3	159.4	134.1	128.5
Jet	18.4	4.1	15.9	20.7	20.9
Avgas	8.7	2.0			
Fuel Oil	14.6	3.3	22.7	24.2	29.4
Lubes	8.3	1.9	2.5	7.8	
Total	445.3	100	393.7	378.9	373.0

The 80 percent government-owned Neft Import Concern (NIC) handled 100 percent of petroleum imports in 1993, but its share was only 54.3 percent in 1998. More than 20 small firms now handle the remaining imports, with the largest having less than a 10 percent share of the market. Government is planning on selling the bulk of its shares in NIC during 2001-2002.

Petroleum products have traditionally been imported from Russia via rail. However, there have been short term problems with supply in recent years because of several factors. These include high consumption levels within Russia during peak harvest periods and stockpiling periods in Russia before winter. In addition, there have been maintenance and operating problems at some Russian refineries. But the major factor has been that NIC has not been paying its bills with the result that by the end of 1999, Russia would not supply products without advance payment.

Table 3-4. Petroleum Product Projections, 2010 ('000 tons)

	2000 (actual)	2005	2010
Gasoline	233.6		
High		289	364
Low		238	269
Diesel	161.7		
High		194	245
Low		153	164
Jet Fuel	18.4		
High		25	29
Low		21	23
Fuel Oil	14.6		
High		28	32
Low		24	25
Total	445.3		
High		536	671
Low		437	481

Source: Feasibility Study and Investment Component for the Zamyn Uud Transshipment Facility, Progress Report-Executive Summary, ETC Transport Consultants, European Union-TACIS, September 1999.

According to some consultancy studies, petroleum product storage capacity has fallen below desirable levels and when combined with NIC's financial problems, the stockpile has fallen to dangerous levels. The stockpile fell at one point to approximately 10 days of consumption. The International Energy Agency recommends a 90-day stockpile. As a near-term compromise, it has been proposed to develop a 30-day stockpile and tank farm. The approximate cost for this project (near Ulaanbaatar) is $40 million for 69,200 m^3. A second option would be the development of a petroleum transshipment facility at Zamyn Uud, near the Chinese border, approximately $13 million for 5,000 m^3. Government has decided to develop the transshipment facility in order to both increase storage capacity and to provide a means to increase imports from China in the event of supply interruptions caused by weather in Siberia.

Current petroleum product storage includes 22,000 m^3 for gasoline, 9,400 m^3 for diesel, 7,500 m^3 for aviation gasoline. Most of the storage tanks were built between 1962-1970, and are in need of considerable rehabilitation or replacement. In-ground drums are used for lubes and fuel oil storage. Some power plants maintain their own heavy fuel oil stocks.

Table 3-5. Proposed Petroleum Product Storage ('000 tons)

					Proposed 30 Day Stockpile		
Products	Volume	%	Tons	m^3	Tank capacity m^3	Tank number	Storage capacity m^3
Gasoline	233.6	52.5	26,933	31,686	5,000	7	35,000
Diesel	161.7	36.3	18,622	21,908	5,000	5	25,000
Jet	18.4	4.1	2,103	2,474	2,000	2	4,000
Avgas	8.7	2.0	1,026	1,207	2,000	1	2,000
Fuel Oil	14.6	3.3	1,693	1,992	2,000	1	2,000
Lubes	8.3	1.9	954	1,060	600	2	1,200
Total	445.3	100	51,300	60,327		18	

Source: Japan External Trade Organization, September 2001.

Trans Mongolian pipelines

Since 1997, discussions have been held regarding the construction of both a natural gas and a crude oil pipeline carrying fuels from Russia to China. The pipeline routes could transit Mongolia. While it is clear that the oil and gas resources are available in Siberia and there is demand for these fuels in China and Korea, it is less obvious when the pipelines would be built. There are a number of companies involved in the discussions, and there are competing proposals. In addition, construction cost estimates have varied from $1.7 to $5.9 billion for the natural gas pipeline—which suggests that the proposal to build the two pipelines side-by-side would yield better economics for both.

At this stage, it is difficult to determine how either pipeline will evolve—the various companies have to agree on certain development parameters and then conduct a feasibility study. Developing petroleum processing facilities in Mongolia would require a substantial capital investment, but small refineries have proven financially viable in a number of areas. The Government will continue to monitor the pipeline negotiations, and will explore development options once it becomes clearer how these projects will evolve.

Liquefied flammable gas

In addition to coalbed methane, the Government is pursuing other gas supply options. On 29 November 2000, the Government approved a program promoting the use of "liquefied flammable gas." The purpose of the program is to provide the legal basis to establish an industry that would provide compressed natural gas (CNG) for vehicles and liquefied petroleum gas (LPG) for household consumption. This effort is aimed at diversifying energy sources as well as providing more efficient, less polluting and, in the case of LPG, possibly cheaper fuels. To date, four private companies have been working out the details of how they would like to develop the market for these products but data on their current levels of investment and future plans are unavailable.

CNG has been used as a vehicle fuel in a number of countries. Its use is increasing in a number of large cities, where it has been made mandatory for taxis and in some cases, buses and other fleet vehicles to run on CNG. The mandatory policy has been enacted in order to reduce vehicle emissions and thus air pollution. Istanbul has had a successful CNG program operating for several years. New Delhi has been trying to establish one but there has been considerable resistance by taxi and bus owners. CNG would reduce vehicle emissions but the infrastructure required to handle this fuel as well as the cost to install different fuel tanks in vehicles could result in problems developing the market.

LPG is used for household cooking and heating throughout the world. It is far cleaner than coal or wood for household heating, and generally cheaper and more efficient than electricity for cooking. Household costs to purchase one- or two-burner cooking plates and room heat reflectors would not be major expenditures if an adequate supply system is developed. LPG canisters are, for example, trucked across the Sahara and tossed around on small boats supplying scattered islands—they are durable and safe as long as they are replaced every few years. Infrastructure requirements would be similar to those setting up a CNG compressing station. However, one LPG station could supply a fairly large distribution network, which means that the economics for LPG would be more attractive than for a CNG operation.

It has been reported that the companies currently handling LPG are importing canisters by rail from China and then trucking them throughout Mongolia. Importing canisters is an expensive method of handling LPG. However, it should be considered only the first step in developing the market. Government will facilitate development of the LPG infrastructure and market, but LPG operations will be based on private sector investment.

Domestic petroleum resources

As noted in the first chapter, oil production has recently started at one field. Although only 1,000 barrels per day are being extracted, the field is estimated to contain 300-500 million barrels. The development of this field would be a major stimulus to the Mongolia economy—aside from reducing imports, government would considerably increase its tax base.

Importantly, the exploitation of one oil field could lead to the development of additional fields. Although it is extremely difficult to predict whether a particular field will be economic, some estimates of total national oil reserves suggest a range of 5 to 8 billion barrels. This would be a substantial asset.

3.3.4. Other energy sources

The supply of energy from other energy resources is discussed below. Resources included are hydropower, solar, wind, and geothermal. The section begins with a discussion of energy efficiency. Although this is not an energy resource in a strict sense, it should be noted that improvements in energy efficiency can produce considerable energy savings from existing generation facilities. By reducing energy demand, existing generation facilities would not have to be expanded or new plants added until a later date. This results in substantial savings to the generating companies, consumers, and the country as a whole. Importantly, reducing energy demand could be a cheaper source of additional capacity than adding more generation facilities.

Energy efficiency

As noted above, energy efficiency can result in considerable savings—both in terms of energy production but also costs. There are a number of projects that have been implemented or are beginning that will address major energy efficiency problems in the grid systems. The Central Energy System has losses reaching 32 percent (14 percent “technical” and 18 percent “non-technical”). Heat system losses could be as high as 40 percent. Obviously there is a need to reduce losses for both categories.

Beyond these supply-side or energy system issues, energy efficiency has to be considered from a different perspective—the demand-side. A key question to consider is whether it is possible to produce the same quality product using less energy by changing management techniques or by utilizing a different technology in the production process. Currently, there are no programs that are assisting the private sector or government facilities in reducing their energy consumption, or the demand side. Moreover, at this stage, there are no incentives for the generation and transmission companies to assist the private sector or government in reducing energy consumption.

Over the next 5 years and once appropriate tariff and regulatory policies have been implemented, Government intends to place a high priority on establishing an Integrated Resource Planning and Demand Side Management framework that will facilitate reductions in energy consumption. Attention will be given to energy efficient buildings and appliances as well as to the training and implementation measures that are needed for a successful energy efficiency program. Globally, technological and design advances over the last several decades have resulted in major energy savings that clearly demonstrate the value of energy efficient investments based on life-cycle costs. Innovative financing methods for energy efficiency investments such as energy savings performance contracts have helped to spur the development of an energy services industry that is market-driven and environmentally beneficial. Energy efficient building designs and management systems are producing net energy savings of more than 20 percent over the life of the facility. Retrofits of facilities for heating and cooling systems are achieving similar savings. Thus, the potential to reduce energy consumption is considerable and should be pursued at the earliest possible moment.

However, it should also be noted that energy efficiency does not rest solely in the hands of suppliers and larger consumers. Individual consumers and households can also make a tremendous difference. For example, simple actions such as making sure lights are turned off, adding adjustable control valves to pipes feeding steam radiators, and tuning up a car's engine and inflating tires to their correct pressure will all help to save energy and money. In other words, people can change their behavior and become more efficient users of energy—and save money in the process.

Hydropower

With an estimated 3,800 rivers and streams and a total length of 6,500 kilometers, Mongolia has significant hydropower potential. There are currently 5 small hydro plants operating (and installed capacity):

Khar-horin	528 kW
Chigjiin	200 kW
Bogdiin	2.0 MW
Mankhan	150 kW
Guulin	480 kW

The small hydro plants are run-of-river designs that provide electricity to neighboring rural areas except during the winter. Consideration is being given to further develop small hydro plants in order to reduce diesel imports.

A number of larger hydro projects have been identified and are shown in Table 3-6. Because of the demand loads of the Central Energy System, serious consideration is being given to developing the Orkhon project. It would provide peaking capacity (which is atypical of hydro projects) for the CES and eliminate the need for Russian electricity imports. Although the current cost of Russian imports is below Orkhon's estimated cost of power generation, the project is viewed as being able to provide the necessary capacity to better manage the CES load. The Orkhon project would require a 20 kilometer transmission line to the 220 kV Erdenet-Ulaanbaatar line. Government is promoting the development of the Orkhon project as a priority over the next 5 years.

In the Western Energy System region, a loan agreement has been signed with the Kuwait Fund to develop the Ulaanboom/Taishir project. The project would supply electricity to two aimag centers and 8 soums. Although the energy cost is high because of the size of the dam and the low capacity, the feasibility study determined a 13.2 percent economic internal rate of return (EIRR). The Durgun project has an even higher EIRR (24.7 percent) and would connect to the WES grid. Government would like to see this also developed within the next 5 years. The EIRRs are somewhat surprisingly high, and warrant considerably more attention before investment decisions are made. Government would like to see the Delger/Chargait project developed because it would save $4.6 million in diesel imports per year, and provide a power source not subject to the breakdowns and interruptions experienced by the diesel sets.

One of the key issues confronting Mongolia as it considers developing its hydro resources is the cost of power. As Table 3-6 indicates, there is considerable range in power costs for the various proposed hydro schemes. It should also be noted that power production costs for the Ulaanbaatar Power Station 4 are in the range of $0.02 to $0.025 per kilowatt, which is roughly one-half estimated costs for the Orkhon hydro scheme—and Orkhon is the cheapest of all the proposed hydro projects. Similarly, purchasing electricity from Russia is cheaper (approximately $0.035/kWh) than the proposed hydro projects. Given the financial problems of the energy sector, it should be obvious that priority attention has to be given to reducing the burden of the sector on the national budget. This means that hydro schemes that are more expensive than other power options should be deferred until they can be economically justified and paid for—one of the reasons that the energy sector has performed so poorly is because there has been insufficient attention given to economic and financial analyses of projects, and thus decisions to develop projects have been based on other criteria.

Table 3-6. Potential Hydropower Projects

Project Name	Installed Capacity (MW)	Production/year (GWh)	Capital Cost ($ millions)	Energy Cost (US ¢/kWh)
Central ES				
Orkhon	100	219	160	4.60
Egiin	220	484	277	5.72
Burin	161	760	464	6.11
Shuren	205	957	747	7.81
Artsat	118	553	302	5.46
Western ES				
Durgun	12	36	25	6.94
Erdenburen	69	347	128	3.72
Buyan Nuur	58	281	405	14.41
Ulaanboom/Taishir	8	37	39	8.78
Maikhan Tolgoi	12	36	Not available	Not available
Other Regions				
Delger/Chargait	23	114	84	7.37
Khatgal	3	15	6	4.00
Zeergent 1	7	33	43	13.03
Zeergent 2	5	23	64	27.83

Solar

Known as the "land of eternal blue skies," Mongolia has substantial solar potential. Approximately 71 percent of the total land area receives solar insolation at a rate of 5.5-6.0 kWh/m^2 per day, and 2900-3000 sunshine hours per year. An additional 18 percent of the country receives insolation at the rate of 4.5-5.5 kWh/m^2 per day, and 2600-2900 sunshine hours per year. Solar energy could be a suitable source for electricity for lighting and possibly cooking in rural areas. But it is likely that heating and most cooking would be based on other energy sources.

Government has programs and plans to exploit the solar resource. Currently, there are an estimated 4000-5000 photovoltaic units operating in the country. Most of these are used to provide lighting and power for a limited number of other appliances in scattered rural areas. A photovoltaic panel assembly plant in Ulaanbaatar has the capacity to produce 1.5 MW of solar panels per year.

However, there are more aggressive programs being developed. The 100,000 Solar Gers program has been established. Mechanisms to accelerate participation in this program are being considered. One of the key issues is that while costs of the smaller household units vary from only $300-$500, many households would still require a loan for this amount. Banks tend to require payback periods of 3 to 6 months for small loans. Government has initiated discussions with commercial banks willing to provide credit terms for 1 to 2 years. This would be an important step given that many rural households are experiencing the after-effects of the recent two harsh winters and the intervening drought.

Of particular importance, Government is also working with JICA in the development of a comprehensive program for off-grid aimags and soums. This would be phased in over a 15 year period. The first phase (2002-2005) calls for diesel sets to be placed in 38 soums, diesel + photovoltaic hybrid sets in 77 soums, diesel + photovoltaic + wind sets in 45 soums, diesel + small hydro in 2 soums, diesel + small hydro + photovoltaic units in 1 soum, and grid extension for 4 soums. This first phase would target supplying electricity to basic public services such as clinics, schools, soum offices at a cost of $23.8 million. Government is discussing the possibility of grant funding for this first phase.

The second phase for the 2006-2010 period, calls for expansion of the systems to include general consumers and other public offices. This would cost approximately $44 million and require use of a loan. The cost of this project suggests that there will have to be equipment purchase arrangements by individual consumers and/or soum power generating companies rather than a Government loan. The third phase for the 2011-2015 period calls for the introduction of fuel cells and hydrogen production at a cost of $80 million.

Details as to how these projects can be paid for have not been developed, although there has been some discussion about cross-subsidies by urban consumers. Moreover, there is the potential problem of government interjecting itself in activities that the private sector is already addressing—if there are currently 4-5,000 units operating and purchased by individual consumers, should government now take a more prominent role in directing scarce financial resources or should it become more of a facilitator and technical source for information?

Wind

Up to 70 percent of the country has wind resources that may be suitable for development. In particular, the Gobi desert area, Dornod and Sukhbaatar provinces have wind regimes of 150-200 W/m^2 with a wind duration of 4000-4500 hours per year.

As noted in the discussion on photovoltaics, wind power is anticipated to play a major role in the rural electrification program. Government intends to pursue wind power development where viable.

Geothermal

A geophysical study has identified 42 small hot springs in Hangai, Hentii, Huvsgol, Altai Mountains, Dornod-Darigangiin Steppe, and the Orhon-Selenge region. Although the local population makes some use of the hot springs, no commercial power or heat development has occurred.

3.4. Electricity

Table 3-7 shows key operating statistics for the combined grid power systems (Central Energy System, Western Energy System, and Eastern Energy System). Key successes include:

- Energy imports have been falling as a result of upgrades and rehabilitation of the combined systems.
- System reliability especially in the major grids, has improved significantly, with few outages recorded.

However, there are still several outstanding issues, including the need to substantially reduce technical and non-technical losses and to increase collections. Measures are being undertaken to address these and other problems through technical assistance and external borrowing. But external assistance cannot be substituted for the commitment needed to implement full cost recovery tariffs as well as to begin collecting on current bills. Thus, while much remains to be done, the overall performance by the generating, transmission and distribution systems is improving—and it should continue on this positive track.

Table 3-7. Power Demand Statistics for the Energy Authority

Item	1995	1996	1997	1998	1999	2000
Installed capacity (MW)	777.5	777.5	777.5	796	796	802
Avail.Max.Power Output (MW)	499	499	523	565	565	573
Avail.Max.Power Gen. (GWh)	3.814	3.814	4.087	4.305	4.305	4.317
Gross generation (GWh)	2.628	2.614	2.720	2.572	2.740	2.898
Station use (GWh)	598	579	608	569	587	616.3
Net Generation (GWh)	2.030	2.035	2.112	2.002	2.153	2.263
Energy Imports GWh)	381	383	376	355	194	183.8
Energy Export (GWh)	28	69	42	60	59	24.9
Net Supply (GWh)	2.507	2.515	2.589	2.298	2.288	2.461
Increment to the previous year (%)	+15.6	+0.3	+2.8	-11.2	-0.4	+7.6
T&D + Non-tech losses (GWh)	502	482	507	784	589	571.5
Net Sales (GWh)	1.909	1.936	1.939	1.513	1.699	1.744
Peak demand (MW)	477	488	506	513	499	526

The Central Energy System (CES) supplies Ulaanbaatar and 11 surrounding aimags, or 53 percent of the national population and 40 percent of the country's total land area. Current demand is approximately 475 MW and supplied by coal-fired Combined Heat and Power (CHP) generating stations. The grid is connected to the Russian grid at the Selendum substation. The CES grid includes 7,685 kilometers of transmission lines.

The Western Energy System (WES) is connected to the Russian grid at the Chadam substation, and does not have local generation capacity. The WES currently provides service to only the main urban areas in the Altai aimags of Uvs, Bayan-Ulgiy and Khovd. Transmission lines are 729 kilometers in length. During winter, total import approximates 10 MW with maximum demand of slightly more than 8 MW. During summer, maximum demand is less than 1.5 MW.

The small Eastern Energy System (EES) includes 304 kilometers of transmission lines that are supplied from the coal-fired CHP Choibalsan power plant (36 MW installed capacity). Maximum demand is roughly 12 MW.

3.4.1. Demand forecasts

The Asian Development Bank - supported Master Plan indicates that demand is scheduled to increase at an annual average growth rate of 2.9 percent between 2001 and 2020 (see Table 3-8). This growth rate assumes that there will be improved efficiencies in the operating power and heat systems as well as energy savings resulting from conservation and energy efficiencies on the demand side. Preliminary indications are that the total capital costs for the expansion of the central power and heating systems will approximate $1,260 million over the 20 year period.

Table 3-8 Electricity Load Forecasts, 2005-2020 (GWh)

	2000	2005	2010	2015	2020
Central ES					
UB EDO	915.2	979.3	1124.2	1338.6	1626.4
Outside UB	703.4	761.5	852.0	941.8	1015.5
Erdenet	772.1	823.6	878.6	937.2	999.7
Station Use	618.0	641.1	713.7	804.4	910.4
Total CES	**2849.7**	**3205.5**	**3568.4**	**4021.9**	**4552.0**
Peak Load (MW)	526.0	571.2	638.9	724.3	824.5
Western ES	**22.7**	**25.3**	**28.2**	**31.8**	**36.0**
Peak Load (MW)	8.1	9.0	10.0	11.3	12.8
Eastern ES	**58.7**	**65.6**	**73.0**	**82.3**	**93.1**
Peak Load (MW)	11.0	12.3	13.7	15.4	17.4
Total	*2931.1*	*3296.4*	*3669.6*	*4136.0*	*4681.1*

Source: Draft Final Report for Capacity Building in Energy Planning, Asian Development Bank, March 2002. (Note: figures shown are from the "medium" growth forecast).

3.4.2. Electricity in the soums and aimag centers not connected to the grids

There are 4 aimag centers with diesel stations not connected to grids. They have a combined installed capacity of 35.3 MW, and a rated capacity of 27 MW. Of the 334 soum centers, only 126 are connected to grids. Of the remaining soums, their average capacity approximates 200 kW per station, or more than 40 MW. 40 of these soum centers are scheduled for connection to grids. Most of the aimag and soum centers with their own generation capacity have had problems maintaining operations beyond 4 to 5 hours per day. The aimag centers have had their 10 to 25 year old diesels recently rehabilitated. The soum centers are having their old diesels replaced with new generating sets. The Government intends to continue improving the quality and quantity of energy supply to off-grid centers and rural areas. As discussed in the section on other energy sources, plans are moving forward to utilize solar, wind and small hydropower resources in conjunction with diesel generating sets as a basis for increasing electricity supply in rural areas.

3.4.3. Russian electricity exports

As noted above, Russia currently exports electricity to Mongolia. In addition, negotiations have been conducted between Russian and Chinese companies about constructing large transmission lines for the export of electricity from Russia to China. As with the natural gas and crude oil pipelines, it is not clear what the outcome of the negotiations will be—Siberia has excess generating capacity, available hydropower, natural gas and oil resources, and produces electricity 25 to 50 percent more cheaply than China. However, China is also developing more of its domestic generation options. As noted, it is not clear if or when a transmission line would be built. Government will continue to monitor the progress on the negotiations, and consider various development options as appropriate.

3.5. Heat

Because of the cold winters, heating is especially important in Mongolia—it is necessary for survival. Discussed below are the central heating systems in the urban areas as well as the situation in rural areas.

3.5.1. District heating

In terms of heat supply sources for central or district, systems, Mongolia has combined heat and power (CHP) thermal power plants in Ulaanbaatar, Darkhan, Erdenet, and Choibalsan. Most of the boilers are Russian, model BZUI-100, HP-18. In addition, there are some boilers of medium capacity produced in China. In the smaller urban areas, many of the plants are boiler only heating (BOH) and are model KE 25/14, KVTS 20/150. Table 3-9 shows capacity and demand for district heating systems. As the totals indicate, while capacity can meet demand in the near term, there will have to be some expansion. However, it should also be stressed that heat losses can be as high as 40 percent and typically in the 15 to 30 percent range, which means that if efficiencies can be improved, plant expansion can be deferred. In addition, heating tariffs should be raised, and further expansion deferred until it can be economically justified.

The heat network and lines use steel pipes with insulation within the channel. As noted, heat network losses typically range from 15 to 30 percent. Thus, there is a need to upgrade insulation to the standard specified in the Ministry of Infrastructure directive on 1 March 1997.

The heat distribution centers accept hot water from the CHP plants, and then filter and transmit the hot water to customers for heating and consumption. The system is designed to operate on a constant-flow basis, so it is not possible to adjust supply in accordance with the customer's demands. In addition, individual metering would be very difficult, and while improved system metering would improve system management, it would not resolve all the problems. There is considerable need to upgrade the systems, and these are being undertaken.

Table 3-9 District Heating Systems

City	Type	Capacity MW_{th}	Demand MW_{th}	Population ('000)
Ulaanbaatar	CHP	1,524	1,222	691.0
Darkhan	CHP	185	243	72.6
Erdenet	CHP	139*	172	65.7
Sukhbaatar	BOH	51	21	21.3
Choibalsan	CHP	84	112	30.4
Baganuur	BOH	82	105	Included in UB
Khovd	BOH	44	23	27.9
Ulgii	BOH	51	24	23.7
Ulaangom	BOH	44	23	24.2
Dalandzadgad	CHP	8	6	11.8
Sainshand	BOH	38	14	16.8
Zuunmod	BOH	18	12	15.1
Total		2,268	1,977	1000.5

** Erdenet Copper heat generation capacity is not included.*

As noted above, the Ministry of Infrastructure approved standards for insulation and buildings on 1 March 1997. This has been a major step because it has been estimated that due to improper insulation, the heat load is 8 to 10 times greater than many European countries. By improving insulation, it would be possible to reduce heat losses and to:

1) Decrease the *heat/heating area* ratio;
2) Decrease the *fuel/heating area* ratio in order to decrease the amount of fuel necessary for heat production;
3) Improve working conditions;
4) Reduce noise; and,
5) Decreasing the *fuel/heating area* ratio could enable increased use of renewable energy sources.

In order to improve efficiencies, Government has initiated the ADB-financed Heat Efficiency Project. In addition, Government is promoting the adoption of a number of key measures to increase efficiencies, including:

- Replacing old pipelines.
- Installation of efficient exhaust systems.
- Installation of individual meters.
- Installation of demand regulation devices.
- Upgrade insulation in existing buildings.

Heat loads are forecast to increase at the same rate of power demand in the district systems. According to the ADB Master Plan, the average annual growth rate will be 2.9 percent for the period 2001-2020. This means that demand will basically double over the figures presented in Table 3.9 but this would not fully reflect the impact of increased efficiencies and energy savings measures.

3.5.2. Heating in soums and rural areas

Typically, gers use small stoves for cooking and heating. The stoves are small, simple in design, and tend to produce high levels of air pollution because they rely on short chimneys and are continuously in use. Wood, coal or dried dung are the primary fuel sources.

Only 35 of 170 soum centers that are not connected to the grid systems have small central heating systems, with 86 using stove heating for individual rooms, and 45 use an unclassified heating system. 107 soums use coal as the main source of fuel. 121 soums use wood and 41 use dried dung (the number is greater than 170 because multiple fuels are used). Only 4 soums use electric boilers.

3.6. Economic and Financial Perfomance of the Energy Sector

The energy sector has made considerable progress over the last decade, changing from a state-owned supply-side agency into a number of commercializing entities. However, the transformation of these entities into dynamic companies that are working with consumers to ensure that there needs are met, has not yet occurred. There are problems that are being addressed or remain as serious obstacles to becoming a dynamic energy sector. First, is the issue of the "cycle of debt" (tariffs have traditionally been too low, customers have not been paying their bills, and generators have not been able to pay for their fuel—so, the coal mines have not been able to maintain the necessary levels of operation because they could not afford spare parts or other basic charges). Tariffs have been increased but probably need to be raised further. Generators are working with the coal mines to develop an appropriate repayment schedule. It is likely that this will result in a tariff surcharge to reflect that consumers were not paying sufficient rates to cover costs. Distribution companies are increasing their collection efforts. All stakeholders will have to take some responsibility for the problem and accept a role in its resolution. Resolving the above situation is clearly the energy sector's most critical issue, and Government is committed to ending the problem.

Table 3-10 shows the build up of debt to coal suppliers by the generating companies.

Table 3-10 Debt to Coal Suppliers (Tog millions)

Supplier	Dec 1997	Dec 1998	Dec 1999	Dec 2000	July 2001
Baganuur	1193	4359	9927	16053	19565
Sharin Gol	241	466	437	859	1190
Shivee Ovoo	21	286	1286	2627	3871
Other	897	848	1025	1251	694
Total	2352	5959	12675	20790	25320

Although coal prices increased 48 percent between 1997 and 2000, electricity tariffs increased by 9 percent over the same period. However the key issue is that customers owe the distribution companies $20 million (about 2 percent of GDP), of which $2.4 million is uncollectable, and will be written down. The distribution companies in turn owe the generating companies $21.8 million, and the generating companies owe the coal suppliers $22.7 million.

Table 3-11 presents technical and financial operating statistics on the grid systems (CES, WES, EES). As the table shows, production has increased, imports have been reduced, and sales revenue is rising. In addition, the unit cost of electricity production has remained relatively steady.

Table 3-11 Operating Statistics for the Grid Systems

#	Main Indicators	Unit	1996	1997	1998	1999	2000	2001 est.
1	Electricity Production	Mln.kWh	2474.7	2618.7	2666.6	2832.4	3096.4	3134.6
2	Own Consumption	Mln.kWh	562.7	584.2	587.6	604.8	634.9	640.3
	(percentage)	%	22.7	22.3	22.0	21.4	20.5	20.4
3	Distributed Electricity	Mln.kWh	2247.9	2352.9	2381.1	2386.4	2620.4	2642.9
	Heat	Thous.Gcal	5002.4	4913.0	4924.3	4965.3	5318.0	5378.7
4	Import	Mln.kWh	375.8	360.3	362.4	218.2	183.8	180.0
5	Export	Mln.kWh	39.9	41.9	60.3	59.4	24.9	31.4
6	Total Sales Revenue	Mln.$	63.9	87.0	92.0	78.1	76.2	99.1
	Electricity	Mln.$	47.9	68.4	66.6	59.2	57.7	76.4
	Heat	Mln.$	14.6	17.0	19.4	16.5	16.4	22.6
	Other	Mln.$	1.3	1.6	6.0	2.4	2.1	0.2
7	Technical losses	Mln.kWh	448.9	487.4	527.6	494.5	571.5	501.2
	(percentage)	%	20.0	20.7	22.2	20.7	21.8	19.0
8	Sold Electricity	Mln.kWh	1463.7	1526.1	1543.8	1699.3	1744.0	1914.2
	Heat	Thous.Gcal	5002.4	4913.0	4821.7	4833.9	5257.1	5316.2
9	Average Price Electricity	$/kWh	0.033	0.042	0.044	0.035	0.033	0.040
	Heat	$/Gcal	2.927	3.463	4.029	3.314	3.081	4.193
10	Total Expenditures	Mln.$	72.6	75.2	96.2	82.4	85.3	98.7
	Electricity	Mln.$	37.6	51.3	57.6	50.8	54.4	64.4
	Heat	Mln.$	33.6	22.0	32.9	28.2	27.6	34.0
	Other	Mln.$	1.4	1.9	5.6	3.4	3.3	0.3
11	Profit (loss)	Mln.$	-8.8	11.8	-4.2	-4.3	-9.2	0.4
12	Unit cost (electricity)	$/kWh	0.026	0.034	0.038	0.030	0.031	0.034
	Heat	$/Gcal	6.718	4.477	6.832	5.832	5.257	6.403
13	Liabilities	Mln.$	28.7	12.8	31.5	28.2	37.9	
14	Receivables	Mln $	12.3	13.1	21.7	20.0	19.2	
	US dollar rate		504	791	837	1023	1097	1100

And it is likely that there will not be a loss on operations for 2001. The unit costs of heat production have increased. Importantly, while technical losses are decreasing, the level of unaccounted or non-technical losses seems to be increasing. Loss levels are well above international standards. In addition, receivables, or bills owed to the grid systems by consumers, increased sharply in 1998, and remains too high. Given the issues identified with respect to the grid systems, coal mines, and consumers, one can point to achievements but also to the major work still to be completed. If the energy sector is to meet its goal of providing reliable and reasonably priced energy over the coming decade, then the various components of the energy sector will have to improve their productivity, ensure that their bills payable are collected in a timely manner, and eliminate their dependence on the Government for budgetary support.

3.7. Final Comments

From the above discussions it should be apparent that Mongolia has moved well beyond stabilizing basic energy production operations (e.g., eliminating shortages and outages) and rehabilitating heat and electricity generating plants. The sector is planning for its future, and attempting to address the need for it to contribute to national development rather than be a drain on the economy. It should also be obvious that Mongolia has a range of energy resources that can be utilized to meet demand well into the future.

However, the energy sector remains inefficient—both from technical as well as resource management perspectives. System losses for heat and power are well above accepted global industry standards. There are programs and projects being implemented or planned that should reduce these losses and therefore, costs to consumers. Importantly, steps are being taken to improve energy efficiency and increase energy conservation for the entire sector—from the supply of energy to the end-use customer. Nevertheless, the energy sector is still evolving with respect to its institutions and management methods—and, for example, current staffing levels throughout the bureaucracy and in the corporatizing energy companies are still too high, and functions and responsibilities have not been clearly defined. These inefficiencies add cost to the final products (heat, electricity, coal, petroleum) that has to be borne by the end-user—and, consumers have little extra disposable income for management inefficiencies.

One of the basic issues that the sector needs to address is its financing. The ADB Master Plan suggests that roughly $1.3 billion will be needed to finance the sector over the next two decades. It will be difficult to internally generate this level of financial resources, meaning that funds will have to be borrowed from international sources. While concessional terms have been secured, there is no certainty that these will be available in the future. Moreover, the exchange rate for the domestic currency has been declining, losing roughly half its value against the US $ over the last half decade. This is important because it means that the negotiated interest rate of a long-term loan would become quite misleading—if the currency were to continue its devaluation (roughly 50 percent over 5 years) over a 10 year “grace” period and a 40 year payback period, a 1 percent rate could become 2 percent after 5 years, 4 percent after 10 years, 8 percent after 15 years, 16 percent after 20 years, and so forth. While it is doubtful that this would in fact occur so symmetrically, the potential danger to the national economy should be obvious.

As important as the cost of financing projects is the cost of electricity and heat. As Table 3-11 shows, Mongolia’s grid system has provided reasonably priced energy products. As Table 3-6 indicates, future electricity prices will have to be considerably increased if these potential hydro projects are developed. At a time when the economy is severely lagging, increasing costs for consumers and businesses with very limited financial resources may not be the wisest option. Moreover, there is some question as to whether the potential hydro projects would provide the least-cost source of electricity. Implicit to this statement is that critical analyses of potential options including optimization of existing facilities, has not been fully conducted nor institutionalized—and it is essential that analyses of options receive priority attention before any further investment decisions are made.

What the above discussion points to is that the energy sector must adjust its focus to dramatically improving its operations and management over the next few years. The national economy cannot afford to direct its limited financial resources to support the energy sector when there are so many other development needs. The sector has made many positive strides, but much remains to be done.

4.0. Financial Sustainability

One of the fundamental principles of the Mongolian energy strategy is the requirement that over the long term, the energy sector must become financially self-sustaining. This objective is essential to turn the energy sector into a pillar of support for future development of the Mongolian economy, rather than a drain on the resources of the country. There may be interim deficits required to support refurbishing, restructuring, expansion and modernization initiatives. As long as each of the investments required to support these initiatives has a reasonable expectation of a positive rate of return, they would be supportive of the financial sustainability objective. Further, without foreseeable financial sustainability, there would be little interest within the private sector for the acquisition of any energy sector assets. The newly created commercial entities then require tariff structures that would cover costs and yield a reasonable rate of return without financial support from the GOM. Lastly, the accumulated debts of the entities need to be resolved before privatization can be considered to have any probability of satisfactory outcomes.

Within this context, USAID/DAI has supported a number of studies and reports to examine certain financial issues and to provide analytical background for energy policy decision making and the international investment and donor community:

4.1. Sovereign-guaranteed Loans to the Energy Sector

This section is concerned with a particular aspect of the debts of the Mongolian energy sector, namely those foreign debts with a guarantee of repayment by the GOM. Debts of the individual energy entities completely internal to Mongolia are a tariff (cost-of-service) issue.

4.1.1. Background

Over the course of the 1990's, the energy sector had incurred a number of international loans to initially finance emergency repairs and refurbishment for continued energy supply but subsequently, to expand and modernize energy installations. A number of concerns had been raised. For example, given the sovereign guarantees attached to these loans, had and/or could these loans become a major burden to the overall borrowing capacity of the Mongolian economy? Could the repayment terms and conditions cause short-term balance of payments and exchange rate difficulties? Could the economy support additional sovereign-guaranteed loans to the energy sector? What guarantees were there that any additional loans would support the long-term financial sustainability of the energy sector and not just postpone the needed restructuring? To address these and related issues, USAID/DAI supported a study early in 2002 entitled *"Sovereign-guaranteed Loans and Borrowing Capacity"* that was made available as a background document for the Energy Donor's Conference at the end of March, 2002 (Appendix B).

4.1.2. Summary

During the 1990's, the Mongolian energy sector relied heavily on foreign assistance to refurbish and rehabilitate facilities to support the restructuring of the economy to a market-based system. Much of the foreign assistance was in the form of grants and concessionary loans that are now approaching the end of the grace periods. Most of the loans undertaken to date have been guaranteed by the Government of Mongolia (GOM). Furthermore, the GOM has identified requirements for additional foreign financial assistance to modernize and expand the energy and fuel supply sector while attempting at the same time to restructure it into a sustainable market-based commercial sector of the economy. The donor community needs assurance that continued reliance on foreign debt would be sustainable and that the restructuring of the energy sector will proceed so as not to jeopardize the growth of the economy nor the repayment of new and outstanding loans.

Accumulated foreign debt incurred in the energy sector and guaranteed by the GOM amounted to just less than US$400 million at the end of 2001, or almost half of the outstanding foreign public debt. Projects identified for possible future assistance could more than double foreign loans attributable to the energy sector. Although not inconsiderable, the loans incurred to date can likely be sustained by the GOM, in part because the terms and conditions attached to the loans were quite concessionary. New foreign loans are likely to have tighter conditions and shorter repayment periods making them more difficult to sustain. Further, in advance of an energy strategy timetable and restructuring framework, it is not clear if and how the energy sector would be able to profitably use and repay the loans, leading to the need for the GOM to honour the sovereign guarantees. Such an outcome would significantly complicate the macro-economic management of the economy.

It is recommended that before any further loans are incurred, the project proposals be subjected to a rigorous financial and rate-of-return analysis. This would enable a ranking of possible projects and greater assurance of their likely viability over the longer term. Furthermore, the project analysis should demonstrate that the overall value of the energy sector entity where the loan proceeds are to be invested would increase by an amount at least equal to the value of the investment. This would ensure full recovery upon privatization.

On a parallel basis, the commercialisation of the energy sector facilities should proceed expeditiously. This will provide better financial information on which to base investment decisions and privatization proposals. A clear energy policy strategy for the sector would provide the framework within which short-term decisions can be made while moving towards a fully sustainable energy sector.

4.1.3. Mongolian foreign borrowing capacity

Although not financially supported by USAID, a closely related paper presented at the conference by Mr. Martin of the International Monetary Fund (IMF) that builds upon the above paper is very relevant to the foreign financing of the Energy Sector for the future. The paper is entitled *"Mr. Martin's Presentation Notes: Session on Sovereign-Guaranteed Loans, and Borrowing Capacity for the Energy Sector's Donors' Conference: March 28-29, 2002",* and is included in this set of papers for the readers' convenience and information (Appendix B).

In the presentation notes, Mr. Martin discusses the capacity to repay these loans from the perspective of the dynamic interaction of several variables: (1) GDP growth and export expansion, (2) the effectiveness of the utilization of loans, (3) the appropriateness of macro policies, (4) exchange rate developments, and (5) the vulnerability of the economy to shocks.

He also discusses paths other than foreign loans as alternative sources of capital to develop the Mongolian energy sector. Domestic borrowing is excluded because of the restricted supply of domestic savings; however, if there is a careful screening of potential projects, foreign direct investment offers an interesting possible alternative candidate. Of particular interest, mainly because of the reduced capital required, would be the cooperative development of new regional energy supply and transmission systems involving Russia and China at a minimum, and potentially Korea and Japan. As a transit partner in such ventures, Mongolia would gain relatively low cost access to new sources of energy supply while earning transit fees.

4.2. Resolving Inter-company Arrears, Improving Collections and Reducing Losses

This section relates to the numerous accumulated debts within the Mongolian energy sector owed to Mongolians and Mongolian institutions. Unless resolved, they will continue to hinder an orderly progression towards sustainability in the energy sector.

4.2.1. Background

In July 2001, the fully integrated Energy Authority was largely corporatized into 18 state-owned joint stock companies generally subject to the oversight of the Energy

Regulatory Authority (ERA). Not all of the outstanding debts of the old Energy Authority were cleanly assigned at that time, leaving some stranded debts to be resolved. After the restructuring took place, a number of new debts/arrears/accounts receivable were accumulated by the new entities, including significant nonpayment of current energy consumption by end customers. This latter contribution was also responsible for much of the pre-July 2001 outstanding debt. Some, but not all of the debts were under the purview of the new ERA which was in any case striving to get the new regulatory regime operational on a timely basis.

Financial sustainability of the new entities requires that the extent of outstanding debts be determined, that a viable scheduled payment process be implemented, and that any new debts are reflected in current tariffs. To assist the various parties in sorting out the various claims and offsets, USAID/DAI financially supported a number of studies to identify the magnitudes involved and some potential solutions to accelerate the commercialization of the energy sector. These studies and reports include a background document entitled *"Energy Sector Debt Resolution - Let's start Fresh"* (Appendix B) upon which Mr. U. Ulambayar's presentation at the donors' conference relied quite heavily.

4.2.2. Summary

The paper presents the magnitude of the various outstanding debts and how they were accumulated and distributed among the stakeholders involved (coal companies, generators, distributors, customers, and government). Several alternative compromise solutions are portrayed that would resolve the situation if all stakeholders agreed to participate. In order to interest the private sector in purchasing any of these companies, it will be necessary to have sorted out the various debts accumulated in the past and to prevent any further accumulation.

4.3. Tariffs for Grid Systems (Current and Longer Term Needs)

This section relates to issues surrounding tariffs required for many of the new energy entities for financial sustainability.

4.3.1. Background

The enactment of the Energy Law on April 15, 2001 not only provided for a national Energy Regulatory Authority (ERA) but required that the ERA license the various new operating entities in the energy sector and approve their proposed tariff structures, among other responsibilities. This is a particularly important role for the ERA to ensure that not only are the tariffs perceived to be fair and just, but that the tariffs are sufficient to financially sustain the entities without support from the central budget. There was a great deal to be done in a relatively short period of time. Moreover, the precedents and principles established in setting the initial tariff would have subsequent effects on the pace of the commercialization of the energy companies and the potential timing for privatization. To support the GOM in this period of very active policy implementation, USAID/DAI supported a series of studies and analyses to help expedite and facilitate the process. These studies include *"Tariffs for Grid systems (Current and Longer Term Needs)"* which was presented at the March 2002 Donors' Conference by Mr. B. Munkhuu of the ERA (Appendix B).

4.3.2. Summary

The purpose of this paper was to convey to the reader the manner in which the tariff process is evolving in Mongolia. In order to progress in a logical manner, tariff development is being approached on the basis of continuous improvement. The energy sector of Mongolia is building a foundation, with the tariffs currently in place a result of the interim methodology providing licensees the opportunity to recover their reasonable costs to provide service.

Near-term enhancements are being developed and implemented to address the issues of fuel cost increases, the economic situation of households, cost allocation between electricity and heat, and the collection of load research information to aid in the design of retail tariffs.

Longer-term enhancements are planned in the areas of tariff design, incentive regulation, and improvement of the lifeline tariff. Continuous improvement building upon specific objectives and measured results should prove the long-term effectiveness of the ERA.

Hopefully, the donor community and potential investors in the Mongolian power sector recognize that the tariff system is a progressive, transparent one that supports the new commercial environment in the sector. This will be especially important in the coming years as new generation sources will be needed to meet the load and replace aging facilities and necessary improvements in transmission and distribution facilities must be made. A progressive regulatory and tariff environment will facilitate the expansion.

5.0. Restructuring and Transition to Sustainability

Mongolia is not alone in its efforts to restructure the energy sector but the particular circumstances and conjuncture have an influence on the pace and sequence of the restructuring as it applies to Mongolia. Several papers were prepared for the March 2002 Energy Donors' conference to describe the current status of the restructuring process, some of the hurdles to be faced, and decisions that remain to be taken to achieve a sustainable energy sector.

5.1. Restructuring Energy Sector: Current Status and Plans

This paper presents an overview of energy sector restructuring to date and where the priorities lie for the future.

5.1.1. Background

The evolving legal and institutional framework for restructuring the energy sector is portrayed followed by a section outlining the current regulatory regime and the regulatory measures in place. The final section discusses the challenges that will face the restructuring sector in the coming years and the goals Government has set in order to meet these challenges. The paper *"Restructuring the Energy Sector: Current Status and Plans",* was presented at the Energy Donors' conference by Mr. Ts. Sukhbaatar with considerable input from USAID/DAI in terms of drafting, research and editing (Appendix C).

5.1.2. Summary

The Mongolian energy sector evolved in a centrally planned environment making the restructuring more complicated than in market-based jurisdictions. Nevertheless, many of the steps in the restructuring required are similar. The role of the highly integrated Energy Authority has been modified under the 2001 Energy Law which provides the legal framework for the restructuring. The initial phase of the restructuring process involved the unbundling or de-integration of the former integrated entity. The new corporate entities are based upon geography and function and subject to licensing and regulation of a newly created Energy Regulatory Agency (ERA). The ERA is responsible for both the technical and tariff regulation of the new companies but other government agencies are also involved in regulating certain aspects of their operations such as environmental impact. Lastly, the paper describes the remaining issues that must be addressed over the medium to longer term as the restructuring moves forward.

5.2. Commercializaion and Steps to Privatization

In the past, many of the decisions made regarding the energy sector were not strictly commercial. As an arm of the government, the Energy Authority was required to take social, regional and other such matters into consideration and any financial shortfalls would be covered through the central budget. As commercial entities with specific mandates, the new companies are expected to operate independently with tariff structures reflecting only the costs of operation and a reasonable rate of return.

5.2.1. Background

Before the various energy entities can be evaluated by potential investors for possible privatization, they need to be running on a commercial basis so that investors can make valuations based on potential business plans. This process has already begun and the various steps underway were laid out in a paper entitled *"Commercialization and Steps to Privatization",* presented at the Energy Donors' Conference by Mr. Bailikhuu from the State Property Committee. This paper was prepared with the support of USAID/ DAI (Appendix C).

5.2.2. Summary

Mongolia has made significant progress towards privatization of the electric energy sector. Restructuring and corporatization have been completed, and commercialization of the resultant entities is underway. Important issues such as implementation of International Accounting Standards have been undertaken.

The creation and funding of the Energy Regulatory Authority and issuing of licenses to the entities were a big step towards commercialization. The first steps of issuing an interim tariff structure, and creating reporting systems for each of the license holders to request new tariffs have been made.

Since the companies are newly formed (mid 2001), one full year of financial data for the companies is not yet available. However, management is in place at each of the new companies and significant progress has been made towards establishment of commercial entities.

The work currently underway by consultants from USAID/DAI will assist in beginning the full commercialization of the sector.

5.3. The Role of the Private Sector in Privatizing and Developing Small Systems

This paper examines the potential for private interests to acquire existing assets and to build new assets in the energy sector based on related experience outside Mongolia.

5.3.1. Background

Mongolia is not alone in moving down the road to a market-based energy sector. To provide some context on the experience in a few other jurisdictions, background descriptive material was assembled on several other countries and presented as a paper entitled *“Applicability of Power Sector Reform Experiences in Selected Developing Countries to the Mongolian Energy Sector”* by Mr. Gordon Weynand of USAID at the March 2002 Energy Donors’ Conference (Appendix C).

5.3.2. Summary

Mongolia’s reform of its power sector is at a critical stage. Energy legislation has been passed, corporatization has occurred, and a regulator has been constituted. As policy for implementation is considered, it is useful to review relevant experience from elsewhere in the world.

This paper reviews experience drawn for its relevance to the Mongolian power/heat sector with the intent to provide useful guidance to Mongolian policy-makers at this critical time. Systems reviewed include five in Latin America (offering the greatest wealth of experience in pursuit of reform to advanced levels, plus experience in reforming small systems), Hungary (offering relatively advanced experience in reform in a former Warsaw Pact country plus district heating experience), and Georgia (offering relevant experience in the NIS).

Central conclusions are:

- Properly motivated international participation in the generation sector may greatly improve operability. This could be a great benefit, both for minimizing costs overall and for limiting the need to encumber the new system with inflexible power purchase agreements (PPA’s).
- System size significantly limits options for generation deregulation and for attracting investors to a fragmented system. Nevertheless, institution of a cost-based-bid-plus-capacity-payment pool system should be workable and is likely to be highly beneficial.
- The international power industry has proven very successful in solving the threshold problems of distribution as they exist in Mongolia today, and it should also be possible to attract their involvement here.

- Price cap regulation of distribution has benefited many systems and should be seriously considered for Mongolia.
- Concerning power and district heat, the most important things to do are actively pursue metering of the unmetered, billing, and collections. Again, private investment has proven most capable of implementing this.

For the foreseeable future, there is no power market-based reason to fragment the system further. Price cap regulation would bring full benefits of international power industry participation with one distributor. Cost-based-bid-plus-capacity-payment pool structure could bring most benefits of a market with two generators (if necessary, proper rule formulation would allow recombining of the distribution with the small power plants with little or no loss of market discipline). However, size itself will limit international interest to enterprises this size or larger. And the threat of abuse of market power will preclude application of the sort of free-price based bidding pool applied in some larger systems.

5.4. Regulatory Reform Issues in the Mongolian Energy Sector

The Energy Strategy for Mongolia is based in part on a presumption that many of the new corporate entities are and will remain essentially monopolies in their sphere of activity. To prevent potential abuse of that monopoly power, a regulatory regime is being developed that reflects the particular circumstances in Mongolia.

5.4.1. Background

The Energy Regulatory Authority is a new institution (about one year) in Mongolia that has accomplished much in a relatively short period of time but still has much to accomplish. Mr. R. Ganjuur, the Chairman of the ERA, presented a paper at the conference entitled *"Regulatory Issues of the Mongolian Energy Sector"* (Appendix C). In that paper, he outlined the framework and structure of the ERA, the types of issues they have and are facing, and he acknowledges the considerable technical assistance that USAID/DAI has and continues to provide.

5.4.2. Summary

The paper provides a current overview of the regulatory situation and is divided into the following sections/topics:

- General principles for Regulation of the Mongolian energy sector
- Objectives of the Energy Regulatory Authority
- Management and Structure of the Energy regulatory authority
- Entities under Energy regulation
- Peculiarities for Regulation the Mongolian energy sector

- Facing issues
- Methods to resolve the problems
- USAID Technical assistance to ERA

It provides a useful roadmap to the ongoing implementation of the regulatory system as it applies to the Mongolian energy sector.

6.0. Energy Access and Affordability

The transformation of Mongolia's energy sector from totally subsidized non-market operations to commercialized market-based operations over the last decade has raised a range of important and often conflicting issues.

- Consumers now have to pay for their energy but incomes are very low.
- In this context, energy companies need to increase tariffs to at least recover costs.
- GOM has to reverse the energy sector's drain on the national budget by eliminating subsidies, but it also wants to expand energy services to outlying areas and those segments of the population without access to commercial energy.
- Energy, and specifically heat, is necessary for basic survival in the cold harsh winters.
- Aside from the capital, Ulaanbaatar, energy systems are small and scattered, thereby losing the economies of scale necessary for profitable operations.

Thus, GOM is faced with the major quandary of how to expand energy services to those currently not receiving them without compromising either fiscal management or the development of a market-based system (where consumers pay for the products). This section outlines some of the key issues concerning policies and mechanisms that are or can be used to expand energy services within the context of a market economy. A broad framework for energy sector subsidies is addressed, followed by some considerations regarding off-grid and heat subsidy issues. The section concludes with a wider discussion of subsidy issues as well as a summary of specific recommendations on increasing access to energy services.

In addition to the papers discussed below, another important paper was presented at the March 2002 conference. In *Energy Access in Off-grid Areas*, Mr. Ts. Tsengel, State Secretary, Ministry of Infrastructure, outlined problems, needs and GOM's current and proposed energy programs for rural areas. GOM is hopeful that future energy activities in rural areas will be based on renewable energy sources such as photovoltaics and wind. In order to pay for these investments, Mr. Ts. Tsengel suggested that a 1 tugrik per kilowatt hour electricity charge for all consumers could subsidize the required investment levels.

6.1. Subsidies in the Mongolian Energy Sector

A USAID/DAI consultant prepared a background paper (*Subsidies in the Mongolian Energy Sector*, 24 March 2002, Appendix D) that provided the basis for part of Dr. N. Enebish's presentation (*Preliminary Thoughts on Subsidies in the Electricity Sector of*

Mongolia) to the March 2002 conference (Appendix D). The background paper established a framework to assess the level and potential impact of direct and implicit subsidies in the energy sector. Mr. N. Enebish's paper expanded on the background by applying the analytical framework to specific population segments.

Under production or generation subsidies, the background paper highlights the fact that the three grid systems receive 30 percent of their operating budget from direct transfers from GOM. In addition, the grid systems receive indirect subsidies through their delayed payments to coal suppliers (also state-owned) for fuel. Although full-cost recovery for generation companies and payment of arrears (to coal suppliers) are integral components of the Sustainable Energy Sector Strategy, these objectives have not been achieved.

For the off-grid stand alone systems, N. Enebish notes that for the larger systems, direct budget support is used to pay for over 50 percent of total operating costs, and roughly 40 percent in the smaller systems, where tariffs are higher. In the background paper, it was also noted that these operating subsidies do not include that capital costs have been heavily subsidized often through overseas direct assistance (ODA—or foreign aid), nor that replacement costs are included in the tariffs.

For the rural herding or nomadic population, there has been considerable discussion on how to provide energy services. Currently, this population receives no subsidies. Despite the absence of subsidies, there are a reported more than 4,000 household energy systems (e.g., photovoltaic, wind, and internal combustion/diesel generators) operating. In the background paper, it was suggested that an appropriate targeted and fixed term subsidy for this population would be to provide information and technical advice on energy production options and operations. This could be easily justified because of the large subsidies provided urban residents. N. Enebish indicates that this population could also be subsidized through reduced interest rates on loans to purchase the energy production equipment.

With respect to access subsidies, it is asserted in both papers that individual connections to the energy grids as well as grid extensions (under transmission and distribution entities) should be included in the full-cost recovery tariff formula. Implicit to this arrangement is that all consumers would be providing a cross subsidy for new consumers. However, this is a financing option commonly used by utilities, provided that it is based on full cost/benefit analysis of all factors. Both authors also state that there still may be very specific situations that justify some type of access subsidy, and that in these circumstance the subsidy should be "explicit and transparent both to users and the general taxpayer."

Consumer subsidies, and specifically for lifeline tariffs targeted to low income households, are a more complex subject, especially given the weak financial performance by the energy sector. While the concept of providing reduced energy tariffs to households that are living below the poverty line is both a socially positive policy and widely accepted practice, it will be difficult to implement in Mongolia until the energy entities improve their bill collections from customers paying full-cost recovery tariffs. Simply attempting to institute a program that would reduce cash-inflows for energy entities that are not close to breaking even would not seem a viable option.

Moreover, as both writers state, "lifeline tariffs are not an energy issue, they are a social welfare issue." As such, GOM could decide to provide a direct subsidy payment to the energy entities for low-income households, and that subsidy should be explicit and transparent. They also discuss the cross subsidy option, whereby all consumers would share the burden of the reduced tariffs for low-income households. Whatever option (or a combination of the two) is utilized, both authors argue that GOM should first "undertake analyses to identify the target population, compare the lifeline tariff option to alternative measures to attain the same social welfare objective, and evaluate how the lifeline tariff might best be designed to achieve the objective."

Thus, both authors recommend that while a broad policy goal of ensuring access to energy for all citizens can be stated, it should not be implemented until the potential impacts of the policy have been assessed and various implementing mechanisms evaluated in terms of their effectiveness versus costs. Specifically, detailed economic and financial analyses are essential prerequisites to the implementation of any subsidies. N. Enebish continues by stating that it is necessary to collect more basic information about consumers and their needs. He outlines three actions:

- **Willingness to pay/expenditure survey** would provide baseline data on consumers energy requirements (current and future demand) and their ability to pay for these products.
- **Identify the appropriate institutional mechanisms for rural consumers** such as the scattered herding population that is currently not included in GOM energy programs. GOM is initiating the 100,000 Solar Gers program but it is only in its early stages of development, with considerable assessment still needed of implementation and financing arrangements
- **Wind generation study for off-grid centers** would provide data on opportunities to improve the financial viability of off-grid systems.

One of N. Enebish's presentation slides summarizes the key subsidy issues with the following points:

- The utilities have to become financially sustainable.
- The utilities have to provide affordable modern energy services.
- GOM wants to ensure access to energy services for all households.
- Subsidies should be phased out over time.

Reconciling these various objectives is the challenge.

6.2. Off-grid and Heat Subsidy Issues

Ms. D. Oyuntsetseg, Project Manager, Improved Heating Stoves Project (GEF/World Bank funded), presented an interesting paper on heating access in Mongolia. As Table 6-1 shows, a substantial portion of the population still provide their own heat, largely from coal-burning stoves. Many in this population group are also in the low income category, below the poverty line. Currently stove technologies are inefficient and generate considerable pollution. These inefficiencies cost consumers money because they have to purchase more coal and they are also exposed to more health problems because of the indoor air pollution. The Improved Heating Stoves Project is aimed at developing and marketing improved stoves that reduce costs to consumers and harmful emissions. The project is specifically targeted at the Ulaanbaatar ger areas that are not connected to the centralized grid heating systems. Ms. D. Oyuntsetseg estimates that although the improved stoves would cost more than the current inefficient ones, these extra costs could be recovered during one heating season because less coal would have to be used. With the estimated life of the stoves approximating 7 to 10 years, the overall savings to low income households would be substantial. If this project is successfully implemented, GOM and the donor community plan on exploring its applicability to the rest of the country.

Table 6-1. Heating Access in Mongolia (%)

	Centralized Grid	Heat-only Boilers	Own Provision
Urban	54.7	12.1	33.2
Rural	2.5	13.0	84.5
Ulaanbaatar	60.4	8.6	31.0
Total	44.3	12.3	43.4

Source: Oyuntsetseg, Heat Access to Decentralized Customers: Improved Heating Stoves Project, GEF, March 2002

As noted, heating is essential for survival in the cold harsh Mongolian winters. The Improved Heating Stoves Project is an example of a program that targets subsidies in the form of product development and marketing to off-grid and often low-income consumers. If financing arrangements are developed (e.g., providing loans at reduced interest rates for the purchase of the improved stoves—this has been discussed but it has not yet been implemented), this would be an additional explicit subsidy. In this example project, it is important to note that:

- a target population was identified;
- its needs assessed;
- potential costs and benefits evaluated; and,

- the resulting project has taken a step-by-step approach to implementation in order to ensure that the products and services being provided have been correctly packaged for the consumer.

These lessons could be utilized in the development of targeted subsidies for other energy products or populations.

6.3. Subsidies and Ability to Pay

Subsidies are a complex issue—and, they have to be specifically targeted if they are to successfully meet their objectives. Under the socialist system, energy products in Mongolia were provided at no charge to the consumer—and electricity and heat products were largely confined to urban areas and district centers. With the transition to a market-based system, the new energy entities have to charge consumers the full-cost recovery for energy products—and, the full-cost recovery tariffs are only now being implemented. Mongolia is a low-income country, and the transition from socialist to the market system has resulted in poverty rates approximating 40 percent of the total population—and, the cost of energy products places a high burden on poverty-level households. The GOM Sustainable Energy Sector Strategy is attempting to achieve financial sustainability (for the sector), expand energy products throughout the country, and assist low-income households so that they have access to these energy products. Thus, there is a recognition of the goals but the mechanisms to implement these policies have not been developed.

The first two papers present a framework to assess subsidy mechanisms, and they raise important issues concerning their costs and viability. The Oyuntsetseg paper is an example of utilizing limited subsidies for a targeted population. What should be apparent from the discussions is that there are few short cuts to designing and successfully administering subsidies. Rather, subsidies have to be based on the needs of specific populations and packaged in a form that the targeted populations will accept and utilize. This requires baseline knowledge of the populations. Moreover, subsidies have to reflect the ability to pay for them—whether by government, all consumers, the end-use consumer, and/or the energy entities. This requires detailed economic and financial analyses.

Thus, policy goals may be clearly stated but their implementation has to be based on an equally clear understanding of what is needed and what will work, including how to pay for them. Struggling with these often conflicting objectives is not unique to Mongolia. In fact, most countries are wrestling with how to provide energy products and services to targeted populations—whether lifeline subsidies for low-income households, or incentives promoting energy conservation or the use of renewable energy technologies. Reconciling the need for a commercial energy entity to show a profit with social welfare and environmental policy goals will be a continuing challenge for Mongolia's energy sector, one that will require increased public awareness and discussion of the issues. Both government officials and the general population have to understand that broad subsidies for an inefficient energy sector have tremendous opportunity costs—a tugrik spent on energy is one that cannot be used for education, health, economic development, or assisting low-income households. The only valid possible conclusion then is that subsidies have to be explicitly defined and targeted.

7.0. Energy Conservation and Energy Efficency

As noted in previous chapters, Mongolia has made many strides in upgrading and restructuring its energy supply system over the last decade. Because of these improvements, some attention can now be given to energy demand issues—and it is likely that this trend will and should increase over the next decade. The Government of Mongolia (GOM) is actively attempting to develop the necessary legal, institutional, and operational framework for promoting and implementing programs and measures that will further energy conservation and improve energy efficiency throughout the country. The same rules and incentives should apply in the evaluation of both supply and demand side options.

To assist with these efforts, a USAID/DAI consultant provided two papers (*Draft Law on Energy Conservation: Issues and Framework* (Appendix E), and *Establishing a National Energy Management Program*) (Appendix E). In addition, he edited a third paper, (*Energy Savings Potential and Developing Energy Service Companies (ESCOs) in Mongolia*) (Appendix E), for the March 2002 conference. These papers are discussed below.

7.1. Draft Law on Energy Efficiency: Issues and Framework

In order to provide an overriding framework for the various actors involved, the GOM is preparing a draft law on Fuel and Energy Conservation.

7.1.1. Background

Energy use in Mongolia is both intensive and inefficient. There are many explanations for this outcome. For example, the intensive energy use is in part related to the extreme climate and the great distances to transport people and goods. The inefficiency can be explained in part by artificially low prices, the central planning focus on output maximisation rather than input minimisation, and out-dated technologies and equipment. Improvements in energy efficiency throughout the economy are essential to effect cost reductions to make Mongolian industry more competitive and to improve the standard of living of Mongolian consumers.

7.1.2. Summary

The paper first provides a rationale for an energy conservation law by stating that "The purpose of the proposed law would be to emphasize the importance of energy efficiency, provide the legislative mechanisms necessary to facilitate the increased use of energy savings measures, and establish a basis for the partnerships between agencies and the private sector that are essential for the energy sector's becoming more energy efficient." This rationale is based on the fact that 1) the current energy sector has considerable inefficiencies including high levels of technical and management losses, 2) there have been few examples of energy savings technology and measures implemented in Mongolia, and 3) that GOM/Ministry of Infrastructure (MOI) recognize the need to increase energy efficiencies and improve energy conservation.

The paper next reviews the energy conservation legislation for Australia, China, Japan, Russia, Thailand, the United States, and Uzbekistan. The review is important because it discusses recent key trends, including the need for the legislation to be based on the increasing linkages between "the marketplace" (or meeting consumer needs) and energy savings measures. This broader approach has resulted in legislation and executive orders that enable a range of incentives for the use of energy savings measures. The more comprehensive legislation has also led to the inclusion of a wider range of players, including building professionals (e.g., architects and engineers, facility managers), in the design and implementation of energy savings programs. In addition, the legislation is facilitating new financing techniques such as energy savings performance contracting, which has provided the basis for the evolution of the ESCO industry.

The final section of the paper provides a framework for MOI to draft Mongolia's first energy conservation law. As stated, the purpose of the law "is to facilitate energy savings throughout society, improve the efficiency of energy use, increase energy savings to the benefit of the national economy, protect the environment, and to ensure that energy conservation is a priority for all energy consumers." The framework then outlines the necessary chapters on the full powers of the state, energy conservation management, the rational utilization of energy, advancement of energy conservation technologies, legal liabilities, and supplementary provisions.

The paper concludes by stressing that energy conservation and energy efficiency should be a high priority and long-term component of national development. The paper also concludes by emphasizing that energy savings has to be based on participation by all of the population, and that this will require "individuals and individual companies to directly benefit from their market decisions to consume less energy."

7.2. National Energy Management Program (NEMP)

The National Energy Management Program (NEMP) would provide the vehicle to facilitate the implementation of the energy efficiency and conservation measures proposed under the Fuel and Energy Conservation law.

7.2.1. Background

The purpose of a NEMP would be to coordinate the efforts and activities of the diverse agencies, NGO's, companies and other institutions with energy sector related interests in Mongolia with a view towards enhancing their overall effectiveness.

7.2.2. Summary

Using the paper *"Establishing a National Energy Management Program"* (Appendix E) as a basis, the MOI proposed the establishment of a National Energy Management Program (NEMP). The paper states that "NEMP will be aimed at 1) increasing the utilization of energy savings measures, 2) increasing the efficient use of energy by various consumer groups, 3) promoting partnerships between government and other stakeholders that facilitate energy efficient economic growth, and 4) providing for increased energy security by broadening the mix of supply options." More specifically, the paper continues with:

As we move into the 21st century, Mongolia has to utilize more energy efficient technologies and energy savings measures. An argument can be made that by saving energy we are also saving the environment because of reduced pollution. A second argument can be made that by saving energy we are also reducing our energy costs by deferring the construction of additional generation and distribution investments. A third argument for saving energy is that the bills of individual business entities, government agencies and households will be reduced. All of these arguments are valid—but we should also note that if we approach energy savings in a systematic manner, jobs will be created—and these jobs will be based on state-of-the-art global electronic and information technologies. Thus, by promoting energy savings we will be helping to transform the energy sector into a dynamic leader in the nation's economy.

The USAID/DAI consultant discussed a possible structure for NEMP based on the highly successful U.S. Federal Energy Management Program (FEMP) under the U.S. Department of Energy (USDOE). The consultant also provided information has to how the Philippines Department of Energy (PDOE) has utilized the FEMP model in developing its Government Energy Management Program (note: the USAID consultant worked on the development of this program with the Philippines PDOE under USDOE funding). MOI determined that it wanted NEMP to apply to the nation as a whole and not be limited only to government entities. MOI recognized the need for a nation-wide effort to increase energy savings, and because the economy is small, decided that a broad-based program would be necessary if it were to be successful.

As a result, the proposed structure for NEMP includes a wide range of stakeholders, and gives considerable prominence to the formation of the Energy Association of Mongolia (EAM), a non-governmental organization that would bring together all available skills and professions. The EAM would enable improved assessments of supply and demand options, including those related to building, materials, and appliance standards.

The paper also discussed government's role with respect to developing new procurement guidelines that reflect energy savings measures including energy savings performance contracting and the need to utilize the private sector through ESCOs. In addition, the paper highlighted several information and training activities that the government could either lead or facilitate.

7.3. Energy Savings Potential and Developing Energy Service Companies (ESCO's) in Mongolia

The private sector can also play an indirect role in fulfilling Mongolia's energy strategy if ESCO's develop and operate effectively.

7.3.1. Background

The paper *"Energy Savings Potential and Developing Energy Service Companies (ESCOs) in Mongolia"* (Appendix E) was prepared and presented by Dr. J. Dorjpurev, General Manager of the Energy Efficiency Project, a Netherlands-funded activity, and edited by the USAID/DAI consultant.

7.3.2. Summary

The paper presents an overview of the energy savings potential in Mongolia that can be achieved through various energy savings measures, ranging from "good housekeeping" to more technical improvements such as those related to upgrading process technologies. The paper also discusses barriers to implementing energy savings measures. In addition, the paper addresses the potential role for energy services companies (ESCOs) in Mongolia based on the evolution of ESCOs in other countries.

Dr. J. Dorjpurev notes that industry consumes roughly 70 percent of the electricity and 28 percent of the heat produced. He estimates that "good housekeeping," or low-cost measures that reduce or eliminate some inefficiencies and improve operations and maintenance can result in energy savings of approximately 15 to 25 percent in the industrial sector. Audits of some industries show that motors and drives can have loads of only 20 to 30 percent, and operating efficiencies of about 50 percent, compared to 80 percent for properly designed and maintained ones. Upgrading motors and drives can result in energy savings of 15 to 25 percent, and have payback periods of generally less than 3 years. Rehabilitating steam systems, improving waste heat recovery, and upgrading processing technologies would also provide substantial savings (20 to 30 percent) but with payback periods of 5 to 10 years.

For the residential or household sub-sector, there are several identified needs: 1) improve the efficiency of the district heating systems in buildings, 2) upgrade building insulation, 3) increase the use of energy efficient lighting, and 4) utilize more energy efficient coal-burning stoves. The district heating system in buildings is generally unmetered, and charges are based on the area (m^2) or volume (m^3) rather than actual usage. Losses through leaks and insulation problems are considerable, and when combined with a lack of basic control valves, compensators, and thermostats, the total heat losses exceed 40 percent. Dr. J. Dorjpurev estimates that this level of losses can be reduced to roughly 25 percent through a modest investment program.

Similarly, heat losses from buildings and houses can be reduced by upgrading insulation and implementing appropriate building codes and standards. Again, many of the upgrades such as weather stripping, require only modest investments. The development and implementation of appropriate building codes and standards is a longer-term objective, but one that could yield very positive results. The use of energy efficient fluorescent lighting should also reduce consumption of energy.

While there are a range of energy efficiency measures that could reduce energy consumption in industry, commercial buildings, and residences, there are barriers to implementing these measures. Dr. J. Dorjpurev notes that:

- Energy tariffs are comparatively low, and "do not reflect full costs of production."
- As noted, metering is very limited.
- Household incomes and business profits are low, thus severely limiting the availability of capital to invest in energy efficiency measures.
- Payback periods are extended because factories generally operate at a maximum of one shift and heating is needed for only part of the year.
- Information and awareness of energy efficiency measures is very limited.
- Organizations have not been structured to promote energy efficiency—for example, energy managers that would be responsible for energy consumption in factories or apartment buildings, have not been appointed.

All of these barriers limit the use of energy efficiency measures, and importantly, they limit the ability of companies and individuals to reduce energy costs. Specifically, the barriers have limited the development of an ESCO industry. This is significant because it means that the technologies and methods essential to energy efficiency are not being brought into the country. Moreover, innovative financing for energy efficiency retrofits that are commonly used by ESCOs do not exist in Mongolia. For example, energy savings performance contracts that enable an ESCO to implement energy efficiency retrofits for a specific company, and then pay for the retrofits from the reduced costs for energy, have not been implemented and little understood in Mongolia. Dr. J. Dorjpurev cites numerous examples of successful ESCO industries from around the world, and emphasizes the benefits they have provided to their national economies.

Dr. J. Dorjpurev is optimistic that ESCOs can be developed in Mongolia but also acknowledges that it will take some years for them to gain broader acceptance.

7.3.3. Technology and energy efficiency

In addition to the above three papers, two additional relevant papers were presented. The National Agency for Meteorology and Hydrology and Environment Monitoring presented a paper, *Technology Needs Assessment in the Energy Sector in Mongolia*, that focused on implementing an action plan to assess and rehabilitate heat only boilers. These small boiler houses play an integral role in providing heat to urban areas as well as in the provincial and district centers (aimags and soums). Current boiler technologies are inefficient and have high levels of emissions. New boiler designs should be utilized and generally have payback periods of 1 to 2 years, and would greatly reduce pollution levels.

The second paper was presented by Gordon Johnson, UNDP, on energy efficiency in buildings in rural areas. UNDP, Norway, and the GEF have provided support to a program that is constructing buildings for schools and health clinics that are "super insulated." These buildings use readily-available straw as a primary construction material, and the results have been impressive: construction costs are less than wood or brick buildings, and operating costs because of reduced heating requirements are far lower. UNDP hopes that there will be wider acceptance of the straw-based buildings.

As the above discussions illustrate, energy conservation and energy efficiency are relatively new terms to Mongolia. However, there are also major strides being taken to facilitate them. As of September 2002, a draft Fuel and Energy Conservation Law is moving through the approval process, with passage by Parliament anticipated by the end of 2002. Several energy generation and distribution companies are implementing measures to reduce losses and install meters. Discussions are increasing on the need to utilize more energy efficient equipment, revise building codes and standards, and assist ESCOs. All of these are positive signs, indicating both the opportunities as well as the need to increase energy efficiency for the economy as a whole, and to reduce energy consumption whenever possible.

However, as Dr. J. Dorjpurev notes, there are a number of major barriers including the need for tariffs to reflect full production costs. Investing in energy efficiency measures is generally for economic reasons—the amount saved on reduced energy usage will pay for the investment. Similarly, reducing energy consumption relies on individual behavior based on the benefits of conservation—saving money and reducing pollution. These actions cannot be forced or legislated. Rather, they rely on the marketplace as an incentive—provided that prices are "right." Tariffs that are below full costs are the single major barrier to energy efficiency and conservation. It appears that some tariffs will be slightly increased during 2002, but full-costs have to be charged in the near future.

The tariff issue has to be emphasized because the energy sector is currently a drain on the national economy, and it will continue to be one until full costs are charged and collected. Only then, can the energy sector become a dynamic economic force—helping businesses and households reduce costs, and serving as the basis for the development of an ESCO industry that utilizes state-of-the-art technologies. Clearly, there are opportunities for energy efficiency and energy conservation in Mongolia. While strides have been taken, they are but a start.

8.0. Capacity Building

The restructuring of the Mongolian energy sector will require not only the physical capacity and infrastructure to produce energy and deliver it to the final consumer, but also the institutional and human capacities necessary to an efficient and timely implementation of the energy strategy. These considerations are addressed in the following sections.

8.1. Institutional Capacity Building

The human resources working in the energy sector of Mongolia are developing a new and expanded set of skills and knowledge to meet the requirements of the restructured industry in a market-based environment. In particular, the skills and knowledge required within MOI and other agencies will evolve as the new institutional arrangements are implemented and subsequently, managed.

8.1.1. Institutional capacity building in the energy sector

This paper (Appendix F) was co-authored by Mr. Ts. Tumentsogt, Ministry of Infrastructure (MOI), and a USAID/DAI consultant. The paper highlights the fact that the transformation of the energy sector from one that had been centrally planned into a market oriented one requires more than legislation. The personnel that are responsible for planning, operating, and regulating the sector also have to undergo major changes in terms of their skills and perspectives. This paper attempts to provide a framework to understand what changes may be needed in terms of capacity building. The paper first describes the institutional structure of the energy sector. The paper then discusses capacity building needs in key players in the energy sector—the Ministry of Infrastructure, the Energy Regulatory Authority, the National Dispatch Center and the energy companies. The paper concludes with sections on establishing the ADB-proposed Energy Planning Group as well as the future issues that could shape capacity building initiatives.

The energy sector has a range of agencies and private entities involved in its operations, including the MOI, the Ministry of Finance and the Economy (MOFE), the State Property Committee, the Energy Regulatory Authority (ERA), the Energy Authority—now the Coal and Energy Authority (CEA), the National Dispatch Center, 18 corporatized energy entities, the Energy Corporation, the Renewable Energy Corporation, and the Energy Training Center. Given this array of players, there are not surprisingly areas of over-lapping functions and, perhaps more importantly, areas where responsibilities have not been clearly defined—including planning for the sector. One could argue that despite these apparent conflicts, many of these problems will be resolved as the sector evolves into a self-sustaining force in the economy. However, it also has to be recognized that this may not be easy, given the possibility of bureaucratic "turf" battles over budgets, responsibilities and personnel.

Specific capacity building and training needs have been identified for the sector in the following areas:

- Energy sector planning
- Transition to a market oriented economy
- Energy sector regulation
- Demand forecasts (including long-term)
- Tariff setting mechanisms
- Revenue collection in distribution networks
- Technical losses calculation for transmission lines
- Asset evaluation in the energy sector enterprises
- Heat and electricity combined power plant production and cost estimation
- Electricity and heat pricing and customer categories
- Foreign loans, interest rates, currency exchange rate fluctuations, adjustment mechanisms
- Return on Investment (return on equity)
- Energy supply in central grid and off-grid (remote) areas
- Customer service discounts and bonus (e.g., for advance payments) mechanisms
- Bill collection in the distribution networks (clearing and settlements)
- Metering in the distribution networks, time diversified metering devices
- Assessment and monitoring of the financial situation of the energy sector enterprises
- Research and analysis from a regulatory standpoint.

The Asian Development Bank (ADB) recently (2002) submitted a final report for the project "Capacity Building in Energy Planning," that has been commonly termed the master plan for the energy sector. Although it does not recommend a particular agency or ministry to be responsible for energy planning, the ADB report recommended the establishment of an Energy Planning Group tasked with the following:

- Monitoring energy consumption and demand
- Development of long-term energy forecasting and modeling capability
- Developing energy emergency preparedness measures
- Integrated resource planning with resource efficiency evaluation
- Economic analyses (energy intensity versus economic output)
- Research and development of options for capacity expansion
- Evaluation of site options for new facilities
- Planning for environmental and economic sustainability

- Rural energy development planning
- Evaluating market model options
- Maintaining a statistical data base

The ADB master plan recommended staffing the EPG with a planning group manager, an electricity expert, a district heating expert, a renewable energy expert, and a planning economist. In addition to the above tasks and gaining familiarity with various computer planning programs, the ADB master plan recommended that the following activities be undertaken as part of an on-going capacity building effort:

- Establish and continuously update the database required for the different activities (the above tasks) of the group; establish own data collection and processing procedures where required; tap existing databases where available and establish data exchanges.
- Follow the real development of energy demand and its driving forces (population, households, urbanization, economic activity, Gross Domestic Product, etc.), comparing them with the Demand Forecast of the master plan and its assumptions; update the master plan Demand Forecast at regular intervals.
- Keep abreast with the results of on-going and future exploration activities for energy resources, with the planning and development of energy infrastructures (for production, transformation, transmission/transports, distribution), and with the corresponding technologies for energy supplies and utilization in Mongolia and abroad.
- Monitor the national and international discussions on environmental issues, the environmental concerns and abating measures in the energy sector.
- Interlink with other institutions, national and foreign, involved in similar tasks, in order to exchange experiences, coordinate activities and collaborate, and thus avoid unnecessary double tracking of efforts.

While all of these proposals and needs assessments are positive steps, other issues also need to be taken into account. Traditionally, the energy sector has been supply driven. Focus has been on the use of conventional fuels for generating heat and power. Limited attention has been given to meeting consumer needs or utilizing a least-cost methodology in the evaluation of fuel and technology options. With unbundling, commercialization, and ultimately privatization, the energy sector will have to take a much broader and longer term view of the sector, and become more aware of global experiences with technologies, policies, and energy management.

Specifically, the energy sector has to become a leading force in the economy—one that is self-sustaining and able to assess and utilize the latest technologies and management methods. To do less is to condemn the sector to long-term mismanagement and waste. There are major opportunities within the sector such as developing coalbed methane, expanding the use of wind and photovoltaics, and introducing a wide range of energy efficiency and conservation measures. But in order to capture these opportunities, the sector has to develop professionals that are able to adapt to the marketplace—and meet consumer demands, including for least-cost energy products. Only with these professionals will the sector be able to overcome its current weaknesses and practices—the over-regulated and over-staffed days of the past cannot be allowed to continue because they constrict the evolution of the sector.

8.2. Decision Making Capacity for Investments

The whole Mongolian economy is restructuring as it evolves to market-based systems. New and sophisticated analytical tools are required to sort out the competing claims for scarce investment resources. The energy sector in particular is very capital intensive and plays a vital role in supporting the growth and development of other sectors in the economy.

8.2.1. Background

The need for infrastructure in both the energy and other sectors of the Mongolian economy is required to support economic development of the economy. While the requirements are many, the resources are few. The energy sector must compete with other sectors for the scarce financial and real inputs required to build infrastructure. In evaluating the project proposals, there is a new requirement to fully appreciate both the public and private sector perspectives. Furthermore, there is a notable lack in the analytical skills required to develop the background material necessary to an informed and rational scheduling of infrastructure investments based on financial and net benefit rankings across competing proposals. Because domestic sources of capital are extended, foreign capital will be called upon to make a major contribution to energy sector investments, both through foreign aid and private sector foreign capital inflows for purchase of existing assets (privatization) and investments in entirely new facilities. There are many associated issues and decisions required to plan, guide and select among the alternatives.

8.2.2. Summary

A paper addressing these issues *"Capacity Building for Decision Making on Energy Investments",* (Appendix F), was prepared by USAID/DAI and presented by Jonathan Addleton, USAID, to the Energy Donors' conference. The paper summarises the particular circumstances in Mongolia that have led to the need for such investment decision making capacity and the evident shortfalls in the ability to undertake the required analyses. The background paper describes the evolving institutions of Mongolia's Energy Sector such as the separation of the operations of the energy sector into corporate stand-alone entities and the new policy planning and implementation (regulation) roles in the government agencies. Each of these new and restructured energy institutions has a requirement to undertake financial analyses, albeit from different perspectives.

Not only is there a growing need for the overall capacity to undertake financial analyses, but there are many new types or specialties required to deal with the new concerns of the emerging institutional entities. For example, the financial rate of return analysis for new projects is quite different from the financial rate of return analysis for tariff setting purposes. The paper highlights some of the gaps in the capacity to undertake financial evaluations within each institutional structure.

The last section of the paper addresses how these shortfalls might be filled, and finally who might fill them. In particular, the roles that particular donors might play to build up the human capacity to make financial and economic decisions in particular institutional areas based upon their own special areas of interest and expertise are considered, especially during the transition phase to a fully restructured energy sector in Mongolia.

9.0. Summary and Conclusion: Priorities for Implementation

9.1. Introduction

Mongolia's energy sector has undergone significant changes over the last decade. In the early and mid-1990s, focus was on restoring operations and basic services that were collapsing because of aging plant and a general lack of funds—for capital investments as well as operating expenses. In recent years, focus has shifted to building up physical systems so that they could deliver energy products to consumers in a more efficient manner. This period has been based on the need to implement specific projects. Concurrent to these efforts has been the economy-wide push to corporatize, commercialize, and privatize the previously state-owned entities. These efforts are part of a broader set of policies aimed at instituting a market-based system that promotes economic efficiency and growth.

Responsible for the energy sector, the Ministry of Infrastructure (MOI) and other government agencies have worked with the international donor community to facilitate the transition of the energy entities into viable private companies—the groundwork has been laid but much remains to be done. Similarly, MOI has recognized that it has to broaden its focus from project-by-project planning and implementation to a more comprehensive approach that should enable improved management and targeting of resources. Mongolia's Sustainable Energy Sector Strategy is a direct result of this effort.

Importantly, the international donor community has provided support for MOI's efforts to transform the energy sector. At the (May) 2001 Paris Consultative Group meeting, the donor community pledged to assist in the development of a sustainable energy sector strategy. Technical assistance was provided, and a workshop for all stakeholders was held in December 2001. This was followed up by conference in March 2002, at which a draft sustainable energy sector strategy was presented. Based on comments received, MOI submitted a revised strategy to Cabinet, which approved Mongolia's Sustainable Energy Sector Strategy on 4 July 2002. The approved strategy was then presented at the (July) 2002 Consultative Group meeting, where it was recognized as the first sector strategy for Mongolia.

As a first and given that its implementation still has to be detailed, Mongolia's Sustainable Energy Sector Strategy is evolving—it will undoubtedly be revised to meet changing needs, and enhanced as details are added. This section outlines key priority issues that need to be addressed under each of the strategy's five major principles or pillars. Dates for action have been taken from GOM's Sustainability Energy Sector Strategy, unless otherwise noted.

9.2. Financial Sustainability

The energy sector should contribute to economic development without a continuing financial contribution from the central budget. Especially important will be the effort to limit the accumulation of new debts by the energy entities. This is a high priority item that is linked to all the other energy strategy objectives, and should be undertaken immediately. Unless the GOM demonstrates an early and determined effort to prevent the accumulation of new debts in the energy system, other objectives will lack credibility. Past debts can be subject to negotiation but henceforth, all current deliveries ought to be paid for on standard credit terms. A determined effort to identify theft of energy and to punish appropriately will serve to reinforce the GOM resolve to prevent new debts. Unless this issue is resolved, commercialisation will be retarded; energy sector privatisation initiatives (both for existing assets and new investments) will not advance; any tariff increases will be resisted; energy efficiency initiatives will lack credibility; and, financial sustainability will be virtually unattainable. In addition to this effort, other actions are needed:

- **Resolve Inter-company arrears**

  This action is being negotiated—however, negotiations began in 2001 and have yet to be finalized. The sector cannot be privatized, and will continue to drain scarce financial resources until this situation is resolved. Action year: 2002-03.

- **Increase bill collections**

  Efforts have begun to increase bill collections. Again, however, more effort and commitment by all parties are essential. Action year: 2002-05. (Note: improving bill collections should be an immediate action—and should not be delayed through 2005, 2002-2003 is the recommended action period).

- **Reduce technical and non-technical losses**

  Programs have been initiated to address losses, and these should be given priority support within the sector. Action year: 2002-2004.

- **Improve tariffs**

  Efforts are being undertaken to institute a transparent cost-of-recovery tariff. However, these efforts have not been fully explained to the paying customers (see below), nor implemented in a systematic manner. Action year: 2002-05. (Note: both gradual and immediate tariff adjustments to full cost-recovery have been used internationally. In either case, what has been essential is the institutionalization of a transparent tariff setting process that lays out what is being done, why, and then informing consumers about the process. To date, the tariff setting process has not been institutionalized—and it needs to be immediately undertaken).

- **Upgrade management of international loans**

  In the near term, loan portfolio management may be acceptable but key issues including the handling of currency exchange rates, have not been adequately addressed. Given the scale of borrowing by the sector, this should be given increased attention: Action year: 2003-2004.

9.3. Restructuring

This objective includes energy sector corporatization, commercialization, and privatization, as well as the corresponding regulatory framework and tariffs. Actions needed include:

- **Complete corporatization and commercialization**

  The energy entities have not been fully corporatized or commercialized. These are essential steps to improving performance. Action year: 2002-2004. (Note: corporatization and commercialization should be completed within the next two years—accounts, boards of directors, and full accountability should not be delayed).

- **Privatize**

  The energy entities need to operate as private companies, independent of government, and with full accountability. Action year: 2002-2006. (Note: again, privatization should be accelerated—there are no substantive reasons other than a lack of trained staff limiting privatization—and the energy entities are largely over-staffed).

- **Partial or full sale of energy entities**

  Several small heating entities have been unsuccessfully tendered for sale to private investors. Despite these setbacks, this effort should be accelerated whenever possible. Action year: 2002-2006.

9.4. Energy Access and Affordability

This objective indicates that the energy strategy should take account of social issues such as rural access and low income consumers. This strategy pillar is a social policy issue requiring close co-ordination with social agencies in the GOM and the community at large. At an early stage, an interagency working party should be established to co-ordinate activities and responsibilities in this area to avoid duplication and to manage scarce resources. Policies and programs to be implemented should:

- **Identify and evaluate subsidy requirements**

  As discussed in the document, policies and programs should be based on a clear identification of the needs of specific target populations. Broad subsidies and untargeted programs will only waste money, and not yield satisfactory results. Action year: 2003-2004.

- **Determine priority projects/programs**

  Based on the assessments of target populations, projects and programs need to be prioritized based on available sustainable resources. International funding may provide initial support but have limited duration. This is acceptable for subsidies that will be phased out but not for continuing social welfare programs that are tied to scarce budgetary resources. Action year: 2003-2005.

9.5. Energy Conservation

This strategy objective attempts to accelerate the implementation of energy conservation and efficiency measures throughout the energy system from sources of energy to the ultimate consumer. Needed actions include:

- **Pass the energy conservation law**

  This is anticipated to be completed in 2002.

- **Establish the National Energy Management Program (NEMP)**

  Successful energy conservation and energy efficiency programs require participation by all stakeholders. GOM has acknowledged this by recommending the formation of NEMP. However, the path towards implementation has not been clearly articulated. Beginning NEMP should be a priority action for 2003—it could be a significant contributor to the financial sustainability of the sector. (Note: GOM's energy strategy calls for NEMP to become a continuing activity).

- **Determine priority projects/programs**

  Based on NEMP and coordination with other agencies, priority projects and programs should be implemented as an on-going activity beginning in 2003.

9.6. Institutional Capacity Building

This strategy objective acknowledges the need to acquire and disseminate the skills and knowledge required to implement the other pillars while enhancing financial and energy decision making capabilities at the policy level. In addition to the new skills and knowledge required for policy implementation, there will also be redundancies created among current energy staff in areas such as project administration. In 2003, a human resources working group should be established to identify needs and redundancies with a view to smoothing the inevitable adjustment process.

- **Upgrade Analyses of proposed projects/programs**

  This should begin immediately—if agencies and energy entities lack specific skills or systems for evaluating projects, the international donor community should be willing to provide support including technical assistance, for a limited period.

- **Rationalize functions and staffing**

  This would be an initial task of the above human resources working group, and should be focused on upgrading performance and ultimately reducing costs.

- **Identify training requirements**

  This should be a second task (or concurrent to the above) for the human resources working group along with measures to fill training gaps.

9.7. Other Issues

In addition to the above actions that are based on the strategy's five pillars, there are other priority issues that link several of the pillars. These include:

9.7.1. Targets and follow-up reports

An early activity, GOM should determine specific targets (milestones) for each energy strategy objective and the identification of the corresponding responsible governmental agency. In the annual report to Cabinet on the status of the energy strategy objectives, lack of achievement would be identified along with a new set of targets/milestones for the following year. Instituting targets and follow up reports are essential to upgrading management of the sector.

9.7.2. Public relations

Operating within a market-based system requires good sources of information. The background to and expected results of energy strategy objectives need to be explained, especially if the implementation is expected to be controversial. These efforts need to be planned and co-ordinated so that all agencies involved in the implementation of an objective will provide complementary background information.

9.7.3. Cost-of-service tariffs

As these tariffs are calculated and implemented, they will need to be explained to end-users in particular. There is an education process required over and above the public relations issues identified above. Issues such as theft from the system and forthcoming policy initiatives on performance based tariff structures will need to be explained to ensure compliance and to enhance the possibility of privatisation of the assets.

9.7.4. Capacity for financial decision making

The need for this area of expertise will not only grow within the energy sector but will require considerable co-ordination with central agencies in particular to facilitate capital flows and potential balance of payments effects arising from energy sector initiatives. An interagency group should be established to co-ordinate roles and activities.

9.7.5. International co-ordination

Numerous potential benefits for Mongolia have been identified from possible co-operative energy development and transport initiatives with neighbouring countries. Such negotiations would involve many Mongolian agencies, requiring an interagency co-ordination group to avoid duplication of efforts in negotiating treaties and terms and conditions. Some consideration should be given to the identification of roles among agencies in the near future.

9.8. Final Comments

GOM has developed its Sustainable Energy Sector Strategy in order to provide a comprehensive roadmap for the future. Importantly, the strategy articulates the need for the sector to become a much better manager of its resources—including financial and human. Implicit to the strategy is the broad goal that the sector become a dynamic force in the economy, instead of one that siphons off resources that are much needed elsewhere. The opportunity costs of continuing budgetary support for an over-staffed and non-rationalized energy sector are tremendous: Tugriks spent on energy by GOM cannot be allocated to health, education, poverty alleviation, and the overall development of the economy.

This means that difficult decisions have to be made regarding fiscal allocations, international borrowing, staffing, general operations, and timetables for implementation. Significantly, implementation timetables have to become more than vague goals—they have to be followed or, if revised, justified. As an example, all segments of the sector have known that bill collections have to be improved, yet there appear to be few concrete results even after several years—current bills are not being collected let alone past due ones. Simply, if the sector continues in a "business as usual" mode, it will jeopardize broader national development goals to transform the economy into a market-based system. There is a need for commitment and leadership to meet these challenges.

GOM should be congratulated for its efforts to develop the energy strategy—it is Mongolia's first sector strategy. The Sustainable Energy Sector Strategy has been based on input from throughout the international donor community but above all the work of Mongolia's energy sector—the Ministry of Infrastructure has taken the lead but regulatory agencies, energy entities, and the private sector have all contributed. This positive result and its accompanying coordination and cooperation could provide a basis for implementing the various objectives, programs and projects identified during this consultative and evolutionary process.

This volume has attempted to outline the key priorities that will facilitate the transformation of the energy sector into a financially viable and operationally efficient industry as required by the GOM Sustainable Energy Sector Strategy. Evidence from other countries indicates that there is not one set path to developing the energy sector - rather a "Mongolian" approach has to evolve that reflects its unique endowments of resources and social characteristics. At the same time, market economy principles point the way toward the future for the reforms to be undertaken, not the *Never Never Land* of decade-long planning horizons. Only by undertaking the required tasks in this spirit can the aid dependence of Mongolia's energy sector be reduced and sustainability be achieved.

Appendix 1. Law of Mongolia on Energy

CHAPTER ONE
General Provisions

Article 1. The Purpose of the Law

1.1. The purpose of this law is to regulate matters relating to energy generation, transmission, distribution, dispatching and supply activities, construction of energy facilities and energy consumption that involve utilization of energy resources.

Article 2. Legislation on Energy

2.1. Legislation on energy shall consist of this law and other legal acts adopted in conformity with this law.

Article 3. Definitions

3.1. In this law, the following terms shall have the following meanings:

3.1.1. **"Business Rules"** means standards that reflect terms and conditions of contracts between suppliers and consumers, including terms of level and quality of service, payments, and standards governing relations between licensees;

3.1.2. **"Heat transmission network"** means heating lines and equipment from power plants to heat distribution centers;

3.1.3. **"Heat distribution network"** means heat distribution centers and heating lines and equipment from heat distribution centers to consumer equipment;

3.1.4. **"Regulated supply of energy"** means selling energy to consumers at tariffs approved by the Energy Regulatory Authority (hereinafter, Regulatory Authority) specified in article 8 of this law and published (hereafter, regulated tariffs);

3.1.5. **"Unregulated supply of energy"** means selling energy to consumers at contract prices;

3.1.6. **"Main network"** means power plants, as well as transmission and distribution networks connected to each other that supply energy to two or more aimag centers;

3.1.7. **"Main network code"** means legal standards that regulate technical activities of components of the main network;

3.1.8. **“Tariffs”** means prices approved by the Regulatory Authority and published. These may include any one or all of the following: producer prices, charges for dispatching, transmission, distribution and supply, as well as import prices;

3.1.9. **“Central heating supply”** means supply of heat from power plants generating both heat and electricity or from heat producers with capacity of over 100 MW via a heat network through dispatching;

3.1.10. “**Central heating supply code”** means standards regulating technical operation of components of the central heating supply;

3.1.11. **“Heating season”** means a period of time in the year determined on the basis of mean climatic indicators of many years during which time it is necessary to provide heat to buildings and premises in order to ensure comfortable living and working conditions for people;

3.1.12. **“Supplier of energy”** means a legal entity which holds a license to provide regulated or unregulated supply;

3.1.13. **“Consumer”** means a natural or a legal person who is a party to the energy supply contract with the right to purchase energy;

3.1.14. **“Consumer classes”** means classifying consumers depending on the terms of energy supply contract, quantity of energy consumption and time of use;

3.1.15. **“Electricity transmission network”** means high voltage power lines and substations of 110 kV and higher for transmission of electricity, as well as other power lines and substations that are connected to the network or technically and technologically required to be a part of this network;

3.1.16. **“Electricity distribution network”** means power lines and substations coming from substations of electricity transmission network to the consumer equipment;

3.1.17. **“Construction of electric facilities”** means construction of power plants, transmission and distribution power lines and substations; technical renovation, rehabilitation, repair and extension of basic technological equipment by eligible entities;

3.1.18. **“Energy resources”** means fuel and renewable energy resources that can be used in energy generation;

3.1.19. **“Energy”** means electricity and heat produced for consumer needs using energy resources;

3.1.20. **“Power plant”** means facilities generating electricity and heat for consumer needs using energy resources.

CHAPTER TWO
Full Powers of State Authorities with Regard to Energy

Article 4. Full Powers of the State Ikh Khural

4.1. The State Ikh Khural shall formulate the state policy on energy and shall make decisions regarding construction of a nuclear power plant.

Article 5. Full Powers of the Cabinet

5.1. The Cabinet shall exercise the following full powers with regard to energy:

5.1.1. To organize implementation of the state policy and legislation on energy;

5.1.2. To establish the Energy Regulatory Authority, to approve its articles of association;

5.1.3. To approve rules on consumption of heat and electricity and protection of power lines and networks and determine the frame of transmission networks.

Article 6. Full Powers of the State Central Administrative Authority

6.1. The State Central Administrative Authority in charge of energy shall exercise the following full powers:

6.1.1. To implement legislation and decisions of the Cabinet on energy;

6.1.2. To develop a state policy on use of energy and energy resources, importation and exportation of energy and construction of power plants, lines and networks;

6.1.3. To approve regulations on establishing security reserves of fuel, equipment and spare parts to be used in generation of energy that need to be maintained by licensees;

6.1.4. To approve regulations on energy supply during natural disasters and force majeure;

6.1.5. To approve codes of the main network and central heating supply; rules and procedures for assembling, maintenance and utilization of energy facilities and equipment and their operational safety; to establish consumer classes;

6.1.6. To review and issue decisions on disputes regarding licensing and revocation of licenses.

6.1.7. To approve methodology for setting prices of fuel to be used for energy generation and to review estimations; towns and other establishments;

6.2. The Cabinet member in charge of energy shall consult with the authority in charge regarding appointment of directors and management of wholly or partially state owned legal entities conducting activities in the energy sector.

Article 7. Full Powers of Governors of Aimags, the Capital City, Soums and Districts

7.1. Governors of aimags, the capital city, soums and districts shall organize implementation of legislation on energy and decisions issued by the authority in charge, in conformity with this legislation, develop a policy on energy supply in their respective territories; and implement the policy jointly with relevant authorities.

7.2. Governors of aimags and the capital city shall determine starting and ending dates of the heating season based on regional climatic conditions.

Article 8. The Regulatory Authority

8.1. Duties of the Regulatory Authority shall be to regulate generation, transmission, distribution, dispatching and supply of energy.

8.2. The Regulatory Authority shall be governed by the Regulatory Board (hereinafter the Board) consisting of three Regulators.

8.3. The Chairman and Regulators of the Board shall be appointed by the Prime Minister based on a proposal of the Cabinet Member in charge of energy. They shall be appointed initially for 2, 4, and 6 years, respectively, and thereafter for 6 years, so that expiration of their terms of service have intervals of 2 years. The terms of service may be extended once.

8.4. The Regulators shall have a status of state energy inspectors.

8.5. Part-time advisory boards comprised of representatives of equal numbers of consumers and licensees may be established under the Regulatory Board.

8.6. The Regulatory Authority shall be funded by licensing fees and charges for regulatory services provided to licensees.

8.7. Estimates of regulatory service fees and charges and the budget of the Regulatory Authority shall be approved by the Cabinet. The Regulatory Authority shall report to the Cabinet annually on its activities and budget performance.

8.8. The Regulatory Authority shall have its financial reports audited and published annually.

Article 9. Full Powers of the Regulatory Authority

9.1. The Regulatory Authority shall have the following full powers:

9.1.1. To issue, amend, suspend and revoke licenses in accordance with this law;

9.1.2. To set operational and licensing terms and requirements for licensees; to monitor compliance with these terms and requirements;

9.1.3. To develop methodology to determine tariffs, define the structure of tariffs; to review, approve, inspect and publish tariffs of licensees;

9.1.4. To establish a pricing and tariff system that enables supply of energy at the lowest possible cost and allows an adequate rate of return;

9.1.5. To resolve disputes between licensees and disputes between licensees and consumers in accordance with its jurisdiction;

9.1.6. To define levels of reliable supply of energy and service by suppliers to consumers relating these levels to different classes of consumers;

9.1.7. In case a licensed legal entity is to undertake restructuring, renovate or change its facilities, lines, networks, equipment and other property needed to conduct licensed activities, to transfer ownership rights of these assets or to pledge them as collateral in a way that these changes are likely to affect licensed activities, the Regulatory Authority shall make decisions whether to permit these changes.

9.1.8. To establish a database of technical and economic information and information on licensed activities; to obtain relevant information from licensees;

9.1.9. To register contracts made between unregulated licensed suppliers and consumers;

9.1.10. To approve Business Rules of licensees;

9.1.11. To provide technical and methodological guidance to Regulatory Boards of aimags and the capital city;

9.1.12. To approve connection instructions of licensees and consumers to electricity and heat transmission and distribution networks in order to supply and obtain electricity and heat. The said guidelines shall contain financial and technical terms of connection;

9.1.13. Other rights and duties stated in the articles of association of the Regulatory Authority.

9.2. The Regulatory Authority shall discuss issues to be resolved at the Regulatory Board Meeting. The Board Meeting shall issue its decisions in a form of a resolution. Licensees and consumers must comply with the resolution.

Article 10. The National Dispatching Center

10.1. The National Dispatching Center shall be an entity holding a license for energy dispatching and it shall have the following rights and obligations:

10.1.1. To organize implementation of projects and programs based on short-term and long-term energy policy and guidelines;

10.1.2. To provide technical and methodological assistance to local authorities and relevant organizations in implementing energy policy;

10.1.3. To organize training to upgrade skills and improve qualification of personnel of the energy sector.

Article 11. Regulatory Boards of Aimags and the Capital City

11.1. Regulatory Boards of aimags and the capital city shall be responsible for implementing government regulations on energy supply in their aimags and the capital city.

11.2. Regulatory Boards of aimags and the capital city shall consist of three part-time members. The Cabinet member in charge of energy shall approve procedures on appointment of members of Regulatory Boards of aimag and the capital city and their operational procedures.

11.3. Regulatory Boards of aimags and the capital city shall have the following rights and obligations in addition to those stipulated in provisions 9.1.5., 9.1.6., 9.1.7., 9.1.8. and 9.1.9:

11.3.1. To issue, amend, suspend and revoke licenses in accordance with this law:

11.3.2. To control compliance with conditions and requirements of licenses in their respective territories;

11.4. Regulatory Boards of aimags and the capital city shall cover their expenses related to issuing licenses by licensing fees.

CHAPTER THREE
Licences

Article 12. Operational Licenses and Issuance of License

12.1. A legal entity shall conduct the following activities on the basis of licenses issued to it by the relevant authority:

12.1.1. Electricity generation;

12.1.2. Heat generation;

12.1.3. Electricity transmission;

12.1.4. Heat transmission;

12.1.5. Dispatching;

12.1.6. Electricity distribution;

12.1.7. Heat distribution;

12.1.8. Regulated supply of energy;

12.1.9. Unregulated supply of energy;

12.1.10. Importation and exportation of electricity;

12.1.11. Construction of energy facilities;

12.2. Licenses for construction of power lines crossing the state borders and construction of energy facilities with capacity of over 5MW and dispatching licenses shall be issued by the Regulatory Authority upon permission of the State Central Administrative Authority

12.3. Licenses for utilization of power lines crossing the state borders, for construction of plants that generate both heat and electricity and for conducting activities stated in provision 12.1. of this law within the boundary of the main network and the central heating supply system shall be issued by the Regulatory Authority.

12.4. Licenses specified in provision 12.1. of this law shall be issued by Regulatory Boards of aimags and the capital city in cases other than those stipulated in provisions 12.2. and 12.3. of this law;

12.5. Licenses shall not be required for construction and operation of power plants with capacity 1.5 MW and lower and construction of its transmission and distribution lines that do not have any adverse impact on the environment and normal living conditions of people and are designed for own use.

Article 13. A License for Generation of Electricity and Heat

13.1. A license for generation of electricity and heat grants legal entities the right to generate electricity and heat and to connect power plants to transmission and distribution networks.

13.2. A holder of a license for generation of electricity and heat shall have reviewed and approved the prices and conditions for selling electricity and heat by the Regulatory Authority, except in the following circumstances:

13.2.1. generation of electricity and heat solely for own use;

13.2.2. generation of electricity for export, without connecting to the main network; or

13.2.3. selling electricity and heat at contract prices.

Article 14. A License for Transmission of Electricity and Heat

14.1. A license for transmission of electricity and heat grants legal entities the right to transmit electricity and heat using electricity and heat transmission networks.

14.2. A holder of a license for transmission of electricity and heat shall have the following rights and obligations:

14.2.1. To ensure reliability of operations of holders of licenses for generation, distribution and supply of electricity and heat and reliability of electricity and heat supply to consumers; to operate, maintain and extend transmission networks.

14.2.2. To develop connection instructions specified in provision 9.1.13 of this law, have them approved and comply with them.

14.2.3. To create conditions for connecting all licensees to the transmission network in an undiscriminating manner;

14.3. A holder of a transmission license may not be a supplier of energy.

Article 15. A Dispatching License

15.1. A dispatching license grants the National Dispatching Center the right to dispatch generation, transmission and distribution of electricity and heat without delay and match production with consumption.

15.2. A holder of a dispatching license shall have the following rights and obligations:

15.2.1. To dispatch generation, transmission and distribution of electricity and heat in correspondence with technical and technological requirements as well as with the least cost principle with a purpose of ensuring reliable supply of electricity and heat that meets the standards;

15.2.2. To implement a contingency plan on stopping, restricting and subsequently restoring supply of electricity and heat in cases of natural disasters and force majeure;

15.2.3. To register electricity and heat supply contracts in accordance with regulations issued by the Regulatory Authority;

15.2.4. To plan for reserves of electricity and heat, capacity and other services supplied to or provided by holders of other licenses through dispatching, to ensure integrity of operations of the main network and the central heating supply, to establish applicable procedures and to control their implementation.

15.2.5. To develop long-term estimates of consumption of the main network and the central heating supply every year;

15.2.6. To develop and implement the main network code upon consultation with holders of other licenses;

15.2.7. To plan and implement electricity transmission services for importation or exportation;

15.3. A holder of a dispatching license may not be granted a license for generation, distribution and regulated or unregulated supply of electricity and heat.

15.4. Holders of other licenses shall have an obligation to comply with decisions of the holder of a dispatching license within the scope of the main network code and the central heating supply code.

Article 16. A License for Distribution of Electricity and Heat

16.1. A license for distribution of electricity and heat grants legal entities the right to distribute electricity and heat within a defined territory.

16.2. A holder of a license for distribution of electricity and heat shall have the responsibility to connect all consumers of the territory specified in the license to the electricity and heat distribution network.

16.3. A holder of a license for distribution of electricity and heat shall have the following obligations:

16.3.1. To connect lines and equipment of consumers on the territory concerned, that meet requirements specified in this law, to electricity and heat distribution lines and equipment;

16.3.2. To develop, to have approved and to follow connection instructions specified in provision 9.1.13 of this law;

16.3.3. To provide consumers with electricity and heat meters certified by the authorities and install meters at consumers' connection spots;

16.3.4. To provide regulated and unregulated suppliers with equal opportunity to access the distribution network;

16.3.5. To ensure normal operations of holders of licenses for generation, transmission and regulated or unregulated supply of electricity and heat and to ensure reliable supply of electricity and heat to consumers.

16.3.6. To operate, maintain and expand the distribution network.

16.3.7. To connect other consumers to lines and equipment of consumers that meet requirements of connection instructions specified in provision 9.1.13 of this law, upon prior agreement with these consumers.

16.3.8. To purchase electricity and heat upon payment in advance in accordance with contracts made with holders of licenses for generation and transmission.

16.4. Meters specified in provision 16.3.3 of this law shall be a property of holders of licenses for distribution of electricity and heat.

16.5. A holder of a license for distribution of electricity and heat shall also be a holder of a regulated supply license and may also be a holder of an unregulated supply license.

Article 17. A Regulated Supply License

17.1. A regulated supply license shall grant legal entities the right to purchase electricity and heat from holders of licenses for generation, transmission and distribution of electricity and heat, the right to import electricity and to sell electricity and heat to consumers.

17.2. A holder of a regulated supply license shall have the following obligations:

17.2.1. To supply electricity and heat to customers on the territory specified in the license;

17.2.2. To make arrangements to obtain and transmit sufficient quantity of electricity and heat from holders of licenses for generation, transmission and distribution of electricity and heat;

17.2.3. To pay service fees for transmission, distribution and dispatching of electricity and heat;

17.2.4. To develop Business Rules and have them approved

Article 18. An Unregulated Supply License

18.1. An unregulated supply license shall grant legal entities the right to purchase electricity and heat from holders of licenses for generation of electricity and heat and sell electricity and heat to consumers approved by the Regulatory Authority or export electricity.

18.2. A holder of an unregulated supply license shall have the following duties:

18.2.1. To make arrangements to obtain and transmit sufficient quantity of electricity and heat from holders of licenses for generation, transmission and distribution of electricity and heat;

18.2.2. To develop its Business Rules and have them approved.

Article 19. A License for Importation or Exportation of Electricity

19.1. A license for importation or exportation of electricity shall grant legal entities the right to export electricity supplied on an unregulated basis and the right to import electricity supplied on a regulated basis.

19.2. A license for importation or exportation of electricity through the main network shall be granted to a holder of a license for transmission through this network.

19.3. The State Central Administrative Authority in charge of energy shall determine the quantity of electricity to be imported by a holder of a license for importation of electricity.

19.4. A holder of a license for importation or exportation of electricity shall agree with the dispatching center on time, duration and technical conditions of electricity importation and exportation.

Article 20. A License for Construction of Energy Facilities

20.1. A license for construction of energy facilities may be granted to financially capable legal entities that expressed their interest in construction of such facilities.

20.2. A holder of a license for construction of energy facilities shall have the design and construction works undertaken and reviewed by authorized entities.

20.3. A license for construction of energy facilities shall be granted upon assessment of the environmental impact in accordance with applicable legislation.

Article 21. Obtaining a License

21.1. An interested legal entity shall submit an application for a license to the Regulatory Authority or Regulatory Boards of aimag or the capital city.

21.2. The legal entity must attach the following documents related to activities to be licensed, to its application for a license:

21.2.1. Feasibility study;

21.2.2. Survey of energy resources to be used for energy generation;

21.2.3. Type, quantity and quality of energy to be generated, transmitted, distributed or supplied;

21.2.4. Main technical specifications of equipment to be used in operations;

21.2.5. Scope of services, boundaries of ownership, the balance of energy generation, supply and consumption;

21.2.6. Assessment of the environmental impact;

21.2.7. Action plan for environmental protection;

21.2.8. Statements of financial capability and resources of the legal entity;

21.2.9. Start date, amount of initial investment and sources of financing;

21.2.10. Description of skills and experience of technical personnel.

21.3. The Regulatory Authority and Regulatory Boards of aimags and the capital city may appoint an independent expert to review and evaluate applications and enclosed documents, if necessary.

21.4. A decision whether to issue a license shall be made within 60 days from the date of receipt of the application for a license

21.5. In case the application and enclosed documents fail to meet the requirements, they shall be returned to the applicant within 10 days from the date of receipt.

21.6. The decision to issue a license or a justification for refusal shall be published.

21.7. A license shall be granted to a financially capable legal entity, which possesses experience or is able to operate in the given field.

21.8. In case several legal entities submit applications for the same type of license, the license shall be granted on the basis of competitive tendering.

Article 22. Terms of Licenses and Extension of Licenses

22.1. The term of a license for energy generation and transmission shall be 5 to 25 years; the term of a license for construction of energy facilities shall be up to 5 years; terms of other licenses shall be up to 10 years.

22.2. If the licensor considers that the licensee has been properly meeting conditions and requirements of the license and that its normal operations can be sustained further in terms of technical and technological requirements, the licensor shall extend the license for up to 25 years.

22.3. An application for extension of the license shall be submitted no later than 180 days prior to the expiry of the term of the license.

22.4. The license shall become effective from the date of its issue.

Article 23. Modifications, Amendments and Renewal of Licenses

23.1. The licensor may renew a license or make amendments to it in case of changes in conditions of issuing the license or at the request of the licensee.

Article 24. Suspension and Revocation of Licenses

24.1. In case of a failure of a licensee to meet the requirements specified in the license and this law, the licensor shall request to eliminate the delinquency setting a deadline.

24.2. If the licensee has not eliminated the delinquency within the required date, the state energy inspector shall impose the relevant penalties and suspend the license. The suspension shall not serve as a ground for the licensee to terminate its activities.

24.3. The licensor shall revoke the license in the following cases:

24.3.1. the term of the license expired

24.3.2. the licensee is liquidated or is declared bankrupt

24.3.3. it is established that the licensee obtained the license by illegal means;

24.3.4. the license was revoked according to provision 24.2 of the present law, and the delinquency was not eliminated by the due date;

24.3.5. the licensee failed to implement environmental protection and rehabilitation action plan or violated legislation on environmental protection;

24.3.6. other grounds specified by the law.

24.4. The licensor shall issue a resolution on revocation of a license within 30 days after giving a notice on revocation of the license.

24.5. Revocation of the license shall not release the licensee from the responsibility of rehabilitation of the environment and other obligations.

24.6. In case the licensor revokes a license, other licensees may be requested to undertake these activities in order to ensure continuity of reliable energy generation, transmission and distribution and uninterrupted energy supply to consumers.

Article 25. Obligations of Licensees

25.1. Licensees shall have the following obligations:

25.1.1. Not to transfer their licenses to other entities;

25.1.2. To comply with legislation, rules and regulations on technical operation and safety, terms and requirements of the license and decisions of the licensor;

25.1.3. To keep financial and accounting records for each licensed activity, separately from records of activities not specified in the license.

25.1.4. To submit its audited financial statements to the licensor every year.25.1.5. To generate, transmit, distribute and supply electricity and heat in accordance with the main network code and the central heating supply code;

25.1.6. To notify the licensor and obtain a related permission in case of special circumstances specified in provision 9.1.8. of this law;

25.1.7. To comply with requests of authorized officials of the licensing authority made within their jurisdiction, to allow them to enter premises and facilities and to enable them to perform their duties.

25.1.8. To provide accurate information required by the licensor necessary to evaluate technical and economic performance of the licensee, on a timely basis

25.1.9. If holders of licensees for transmission and distribution of electricity and heat develop three to five year investment plan on extension and renovation of electricity and heat transmission and distribution networks, they shall take into consideration comments of other licensees and shall notify the licensor about such plans every year.

25.1.10. If it is necessary to terminate operations for a certain period of time so that it affects energy supply, the licensee shall notify of this the licensor not later than six months in advance.

25.1.11 To have an assessment of environmental impact undertaken by a relevant authority before starting its operations, to prepare annual plans on environmental protection and rehabilitation, to have them approved by relevant organizations and to implement these plans.

25.1.12. To operate in compliance with terms and requirements of applicable rules, regulations, procedures, technical norms and standards and license terms and requirements and to carry out its activities in accordance with technological procedures maintaining a high level of technical safety.

CHAPTER FOUR
Prices and Tariffs

Article 26. Principles for Setting Tariffs

26.1. Tariffs shall be determined separately for each licensed activity including generation, transmission, distribution, dispatching and supply of electricity and heat.

26.2. The following principles shall be observed in determining tariffs:

26.2.1. tariffs should be based on real costs of operations;

26.2.2. costs should be allocated to different consumer classes according to their requirements on electricity and heat supply;

26.2.3. tariffs should enable regulation of energy consumption;

26.2.4. tariffs should ensure price stability;

26.2.5. tariffs should ensure that revenues of licensees are sufficient to support their financial viability;

26.2.6. the tariff structure for electricity and heat should be clear and understandable for consumers;

26.2.7. the least-cost principle should be followed while tariffs should be sufficient to enable compliance with the requirements of technical and technological safety in energy generation, transmission, distribution, supply and dispatching;

26.2.8. the cost should be determined based on prior years' performance. However, depreciation of future investments or renewals should not be incorporated in the cost.

26.3. The Regulatory Authority shall be responsible for assessing justification and accuracy of cost estimations by licensees. It shall return the cost estimates to the licensee for a revision in case the estimates are not adequate. The Regulatory

Authority shall not itself complete licensee's estimates by giving suggestions or making estimates on behalf of the licensee.

26.4. The Regulatory Authority shall develop and publish tariff determination methodology and procedures for review and examination of tariffs.

Article 27. Tariffs and Contract Prices

27.1. The Regulatory Authority and Regulatory Boards of aimags and the capital city shall review tariffs and terms of services provided by suppliers annually, and may review them semi-annually upon requests of suppliers.

27.2. Consumers shall pay for regulated supply in accordance with published tariffs and for unregulated supply in accordance with contract prices.

27.3. The Regulatory Authority shall determine consumers eligible to receive unregulated supply on the basis of their electricity and heat load. These consumers have the right to choose either regulated or unregulated supply.

27.4. A holder of a regulated supply license shall submit any proposals for change in tariffs together with an itemized list of costs to the Regulatory Authority.

27.5. The Regulatory Authority shall notify consumers or publish in mass media information about changes in energy tariffs no later than 15 days prior to the date when these changes become effective.

27.6. Tariffs and contract prices may differ for certain groups of consumers depending on the following factors of energy supply in addition other factors:

27.6.1. Maximum load requested and consumption specified in the contract;

27.6.2. Load factor or pattern of load;

27.6.3. Ability of the consumer to manage its load or willingness to accept interruptions in the supply;

27.6.4. Geographical area served by the supplier;

27.6.5. Duration of the contract;

27.6.6. Other factors.

CHAPTER FIVE
Relations Between Suppliers and Consumers

Article 28. Energy Supply Contracts

28.1. Relations between consumers and suppliers shall be regulated by Article 226 of the Civil Code, this law, Business Rules and contracts made by consumers and suppliers.

28.2. Energy supply contracts with individuals shall specify quantity and quality of energy to be consumed, terms of payments, rights, obligations and responsibilities of the parties and other necessary issues.

28.3. Energy supply contracts with legal entities shall specify, in addition to issues specified in provision 28.2. of this law, pattern of energy consumption, monthly schedule, terms of direct debit deductions from bank accounts of consuming legal entities by banks, payment collateral and other necessary issues.

28.4. A supplier may enter into an energy supply contract based on bank guarantee of the consumer's creditworthiness.

28.5. A consumer shall make necessary amendments to the contract made with the supplier within 15 days after the notification specified in provision 27.5. is given. The failure to amend the contract shall not serve as a justification to refuse to comply with the amendments.

Article 29. Rights and Obligations of Suppliers

29.1. The supplier shall have the following rights and obligations in addition to those specified in Article 228 of the Civil Code and Article 25 of this law:

29.1.1. To provide consumers with energy that meets standard requirements;

29.1.2. To inform consumers about scheduled interruptions of energy supply not later than 4 hours prior to the interruption;

29.1.3. To ensure provision of services at the level specified in the contract;

29.1.4. To commence energy supply starting from the date specified in the contract;

29.1.5. To continue energy supply immediately after elimination of reasons for interruption;

29.1.6. An authorized representative of the supplying entity shall have the right to conduct inspection of consumers' energy supply equipment and to enter into buildings for this purpose;

29.1.7. To terminate a supply contract if the consumer fails to pay for energy in due time as specified in the contract and refuse to supply energy to consumers that dwell in the network safety zone as specified in provision 33.1 of this law.

29.1.8. To suspend energy supply to consumers as specified in provision 32.2 of this law.

29.2. A supplier shall be prohibited from restricting consumer rights by imposing conditions and requirements not specified in legislation and the contract.

Article 30. Rights and Obligations of Consumers

30.1. Consumers shall have the following rights and obligations in addition to those specified in Article 227 of the Civil Code:

30.1.1. To obtain energy supply;

30.1.2. To pay the energy supplier in due time and in full according to the contract;

30.1.3. To follow all technical operation and safety rules;

30.1.4. To provide possibilities for supplier's representatives to perform their duties;

30.1.5. To refuse to pay the energy bill fully or partially and claim compensation for damages incurred if the supplier fails to supply energy in a manner specified in the contract, resulting in insufficient supply or supply of energy of different quantity and quality than that specified in the contract;

30.1.6. To get compensation for damages caused due to suspension of energy supply in cases other than those specified in provisions 32.2 and 32.3 of this law;

30.1.7. To take responsibility for completeness of energy meters and measuring devices;

30.1.8. To ensure completeness and safety of own power lines and equipment;

30.1.9. To notify the supplier 7 days in advance of deciding not to receive energy in accordance with the contract, in cases other than natural disasters and force majeure.

30.1.10. To connect other consumers from own lines and equipment upon the consent of a holder of a license for distribution and regulated and unregulated supply.

30.1.11. To transmit and distribute energy to others through own lines and equipment, to receive service payments from related suppliers in accordance with contracts.

30.2. Consumers that risk to cause damage to human lives, national interests and significant damages to self in case of interruption of energy supply, shall have their own backup sources of energy. A list of these consumers shall be issued by the Regulatory Authority and Regulatory Boards of aimags and the capital city depending on consumer classes.

Article 31. Payment for Energy and Imposition of Penalties

31.1. Settlement of payments for energy consumption to be made between suppliers and consumers shall be based on readings of meters certified by a relevant authority and determined in accordance with the effective contract prices and tariffs.

31.2. Unless stated otherwise in the contract, a consumer shall have the right to claim a penalty of up to 5.0% of the value of undersupplied or partially supplied energy from the supplier.

31.3. A supplier shall have the right to impose penalties equal to up to 0.5% per late day on the amount not paid or paid improperly.

31.4. The amount of compensation for damages and penalties specified in provisions 31.2 and 31.3 of this law shall not exceed 50% of the value of undersupplied or partially supplied energy or payment due.

Article 32. Suspension of Energy Supply and Consumption

32.1. The state energy inspector shall suspend the operation in whole or operations of some equipment of a licensee until the breach is corrected, in the following cases:

32.1.1. circumstances emerged that may lead to industrial accidents and threat to human health and lives;

32.1.2. energy equipment, lines and networks do not meet operational and safety requirements;

32.1.3. generated energy does not meet standards and quality requirements;

32.1.4. persistent incompliance with requirements made by the state energy inspector;

32.2. An authorized representative of the supplier shall suspend energy supply to a consumer until the delinquencies are corrected, in the following circumstances:

32.2.1. the consumer fails to pay the electricity bill in due time;

32.2.2 the consumer purposefully damages metering equipment, removes their seals, changes their location, damages their connection and disrupts their normal functioning;

32.2.3. the consumer uses electricity in a manner not specified in the contract, in case the consumer does not have meters;

32.2.4. the consumer supplies electricity to another consumer of an area beyond its own consumption without the consent of the supplier;

32.2.5. emergence of force majeure, natural disasters, shortage of fuel, accidents or delays in the energy supply system, emergence of conditions dangerous to human lives and to property, and fire outbreaks;

32.2.6. the consumer refused entry to an authorized representative of the supplier to do inspection.

32.3. The state energy inspector shall suspend energy consumption of consumers until incompliance is corrected, in the following cases, in addition to those specified in provisions 32.2 of this law:

32.3.1. equipment or power lines of the consumer do not meet operational and safety requirements;

32.3.2 the consumer fails to comply with technical requirements of energy consumption;

32.3.3. the consumer consumes electricity that exceeds the capacity specified in the contract;

32.4. The state energy inspector shall notify the licensor about suspending activities of the licensee in advance and shall notify the supplier about suspending the right of a consumer to consume energy,

32.5. The state energy inspector shall notify the licensee on suspension of its activities, and the authorized representative of the supplying entity shall notify the consumer on suspension of energy consumption no later than 48 hours before the suspension. They shall clearly state the justification for suspension in their resolutions and seal equipment, meters and other necessary instruments. The state energy inspector may suspend activities of the licensee and consumption of energy by the consumer without advance notice in case circumstances arise threatening human lives, national interests and causing serious damages to other customers.

32.6. The licensee and the consumer, whose activities and consumption of energy are suspended, shall be prohibited from using sealed equipment and instruments before notifying the relevant state energy inspector or the authorized representative that the reasons for suspension will have been corrected and examined.

32.7. Suspension of activities and consumption of energy in accordance with provisions 32.1, 32.2 and 32.3 of this law shall not affect the rights of other licensees and consumers that comply with legislation, their licenses and contracts.

Article 33. Boundaries of Network Safety Zones

33.1. Lines and networks shall have established boundaries of their safety zones. it is prohibited to build any gers, housing and buildings or conduct any activities other than those permitted by the network owner within these boundaries.

33.2. Governors of aimags, the capital city, soums and districts shall determine boundary lines in accordance with safety rules for lines and networks.

33.3. Owners of trees and bushes planted or growing on the safety zone shall be obliged to transplant or cut them, if the trees or bushes may cause damage to the network or obstruct inspection and servicing of the network

33.4. The state energy inspector or an authorized representative of the supplying entity shall have the right to enter or to pass through places and buildings owned or operated by others which are located alongside the boundary. In case owners fail to meet their obligations specified in provision 33.3 of this law, the state energy inspector or an authorized representative shall request to cut or transplant the trees and bushes. If this requirement is not accomplished, they shall have the right to have the trees and bushes cut.

CHAPTER SIX
Control and Liability

Article 34. Monitoring Compliance with Legislation on Energy

34.1. The state energy inspection authority and state inspectors shall carry out technical control of compliance with legislation on energy as follows:

34.1.1. To control whether licensees and consumers comply with assembly, repair, operation and safety requirements of energy facilities and equipment;

34.1.2. To control compliance with requirements on appropriate and economical consumption of energy and requirements of network protection;

34.1.3. To investigate and draw lessons from accidents that occurred in energy facilities and equipment and take actions to prevent future accidents;

34.1.4. To keep a register of boilers, pressure containers, pipelines, electric and mechanical equipment; to test them in due time specified in relevant norms and rules, to certify them and to issue permissions for their utilization;

34.1.5. To issue permissions for assembly and repair of energy facilities and equipment (for steam pipelines with pressure 0.07 mPa and higher and water pipelines with temperature 115 C^0 and higher) and to provide quality certification for assembling and repair works.

34.2. Organizations for protection of consumer rights shall carry out public control on energy supply and justification of established prices and tariffs.

Article 35. Resolution of Disputes

35.1. The Regulatory Authority and Regulatory Boards of aimags and the capital city shall resolve disputes between licensees and between licensees and consumers within their jurisdiction.

35.2. If licensees or consumers disagree with decisions of the authority or its officials, they may appeal to court.

Article 36. Compensation for Damages

36.1. A supplier shall compensate direct damages caused to consumers due to the failure of the supplier to meet its contract obligations or due to disruption of energy supply without reasonable justification. The supplier and the consumer shall jointly determine the extent of the damage and have it documented.

36.2. A supplier shall compensate damages caused to a consumer while undertaking activities described in provision 29.1.6. of this law.

36.3. A supplier shall not bear any responsibility for damages caused to a consumer due to the consumer's own fault that occurred during planned interruption of energy supply, as described in provision 29.1.2 of this law, when the consumer was notified in advance.

Article 37. Liabilities for Violation of Legislation on Energy

37.1. If a breach of legislation on energy does not constitute a criminal offense, the state energy inspector or a judge shall impose the following penalties:

37.1.1. Confiscation of sales proceeds and imposition of fines of Togrog 3,000 – 60,000 on the official in charge and Togrog 50,000 – 250,000 on legal entities or organizations for carrying out unlicensed activities, transferring the license to others, conducting activities under licenses of others and selling energy at prices and tariffs different from those approved by the relevant authority;

37.1.2. Imposition of fines of Togrog 5,000-50,000 on citizens, Togrog 3,000-60,000 Togrogs on officials in charge and Togrog 50,000 - 250,000 on legal entities or organizations for the failure to fulfill requirements of the state inspector, obstruction of inspection, incompliance with regulations on accounting and reporting or for provision of false information;

37.1.3. Imposition of fines of Togrog 5,000 – 50,000 on individuals, Togrog 10,000 - 60,000 on officials in charge and Togrog 50,000-250,000 on legal entities or organizations for failure to meet contract obligations and obligations specified in provision 30.1 of this law;

37.1.4. Imposition of fines of Togrog 5,000 - 50,000 on officials in charge and Togrog 80,000 – 250,000 on legal entities or organizations for restricting consumer rights by making requirements not specified in legislation, contracts and licenses and for suspension of energy supply and consumption in circumstances other than those specified in provisions 32.1, 32.2 and 32.3 of this law;

37.1.5. Compensation of damages and payment of the value of illegally consumed energy and imposition of fines of Togrog 10,000 - 50,000 on individuals, Togrog 20,000 - 60,000 on officials in charge and Togrog 80,000 - 250,000 on legal entities or organizations for damaging seals, changing location or connections of energy meters and measuring devices and disrupting their normal functioning, purposefully or through culpable negligence; consuming energy without permission or breaching rules on protection of networks and consumption of electricity and heat;

37.1.6. Compensation for damages and imposition of fines of Togrog 5,000 - 50,000 on individuals, Togrog 20,000 - 60,000 on officials in charge and Togrog 100,000 - 250,000 on legal entities or organizations for breach of terms and requirements of licenses, failure to meet obligations stipulated in provisions 25.1.4, 25.1.6., 25.1.7., 25.1.9. and 25.1.10 of this law, incompliance with the main network code and the central heating supply code, technical and technological safety norms and standards and norms on assembling energy facilities and equipment; for industrial accidents, significant damage of property or technical breakdowns;

Article 38. Effectiveness of the Law

38.1 This Law shall become effective on the 15th of April, 2001.

CHAIRMAN OF THE
STATE IKH KHURAL OF MONGOLIA L. ENEBISH

Law of Mongolia
On Invalidating the Energy Law (1995)

February 1, 2001 Ulaanbaatar city

Article 1. The Energy Law which was enacted on December 1, 1995 shall be invalidated.

Article 2. This law shall be complied with starting from the date of effectiveness of the Law on Energy.

CHAIRMAN OF THE
STATE IKH KHURAL OF MONGOLIA L. ENEBISH

Sovereign-guaranteed Loans and Borrowing Capacity

Garry Vollans

Ottawa, Canada

Economic Policy Support Project

USAID/DAI

Executive Summary

During the 1990's, the Mongolian energy sector relied heavily on foreign assistance to refurbish and rehabilitate facilities to support the restructuring of the economy to a market-based system. Much of the foreign assistance was in the form of grants and concessionary loans that are now approaching the end of the grace periods. Most of the loans undertaken to date have been guaranteed by the Government of Mongolia (GOM). Furthermore, the GOM has identified requirements for additional foreign financial assistance to modernize and expand the energy and fuel supply sector while attempting at the same time to restructure it into a sustainable market-based commercial sector of the economy. The donor community needs assurance that continued reliance on foreign debt would be sustainable and that the restructuring of the energy sector will proceed so as not to jeopardize the growth of the economy nor the repayment of new and outstanding loans.

Accumulated foreign debt incurred in the energy sector and guaranteed by the GOM amounted to just less than US$ 400 million at the end of 2001, or almost half of the outstanding foreign public debt. Projects identified for possible future assistance could more than double foreign loans attributable to the energy sector. Although not inconsiderable, the loans incurred to date can likely be sustained by the GOM, in part because the terms and conditions attached to the loans were quite concessionary. New foreign loans are likely to have tighter conditions and shorter repayment periods making them more difficult to sustain. Further, in advance of an energy strategy timetable and restructuring framework, it is not clear if and how the energy sector would be able to profitably use and repay the loans, leading to the need for the GOM to honor the sovereign guarantees. Such an outcome would significantly complicate the macro-economic management of the economy.

It is recommended that before any further loans are incurred, the project proposals be subjected to a rigorous financial and rate-of-return analysis. This would enable a ranking of possible projects and greater assurance of their likely viability over the longer term. Furthermore, the project analysis should demonstrate that the overall value of the energy sector entity where the loan proceeds are to be invested would increase by an amount at least equal to the value of the investment. This would ensure full recovery upon privatization.

On a parallel basis, the commercialization of the energy sector facilities should proceed expeditiously. This will provide better financial information on which to base investment decisions and privatization proposals. A clear energy policy strategy for the sector would provide the framework within which short-term decisions can be made while moving towards a fully sustainable energy sector.

1.0. Introduction

During the early 1990's, Mongolia relied heavily on foreign assistance to refurbish facilities in the fuel and energy sector, to undertake a number of initiatives related to improved efficiencies in energy use and supply, and to expand alternative sources of energy supply to consumers outside urban areas. There are also numerous projects in the planning stage that anticipate various degrees of foreign grants, loans and technical assistance in implementation. The early projects were critical to ensure continued energy supplies to the economy as it moved through transition to an open market-based system and carried a sovereign guarantee. In the context of the development of a longer-term energy strategy for Mongolia, the role of foreign assistance needs to be evaluated both from the perspective of how it might best contribute to longer-term energy strategy objectives and how any associated negative consequences might best be mitigated.

2.0. Report Structure

The first part of this report outlines a number of issues on a conceptual basis related to the past use of foreign loans in the energy sector and potential future use of such loans. Statistical annexes (spreadsheets) provide both historical and some forecast data on several economic variables related to the energy sector and the total economy. The second part of the report provides a preliminary statistical analysis of some of the issues raised. Limited time and resources precluded in depth consideration of all the issues raised.

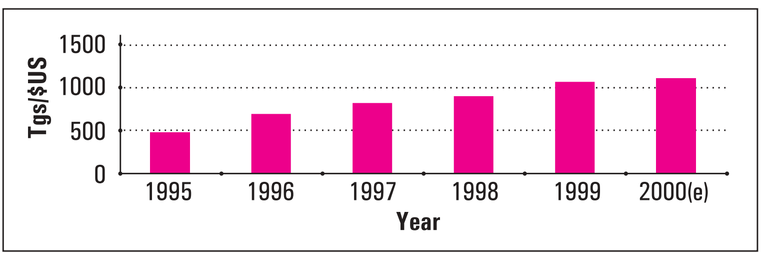
3.0. Issues Related to Forein Loans in the Energy Sector

Generally, investments in the energy sector are capital intensive and can be expected to add output capacity and/or to reduce costs in delivering energy to the final consumer at a profit. Comparative analyses of investment alternatives should permit a ranking where projects with higher rates of return would proceed first, provided the rate of return was higher than the opportunity cost of alternative investments or the cost of capital borrowed to undertake the project. If a project is unable to at least recover both capital and operating costs over the life of the project, it is not financially sustainable and will require cross-subsidies from other sources to continue operations. In a market-based economy, private investors do not undertake investments that do not promise a positive rate of return on the invested capital, normally including the opportunity cost of the capital invested.

Where the capital is borrowed, it can be from domestic and/or foreign sources. In the current situation in Mongolia, it is unlikely that foreign financed energy projects would be repayable from export earnings from the project directly but would rather support general economic growth in the economy. Consequently, the repayment of foreign loans to the energy sector becomes a potential matter of general relevance to the economy as a whole.

The foreign loans for the energy sector are denominated in foreign currencies and/or SDR's. As a result, there is an associated foreign exchange risk attached to these loans. If the exchange rate were to decline, more Togrogs would be required to pay back the same foreign obligation. The exchange rate has already experienced some depreciation over the second half of the 1990's. (See figure I).[1] In effect, the cost of repaying US$

Figure 1. Mongolian Exchange Rate



[1] *IMF page 28.*

denominated foreign loans virtually doubled in domestic (Togrog) terms over this period. This risk can be minimised on future borrowing if the loans are made to privatized entities, although the foreign exchange risk on past loans would remain outstanding. This later risk can be reduced through hedging arrangements on future anticipated foreign exchange requirements but at additional cost.[2]

3.1. Macro-economic Issues

3.1.1. Balance of payments:

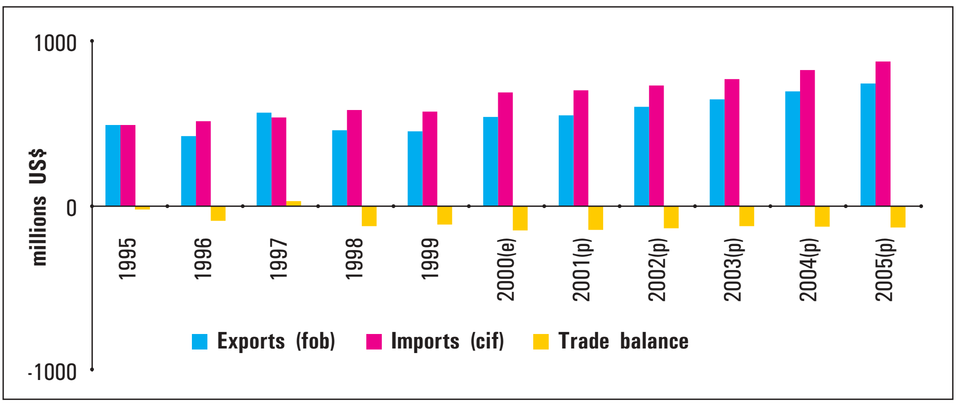
The inflow of funds from foreign sources can cause upward pressure on the exchange rate unless the flow matches the payment for imported components of the investment project. Similarly, the outflow of funds to pay back project foreign loans can cause downward pressure on exchange rates unless the project results in energy exports and/or displaced imports of a like magnitude.

The interest payable on foreign loans has a similar, albeit delayed impact on the balance of payments and exchange rates. In the current context, the concessionary terms and conditions attached to the early foreign loans have mitigated and delayed this impact.

As a general rule, the most important components of a county's balance of payments are the direct imports and exports of goods and services. Moreover, for smaller nations foreign trade represents a rather high proportion of GDP and external shocks such as a sudden weakening in an important export commodity such as copper can cause rather severe adjustments to the economy.

In Mongolia's case, there has been a fairly consistent balance of trade deficit that the IMF forecasts will decrease from the current level of roughly $150 million to about

Figure 2. Mongolian Foreign Trade



[2] *The IMF estimates that at the end of 2000, about three-quarters of Mongolia's public and publicly guaranteed external debt was denominated in Japanese yen or SDR's (IMF page 8).*

$125 million in 2003 and 2004. (See figure 2). Thus, for comparison purposes, the scheduled repayment of foreign debt with interest on current outstanding loans of roughly $20 million in 2012 (see figure 3) would be the equivalent of a 15% increase in the foreign trade deficit.

3.1.2. Interest rates

Borrowing funds in domestic markets to finance energy projects can result in higher interest rates in the domestic economy. Also, sovereign guarantees on foreign loans can lead to a downgrading of the overall credit rating of a country, tending to increase the cost and availability of future credit from foreign sources for all sectors of the economy.

3.1.3. Inflationary pressures:

The additional demand for labor and goods to be used in the energy projects can lead to higher prices in some particular markets and general upward price pressures in the economy. This effect can be compounded by higher domestic interest rates implemented by monetary authorities to combat higher inflation.

3.2. Energy Sector Issues

3.2.1. Energy sector priorities:

The fact that a foreign donor/lender has a particular interest in a specific project proposal may influence domestic decision-makers to move a less profitable project up the implementation schedule ahead of more profitable purely domestic projects. This outcome may not be deliberate but rather the result of having an easier access to domestic funds for projects with foreign participation. This “crowding out” effect on purely domestic projects may lead to an overall reduction in the rate of return on investments in the sector. (Where the assistance is in the form of a grant rather than a loan, this effect would be greatly diminished.) Bilateral foreign assistance in the form of loans is rarely altruistic and foreign lenders normally have their own set of priorities and reasons for pursuing a particular project.

The GOM has prepared a set of possible energy sector projects for consideration by the international donor community for loan assistance.[3] Noticeable by its absence among the data provided on each project is information concerning the financial benefits to be derived from each project. Such information would permit a ranking of these projects with regard to their potential for reducing costs, increased earnings, benefit/cost ratio, internal rate of return etc. Even potential donors would presumably like to see this

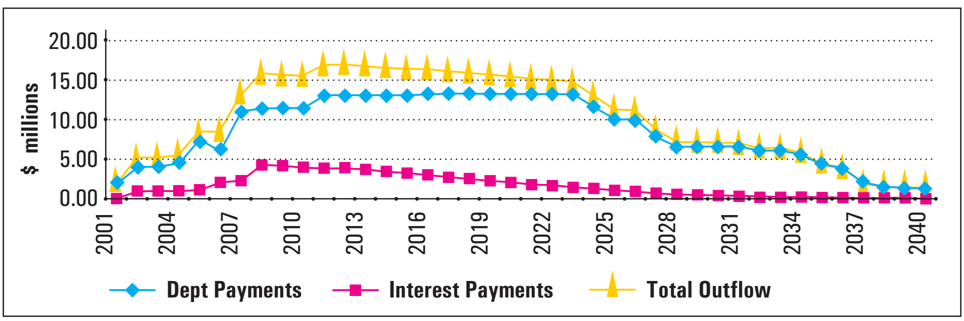
[3] *GOM (III) pages 51 - 68.*

type of background information to help them in identifying those projects of particular interest. Of even more interest would be information describing how these projects would make their respective installation even more attractive to potential private investors in financial terms, both domestic and foreign. Ranking of projects by normalized financial criteria would also assist the GOM in establishing priorities for allocation of scarce resources while providing the international donor community with some confidence that these proposals are financially viable over the longer term and should generate more than sufficient returns to pay back the loans.

The loans to the energy sector in the first half of the 1990's were largely to rehabilitate facilities on an urgent basis to avoid/reduce energy shortages that were not only hampering the macro-economic performance of the economy but also causing hardship to particular sectors. There was an evident need to get things up and running again on a continued basis. As a consequence, most of these loans were of a concessionary nature, typically with an extended grace period of up to 10 years before nominal interest charges (around 1 percent) and extended repayment periods began, often over 30 years. Figure 3 portrays the scheduled interest and debt repayments on the foreign debt incurred in the energy sector over the 1990's and until 2001. The outflow peaks around 2012 at just under $20 million annually.

It is noteworthy that the loans extended in the second half of the 1990's typically were tighter i.e. the interest rates were higher, the grace period shorter and/or the repayment schedule was shorter. This tendency has continued into the loans extended in 2000 and 2001. Furthermore, the quantity of grants and free technical assistance is falling. Thus, it is to be expected that any future loans will also be more stringent in the associated terms and conditions, leading to even higher interest carrying costs and accelerated repayment.[4]

Figure 3. Energy Sector External Debt



[4] *Many of the sovereign loans have been passed on to the respective energy sector agencies of the Mongolian government such as the Energy[5] Authority or the various state-owned energy companies using the proceeds on terms and conditions that are somewhat more stringent (higher interest rates and shorter repayment terms). This analysis does not deal with such matters as they amount to transfers from one arm of the government to another.*

Thus, if the level of debt were to roughly double over the next couple of years to say, US$ 800 million, the outflow of interest and payments on the debt principle would more than double and ramp up sooner because of the tighter terms and conditions. An annual total outflow of US$ 45 million for energy sector debts alone would represent over 6 percent of the total exports for the entire economy projected for 2005. A debt repayment schedule of that order of magnitude would not only create macro-economic management issues but also start crowding out investments in other sectors of the economy such as transport infrastructure. Further, critical government budgetary envelopes such as health and education could suffer in order to meet payments on the energy sector debt.

3.2.2. Choice of technology

The foreign lender may influence decisions on technologies selected (and equipment used) in energy projects to the detriment of project profitability and/or compatibility with existing energy systems. As a result, the amount to be repaid to the foreign lender may be higher than necessary and/or the technology selected may be less than the most cost-effective available. As a result, the operational costs of maintaining the energy sector operations are higher than necessary and returns from the investment are reduced accordingly.[5]

3.3. Other Issues

Several of the energy and macro-economic issues outlined above are only relevant to the extent that the ownership of the energy sector remains largely in state hands. The government has stated that over the medium term, it intends to move towards a new electricity industry structure. The main elements involve privatization of the generation and distribution assets and commercialization of the transmission assets (but still state-owned), all operating within a new regulatory structure.[6] Such moves would alleviate the financial situation in at least two respects: the proceeds could be used to partially retire the outstanding debts; and, requirements for new financing with sovereign guarantees would be reduced accordingly. A similar approach could also be taken with the coal-mining sector but that process does not appear to be moving forward expeditiously, as compared to the electricity sector.

[5] *Take for example the case of an airline forced by such financing considerations to maintain a fleet with say, 6 types of aircraft rather than 3. All the staff technical training, spare parts inventories, maintenance manuals and equipment, etc. must be roughly doubled as compared to the case with fewer types of aircraft.*

[6] *GOM (III), page 51.*

4.0. Evalution of Issues Related to Foreign Loans

4.1. Macro-economic Issues

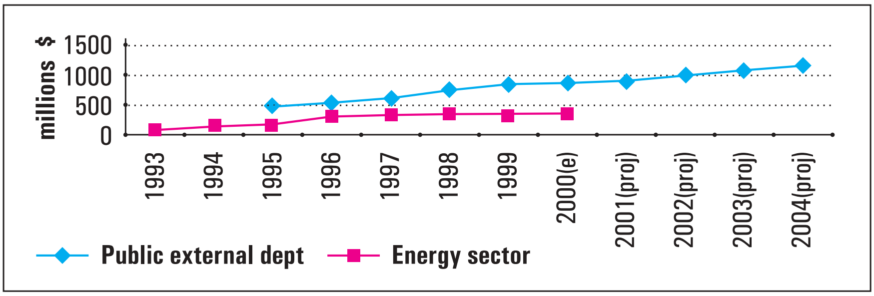
The World Bank has identified and reported on a number of shortcomings in the macroeconomic management of the Mongolian economy. "Government needs to act quickly to attack macroeconomic imbalances, and put in place a sustainable macroeconomic program."[7] The difficulty in managing the economy has been compounded by shocks such as the exceptionally cold winters of 2000-2001 that caused severe losses in the agricultural sector, further depressing the already declining rate of growth in the economy experienced over the second half of the 1990's. A number of disturbing trends in the economy were identified for early remedial action. "These trends — low and declining national savings, low and falling productivity of investment, the mushrooming external debt, and worsening income distribution — require immediate and persistent action if Mongolia is to realize the new government's admirable objectives of increasing growth and reducing poverty."[8] The external debt in particular increased rapidly from US$ 500 million in 1996 to US$ 850 million in 1999 and is estimated to rise to more than US$ 1100 million by 2004 [9], effectively more than doubling over 9 years.

4.1.1. External debt

The energy sector has accounted for a significant proportion of this external debt, rising from nil to almost US$ 400 million by 2000 over the decade.[10] Thus it can be inferred that the foreign debts attributable to the energy sector have contributed to the macro-economic concerns raised by international financial institutions. The IMF has noted that "by 1999, the public debt exceeded 100 percent of GDP (72 percent of GDP in net present value (NPV) terms), posing a threat for fiscal sustainability".[11] A high ratio does not necessarily indicate an inability to repay foreign loans, but it does represent an early warning signal of potential difficulties ahead if unforeseen external shocks or other such abnormal circumstances arise.

[7] *World Bank (1), page 3.*
[8] *World Bank (1), page 2.*
[9] *IMF, page 28.*
[10] *The outstanding debts from the Soviet era is excluded from all the estimates and data quoted.*
[11] *IMF page 5.*

Figure 4. External Debt



4.2. Energy sector issues

In January, 2002 there were about US$ 370 million in foreign loans outstanding to the energy, fuel and coal sector guaranteed by the Government of Mongolia (GOM).[12] Most of these loans involved generous concessions in terms of interest rates and grace periods before interest charges and debt repayment were scheduled to commence. Consequently, there has been little repayment to date (other than the Russian loans), nor any interest accumulated. (See figure II).

This situation is changing from two perspectives: the grace period for many of the loans is coming to an end; and the terms and conditions for later loans have much more stringent terms and conditions attached to them. Most of the early loans were typically at very low interest rates (1%), had a ten year grace period before interest was incurred and repayments scheduled, and the repayment period was over 30 years. More recent loans have typically been at higher interest rates (2 - 3%), had only a 5 year grace period, and the repayment is over 20 years or less.

There are a number of foreign loans for energy projects in various stages of negotiation where donors have already been identified amounting to $347 million. (See annex 4 for details.) In addition to these loans, the GOM has proposed a list of new priority programs and projects in this sector that it wishes the Donor community to consider.[13] The total cost of these projects is estimated at US$ 165 million, of which $118 million would be in the form of loans and $47 million in grants. Assuming that the costs are correct and that the share of loans in the total is valid, the total value of foreign guaranteed debt attributable to the energy sector would amount to about US$ 835 million. While less than half of these projects have been approved and are in various stages of completion and some of the loans under consideration may never move forward, the potential amounts are quite large. If the shortened grace periods, higher interest rates

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[12] *See Annex I for a detailed breakdown of the loans by project and the planned repayment schedule. About $12.8 million had aldy been repaid to Russia by 2001.*

[13] *See GOM (III) page 57 for a summary list and subsequent pages for detailed project descriptions.*

and shorter amortization periods on recent loans are maintained for these projects, the potential issues raised above in managing the economy become even more critical.

In addition, the increased possibility of creating macro-economy management problems becomes a self-fulfilling prophecy. Concerns within the international lending community about the ability to repay outstanding loans leads to higher interest rates which in turn makes it more difficult to manage the loans.

4.3. Other issues

Privatization of the assets in the energy sector will not resolve the issues surrounding the past use of foreign debt in the energy sector. The rate of growth of the debt attributable to the energy sector would slow down and, to the extent that foreign investors acquire the assets (using foreign funds to pay for them), the balance of payments issues will be attenuated.

The restructuring of the Energy Authority into separate commercial entities for generation, transmission and distribution forebodes well not only for possible privatization but also for clearer market signals for calculating the potential costs and benefits arising from energy sector investment proposals. Potential investors need to understand the framework in which they will operate if they decide to proceed with a project.

It is interesting to note that there is at least one large energy project, the Egiin hydro power station with a potential capacity of 220 MW, which is under consideration as a straight foreign investment project, without government guarantees. If it does move forward on that basis, it would be an excellent prototype for longer-term energy sector sustainable development.

5.0. Options

There are many possible options with regard to future actions and policy approaches to the use of foreign sovereign guaranteed loans to finance new and maintenance investments in the energy sector. To help focus the debate on these issues, three options have been selected to help illustrate the considerations and trade-offs involved. The first two represent polar extremes and the third a middle option, combining some aspects of both extremes.

5.1. Continuation of Status Quo Approach

Under this option, virtually any project with a non-negative return that a donor agreed to finance on concessionary terms and conditions would be implemented. There would be a continued effort to rank projects according to an overall energy sector strategy but those priorities could be superseded by the availability of foreign financing considerations. The success of this option depends upon favorable economic growth rates for the Mongolian economy. If and when the combined repayment of accumulated foreign loans and associated interest became difficult for the economy to support because of slow economic growth and/or an external shock, even more concessionary loans would be sought to permit time to find innovative financial solutions to the repayment schedule. This scenario is somewhat exaggerated but it approaches the current state of affairs. Projects with high priority from an energy supply perspective (e.g. rehabilitation loans on existing equipment to maintain output) that have foreign financing on a concessionary basis were virtually assured of acceptance by the GOM and this behavior was encouraged by the international donor community.

This behavior is also perfectly understandable from the perspective of the 1990's in Mongolia. The foreign financing was very inexpensive, the repayment terms very generous and the need was immediate. As the concessionary terms for new loan financing is tightened for future loans, this option becomes less and less sustainable. Further, unless projects selected for foreign financing have undergone a rigorous financial analysis to ensure that they are likely profitable, there is no guarantee that these investments would be repayable in Togrogs, let alone in foreign currencies.

5.2. Full Privatization and no Further Sovereign Loans

At the other extreme, the GOM could turn down any further offers of foreign loans for the energy sector requiring sovereign guarantees. This "tough market-based" policy stance would be combined with privatization of most of the energy sector on an early basis and an energy policy strategy that would accommodate or at least did not actively discourage foreign ownership of major segments of the energy sector. Short-term energy shortages and higher energy prices could develop in some areas of the economy, but the private sector would be relied upon to find innovative solutions to resolve these temporary imbalances. The energy regulatory authority would be required to set price ceilings in regulated energy markets and to act as a first-level disputes settlement mechanism between energy consumers and suppliers.

As the energy sector assets were privatized, the funds could be used to repay the concessionary loans or added to general government revenues until required to amortize the outstanding loans. This scenario is likely too harsh for any GOM to accept in the extreme, but it indicates the direction of some tough policy options that could be forced upon Mongolia if the repayment of the government guaranteed loans from foreign sources becomes untenable.

5.3. Utilize Foreign Loans Where Profitable and Supportive of Privatization Valuations

In this scenario, no new foreign loan to the energy sector would be undertaken unless it met at least two criteria. First, the project must be financially sustainable in its own right, i.e. after detailed financial analysis, it would be evident that the proposed project would generate enough cost reductions and/or returns to repay all the costs involved, including financing costs and a normal profit. Secondly, the project analysis would be required to provide clear evidence that the proposed project would enhance the potential sale/privatization value of the entity to which it would belong upon completion. Then, any subsequent privatization would clearly provide the funds to retire the associated foreign debt. Since past foreign borrowing can likely be repaid, the overall financial sustainability of foreign loans to the energy sector would be assured.

Restructuring of the energy sector to make the operations more commercial and with prices that fully reflect all costs, would make the required financial analysis before undertaking new energy projects easier and provide clearer signals for priority projects. This scenario assumes that the regulatory authority would ensure that the commercialized energy entities did not abuse their monopoly power. Privatization of the commercialized energy sector entities could proceed at a pace that ensured the GOM received full value for the assets sold.

One might also call this scenario the “maintain Mongolian control of energy strategy” scenario. Continuing down the free and easy foreign loan scenario is not sustainable and eventually leads to the loss of macro-economic control to international financial institutions. Going down the tough-market scenario route involves some tough medicine that could lead to the political party that tried to implement such a strategy losing political power.

6.0. Conclusions and Recommendations

The GOM has entered into a series of foreign loans to repair and upgrade energy and fuel sector facilities. These loans were granted on a concessionary basis and are unlikely to cause severe hardship to the economy as they are repaid. More recent loans have much tighter terms and conditions attached to them with respect to interest charges, grace period and amortization schedule. Any new loans are also likely to face these tighter terms and conditions. Unless evaluated carefully, potential new loans could greatly increase the foreign debt level of both the energy sector and the GOM, creating possible repayment hardships and other macro-economic management difficulties.

It is recommended that before any further loans are incurred, the project proposals be subjected to a rigorous financial analysis to ensure their likely viability and level of profitability. Furthermore, the project analysis should demonstrate that the overall value of the entity where the loan proceeds are to be invested should increase by an amount at least equal to the value of the investment. This type of rigorous project-by-project financial analysis would also yield an overall ranking of projects by financial rate-of-return, a valuable decision-making aid in determining priorities.

On a parallel basis, the commercialization of the energy sector facilities should proceed expeditiously to provide better financial information on which to base investment decisions and evaluate privatization proposals. The energy regulator should be relied upon to monitor the new energy sector commercial entities to preclude abuse of monopoly power and help settle access to facilities disputes. This would permit the government to shift its focus to longer-term energy strategies and policy analysis and away from day-to-day energy sector management issues.

Annex 1. Documents referenced and reviewed

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Annex 2: Individuals contacted

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Annex 3: List of acronyms used

GOM:	Government of Mongolia
GTZ:	Gesellschaft fuer Technische Zusammenarbeit (German Technical Cooperation)
IMF:	International Monetary Fund
ODA:	Official Development Aid
PRGF:	Poverty Reduction and Growth Facility
SDR:	Special Drawing Rights
USAID:	United States Agency for International Development

Annex 4: Projects in negotiation with an identified foreign loan donor

Project	$US million	Donor
Durgun Hydro Power	26.5	China
Distribution Grid Loss Reduction	29.1	World Bank
Transmission Grid Rehabilitation	7.1	Germany
Orkhon Hydro Power	160.0	Japan
Rural Solar Power phase II	43.8	Japan, Netherlands and Germany
Rural Solar Power phase III	80.5	Japan, Netherlands and Germany
Total	**347.0**	

Notes: 1 SDR = US$ 1.242
1 DM = US$ 0.438
1000 yen = US$ 7.46
1000 Kor. Won = US$ 0.762

Annex 5: Scheduled Energy Sector Debt Repayment

SOVEREIGN LOANS FOR MONGOLIAN ENERGY SECTOR - Annual Principal Repayment (millions of $US)

Year	**Amount**	**Interest %**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
PROJECT DESCRIPTION																
Power Plant Rehabilitation (Russia)	19.10	2.00	1.90	1.90	1.90	1.90	1.90	0.40	0.40							
Extension of Power Plant #3 (Russia)	10.50	3.00														
Parts and Materials (Germany)	0.88	0.75			0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Parts and Materials (World Bank Cr. 2320)	4.08	0.75		0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Egiin Hydro Project (ADB)	3.42	1.00		0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Nalaikh Boiler (Russia)	2.30	3.00														
Darkhan Rehabilitation I (Germany)	3.94	0.75				0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Darkhan Rehabilitation II (Germany)	2.19	0.75							0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
PP#3 Boiler Rehabilitation (ADB)	33.71	1.00					1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
PP#3 Turbine Rehabilitation (NDF)	4.97	1.00					0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
PP#4 Boiler Rehabilitation I (JBIC)	33.52	2.30					1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
PP#4 Boiler Rehabilitation II (JBIC)	45.80	0.75											1.53	1.53	1.53	1.53
Energy Conservation Project (ADB)	8.62	1.00							0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Heat Efficiency Project (ADB)	36.62	1.00							1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Choibalsan Rehabilitation I (Germany)	6.57	0.75								0.22	0.22	0.22	0.22	0.22	0.22	0.22
Choibalsan Rehabilitation II (Germany)	2.63	0.75											0.09	0.09	0.09	0.09
Dalanzadgad Cogeneration PP II (Korea)	4.78	3.00		0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
Dalanzadgad Cogeneration PP II (Korea)	0.55	3.00				0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Taishir Hydro (Kuwait & Abu Dhabi)	33.00	2.50		1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Sub-total Fuel and Energy	*257.17*	*1.51*	*1.90*	*3.97*	*4.00*	*4.17*	*7.13*	*5.63*	*7.21*	*7.03*	*7.03*	*7.03*	*8.65*	*8.65*	*8.65*	*8.65*
Baganuur rehab'n (World Bank Cr. 2320)	10.70	0.75		0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Coal technical Asst. (World Bank Cr. 2551)	7.93	0.75				0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Baganuur/Shiver coal mine I (Japan)	43.47	2.30							2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17
Baganuur/Shiver coal mine II (Japan)	32.06	2.30							0.77	1.54	1.54	1.54	1.54	1.54	1.54	1.54
Baganuur mine (World Bank Cr. 2854)	29.56	1.25						0.30	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Sub-total Coal	*123.72*	*1.82*	*0.00*	*0.36*	*0.36*	*0.62*	*0.62*	*0.92*	*4.16*	*4.93*	*4.93*	*4.93*	*4.92*	*4.92*	*4.92*	*4.92*
Total Fuel Energy and Coal	380.89	1.61	1.90	4.33	4.35	4.79	7.75	6.55	11.37	11.96	11.96	11.96	13.57	13.57	13.57	13.57
Total Interest Payments			0.21	1.15	1.15	1.10	1.16	2.28	2.54	4.63	4.43	4.26	4.04	4.18	3.95	3.72
Total Debt and Interest			2.21	3.58	3.60	3.99	7.01	8.42	13.50	16.59	16.39	16.21	17.61	17.75	17.52	17.29

Year	Amount	Interest %	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
PROJECT DESCRIPTION																
Power Plant Rehabilitation (Russia)																
Extension of Power Plant #3 (Russia)																
Parts and Materials (Germany)			0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Parts and Materials (World Bank Cr. 2320)			0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Egiin Hydro Project (ADB)			0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Nalaikh Boiler (Russia)																
Darkhan Rehabilitation I (Germany)			0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Darkhan Rehabilitation II (Germany)			0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
PP#3 Boiler Rehabilitation (ADB)			1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
PP#3 Turbine Rehabilitation (NDF)			0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
PP#4 Boiler Rehabilitation I (JBIC)			1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68				
PP#4 Boiler Rehabilitation II (JBIC)			1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53
Energy Conservation Project (ADB)			0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Heat Efficiency Project (ADB)			1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Choibalsan Rehabilitation I (Germany)			0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Choibalsan Rehabilitation II (Germany)			0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Dalanzadgad Cogeneration PP II (Korea)			0.32	0.32	0.00											
Dalanzadgad Cogeneration PP II (Korea)			0.04	0.04	0.04	0.04	0.00									
Taishir Hydro (Kuwait & Abu Dhabi)			1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	0.00				
Sub-total Fuel and Energy			*8.65*	*8.65*	*8.33*	*8.33*	*8.29*	*8.29*	*8.29*	*8.29*	*8.29*	*6.79*	*5.11*	*5.11*	*5.11*	*5.11*
Baganuur rehab'n (World Bank Cr. 2320)			0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Coal technical Asst. (World Bank Cr. 2551)			0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Baganuur/Shiver coal mine I (Japan)			2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	0.00	
Baganuur/Shiver coal mine II (Japan)			1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	0.05
Baganuur mine (World Bank Cr. 2854)			0.59	0.89	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
Sub-total Coal			*4.92*	*5.22*	*5.52*	*5.52*	*5.51*	*5.51*	*5.51*	*5.51*	*5.51*	*5.51*	*5.51*	*5.51*	*3.34*	*1.85*
Total Fuel Energy and Coal			13.57	13.87	13.84	13.84	13.80	13.80	13.80	13.80	13.80	12.30	10.63	10.63	8.46	6.96
Total Interest Payments			3.49	3.26	3.02	2.79	2.56	2.33	2.10	1.87	1.64	1.42	1.19	1.00	0.84	0.69
Total Debt and Interest			17.06	17.12	16.87	16.63	16.36	16.13	15.91	15.68	15.45	13.72	11.82	11.62	9.30	7.65

Year	Amount	Interest %	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
PROJECT DESCRIPTION															
Power Plant Rehabilitation (Russia)															
Extension of Power Plant #3 (Russia)															
Parts and Materials (Germany)			0.03	0.03	0.03	0.03									
Parts and Materials (World Bank Cr. 2320)			0.14	0.14	0.14										
Egiin Hydro Project (ADB)			0.11	0.11	0.11										
Nalaikh Boiler (Russia)															
Darkhan Rehabilitation I (Germany)			0.13	0.13	0.13	0.13	0.13								
Darkhan Rehabilitation II (Germany)			0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07					
PP#3 Boiler Rehabilitation (ADB)			1.12	1.12	1.12	1.12	1.12	1.12							
PP#3 Turbine Rehabilitation (NDF)			0.17	0.17	0.17	0.17	0.17	0.17							
PP#4 Boiler Rehabilitation I (JBIC)															
PP#4 Boiler Rehabilitation II (JBIC)			1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	
Energy Conservation Project (ADB)			0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29					
Heat Efficiency Project (ADB)			1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.00				
Choibalsan Rehabilitation I (Germany)			0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.00			
Choibalsan Rehabilitation II (Germany)			0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
Dalanzadgad Cogeneration PP II (Korea)															
Dalanzadgad Cogeneration PP II (Korea)															
Taishir Hydro (Kuwait & Abu Dhabi)															
Sub-total Fuel and Energy			*5.11*	*5.11*	*5.11*	*4.86*	*4.84*	*4.70*	*3.41*	*3.41*	*1.83*	*1.61*	*1.61*	*1.61*	*0.00*
Baganuur rehab'n (World Bank Cr. 2320)			0.36	0.36	0.36										
Coal technical Asst. (World Bank Cr. 2551)			0.26	0.26	0.26	0.26	0.26								
Baganuur/Shiver coal mine I (Japan)															
Baganuur/Shiver coal mine II (Japan)			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.03			
Baganuur mine (World Bank Cr. 2854)			1.18	1.18	1.18	1.18	1.18	1.18	1.18	0.59	0.05				
Sub-total Coal			*1.85*	*1.85*	*1.85*	*1.49*	*1.49*	*1.23*	*1.23*	*0.64*	*0.10*	*0.03*	*0.00*	*0.00*	*0.00*
Total Fuel Energy and Coal			6.96	6.96	6.96	6.35	6.33	5.93	4.64	4.05	1.93	1.64	1.61	1.61	0.00
Total Interest Payments			0.59	0.52	0.45	0.39	0.32	0.26	0.19	0.14	0.09	0.05	0.04	0.02	
Total Debt and Interest			7.55	7.48	7.41	6.74	6.64	6.18	4.83	4.19	2.02	1.70	1.65	1.64	

Annex 6: Scheduled Energy Sector Interest Payments
Post Grace Period - US$ millions

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PROJECT DESCRIPTION														
Power Plant Rehabilitation (Russia)	0.21	0.17	0.13	0.09	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Extension of Power Plant #3 (Russia)												0.00	0.00	0.00
Parts and Materials (Germany)				0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Parts and Materials (World Bank Cr. 2320)		0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Egiin Hydro Project (ADB)		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Nalaikh Boiler (Russia)												0.00	0.00	0.00
Darkhan Rehabilitation I (Germany)					0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Darkhan Rehabilitation II (Germany)								0.02	0.02	0.02	0.01	0.01	0.01	0.01
PP#3 Boiler Rehabilitation (ADB)						0.34	0.33	0.31	0.30	0.29	0.28	0.27	0.26	0.25
PP#3 Turbine Rehabilitation (NDF)						0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04
PP#4 Boiler Rehabilitation I (JBIC)						0.77	0.73	0.69	0.66	0.62	0.58	0.54	0.50	0.46
PP#4 Boiler Rehabilitation II (JBIC)												0.34	0.33	0.32
Energy Conservation Project (ADB)								0.09	0.08	0.08	0.08	0.07	0.07	0.07
Heat Efficiency Project (ADB)								0.37	0.35	0.34	0.33	0.32	0.31	0.29
Choibalsan Rehabilitation I (Germany)										0.05	0.05	0.04	0.04	0.04
Choibalsan Rehabilitation II (Germany)												0.02	0.02	0.02
Dalanzadgad Cogeneration PP II (Korea)		0.14	0.14	0.13	0.12	0.11	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04
Dalanzadgad Cogeneration PP II (Korea)						0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Taishir Hydro (Kuwait & Abu Dhabi)		0.83	0.83	0.79	0.75	0.71	0.68	0.64	0.60	0.56	0.53	0.49	0.45	0.41
Sub-total Fuel and Energy	*0.21*	*1.21*	*1.17*	*1.09*	*1.03*	*2.12*	*2.01*	*2.36*	*2.25*	*2.17*	*2.05*	*2.30*	*2.16*	*2.03*
Baganuur rehab'n (World Bank Cr. 2320)		0.11	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.07
Coal technical Asst. (World Bank Cr. 2551)					0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06
Baganuur/Shiver coal mine I (Japan)								1.00	0.95	0.90	0.85	0.80	0.75	0.70
Baganuur/Shiver coal mine II (Japan)								0.74	0.72	0.68	0.65	0.61	0.58	0.54
Baganuur mine (World Bank Cr. 2854)							0.37	0.37	0.36	0.35	0.34	0.34	0.33	0.32
Sub-total Coal	*0.00*	*0.11*	*0.11*	*0.10*	*0.18*	*0.17*	*0.54*	*2.26*	*2.18*	*2.08*	*1.98*			
Total Fuel Energy and Coal	0.21	1.32	1.28	1.20	1.21	2.29	2.54	4.63	4.43	4.26	4.04	1.89	1.79	1.69

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
PROJECT DESCRIPTION														
Power Plant Rehabilitation (Russia)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Extension of Power Plant #3 (Russia)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Parts and Materials (Germany)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Parts and Materials (World Bank Cr. 2320)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Egiin Hydro Project (ADB)	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nalaikh Boiler (Russia)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Darkhan Rehabilitation I (Germany)	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Darkhan Rehabilitation II (Germany)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PP#3 Boiler Rehabilitation (ADB)	0.24	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.13	0.12	0.11	0.10	0.09
PP#3 Turbine Rehabilitation (NDF)	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
PP#4 Boiler Rehabilitation I (JBIC)	0.42	0.39	0.35	0.31	0.27	0.23	0.19	0.15	0.12	0.08	0.04	0.00	0.00	0.00
PP#4 Boiler Rehabilitation II (JBIC)	0.31	0.30	0.29	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.19	0.18	0.17	0.16
Energy Conservation Project (ADB)	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03
Heat Efficiency Project (ADB)	0.28	0.27	0.26	0.24	0.23	0.22	0.21	0.20	0.18	0.17	0.16	0.15	0.13	0.12
Choibalsan Rehabilitation I (Germany)	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Choibalsan Rehabilitation II (Germany)	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Dalanzadgad Cogeneration PP II (Korea)	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dalanzadgad Cogeneration PP II (Korea)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taishir Hydro (Kuwait & Abu Dhabi)	0.38	0.34	0.30	0.26	0.23	0.19	0.15	0.11	0.08	0.04	0.00	0.00	0.00	0.00
Sub-total Fuel and Energy	*1.90*	*1.77*	*1.63*	*1.50*	*1.38*	*1.25*	*1.13*	*1.01*	*0.89*	*0.77*	*0.64*	*0.56*	*0.51*	*0.47*
Baganuur rehab'n (World Bank Cr. 2320)	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02
Coal technical Asst. (World Bank Cr. 2551)	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Baganuur/Shiver coal mine I (Japan)	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00
Baganuur/Shiver coal mine II (Japan)	0.51	0.47	0.44	0.40	0.37	0.33	0.29	0.26	0.22	0.19	0.15	0.12	0.08	0.05
Baganuur mine (World Bank Cr. 2854)	0.31	0.31	0.30	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.18	0.17	0.16	0.14
Sub-total Coal	*1.59*	*1.49*	*1.39*	*1.29*	*1.18*	*1.07*	*0.97*	*0.86*	*0.76*	*0.65*	*0.54*	*0.44*	*0.33*	*0.22*
Total Fuel Energy and Coal	3.49	3.26	3.02	2.79	2.56	2.33	2.10	1.87	1.64	1.42	1.19	1.00	0.84	0.69

Year	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
PROJECT DESCRIPTION												
Power Plant Rehabilitation (Russia)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Extension of Power Plant #3 (Russia)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Parts and Materials (Germany)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Parts and Materials (World Bank Cr. 2320)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Egiin Hydro Project (ADB)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nalaikh Boiler (Russia)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Darkhan Rehabilitation I (Germany)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Darkhan Rehabilitation II (Germany)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PP#3 Boiler Rehabilitation (ADB)	0.08	0.07	0.06	0.04	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00
PP#3 Turbine Rehabilitation (NDF)	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PP#4 Boiler Rehabilitation I (JBIC)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PP#4 Boiler Rehabilitation II (JBIC)	0.15	0.14	0.13	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.03	0.02
Energy Conservation Project (ADB)	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Heat Efficiency Project (ADB)	0.11	0.10	0.09	0.07	0.06	0.05	0.04	0.02	0.01	0.00	0.00	0.00
Choibalsan Rehabilitation I (Germany)	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Choibalsan Rehabilitation II (Germany)	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Dalanzadgad Cogeneration PP II (Korea)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dalanzadgad Cogeneration PP II (Korea)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taishir Hydro (Kuwait & Abu Dhabi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total Fuel and Energy	*0.42*	*0.38*	*0.33*	*0.28*	*0.24*	*0.19*	*0.15*	*0.11*	*0.08*	*0.05*	*0.04*	*0.02*
Baganuur rehab'n (World Bank Cr. 2320)	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coal technical Asst. (World Bank Cr. 2551)	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Baganuur/Shiver coal mine I (Japan)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Baganuur/Shiver coal mine II (Japan)	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Baganuur mine (World Bank Cr. 2854)	0.13	0.11	0.10	0.08	0.07	0.05	0.04	0.02	0.01	0.00	0.00	0.00
Sub-total Coal	*0.17*	*0.15*	*0.12*	*0.10*	*0.08*	*0.06*	*0.04*	*0.03*	*0.01*	*0.00*	*0.00*	*0.00*
Total Fuel Energy and Coal	0.59	0.52	0.45	0.39	0.32	0.26	0.19	0.14	0.09	0.05	0.04	0.02

Annex 7: IMF macro-economic data related to Mongolian Economy
Energy Sector Foreign Debt Mongolian Data

Description (millions US$)

Year	1995	1996	1997	1998	1999	2000(est.)	2001(proj.)	2002(proj.)	2003(proj.)	2004(proj)	2005(proj)
GDP (nominal)	1227	1379	1054	972	906	970	1020	1078	1156	1257	
Exports fob	486	423	569	462	454	537	549	601	647	693	741
Imports (cif)	489	511	538	582	567	687	699	733	771	819	871
Trade Balance	-3	-87	31	-120	-113	-150	-150	-132	-124	-126	-130
Public external debt	504	542	605	753	850	854	912	1009	1089	1171	
Public ext. debt (% of GDP)				77.4	93.9	88	89.4	93.6	94.2	93.1	90.5
Debt Service	64.2	56.6	41	39.3	41.3	31.5	45.8	37.4	40.9	36.5	
Debt service (% of Exports)				7.3	9.3	6	7	5.3	5.4	4.5	4.2
Reserves (year end)	115	98	137.5	124.7	156.8	190.9	209.2	237.1	259.8	284.2	298.8
Exch. Rate (Tg/$US)	474	694	813	902	1072	1097					

Source: IMF Country Report No. 01/182, October 2001, Page 28.

Fiscal Impact: Sovereign-guaranteed Loans and Borrowing Capacity

Michael Martin
Resident Representative
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External Debt Burden: Present and Future

If one looks at the debt numbers in static terms, the picture with respect to sovereign debt does not look particularly troubling. The debt to GDP ratio is admittedly high (about 84 percent of GDP), but given generous grace periods and the high degree of concessionality, the debt service burden does not represent a serious threat to sustainability (4 percent of GDP).

However, if one looks at the debt situation in a dynamic sense, the picture gives much more cause for concern. The growth in debt has been very sharp, doubling in the last five years. The degree of concessionality has declined sharply, and grace periods are coming to an end. Moreover, loans to the energy sector have been preponderant, accounting for $400 million of the debt by January 2000, or almost half of the total debt outstanding. Future growth of energy loans is projected to be strong: These loans, which grew from nil in 1990 to about $400 million by January 2000, are expected to double to about $800 million in the next couple of years.

In addition, there is the issue of the pre-1991 debt owed to the Russians. This amounts to about 10.3 billion transferable rubles. Even if discounted by 90 percent, this would effectively double the amount of foreign debt outstanding. The authorities are only now beginning to discuss this debt with the Russians, so it would be premature to judge the outcome, but clearly this could materially affect Mongolia's debt circumstance as the amount is prodigious.

Sustainability

Sustainability also depends on the dynamics of capacity to pay. In this connection, the following are important: (1) GDP growth and export expansion, (2) the effectiveness of the utilization of loans, (3) the appropriateness of macro policies, (4) exchange rate developments, and (5) the vulnerability of the economy to shocks.

(1) GDP growth and export expansion. Recent growth trends are not encouraging, with real GDP growth registered at only about 1 percent, and according to some accounts even negative, for 2000 and 2001. We are hopeful that growth will soon be rising in the order of 6 percent per annum, but one must be cautious in case such a favorable outcome does not materialize. The growth of exports of goods and services has also been uncertain and less than robust.

(2) Effectiveness of the utilization of loans. Capacity to pay is dependent on whether the loans have been effectively utilized. There are many signs which would suggest that loans are not being effectively employed. In this connection, let's look separately at project loans, program loans, and energy loans.

Regarding **project loans,** many of these loans have been channeled through the budget, where expenditure management has been poor or through state enterprises which have been encumbered with poor financial management and use of resources. In short, poor expenditure management and weak budgetary discipline, as reflected in massive arrears for wages, pensions, and financial obligations, in addition, to poor financial management incentives and distorted pricing in state enterprises have probably resulted in a less than optimal use of borrowed funds.

Energy sector loans, even if effectively managed, don't impact in a major way on export growth development in the short-to-medium term. Hence, their contribution to servicing the debt in the medium term is likely to be minimal.

The effectiveness of **program loans** depends in part on the degree of ownership. If the latter has been lacking, the positive impact on the economy would have been diminished. The heart and spirit of the authorities in Mongolia has not always been in the programs, but rather in the money, so this factor as well may adversely impact the debt burden.

(3) Appropriateness of macro policies. The effectiveness of debt management depends on the appropriateness of other policies. Trade, exchange rate, and pricing policies, as well as domestic monetary and fiscal policies, directly affect the return on investment and therefore the appropriate level of borrowing. In Mongolia, a liberal trade regime and a flexible exchange rate policy are clearly positive factors, but the fiscal deficit has been substantial and could cause difficulty. Clearly, there are many pressures on the budget, which if not effectively dealt with, would necessitate a continued accumulation of debt. This, together with a heavy reliance on grants, would enhance Mongolia's vulnerability.

(4) Exchange rate dynamics. Depreciation which has been the historical pattern, exacerbates the debt burden. Over the second half of the 90s, the debt burden in tugrik terms in effect doubled as a result of depreciation. To the extent that there is privatization the potential for such an adverse impact can be reduced for future loans. Of course, this would not be so for those loans already outstanding. Moreover, even if there were privatization there would still be some exposure to risk to the extent that the government would have to provide sovereign guarantees.

During the period that the loans are flowing in during the construction and development phase of the energy projects, the impact on the exchange rate is towards appreciation to the extent that the import content is less than the value of the loan. This creates a distortion, making the loans appear cheaper than in reality they are. As the development phase of the energy sector ends and the industry matures, less loans would be coming into the country. This would create a tendency toward exchange rate depreciation. The period in which the exchange rate was appreciated due to the energy loan inflows would also generate pressures for subsequent depreciation, as it would have hindered export development and fostered import growth.

(5) Vulnerability to shocks. Mongolia is quite vulnerable to shocks, as its economy is narrowly based. Given this, a high debt burden is more risky for Mongolia than for a country with a well balanced, stable economy.

Alternative Paths for Developing the Energy Sector

There is not really an alternative in the form of domestic financing. The capital market in Mongolia is undeveloped, and the banking system lacks the capacity for large scale lending. The banks are relatively small and banking statutes limit the size of loans to a given client to no more than 20 percent of capital. Syndicated credits would be a way around this constraint, but the banks here have not yet shown a disposition towards it. Moreover, the banks are oriented toward short to medium term lending, not to long term lending.

Given the need to limit growth in reliance on external borrowing and the fact that domestic borrowing is not an option, the implications are clear: (1) maximal care needs to be exercised in selection of future energy projects; (2) foreign direct investment in the sector needs to be encouraged, and (3) a regional solution, involving integration with Russian and China, should be explored.

Issue of project selection. In Mongolia there is the tendency to shop around a project with international donors and not look at it from the standpoint of a national energy development plan and on the basis of internal rates of return. The availability of foreign assistance in the form of both loans and grants appears to have affected the selection of projects, moving these projects ahead of inherently more productive ones. This has led to an incoherent energy development strategy and an ad hoc selection of projects.

One should begin by determining whether a project is worthwhile, and then seek financing. Instead the process has been inverted in Mongolia. Financing is accorded first priority and undertaken first. In fact, the financial return or productivity of a project appears in many cases not to have been seriously studied, nor has the impact on future debt sustainability. Such information would permit a ranking of these projects with regard to their potential for reducing costs, and increasing earnings, benefit/cost ratios, and internal rates of return. This information would also be helpful to potential donors in identifying projects.

In the early 70s it was thought that the primary constraint to development was lack of external financing. But external financing can be a bane as well as a benefit. For example, the debt crisis of the 70s and 80s arose as a result of commercial banks pushing funds at developing countries. Most of these countries were unable to resist. The choice looked easy at the time when they took the credits, but the bills ultimately came due and they paid the price for almost a decade in terms of macroeconomic instability and reduced growth. This period is sometimes referred to as the lost decade.

Unfortunately, adverse incentives are operative. The choice appears clear for the government in power as the benefits of additional borrowing accrue immediately during its regime. The problems only emerge down the road. It is then becomes someone else's problem.

To put it in blunt terms, I have heard it said, "If the foreign community wants to throw money at us, lets take it." I can understand this mentality, but, to the extent that this is true, it will not serve the country well. Such funds even if in the form of grants have real costs, as they distort project selection and tie up scarce real resources. The government, but also the donors, need to play a more proactive role to ensure that debt accumulation does not result in an unfavorable outcome.

FDI issue. Direct investment involves a transfer of capital, but perhaps just as important it also entails a transfer of technical and managerial expertise. A major cause of the developing country debt problems in the 1980's was that the massive inflow of capital into developing countries during the seventies was not channeled into the right activities nor was it managed effectively. Capital inflows in the form of foreign direct investment would help to preclude this.

To the extent that Mongolia increases the proportion of their financing requirements satisfied through direct investment, its vulnerability to external shocks would likely be reduced. Equity investment is less volatile than foreign bank financing. Moreover, in contrast to bank financing, direct investment entails a service payment only if it is positive. Countries that rely more on direct investment than foreign bank financing essentially shift the risks of unforeseen economic disturbances onto foreigners.

The relative proportion of direct investment to external bank financing that a country chooses should be determined primarily by two factors: (1) disposition to risk, and (2) the costs associated with maintaining service payments in untoward economic circumstances. If a debtor country is risk averse (willing to pay the associated higher costs), such a country would tend to favor external financing weighted toward direct investment. Given that equity investment involves more risks for foreign investors, it generally requires a higher return than external debt. With respect to the costs associated with maintaining service payments in untoward economic circumstances, these refer to the costs resulting from adjustment policies that must be put into place to correct an unsustainable balance of payments position. Political, economic, and institutional differences make adjustment easier for some countries than others. Similarly, the balance of payments of some countries is more prone to volatility than others. Thus, the higher the costs associated with adjustment and the greater the volatility of its external sector, the greater the reliance should be on direct investment as opposed to bank financing.

An obvious corollary to this is that the process of adjustment to economic disturbances is easier for countries with a large share of direct investment to its external liabilities.

The restructuring of the Energy Authority into separate commercial entities for generation, transmission and distribution represents a big step forward. This should greatly facilitate foreign direct investment in the energy sector. Establishing the industry on the basis of market determining factors should make it easier for foreign investors to calculate the potential costs and benefits of an investment. It should also help to ensure that the projects are as productive as possible. If investments were to be calculated on the basis of distorted market signals, less productive projects would be selected. Moreover, once prices were rationalized in line with market prices, wrenching and difficult adjustments would be required in the industry.

Foreign direct investment represents a medium-to long-term solution. It will take policy changes and time to bring significant foreign investment into Mongolia, so in the meantime changes need to be made to strengthen the industry. In this connection hard decisions will be required in the interim on the following issues: (1) the level of energy tariffs needs to be increased, (2) the need to break the vicious cycle of nonpayment (customers don't pay the energy companies, the energy companies don't pay the coal mines, and neither pay taxes to the government), (3) Erdenet's discounted energy tariff needs to be modified, and (4) steps need to be taken to improve collections and reduce technical losses.

Summary of Options

(1) The status quo: continue with the current approach.

- Take all loans offered
- Ad hoc project selection and incoherent industry strategy
- Pay little attention to the financial returns of projects
- Ignore the warning signals of debt accumulation
- Pay the consequences down the road
- Wrenching macroeconomic and industry specific adjustment
- Reduced economic growth and debt overhang which would affect the country's development for years.
- Social sector and poverty alleviation efforts would have to be retrenched, as the budget becomes burdened with debt service

(2) Full privatization and no further sovereign loans.

- Based on a completely market reliant approach.
- If there were full privatization, it would need to be mostly with foreign firms as domestic firms would not have the ability to borrow on international markets; or if they could access funds, it would be at much higher rates.
- The government would not take on any additional sovereign loans, but it would still need to offer guarantees, as domestic and foreign funding sources would not be available to individual small companies).
- Short term energy shortages and higher energy prices would likely develop in some sectors of the economy.
- Proceeds from privatization could be used to pay off existing debt
- A crash effort to privatize the industry completely could mean lower prices for the assets.
- Tough sell politically.
- Not realistic and would take time, so action would need to be taken in the interim period.

(3) The middle road: partial privatization and the assumption of a reduced amount of carefully screened loans.

- Select loans carefully, screen projects in the framework of a coherent national strategy with projects ranked and evaluated on the basis of efficiency and financial sustainability
- Even with privatization, the commercial entities would not be able to finance themselves either domestically or internationally, so a government guarantee would still be necessitated. However, to the extent that energy sector enterprises would be put on a commercial footing with tariffs adjusted to reflect underlying costs, sustainability of the sector would be much improved.

(4) Pursue a regional solution, involving Russia and China. For example, a high voltage transmission line or natural gas line. These would, according to most estimates, provide energy at a lower cost. It would also avoid large-scale capital investment and the associated augmentation in debt.

The status quo is not an option. Financial losses in the industry amounted to about 3 percent of GDP in 2000. Almost all of the new unbundled energy companies are now operating at a financial loss. The true cost of maintaining the energy industry in its current form is hidden, but it is a huge cost. Politicians may see change as involving large costs, and this is undoubtedly true, but these costs are much smaller than those of doing nothing.

Resolving Inter-company Arrears, Improving Collections and Reducing Losses

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1.0. Introduction

The purpose of my presentation is to present the debt situation of the energy sector of Mongolia and ways of resolution of those historically accumulated debts in a concise manner. To give the newly restructured entities the opportunity to operate in the future with relatively clean balance sheets and to be able to focus on future improvements, a concerted effort should be made to resolve these “old debt” issues as soon as possible.

Power sector entities and the Energy Authority devoted significant effort to the review and restructuring of a significant portion of the power sector debt prior to 31 July 2001, when the individual entities were corporatized and began operating as independent businesses.

Significant progress was made to identify and restructure both external and internal debts as discussed in the following sections.

1.1. External Debt

There are significant external debts owed by power sector entities to entities outside of the sector. In addition, customers owe significant amounts to the sector for electricity and heat consumed in prior periods. Resolution of some of those issues is described in the following sections.

1.1.1. International loans

International Loans of 134 billion Tg for the energy sector renovation were transferred to the appropriate individual entities. This was accomplished by developing new “On-lending” agreements between the Ministry of Finance and Economy and the individual entities. The agreements specify the interest rate to be paid by the entity and the payment terms over the life of the loan.

1.1.2. Value added tax

Value Added tax (VAT) payable of energy sector entities in the amount of 3.7 billion Tg was offset with energy debt of Local and State Budget organizations.

1.1.3. Commercial bank loans

Commercial bank loans of 0.8 billion Tg were assigned to the appropriate individual entities.

1.1.4. Fund for fuel and spare parts

The fund for fuel and spare parts established by a Japanese Grant of 4.8 billion Tg was partially transferred to individual entities (3.8 billion Tg) and partially considered as reimbursement of subsidies to the Diesel Aimags (1 billion Tg).

1.1.5. Amounts due from customers

Debt from customers (Accounts Receivable) was 21.7 billion Tg at 31 July 2001. With regard to the energy sector restructuring, Ministry of Finance and Economy and the State Property Committee reviewed accounts receivable situation of each entity and it was determined that 2.6 billion Tg of receivables should be written off since the possibility of their eventual collection was estimated to be “hopeless”. The resulting composite level of accounts receivable at that point was, therefore, written down to 19.1 billion Tg. Subsequent conversations with several entities, however, indicate that a significant amount of the remaining receivables, especially those more than 90 days old, are likely to remain unpaid. Continuing effort by the distribution licensees is needed in this area. It is interesting to note that receivables from households have contributed most to the increasing level of accounts receivable in recent periods.

1.2. Internal Debt

Internal debt has been significantly reduced and resolved. The initial components prior to the entities being corporatized and spun off from the Energy Authority included:

- § Debts incurred between October 2000 and July 2001 of 42 billion Tg that were specifically identified to the appropriate entities
- § Pre October 2000 debts of the Energy Authority (EA) to the individual entities of 36 billion Tg
- § Pre October 2000 debt of the individual entities to the EA of 26.3 billion Tg, providing a partial offset to the above item.

This was resolved by canceling 27.4 billion Tg of debt and assigning the remaining 24.3 billion Tg to the individual entities. The 24.3 billion Tg basically represents the payables of the distribution entities (EDOs and HDOs) to the electricity and heat generators, resulting in a financial burden for the distribution entities.

1.3. Composite Energy Sector Balance Sheet after the Restructuring

The resolution of the above items results in the following composite summary balance sheets of the entities at 31 July 2001 and 31 December 2001 shown below:

Composite Energy Sector Balance Sheet
At 31 July 2001 and 31 December 2001 (after restructuring)
(Billions of Tg)

	July 31	Dec 31	Difference
Cash	2	2.6	0.6
Customer Accounts Receivable (net of bad debt)	19	15	-4.0
Receivables of Generators from Distribution Entities	24	24.3	0.3
Fixed Assets	308	331	23.0
Other Assets	23	26.4	3.4
Total Assets	**407**	**399.2**	**23.2**
Payables to Coal Suppliers	25	22.2	-2.8
Payables to Suppliers & Other Entities	12	12.6	0.6
Payables of Distribution Entities to Generators	24	23.9	-0.1
Short-Term Loans	2	2.1	0.1
Long-Term Loans	134	150.6	16.6
Equity	179	187.9	8.9
Total Liabilities and Equity	**376**	**399.2**	**23.2**

As of 31 July 2001, the debt situation of the sector can be summarized as follows:

- § Customers owe 19 billion Tg to the EDOs and HDOs.
- § Generators owe 25 billion Tg to the coal suppliers (77% of which is owed to Baganuur).
- § The internal debt of 24 billion Tg from the distribution entities to the generators is approximately equal to the coal debt of the generators.

As of 31 December 2001, the debt situation of the sector can be summarized as follows:

- § Customers owe 15 billion Tg to the EDOs and HDOs.
- § Generators owe 22.2 billion Tg to the coal suppliers (69% of which is owed to Baganuur).

2.0. Analysis of the Situation of the Debt to Coal Suppliers

The first step is to analyze how the debt to coal suppliers has arisen over time. The following table gives a history of the debt situation:

Debt to Coal Suppliers (Millions of Tg)

Supplier	Dec '97	Dec '98	Dec '99	Dec '00	Jul '01
Baganuur	1,193	4,359	9,927	16,053	19,565
Sharin Gol	241	466	437	859	1,190
Shivee Ovoo	21	286	1,286	2,627	3,871
Other	897	848	1,025	1,251	694
Total	**2,352**	**5,959**	**12,675**	**20,790**	**25,320**
Fuel Expense for the Year		34,400	36,600	40,400	43,957
Payable as % of fuel Expense		17%	35%	51%	58%

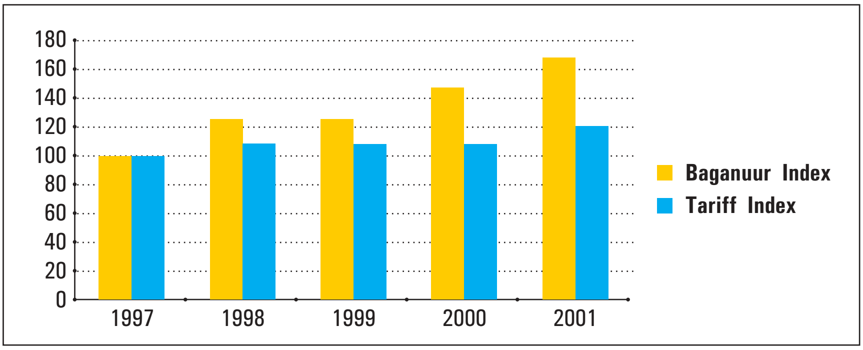
This debt has accumulated primarily over the past few years and it has increased faster than the overall increase in total fuel expense. The primary reason for the energy sector not being able to pay the entire fuel bill is that unit fuel prices have increased at a much faster pace than energy prices. The following table shows the movement in unit fuel prices from 1997 through 2001.

Coal Prices (Tg per ton)	1997	1998	1999	2000	2001
Baganuur	4,800	6,000	6,000	7,100	8,050
Increase over prior year		25%	0%	18%	13%
Sharin Gol	6,200	6,800	6,800	8,100	9,300
Increase over prior year		10%	0%	19%	15%
Shivee Ovoo	3,500	4,000	4,000	4,700	5,400
Increase over prior year		14%	0%	18%	15%
Baganuur Price Index (1997=100%)	100%	125%	125%	148%	168%

Unit fuel prices grew 68% over the four-year period; however, electricity prices grew at a much slower pace as shown in the following table.

	1997	1998	1999	2000	2001
Electricity Revenue (mil Tg)	51,024	54,900	61,200	63,300	77,500
Electricity Sales (mil kWh)	1,526	1,514	1,699	1,744	1,914
Average Tariff (Tg/kWh)	33.44	36.26	36.02	36.30	40.49
Increase over Prior Year		8%	-1%	1%	12%
Electricity Tariff Index (1997=100%)	100%	108%	108%	109%	121%

The comparison of the movement in unit fuel prices and tariffs is best displayed by the following chart:



The situation, therefore, has been that the electricity sector has not been able to generate enough cash from tariffs to afford the significant increase in unit fuel prices.

3.0. Framework for Resolution

Given the recent restructuring of the energy sector, this is the time to attempt to resolve the significant remaining debt issues – the debt owing to the coal sector and the debt due from customers. Many countries in a similar situation often refer to this as the "Cycle of Debt". The scenario is often as follows:

- § Tariffs have traditionally been too low
- § Customers don't pay
- § Generators are often not able to pay for fuel

To give the newly restructured entities the opportunity to operate in the future with relatively clean balance sheets and to be able to focus on future improvements, the objective should be to resolve "old debt" issues as soon as possible.

Customers, Distributors, Generators, and Coal Suppliers should share in the solution to the problem and negotiate on "How much should each stakeholder be willing to contribute to the solution.

The Donor Community may be able to facilitate a solution as far as loans and technical assistance to the electricity and heat sector entities is concerned. For example, there are significant World Bank loans outstanding to Baganuur Coal Mine, implying that World Bank can contribute to the coal sector debt resolution.

Coal suppliers should be willing to accept an amount less than the 25 billion due in return for a promise to receive cash according to a planned schedule. Also, since their prices were increased more than their customers could afford, they share some of the responsibility for the current situation. Those entities are in need of cash to continue operations and should be willing to discount the outstanding debt in return for faster receipt of cash.

If coal suppliers agree to concessions, the generators should be required to make sure that, in addition to the arrears, all future purchases of coal are paid for on a timely basis, according to contract terms.

Distributors should be held responsible for collecting as much as possible from their customers for energy they consumed. The Energy Law gives distribution entities the authority to disconnect customers for non-payment. Collections of the old debts should be applied to repay the coal debt.

Customers should also share in the solution. Their tariffs were not sufficient to cover the cost of production in the past. To obtain a measure of the impact on customer tariffs, for each 1 billion Tg of the coal debt to be collected in a one-year period, a tariff surcharge of 0.56 Tg/kWh for all electricity sales would be needed. Therefore, for example purposes, if it is decided that customers are responsible for 10 billion Tg of the debt to coal suppliers over a three year period, then a surcharge of 1.85 Tg/kWh would be needed for the next 3 years.

There is not a "Right" answer to this situation. Energy generators, distributors, customers and coal companies must be encouraged to enter into negotiations in good faith with the objective of arriving at a reasonable solution.

There are a lot of options for the debt resolution. I would like to propose one option from those.

Alternative I

This alternative begins with resolution of the debt to coal suppliers of 25.3 billion Tg as of 31 July 2001. The objective is to resolve this debt by the following means:

- § An assumed coal company discount or concession
- § Application of a given percentage of Customer Accounts Receivable
- § A surcharge to be collected from customers to satisfy the remaining amount

In order for the coal sector to assess their position, a summary of the cash to be received each year is also presented.

Alternative I

Debt to Coal Suppliers	25.3 Billion Tg
Coal Company Concession (20%)	5.0
Resulting Debt Level	20.3
Customer Accounts Receivable to be applied to Coal debt (19.1 * 50%)	9.6
To be collected from customers via a surcharge	10.7

(Surcharge of 2.0 Tg/kWh (4% of current tariff) in 2003 and 2004)

Coal Company	Cash Realization:
In 2002	13.3
In 2003	3.5
In 2004	3.5

In order to accomplish this proposal, the following commitments are needed:

- From Coal Companies:
  - o Reduce outstanding debts of Energy Sector Entities by 20% or 5.0 billion Tg
- From Power Stations:
  - o Agree to pay for future coal purchases according to terms (ON TIME).
  - o Eliminate internal debts (24 billion Tg at 31 July) from distribution entities.

- § From Electricity and Heat Distribution Entities:
  - o Collection of 50% of outstanding accounts receivable and remittance of the amount to the coal companies (9.6 billion Tg) in 2002. Collections in excess of 50% remain with the Distribution Entities.
- § From the Energy Regulatory Authority:
  - o Commit to approval of a 2.0 Tg/kWh surcharge on all electricity sales for 2003 and 2004 and insure that the amounts collected (10.7 billion Tg) are remitted to the Coal Companies

Other Options

There can be more alternatives by adjusting the amounts to be committed by the energy generators, distributors, customers and coal companies. Other alternatives could be developed by adjusting the same variables:

- § Coal Company Concession
- § Customer Accounts Receivable to be applied to coal debt
- § Surcharge to be assessed to electricity customers (over 2 to 3 years)

Other alternatives could involve additional variables that could include:

- § Negotiation of future coal price adjustments
- § Surcharges on Electricity Customers over periods in excess of 3 years
- § Surcharges on Heat Customers
- § Another Stakeholder – The Government of Mongolia. Electricity and heat prices were kept unrealistically low in prior years by the government, so one could argue that the GOM should fund that “Subsidy”

5.0. Summary

The purpose of this presentation was to present the debt situation of the energy sector and to generate discussion at the Donors Conference with the objective to facilitate resolution of the significant debt issues through serious negotiation in the near term. The energy generators, distributors, customers and coal companies are encouraged to begin negotiations as soon as possible to give the newly restructured entities the opportunity to operate in the future with relatively clean balance sheets and to be able to focus on future improvements in their operations. The donors can play a key role in facilitating this effort.

Ministry of Infrastructure

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1.0. Introduction

As in many countries where the energy sector is entirely owned by the State, electricity and heat tariffs in Mongolia were determined by the State in a manner that did not follow basic commercial principles and was not transparent. Cost recovery from consumers was not based on cost of supply or the manner in which the consumers (entities and households) utilized the service.

The energy sector of Mongolia has now been restructured from a traditional bundled system to an unbundled one in accordance with the "Government Resolution on Restructuring" and the "Law of Mongolia on Energy" (Energy Law). The result is that 18 entities were spun off from the Energy Authority, each with their own corporate identities and financial structures. The new entities hold licenses issued by the newly formed Energy Regulatory Authority (ERA) in the following categories:

- 8 Generators
- 4 Electricity Distributors (holding Retail licenses as well)
- 2 Heat Distributors (holding Retail licenses as well)
- 1 Transmission Company
- 1 Dispatch Company (National Dispatch Center)
- Eastern Electricity System (Stand alone power system)
- Western Electricity System (Stand alone power system)

As far as tariffs are concerned, there are several significant changes to be made as a result of the legislation. First, the tariff process will be a more transparent one, with the ERA responsible for carrying out the tariff process in accordance with the guidelines of the Energy Law. Secondly, the unbundled structure of the industry requires that tariffs also be unbundled. This requires the ERA to approve tariffs for the licensed activities of each licensee. Finally, the retail tariffs for entities and households must also be approved by the ERA in a transparent and fair manner.

2.0. Purpose

The purpose of this paper is to convey to the reader the manner in which the tariff process is evolving in Mongolia for the licensees and consumers connected to the Central Electricity System Grid consisting of:

- Five Combined Heat and Power (CHP) stations in Ulaanbaatar, Darkhan, and Erdenet
- Four Electricity Distribution Offices (EDOs) in Ulaanbaatar, Darkhan, Erdenet, and Baganuur (which also hold Retail Licenses)
- Two Heat Distribution Offices (HDOs) in Ulaanbaatar and Darkhan

A major theme is that the tariff process in Mongolia, as in many other countries, is an evolving one that must support the market structure, allow licensees the opportunity to recover their reasonable costs, and provide consumers with fair prices. The discussion will begin with an analysis of the impact of the Energy Law on tariffs (the basic building block), review the restructuring that has already occurred, progress to the Interim Tariff Methodology recently implemented, and examine continuous improvements to the process to arrive at the eventual long-term policy.

Another purpose of this paper is to communicate to the donor community and to potential investors in the Mongolian power sector that the tariff process is a progressive, transparent one that supports the new commercial environment in the sector with a regulatory framework independent from the Government of Mongolia.

3.0. Law of Mongolia on Energy – The Basic Building Block

The Energy Law forms the foundation for the structure and operation of the entire sector. The establishment of the Energy Regulatory Authority moves the sector to a more commercial environment with the ERA responsible for regulation of the industry and protection of consumers. The ERA carries out its mission utilizing various key tools including licensing and tariff approval. As far as tariffs are concerned, the law establishes broad principles to be applied in the process.

Article 9, "Full Powers of the Regulatory Authority", delineates the authority of the ERA in the tariff process in the following sections:

"9.1.4. To develop methodology to determine tariffs, define the structure of tariffs; to review, approve, inspect and publish tariffs of licensees;

9.1.5. To establish a pricing and tariff system that enables supply of energy at the lowest possible cost and allows an adequate rate of return;"

This gives the ERA the full authority to approve tariffs for each of the licensees and the resulting retail tariffs, a significant improvement over the former tariff environment.

Certain basic tariff principles are enumerated in the law to provide a framework in which the ERA can carry out its mission. Article 26, "Principles for Setting Tariffs", reads as follows:

"26.1. Tariffs shall be determined separately for each licensed activity including generation, transmission, distribution, dispatching and supply of electricity and heat.

26.2. The following principles shall be observed in determining tariffs:

> *26.2.1. tariffs should be based on real costs of operations;*
> *26.2.2. costs should be allocated to different consumer classes according to their requirements on electricity and heat supply;*
> *26.2.3. tariffs should enable regulation of energy consumption;*
> *26.2.4. tariffs should ensure price stability;*
> *26.2.5. tariffs should ensure that revenues of licensees are sufficient to support their financial viability;*
> *26.2.6. the tariff structure for electricity and heat should be clear and understandable for consumers;*

> *26.2.7. the least-cost principle should be followed while tariffs should be sufficient to enable compliance with the requirements of technical and technological safety in energy generation, transmission, distribution, supply and dispatching;*
> *26.2.8. the cost should be determined based on prior years' performance. However, depreciation of future investments or renewals should not be incorporated in the cost.*

26.3. The Regulatory Authority shall be responsible for assessing justification and accuracy of cost estimations by licensees. It shall return the cost estimates to the licensee for a revision in case the estimates are not adequate. The Regulatory Authority shall not itself complete licensee's estimates by giving suggestions or making estimates on behalf of the licensee.

26.4. The Regulatory Authority shall develop and publish tariff determination methodology and procedures for review and examination of tariffs."

Further guidance is provided in Article 27, "Tariffs and Contract Prices":

"27.6 Tariffs and contract prices may differ for certain groups of consumers depending on the following factors of energy supply in addition other factors:

> *Maximum load requested and consumption specified in the contract;*
> *Load factor or pattern of load;*
> *Ability of the consumer to manage its load or willingness to accept interruptions in the supply;*
> *Geographical area served by the supplier;*
> *Duration of the contract;*
> *Other factors".*

Within these guidelines, the ERA's task is to establish a tariff methodology for both licensee tariff development and retail tariff development.

In order to properly carry out its mission, the ERA must have access to operating and financial information of licensees. The law recognizes this need in Article 25, "Obligations of Licensees" and, among other provisions, specifies the following requirements of licensees:

"25.1.3. To keep financial and accounting records for each licensed activity, separately from records of activities not specified in the license.

25.1.4. To submit its audited financial statements to the licensor every year.

25.1.8. To provide accurate information required by the licensor necessary to evaluate technical and economic performance of the licensee, on a timely basis"

Finally, Article 32 gives the supplier the right to terminate service to a customer in the event of non-payment, an important provision to insure that tariffs once assessed are collected.

The Energy Law, therefore, provides a solid foundation upon which to build as the sector begins to operate on a more commercial basis.

4.0. Building upon the Foundation - Interim Tariff Methodology

The ERA definitely had its work cut out for it in terms of timing. The restructuring of the entities occurred at the end of July 2001, and by the end of the year the ERA issued interim licenses to the newly restructured entities, developed its Interim Tariff Methodology, analyzed the tariff submissions of each entity in the central system, and established tariffs to be effective January 2002.

Building on the technical assistance provided by USAID on prior and current projects, the ERA staff developed an interim tariff methodology incorporating solid regulatory principles and including the formats and methodologies for each category of licensee to submit their tariff application. The methodology specifies the requirements for:

- Electricity and/or heat production tariff for each generator licensee that recognizes its cost structure
- Fee for the Dispatch licensee to cover its cost of operation
- Fee for the Transmission licensee to cover its costs of operation and maintenance of the 220 and 110 kV system
- Tariffs for the wholesale purchase of power and heat by each EDO and HDO, recognizing the source of the generation
- Tariffs for each EDO and HDO to recognize its costs related to operation and maintenance of the distribution system as well as the cost related to supply activities (customer billing and collection, etc.)

The Interim Tariff Methodology basically follows a traditional “Rate of Return” methodology using the cost structure and output levels of each licensee. It is structured to allow licensees to recover their prudent:

- Operating and maintenance costs
- Depreciation
- Interest on short-term debt
- Return on investment (rate base, including fixed assets and working capital) that allows for recovery of:
    - International loan costs
    - Other long-term loans
    - Return on equity (to a limited extent)

The result is that if licensees control their costs to the levels assumed in their tariff filings, they will have the opportunity to recover all their costs.

4.1 Overview of the Process for Developing Licensee Tariffs

As with any cost-based tariff methodology, the process utilizes a three-step procedure as follows:

Revenue Requirements Overall level of costs	⟹	**Cost of Service** Allocation of costs	⟹	**Tariff Design** Price Structure

The following three sections deal with each of these steps individually.

4.1.1 Determining the revenue requirement

The Revenue Requirement to be submitted by each licensee was to be based on estimated costs to be incurred in 2002, with the exception of fuel costs that were to be based on current costs. Since fuel is the largest cost element for generators, the ERA did not want licensees to speculate on the price increase for 2002. Licensees will, however, be compensated for the actual cost of fuel through the application of a Fuel Adjustment Mechanism to be discussed later in this paper.

The revenue requirement contains the following components:

1. Operation and Maintenance Component
   - Fuel for Generation
   - Salary costs
   - Other employee related costs (Social Security, labor protection, etc.)
   - Utilities (electricity, heat, water, phone)
   - Consumables and spare parts used for operation and maintenance
   - Administrative (business trips, stationery, legal, accounting, etc.)
   - Meter reading
   - Billing
   - Collection expense
   - Regulatory fee
2. Depreciation of Fixed Assets
3. Recovery of Financial Costs consisting of:
   - Short-term loan interest, plus
   - Return on Long-term capital calculated as Rate Base x Rate of Return.

Rate Base consists of Net investment in Fixed Assets plus a working capital allowance (basically, current assets less current liabilities).

Rate of Return is calculated in the manner shown in the following hypothetical example:

Component	Amount (Million Tg)	Cost (%)	Percentage of Total	Weighted Cost (%)
International Loan	24,000	2%	40.0	0.80
Domestic Long-Term Loan	6,000	9%	10.0	0.90
Equity	30,000	3%	50.0	1.50
Total	60,000		100.0	3.20

Of course, the largest source of external financing is provided by the International loans. The interest rate is determined by the “On-lending” rate specified in the loan agreement between the Government of Mongolia and the entity.

The cost of equity is always a difficult parameter to determine. In fact, in the case of State owned entities, which is currently the case in Mongolia, most countries do not allow tariffs to include any return on equity at all. At this point, the important thing is to establish the principle that there should be a return on equity. The ERA recommended that licensees utilize a 3% rate in their applications. Although licensees were instructed to use the 3% rate in their filing, the ERA reduced the return on equity to a lower number for each licensee in order to retain the current basic retail electricity tariff of 45 Tg per kWh. As an interim measure, this can be justified by the fact that all licensees are currently owned by the Government of Mongolia and it is the government’s to keep retail tariffs, especially for households, as low as possible.

The Tariff Department of the ERA analyzed the cost data submitted by each licensee, made adjustments to various cost estimates submitted by licensees, and discussed the adjustments in meetings with each licensee. These are adjustments normally made by regulators, based on their review, and fall into two categories. Cost level adjustments were made primarily to the wage category, since licensees assumed that wages would increase significantly (up to 20% in some cases). Performance level adjustments were made for generators in the area of heat rate assumptions, the amount of mazut needed due to cycling of the units, and station use. In the case of distribution licensees, the estimated losses were revised somewhat.

The resulting revenue requirement, therefore, includes all cost categories related to the licensed activity. Assuming that licensees can manage their costs to the levels included, they have the opportunity to recover all their costs. If the management teams can take actions to reduce costs, they can achieve higher earnings. Opportunities for cost reduction are plentiful and include reduction of station use at power stations and reduction of technical and commercial losses throughout the distribution system. Of course, maintenance should not be deferred in order to contain costs. In fact, prudent maintenance practices can result in lower future costs and better service levels

4.1.2 Cost of service

The next step in the process, often referred to as the "Cost of Service", was to allocate the revenue requirement of the power stations to electricity and heat. As in most countries, the ERA decided that the heat business should be subsidized by the electricity business. Generation licensees were instructed to allocate their costs appropriately between electricity and heat as a starting point. In order to keep heat tariffs at current levels, however, licensees were instructed to insert a "Heat Subsidy" line item in their revenue requirement applications. This resulted in a reduction of the revenue requirement for heat and an equal corresponding addition to the electric revenue requirement. The cross subsidy is, therefore, quantified and transparent.

In the case of Transmission, Dispatch, and Distribution, costs were allocated based on energy as measured by kWh.

For all licensees, "losses" were considered as a cost of the appropriate licensee. In the case of generators, the cost of generation was allocated to the net output, implicitly incorporating station use as a cost of generation to be charged to users. Similarly, the transmission tariff equals transmission costs divided by energy delivered to the distribution system, passing the cost of transmission losses to users. A similar situation exists for distribution losses.

4.1.3 Tariff design

The third and final step in the process is Tariff Design. In the case of generation licensee tariffs, this involves designing an electricity output tariff and a heat output tariff. Basic tariff principles dictate that the fixed costs should be allocated to consumers based on the demand they place on the system and that the variable costs should be allocated based on usage (ideally based on time of use). Similarly, transmission and distribution tariffs should reflect demands placed on those systems. The interim tariff methodology, however, did not provide for such a tariff design due to the limited time frame and the lack of load research data. Those enhancements to the tariff process will be made over time (as load research information is developed by licensees) and incorporated in the longer-term tariff process.

The interim tariffs for the licensees connected to the central grid are as follows:

Licensee	2002 Tariff(Tg/kWh)
Power plant #2	32.21
Power plant #3	42.94
Power plant #4	23.05
Darkhan Power plant	36.43
Erdenet Power plant	42.12
Central Electricity Transmission Network	1.62
UBEDN	5.7
Darkhan-Selenge EDN	3.85
Erdenet EDN	2.06
Baganuur EDN	7.16
National Dispatching Center	0.00566

In order to maintain uniform electricity tariffs throughout the Central Electricity System, a simulation of the system was performed and the amount of electricity assumed to be delivered from each power station to each Electricity Distribution Network was determined in order that when individual tariff components (generation, dispatch, transmission and distribution) are summed, the resulting retail tariff is uniform.

4.2. Retail tariffs

The retail tariffs for the central grid remain at the basic level of 45 Tg per kWh. As discussed previously, this was accomplished in part by reducing the return on equity from the target 3% to a lower amount, depending on licensee, as an interim measure. Fuel costs were incorporated at their current levels. The fuel adjustment mechanism will allow for recovery of actual fuel cost increases for licensees with corresponding adjustments to retail tariffs.

The ERA recognizes that tariffs for individual customer classes should reflect the cost to serve each class. In January 2000, a significant structural change was made, increasing the basic household tariff to the level of the entity tariff. Significant effort will be required in the area of retail tariffs in order to implement more cost based tariffs in the future. That is a primary objective of the continuous improvement process to evolve toward a longer-term tariff policy.

4.3. Tariff approval process.

After detailed review and analysis of the tariff applications, the ERA Tariff Department met with each licensee to review and discuss the proposed cost adjustments. Tariffs were then developed for each licensee considering the adjustments and ERA Regulatory Board meetings were held on 27 and 28 December. Following those open hearings, the tariff order was issued.

5.0. Building upon the Foundation — Continuous Enhancements

5.1. Basic Tariff Principles

Building on the solid foundation provided by the Energy Law and the Interim Tariff Methodology, the Energy Regulatory Authority is working to improve the overall tariff structure.

In order to lay the groundwork for the development of a tariff methodology, certain guiding principles or objectives should be followed. The approach to electricity pricing recognizes various objectives and criteria, some of which are not mutually consistent. The more important may be summarized as follows:

§ Resources of the national economy must be allocated efficiently among the different sectors as well as within the power sector. This means that prices reflecting costs are to be used to indicate to the electricity consumers the economic cost of supplying their specific needs. This in turn should lead to efficiently matching supply and demand as well as sending the correct price signals;

§ Given that an adequate supply of electric service is critical to the development and growth of other sectors of the economy, proper pricing is necessary for overall economic growth;

§ Costs should be allocated to consumers according to the burden they put on the system. In general, each class of customer should pay its appropriate share of the cost to provide service to it;

§ Frequent price changes should be avoided, assuring price stability for a reasonable time period;

§ The tariffs should generate sufficient revenues to ensure the financial viability of the licensees and to recover their justifiable costs. For power sectors operating on a commercial basis, investors expect to recover the full cost of providing service that includes: recovery of (a) all justifiable operating and maintenance costs, (b) the cost of facilities devoted to providing service, (c) taxes, and (d) the financial costs incurred to finance the investments in facilities used to provide service;

§ The tariff structure should be simple and not become an administrative burden. It should facilitate metering and billing and allow the consumers to understand the basis for their cost of electricity;

§ The tariffs may take into account macro economic and political requirements such as regional or special sector development, which may have to be "jump-started" or even supported in the longer run with subsidized power supply;

§ A variety of tariffs are needed in order to match supplier cost structures with customer needs;

§ Social considerations must be factored into the tariff process. Protection of consumer rights and fair pricing are obvious social factors, but other public policy objectives are also important. Environmental protection, low-income consumer needs, and energy efficiency are some of the areas that must be considered;

§ If, for political or social reasons, it is decided that some customers should pay less than the cost to provide service to them (lifeline rates, for example), then the amount of that subsidy should be quantified. A transparent methodology must then be determined to either have other classes of customers or State or Local budgets pay for the subsidy. In the case of lifeline rates for poor customers, consumption limits must be determined and enforced to prevent abuse;

§ Electricity tariffs are not the appropriate tool to use to solve problems in other industries. Prices should be based on the cost to serve a particular load profile. If other industries feel they need subsidies, then they should establish their own, hopefully transparent subsidy mechanism. If the government concurs that a subsidy is necessary to achieve its policy goals, then it should fund the subsidy;

§ The costs of licensees pertaining to non-licensed activities must be identified so they are not considered for tariff recovery;

§ Costs should be separated into two categories, fixed and variable. Fixed costs are associated with facilities and are related to the demands (expressed in kW) placed on the system at the production, transmission, or distribution levels. Variable costs are related to output over a period of time and vary with kWh output. To the extent possible, tariffs should reflect these separate components in order to send the correct price signals to customers. This requires adequate metering devices.

Very often some of these criteria conflict with one another. Therefore, tradeoffs and compromises have to be made and this is where the regulator plays a critical role.

5.2. Near-Term Improvements

The Interim Tariff Methodology was a good starting point and concentrated primarily on development of tariffs for individual licensees. Those will continue to be improved upon, while focusing on the important issue of retail tariffs. Change takes time, effort, and in many cases financial resources. The ERA recognizes that priorities must be established in order to work on the most critical issues. The following issues are the ones identified as most important to which resources are being applied currently.

5.2.1. Establishment of a fuel adjustment mechanism

Fuel expense accounts for over 40% of the total cost of electricity and heat in Mongolia. Generation Licensees submitted their tariff proposals for the year 2002 using the fuel prices currently in effect. As fuel prices change, there must be an efficient mechanism to factor the price change into the electricity and heat tariffs of each Generation Licensee and into the retail tariffs for electricity and heat. With technical assistance provided by USAID, the Tariff Department of the ERA has developed a fuel adjustment mechanism to be utilized immediately when fuel costs change.

The first issue addressed was which components of fuel expense should be reflected in the adjustment mechanism. The approximate composition of fuel expense in the central system is as follows:

Coal Cost at the mine	81%
Transportation of coal	12%
Mazut Cost	4%
Other Miscellaneous costs	3%

Since the coal price at the mine is approximately 81% of total fuel expense, when unit fuel prices charged by the mines are increased, the fuel adjustment clause should come into effect. It was decided that the adjustment mechanism should also reflect coal transportation tariffs and the unit price of Mazut. Other miscellaneous costs and fuel handling expense at the power station are not included in the mechanism.

The mechanism was designed considering the manner in which the base tariffs are developed for both suppliers and customers. It recognizes that a change in fuel prices affects the tariffs of the individual power stations and the retail tariffs for both electricity and heat, depending on the source of the generation.

In order to insure that the adjustment mechanism is working properly, the ERA will require Licensees to report on their actual experience with the mechanism at the end of each year. The report would include the actual fuel costs experienced, detailed by component, and the amount collected in base tariffs and through the fuel adjustment mechanism. In addition, Licensees should be encouraged to propose any changes to the adjustment mechanism that they feel would improve it.

5.2.2. Development of a "Lifeline tariff"

Poverty is a significant problem in Mongolia and is receiving more attention and resources. Addressing the special needs of economically disadvantaged households is a responsibility of every regulator. Subsidies are a reality in every country. A major issue is whether the subsidy should come from other customer classes (cross subsidy) or from the government.

Basic tariff principles call for subsidies to be:

- § Quantifiable
- § Transparent
- § Formally Justified
- § Targeted to Intended Recipients
- § Funded from a logical source

To address the basic issue of poverty, Lifeline Tariffs are based on the premise that "Poor" customers should be allowed to purchase a minimum amount of electricity to carry out basic daily activities at a price they can afford. Targeting the correct population is a challenge since, in Mongolia, there is not a single social service agency charged with the responsibility of identifying the specific customers in need.

The ERA Tariff Department is currently studying this issue in order to arrive at a provisional lifeline tariff to be implemented with the next retail tariff adjustment expected at the beginning of 2003. A possible alternative is to define customers living in ger districts as generally being "poor" and therefore, eligible for the tariff. There is some economic justification for such a proposal since the electricity tariff contains a subsidy for heat customers. Since those living in ger districts do not have access to the central heat system, their tariffs should be lower. It is recognized that such a tariff does not exactly target all intended recipients since some households in ger districts are not poor and some households in apartments are poor. The point, however, is to start at some point and continuously improve the tariff requirements over time.

The tariff must not allow customers take advantage of low cost energy by wasting it or "reselling" it, however, and therefore consumption limits must be put in place. For example, a household could receive a given amount of energy (say 100 kWh per month) at a lifeline, or reduced, tariff and the remainder at the normal tariff. For those customers that are metered, an inverted tariff could be used or consumption limits established. The challenge is with the unmetered customers.

5.2.3. Development of a methodology to allocate fuel costs of generators

Combined Heat and Power (CHP) stations are designed to take advantage of some of the energy, in the form of heat that is otherwise lost in the production of electricity due to the laws of thermodynamics. Fuel is the largest single cost of a CHP and there is no exact formula to determine the precise amount of fuel utilized to produce each product (electricity and heat). The current methodology for allocation is not transparent and must be modified. This is especially important since the electricity sector is expected to move to a more competitive environment over time and, therefore, the heat and electricity production costs must be identifiable. There are several conventions in use in various countries that are applied to allocate the fuel cost. Those methods recognize the savings that are inherent in the CHP process and the question is how to allocate the savings to the two products. At one extreme, the cost to be assigned to heat should be no more than the cost to generate that heat in a heat-only boiler. At the other extreme, the cost to be assigned to electricity should be no more than the cost of generation in a full condensing mode. Regulators in most countries recognize that the heat operation requires subsidies and, therefore, decide to assign most of the savings to the heat output. That is acceptable, assuming that the methodology is based on engineering principles and is applied consistently.

Engineering cost studies are needed to determine the parameters for each CHP in order to provide the ERA with useful information. This task is being worked on in order to have a methodology in place by the second quarter of 2002.

5.2.4. Compilation of load research data

As previously discussed, there is significant enhancement needed in the design of tariffs for both licensees and retail customers. The interim tariff methodology did not address this issue because of limited time and lack of data.

Article 27 of the Energy Law requires tariffs to be based on the load characteristics of the customer classes. Due to the nature of the electricity business, a significant amount of costs are fixed. Most fixed asset related costs such as depreciation, return on investment, and maintenance of facilities are fixed, especially in the short run. There are other costs that do not vary with output such as some salary and labor related costs. Metering, billing, and collection costs also tend to be fixed based on the number of customers and are often referred to as “Customer Costs”. Variable operation and maintenance costs (including fuel) are referred to as energy related.

The objective is to design tariffs for licensees and customers that reflect the costs of providing energy based on their load characteristics considering:

- The voltage level at which service is received
- Contribution to peak load
- Load Factor
- Time of use

The objective of “Least Cost” can be achieved in part by managing the growth of the peak load, thereby minimizing the need to invest in new fixed assets, and by encouraging customers to consume in off-peak periods when the cost of generation is lower. Matching the customer usage pattern to the supplier cost curve can create a “Win-Win” situation for the customers and suppliers, benefiting all stakeholders.

A significant effort is underway to identify the information needs and have licensees begin to accumulate load research data that is needed to properly design tariffs in the future. Information needs include the following:

- Losses identified at each voltage level
- Estimated portion of losses due to technical and commercial factors
- Demand for each "large" customer to be metered
- Estimated demands for each customer class based on load curves
- Estimated time of use for large customers and other classes
- Standard cost categories for each category of licensee
- Fixed and variable cost categories established

5.2.5. Compilation of financial and operating data of licensees

In order to carry out its regulatory mission, the ERA must have access to financial and operating information of licensees. Information needs are being assessed and accounting and reporting requirements for licensees being determined. An electronic database will be developed to store and readily access that information.

5.3. Longer-Term Improvements

5.3.1. Cost reflective tariffs for all customer classes

As previously discussed, tariffs should reflect the cost of the service being provided. To accomplish that, there should be components to reflect:

- Fixed costs to serve the load (often called demand charges)
- Variable costs to provide service (energy charges)
- Customer costs such as metering, billing and collection.

Given that data must be collected and analyzed, cost studies performed, and metering enhancements made in order to design and implement such tariffs, the migration to more sophisticated tariff structures is part of the continuous improvement program. In the case of large entities, demand meters are relatively economic and can be used to assess a demand component of the tariff in addition to an energy component. This can be accomplished in a relatively short period of time. The current time of use tariff for large entities can also be redesigned to produce benefits for those customers and the system in total. The current time of use tariff design results in a valley hour tariff that is too low (less than the cost of fuel) and a peak hour penalty that is too large.

Using preliminary load research data, estimates of technical and commercial losses at each voltage level can be determined. This information can then be used to produce a voltage level cost of service that can be used to more accurately determine the cost to serve customer classes at each voltage level.

The objective of achieving more cost reflective tariffs will, therefore, be achieved in stages over time.

5.3.2 Design of incentive mechanisms for licensees

Rate of Return (or Cost Plus) Regulation does not necessarily provide the necessary incentives to reduce costs, improve service levels, or to implement new, innovative programs. Performance Based (or Incentive) Regulation aims to overcome this deficiency. If a pre determined performance measure has been met or exceeded, the Licensee is rewarded in the form of higher “Profits”. If targets are not met, the Licensee is penalized, generally in financial terms (lower “Profits”). The performance measures must be carefully designed to achieve the desired results and make the efforts of licensees meaningful.

A form of incentive regulation called “Price Cap” can also be effective. The regulator sets a given price for the output of an entity and it is up to the entity to manage effectively in order to provide the service (at some given level) and realize a profit. This method of regulation requires the application of good business management practices and a profit motive on the part of the entity. Very often, strategic investors prefer this type of regulation if they feel that the entity they are investing in has significant opportunity for improvement and they do not want a regulator to pass all the savings due to cost reduction programs on to customers. It is very important to remember, however, that the Regulator should not be running the Licensees’ businesses. The Regulator can provide the proper incentives, however, to allow innovative managers to benefit from cost effective and customer oriented improvements.

Most Performance Based Mechanisms rely on financial incentives and disincentives to induce desired behavior by a regulated firm. The basic assumption, of course, is that Licensees have a profit motive. An important issue in many countries with government owned power sector entities is: “How can Performance Based Regulation be implemented for Licensees that are not driven by a strong profit motive?”

Future enhancements of the overall tariff process will include implementation of a performance-based system. Measures will focus on key elements related to both cost and service quality issues and may include:

- For Generators:
  - Reduction in station use
  - Availability and capacity factor of the power station at critical periods
  - Improvement in heat rate
  - Recognition, of course, that measures for UB 4 may be different than those for UB 2 or Erdenet Power Station.
- For EDOs and HDOs
  - Reduction in the number of unmetered customers

- o Reduction of technical and commercial losses
- o Improvement in customer collections (reduction in the level of customer accounts receivable measured by days sales outstanding)
- o Improving Customer Service and Satisfaction (reducing the frequency and duration of outages, for example)

5.3.2 Continuing Improvements to the lifeline tariff

In order to address the immediate needs of poor customers, a provisional lifeline tariff is being developed for implementation in 2003. The ERA recognizes that it may not target the exact intended recipients. However, it is better to have something reasonable in place upon which to build than simply delay the implementation awaiting an ideal solution.

The lifeline tariff will be enhanced in future years to become more targeted, possibly with the assistance of governmental agencies. The funding source of the subsidy should also be readdressed.

6.0. Summary

The purpose of this paper was to convey to the reader the manner in which the tariff process is evolving in Mongolia. In order to progress in a logical manner, tariff development is being approached on the basis of continuous improvement. The energy sector of Mongolia is starting out on a solid foundation, with the tariffs currently in place as a result of the interim methodology providing licensees the opportunity to recover their reasonable costs to provide service.

Near-term enhancements are being developed and implemented to address the issues of fuel cost increases, the economic situation of households, cost allocation between electricity and heat, and the collection of load research information to aid in the design of retail tariffs.

Longer-term enhancements are planned in the areas of tariff design, incentive regulation, and improvement of the lifeline tariff. Continuous improvement will be an ongoing process of the ERA.

Hopefully, the donor community and potential investors in the Mongolian power sector recognize that the tariff process is a progressive, transparent one that supports the new commercial environment in the sector. This will be especially important in the coming years as new generation sources will be needed to meet the load and replace aging facilities and necessary improvements in transmission and distribution facilities must be made. A progressive regulatory and tariff environment will facilitate the expansion.

Restructuring the Energy Sector: Current Status and Plans

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1.0. Introduction

This paper presents an overview of energy sector restructuring. Considerable progress has been made, especially as a result of the 2001 Energy Law. However, the process is far from complete and the performance of the unbundled energy companies needs to improve. Restructuring is a long process that will not necessarily provide magical results overnight. Instead, it involves changing the manner in which companies operate—and, a different way of thinking.

Following the introduction, the paper presents restructuring in a broader global context. The next section describes the evolving legal and institutional framework for restructuring. The following section outlines regulation and regulatory measures. The final section discusses the challenges that will face the restructuring sector in the coming years and the goals Government has set in order to meet these challenges.

2.0. The Global Context for Restructuring

This section discusses restructuring from the perspective of how state-owned energy companies have evolved, their problems and how these have been addressed by restructuring the energy sector. Implicit to the discussion are the various obstacles and challenges that have limited the effectiveness of restructuring, while at the same time clearly showing that restructuring is essential to the efficient delivery of energy services.

The development of the economy of any country, regardless of its political system is heavily dependent on a well-functioning infrastructure particularly energy supply. Public utilities, such as companies that generate, transmit and distribute electricity and heat, are a significant part of the infrastructure and major contributors to the national economy. The utilities are traditionally large, capital-intensive entities, and historically have not been subject to competition. Due to their critical role in the economy they are considered strategic. In many countries, they have been exceptionally vulnerable to political interference in terms of tariff setting and investment decisions. This has frequently led to the imposition of low and controlled prices, subsidized services, and has endangered the financial viability of the energy enterprises—and, has subsequently resulted in the introduction of inefficiencies into the economy.

Over the last few decades, the declining economic efficiency in and lack of reliability of energy supplies has been notable worldwide. In most of the cases this decline was brought about by the prevailing sector models—monopolies that were often state-owned, which encouraged ever-increasing government interference dictated by conflicting social, economic and political objectives. In addition, the energy companies operated in a noncompetitive environment so the incentive for economic efficiency was extremely limited.

The nature and seriousness of the problems varied from country to country, but very few escaped them completely. The political and social framework that defined the economic model of a country and the state of its development influenced the nature and the extent of the problems, but they did not provide immunity against them. Frequently similar problems plagued the power sector in both the market and in the centrally planned economies.

In Mongolia, as in other ex-socialist countries, the government role was overwhelming. Rigid institutional structures were maintained in the entire economy, including the energy sector. Plans for development and operation were centrally formulated and controlled with the main objective to meet pre-established performance targets.

Economic criteria were not considered in the context of overall plans, and decision-making by and large, was based on political and technical considerations. Appropriate economic and financial evaluations did not support decision-making, which included the design and determination of electricity tariffs. As a result the revenues often did not cover investment requirements, and/or the operating costs of the energy companies. In turn, these led to an unhealthy reliance on government funds, further increasing the scope for government interference.

The built-in inefficiencies of central planning gradually became evident worldwide. Planning often became a personalized bargaining process and together with the absence of legitimate incentives had a devastating impact on the economies, which stagnated at best. By the late 1980s it became evident to many of the countries that their socialist governments had lost the ability to maintain an acceptable economic framework and to provide critical services efficiently. The response was the rejection of the political systems associated with central planning. In most of the ex-socialist countries this involved changes such as establishing a democratic political system with a strong mandate to dismantle central planning and begin the transformation to a market economy.

During the last decade a consensus evolved in Mongolia, to reform the country's political and economic system and as part of the reform to put the energy sector on a technically and financially viable basis. Since the country's budgetary conditions do not permit the badly overdue re-capitalization of the sector entities, the government has been looking for other means to ensure the sector's continuous operation because of its key role in the further development of the economy. Restructuring, including the privatization of some of the components, appears to be the obvious answer and the government has been evaluating various options regarding ownership arrangements and structures.

The most significant reason to modernize the sector is to improve its efficiency. However, neither the energy sector itself nor the Mongolian government has the financial capacity to provide the needed resources. Capital inflow is needed from strategic investors with the professional knowledge and resources to operate the entities. In fact, due to resource constraints, renewal of vital facilities has often been postponed and essential maintenance deferred. Although, apart from the rural areas, there is no significant unmet demand as yet, the cost of power produced is increasing and the sector is consuming its capital. The urgency for remedial actions is increasing and even if tariffs, which are deficient both regarding structure and level, could be corrected instantly, there would be not be sufficient time to accumulate the needed resources for the re-capitalization.

3.0. The Legal and Institutional Framework

This section provides an overview of the past and current legal and institutional framework for the energy sector. The section concludes with a discussion of efforts to corporatize and commercialize the sector.

The Previous Structure: The Energy Authority and its Role

In 1922, Government approved the transfer of the Nalaikh coal mine to state ownership and under the budget of the State Power Committee, and it is considered the date when an energy sector was established in Mongolia. The Energy Authority (EA) was established in 1965, and since then served as the implementing agency responsible for Government's policies for utilization of energy and related resources. Previously the EA was called Central Energy System (CES).

The main objective of the EA was to provide a reliable supply of electricity and heat, based on the most effective means of generation and distribution. In the Energy Authority's code set by the Government there was a provision: "… The Energy Authority has the right to acquire assets, to utilize them and own them . . . ". There was also the provision that the Energy Authority had the authority to supervise and monitor all professional activities regarding power production, dispatching, transmission and distribution. The main functions of the Energy Authority included ownership, operations, and supervision functions. It operated as one large company, exercising authority over all power plants, transmission and distribution companies of the Central Energy System (CES), and the major diesel stations in aimags (provinces) which were not connected to the central grid. The Energy Authority was responsible for all aspects regarding financial performances, such as collection of revenues, payments for coal, railway transportation, and tax settlements. Energy Authority (EA) power plants used to follow a pre-set plan, which determined monthly minimum limits for power and heat production based on a planned number of boilers and turbines.

During the 1996-2000 period, state involvement in the energy sector was implemented through two agencies, the State Property Committee and the Energy Authority. The State Property Committee was responsible for all aspects concerning property issues, such as the return on equity, profitability, and increasing dividends on state equity. The Energy Authority was responsible for all technical and professional aspects in the energy sector, such as establishing rules and regulations of service and operations of power plants and networks, licensing and technical expertise, supervision and maintenance services.

Since 1992, the role of public sector run entities has been declining, but their continued presence and deteriorating performance increasingly has weakened the budget and the economy as a whole. This has been the heritage of a centrally planned economy: Government strictly controlled retail prices for electricity and heat, and as a result the energy sector became unable to cover expenses, let alone the costs of developing into an efficient and competitive industry. Thus, every year foreign aid and technical assistance have been thrown at the problems of inefficiency and weak performance. However, major policy and tangible changes are occurring: tariffs have been increased, the problems relating to payments between different components of the energy sector are going to be resolved, and the companies that have been established are going to become more accountable to their shareholders and their customers.

Energy Sector Restructuring

The energy sector is going through the challenge of restructuring, and with the adoption of a new Energy Law, the legal framework has been established. The Government of Mongolia is working to create an institutional framework that draws on the global standards for company rules and regulations, and it recognizes that it should be based on an overall energy sector strategy and long-term strategic planning. The main objectives of energy restructuring are to introduce competition among companies, to increase private sector participation, to unbundle the energy sector (divided into separate enterprises, generation, transmission, and distribution companies), to create open access to transmission and distribution grids for new entrants, and to establish an independent regulatory body for licensing, pricing and monitoring.

The Energy Law was enacted by the Parliament of Mongolia on February 1, 2001 and went into force on April 15, 2001. The law is based on economic principles, commercial (market) relationships and on rights and obligations for both the industry and the consumers. This law fundamentally changes the operations and regulations of the energy sector. On the sector's structural side, the law is based on the concept that the Mongolian energy industry should be unbundled into component elements, namely, generation, transmission, dispatch, distribution and supply entities. This is supported on the regulatory side by the provision that each of these new entities will have to apply for and be issued licenses for operation, and separately for power and district heating. The Law calls for the establishment of an Energy Regulatory Agency (ERA) that will be responsible for administering the Law's provisions.

Corporatization and Commercialization

The Government of Mongolia passed Resolution #164 on July 9, 2001, which was the first step in corporatizing existing state-owned enterprises in the energy sector. By passing the resolution, the Government created 18 joint stock companies covering each stage of the energy cycle, including generation, transmission and distribution. According to the resolution, 8 power plants, 3 transmission companies, 6 electricity and heat distribution companies were restructured into state-owned joint stock companies, with share entitlements distributed as follows: Ministry of Infrastructure received 41 percent, State Property Committee received 39 percent, and 20 percent of the shares were allocated to the Ministry of Finance and Economics. In addition, the National Dispatching Center (NDC), a company responsible for monitoring and the regulation of dispatch, was created as a limited liabilities company (LLC), and shares of this company were distributed to the Ministry of Infrastructure (51 percent) and the State Property Committee (49 percent).

The Government of Mongolia recognizes that in order to have successful restructuring, it is necessary to create cost efficient enterprises. With the assistance of the international community, Government is taking steps to assist these newly born enterprises achieve their needed efficiency levels. Considerable resources are being injected to ensure that plant and equipment are in sound working order, that personnel are able to provide the necessary leadership and management, and that past financial problems are resolved in a satisfactory manner for all stakeholders, including consumers. The Government recognizes that there can be some major benefits from commercialization including that a cost efficient company will 1) have to improve energy efficiency, 2) when appropriate, draw on a broader range of renewable energy technology in order to capture additional savings, 3) implement appropriate rural electrification, and 4) utilize international standards and practices with respect to environmental protection, safety and operating regulations, and enforcement mechanisms.

Regulation and Regulatory Instruments

This section describes the role of regulatory agencies in restructuring, and specifically the emerging regulatory framework in Mongolia. In addition, the section discusses regulatory instruments and their objectives.

Energy utilities are generally large entities, often operating without effective competition even in a market economy. Due to their dominant role and to their indispensable services, their position is considered strategic. Often due to their size, but basically because of their overall importance, the utilities' monopolistic position is tolerated within a defined regulatory framework. In these cases, a utility's operation is "regulated" to ensure that consumers are protected from possible monopoly abuses and that the absence of competition would not adversely influence the quality of the services provided and the utilization of economic resources.

The regulatory framework essentially consists of technical and economic regulations. Technical regulatory matters pertain to the operation of the industry, including matters such as safety, assets and other property, environmental regulations, and acceptable standards for operation of the electrical system. Economic regulations aim to ensure appropriate pricing, and the financial viability of the energy companies.

Under the emerging regulatory framework in Mongolia, the specific responsibilities of the regulatory agencies, and with independent authority for regulatory oversight, include:

- consumer protection against discriminatory pricing;
- equitable cost recovery for the suppliers;
- assurance that prices are not based on excessive and imprudent costs;
- maintenance of appropriate conditions (mainly through pricing) for the energy companies' continued financial integrity and for high quality of service;
- maintenance of a sufficiently attractive technical and commercial environment for the entry of additional, efficient service providers in the case of an open access market structure;
- promotion of safe and economic use of electricity based on integrated resource planning and demand side management;
- arbitration in cases of disputes among sector entities; and
- to generally secure the orderly and economic operation of the energy sector.

Apart from the energy tariff, the primary regulatory instrument under Mongolian law are the licenses issued to the energy companies. The licenses are issued by the regulatory agency and only to technically and financially competent companies. Usually separate licenses are issued for production, transmission, and distribution companies and they are often valid only for a definite period. The more prominent areas covered by the licenses include:

- rights and obligations of the licensee reflecting its operational profile;
- regulations covering significant investment in new assets;
- obligations to establish and meet quality of service standards;
- approval of tariffs and conditions of service;
- rules for financial discipline including the creation of financial reserves; and
- regulations governing emergencies.

As the sector restructuring moves forward, it may be warranted to introduce incentive mechanisms into the tariff structures. In many countries it was found that licensees could make significant improvements in the quality of service, given the proper incentives. Common incentives for power generators include improvements in heat rates or improvements in the availability of efficient generating units. In the case of distributors, improvements in the quality of service, as measured by the frequency and/or duration of outages, are factors that could be rewarded as well as a reduction in the level of technical or commercial losses. The reward could be in the form of an incremental increase in the allowed return on equity or a certain increase in the allowed energy charge based on achieving certain levels of performance.

While it appears from the above that the regulatory agency oversees the entire operation of the energy sector, in fact some specific areas are often regulated by other agencies (or regulations) than the energy regulatory agency. These may include:

- environmental agencies (for water, air and waste pollution);
- unfair trade practices and antimonopoly agencies;
- standards and measurement agencies (controlling metering and e.g., installation/ connection and appliance standards);
- regulations governing building codes, job safety, accounting practices and information disclosures.

Consequently, to effectively regulate the energy companies, close coordination among the various agencies is imperative. In terms of phasing in of priority actions, the first phase is the privatization of energy sector assets, followed by a focus on improving commercial operation of energy enterprises, and thereby enhancing the financial viability of the sector in short term.

A second priority phase is that in the medium term, the policy objectives of the regulatory framework will be focused on the management of assets and improving their efficiencies, productivity, and returns to the sector. The third priority phase is the development of a long-term expenditure program that enables an appropriate matching of supply and demand resources that optimizes energy efficiencies, while at the same time providing a vehicle for the energy companies to achieve their return on investment targets.

As the above indicates, considerable progress has been made in restructuring the energy sector over the last decade, despite the numerous problems that were present at the beginning of the restructuring process. These problems included inefficiencies in coal production, run down plant and equipment, and the heritage of a centrally planned economy. External assistance has enabled the upgrading of coal production and the energy system more generally. While these important steps have been taken, the energy companies that have emerged as a result of restructuring need to improve their performance. Only then will they become viable assets that will benefit the nation.

Future Issues of Institutional Reform

The energy sector is going to face the following issues during the restructuring process. The list is long but probably not exhaustive—it provides an outline of the challenges and conflicts ahead.

Energy Sector Reform

- Poverty alleviation and the social impact of energy sector restructuring in the face of tariff increases.
- Environmental management while at the same improving operating cost structures.
- Private sector participation in a small market.
- Improving the overall efficiency of the energy sector with limited budgets.

Energy Sector Inefficiencies and Remedies

- Introducing competition is a priority but the reality is that one power plant produces almost 70 percent of total electricity, and this will limit competition.
- Regulating existing companies while trying to attract new ones.
- Inter-regional energy trade opportunities to develop such projects as gas and oil pipelines and high voltage electricity transmission lines—all of which could provide cheaper energy, while at the same time encouraging domestic producers to become more competitive in a small market. For example, the Western Energy System (WES) buys electricity from Russia but if it generated its own electricity by using diesel fuel it would be five times more expensive.

Expanding Access to Energy for the Poor

- The cost of supplying electricity is almost always less than that of supplying kerosene but it is still expensive to provide these services.
- Subsidies may be needed but when extended to all consumers, they are generally a wasteful use of scarce resources. Thus, lifeline tariffs would have to be very carefully targeted (and transparent) to help only those that need assistance.
- Subsidizing access could be one method of assisting low-income households, and the subsidy could take the form of prolonged but scheduled repayments or extending micro-credit facilities.
- Cross subsidies to pay for increased access could be provided by increases in fuel taxes for coal, petroleum products, and even firewood and dung in rural areas.

Energy and the Environment

- Promoting integrated resource planning and demand side management as companies try to improve their operating cost structures.
- Facilitating the development of an energy service industry as generating and transmission companies try to increase profits.
- Privatization and market reforms that should reduce technical and non-technical losses in the context of a small market.
- Environmental standards are comprehensive but organizations are still too weak to enforce these regulations.
- Kyoto agreement requirements could increase costs.

Given the emerging restructuring framework and the issues outlined above, the following are the goals of Government for the energy sector and the actions and commitments that will be undertaken to achieve them.

1. Improvement of the reliability, quality and efficiency of existing coal, heat and power delivery systems. Projects have been and will continue to be implemented to meet this goal.
2. Restructure ownership and regulatory framework aimed at full commercial accountability and asset management approaching comparable international best practices. Entities have been corporatized, they are operating increasingly as commercial entities, and once operating on a sound financial basis, they could be partially or fully privatized.
3. Strengthen institutional regulatory capabilities in policy formulation and in their implementation. The Energy Regulatory Authority will be given the commitments needed to become an independent body that will provide transparency in its operations and decision-making processes.
4. Facilitate transformation of energy sector management. The principles and rules of the Energy Law will be implemented and supported.
5. Electricity Access Development. Providing rural energy opportunities will be undertaken through:

- Rural electrification by increasing grid connections for appropriately located soums.
- Rural electrification where appropriate by developing renewable energy sources.
- Rehabilitate selected diesel generators in remote soums.
- Finance “100,000 solar ger” program by attracting international financial and non-governmental organizations under the umbrella of the poverty reduction program.
- Find financing sources for the Bayanteeg thermal power plant.
- Conduct feasibility study for the construction of the high voltage transmission line between Erdenet and Moron.

Thus, one could conclude that despite the many challenges, the energy sector is moving through its restructuring as planned. However, that would also ignore the realities of the situation. Simply, privatization cannot become a reality until the energy companies are operating on a sound sustainable financial basis. That means that:

- Billing and collections have to be improved.
- Inter-company arrears have to be resolved.
- A new tariff formula that provides for full recovery of costs including reasonable profits, has to be developed.

These measures have to be acted upon this year—not at an undetermined future date. Steps are currently being taken to further restructuring, including the issuance of management contracts under an open bidding process for heat only boiler operations at Baganuur and Nalaikh to commence in 2002. Additional contracts will be issued next year. These are some of the first but clearly positive actions in moving towards a privatized, more efficient and more accountable energy sector.

Commercialization and Steps to Privatization: Framework, Milestones and Preparation for Privatization

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1.0. Introduction

The purpose of this paper is to present an overview of the restructuring efforts that have been made in Mongolia towards privatization of the Electric Energy Sector. This includes the framework under which restructuring is being done, as well as efforts to fully commercialize the sector prior to privatization of the individual entities created during restructuring.

The overall framework for restructuring of the sector is defined by:

- The government resolution # 164 on the “Energy Sector Restructuring” issued 9 July 2001, and
- The “Law on Mongolia on Energy” issued on 15 April 2001

Implementation of this resolution and law unbundled the sector into the following components in the second half of 2001:

- Generation (Electricity and Heat);
- Transmission;
- Dispatch;
- Distribution of Electricity;
- Distribution of Heat, and
- Regulation

2.0. Process

The process of privatization involves:

- Unbundling of the sector;
- Corporatization of the created entities through implementation of legal and financial structure;
- Commercialization of the individual companies by making the companies “stand alone” as going concerns and using profitability as a management goal, and
- Privatization by transfer of ownership of the commercialized companies from state owned enterprises to private investors, either local or foreign.

In this process of privatization, Mongolia is in the commercialization phase—prior to privatization. Commercialization of the eighteen individual companies that have been created as a result of restructuring is now underway. These companies include:

- Eight Generating Companies:
  - Ulaanbaatar Power Plant #2
  - Ulaanbaatar Power Plant #3
  - Ulaanbaatar Power Plant #4
  - Darkhan Power Plant
  - Erdenet Power Plant
  - Nalaikh Power Station
  - Baganuur Heat Station
  - Dalanzadgad Power Plant
- Four Electricity Distribution Companies:
  - Ulaanbaatar Electricity Distribution Network
  - Darkhan-Selenge Electricity Distribution Network
  - Erdenet-Bulgan Electricity Distribution Network
  - Baganur-South Eastern Electricity Distribution Network
- Two Heat Distribution Companies
  - Ulaanbaatar Heat Distribution Network
  - Darkhan Heat Distribution Network
- Central Electricity Transmission Network
- National Dispatch Center
- Eastern Electricity System (Stand Alone Power System)
- Western Electricity Transmission Network (Stand Alone Power System)

3.0. Goals of commercialization

The path to fully commercialized companies involves implementation of management, accountancy and reporting systems and defines profitability as a management goal. The Mongolia Electric Sector has made fairly significant progress in implementation of commercialization, but further work is necessary. A fully commercial enterprise strives for the following characteristics:

3.1. Has Completely Implemented an International Accounting System (IAS).

This includes a uniform system of accounts, standardized reporting methods, internal audit controls, and an annual external audit by a recognized accounting firm. *The energy sector of Mongolia has made significant progress towards implementation of IAS, and continuing efforts are being made in audit controls and reporting systems for the Energy Regulatory Authority. Full implementation that includes auditing is a goal for the future.*

3.2. Utilizes an Efficient Billing and Collection System.

Billing and collections are of primary importance for the electric distribution sector. *In Mongolia there remain problems with accurate billing for electricity due to a lack of secure metering at the retail level, and inaccurate estimation of amount consumed under the "open tariff" structure. Construction of "secure" metering boxes has been implemented in several of the distribution companies with excellent results. Management realizes that precise metering, accurate and timely billing, and increasing collections are paramount to increasing enterprise profitability. Addressing the problem of past due accounts remains a challenge for management. The capability of collecting a significant portion of past due accounts is also problematic.*

3.3. Technical and Non-technical Losses are Measured and Managed.

Additional progress has been made in measurement of and the lowering of system technical losses. Budgeting of the investment required to add necessary assets for lowering technical losses is underway. Dealing with non-technical or commercial losses is a technical, social and political issue. Additional staffing is being put in place at the distribution level to continue identifying and lowering of non-technical losses. The political will of regional and state government agencies is also required, and communication with these agencies is underway. Transmission losses for 2001 are 4.7% and lowering this to a target 3% amounts to a retail *value savings of about $1.5 million. Total losses at the distribution level for 2001 of about 21% have a retail value of over $17.5 million. Limiting these losses has a large effect on distribution profitability, although bringing all losses to Western Standards will take serious effort, government commitment, and several years for implementation.*

3.4. Financial Reporting Systems are in Place to Assure Accurate Management Decisions.

The creation of management accounting systems needs to be further implemented, along with training of upper management to allow upper management to make decision based on increasing efficiency and profitability of the company. It is necessary to articulate a profit goal and plan for profitability.

3.5. Management Information Systems are Implemented and Maintained.

Computer accounting systems have been installed and are utilized at most of the new entities. Further work is necessary to install communication systems between the installations, implement back-up systems and modify existing software or install new software.

3.6. Forecasting and Planning is Part of the Management Philosophy

Accurate forecasting of costs, and sales is important to maintain a focus on profitability. Information relating to changes in customer base, and consumption needs to be obtained and used for forecasting investment requirements and cash requirements. Accurate forecasting and planning also allows determination of finance requirements and profit estimates. *In Mongolia, the ERA is requiring forecasting of costs and demands, and as a result systems are being put in place at the entities for forecasting and planning.*

3.7. Budgets are Created and Compliance to Budgets Monitored

Creation of accurate production, materials, and component cost budgets is critical for monitoring and maintaining profitability. Budgets must be created for all areas of the enterprise and monthly reporting to conformance with the budget reported to management. Variances must be explained and problems identified. *The entities in Mongolia have taken steps towards creating and maintaining budgets.*

3.8. Effective Management of Assets

Efficient utilization of assets is required for a successful commercialized company. Efficient utilization means maintenance of existing assets for continuing production efficiency and the disposition of non functioning assets. Part of asset management is also the arranging and sourcing of investment capital, either internally or external. *Assets have been transferred to the individual companies formed during corporatization. Some entities have re-valued these assets, and studies are underway to determine investment requirements to bring the assets to an efficient operating level.*

Some issues related to commercialization are not under the control of the entities. These external issues include such items as:

3.9. A Fully Independent Energy Regulatory Authority is in Place

A regulatory authority must be free from political interference and develop tariffs that are adequate to cover costs of operations, allow a return on investment, and a return on capital. Any subsidies that are in place such as those subsidizing heat from electricity sales are clear and transparent. *The Energy Regulatory Authority in Mongolia is staffed and actively receiving information from the license holders in order to set tariffs on a cost recovery basis.*

3.10. A Legal Structure Exists to Support Commercial Enterprises

Commercial enterprises must be formed under a legal structure that allows foreign and local investment. A contractual framework that allows recourse for such issues as non-payment and remedies against non-performance should be in place.

3.11. Tax Laws

Tax laws need to be clear, with fair and equitable enforcement. Retroactive tax laws should not be enacted. *Mongolian tax laws are understandable and equitable.*

4.0. Present financial structure

4.1. Composite Balance Sheet of the Sector

The overall key to short-term liquidity in the sector is to manage accounts receivable at both the generation and the distribution level. Particularly at the generation level a payment schedule should be negotiated with the coal suppliers to resolve the problem of “old debt”. One alternative is to agree on a repayment schedule in return for cancellation of a portion of the present outstanding balance. Without payment of this debt for coal supply, the debt spiral could continue.

There are high levels of accounts receivable at the distribution level, and these past due accounts have a serious impact on the electrical distribution companies. The heat distribution companies have much less of a problem with past due accounts. Management at these firms is beginning to aggressively pursue collection of these past due accounts, and if they are not collectible begin writing them off as bad debt.

The interim tariff methodology of the Energy Regulatory Authority includes provision for the recovery of operational, maintenance, depreciation and financial costs. The tariff also includes recovery of the costs of debt, including international loans. The allowed return on equity is presently minimal.

Composite Sector Balance Sheet as of 31 July 2001 in billions of Tg:

Cash		2.0
Customer Accounts Receivable		21.7
Receivables from Other Sector Entities		24.3
Net Fixed Assets		308.5
Other Current Assets		22.8
	Total Assets	379.3
Payable to Coal suppliers		25.3
Payables to Suppliers & Other Entities		10.9
Payables to Entities in the Sector		24.6
Short-term Loans		2.3
Long-Term loans		133.9
Equity		182.4
	Total Liabilities	379.3

4.2. Composite Balance Sheet of the Generating Entities

The liquidity of the generation sector is dependent on receiving cash for current and past due receivables from distribution. Receiving this payment in conjunction with restructuring of the debt to coal suppliers is important.

Billion Tg as of July 31, 2001	UB 2	UB 3	UB 4	Erdenet PP	Darkhan PP	Choibal. PP	Dalanza PP	Bagan. Heat	Nalaikh Heat	Total
Cash	0.01	0.29	0.31	0.00	0.01	0.03	0.01	0.00	0.00	0.7
Customer Accounts Receivable		0.10	0.29	0.21	0.00	0.50	0.04	0.30	0.04	1.5
Receivables from Other Sector Entities	0.61	6.85	15.61		1.25					24.3
Net Fixed Assets	2.57	83.20	118.41	10.40	4.24	16.02	11.85	4.14	1.20	252.0
Other Current Assets	0.68	3.08	7.19	0.75	1.27	1.03	0.19	0.44	0.49	15.1
Total Assets	*3.86*	*93.52*	*141.81*	*11.36*	*6.77*	*17.59*	*12.09*	*4.88*	*1.73*	*293.6*
Payable to Coal suppliers	1.39	4.10	17.66	0.56	0.99	0.16	0.07	0.24	0.15	25.3
Payables to Suppliers & Other Entities	0.59	2.31	2.82	0.22	0.28	0.21	0.14	0.10	0.05	6.7
Short-term Loans		0.30	1.08		0.04					1.4
Long-Term loans		52.58	54.20	0.38	1.68	7.73	5.60			122.2
Equity	1.88	34.24	66.04	10.20	3.79	9.49	6.28	4.54	1.53	138.0
Total Liabilities	*3.86*	*93.52*	*141.81*	*11.36*	*6.77*	*17.59*	*12.09*	*4.88*	*1.73*	*293.6*

4.3. Composite Balance Sheet of the Electric Distribution Entities

The distribution companies owe the generators a total of 24 billion Tg of internal debt. Management must aggressively deal with the total accounts receivable of about 20 billion Tg. Management additionally must create systems to reduce technical and commercial losses along with the reporting systems to measure improvement in those areas. Decisions for cost control without impairing service levels by deferring maintenance also must be made.

5.0. Current Commercialization Efforts

Technical assistance is being provided by USAID to the newly created entities to help them in the transition to fully commercial companies. Four companies were chosen for this initial effort as representative of the sector:

- Ulaanbaatar Heat Distribution Network
- Darkhan-Selenge Electric Distribution Network
- Ulaanbaatar Power Station Number 4
- Eastern Electricity System

The focus of effort at these companies involves business management, particularly the following areas are being addressed:

- Financial Review, including reporting systems;
- Billing and collections;
- Management Information Systems;
- Organizational and staffing, including job descriptions, bonus methods, and training issues;
- Technical performance, and
- Best business practices.

For the generation entities, attention will be given to key performance measures, including:

- Reduction in station use;
- Improved availability;
- Improved capacity factor;
- Prudent maintenance practices, and
- Optimize procurement of
  - Fuel
  - Spare Parts
  - Consumables.

A report with initial recommendations for improvement in each of these areas will be completed, and technical assistance continued with the other entities in Mongolia. It must be understood that these initial recommendations are only the first step towards full commercialization of the sector. Issues such as asset valuation, financial auditing, and full MIS implementation are outside the project scope.

6.0. Summary

Mongolia has made significant progress towards privatization of the electric energy sector. Restructuring and corporatization have been completed and commercialization of the resultant entities is underway. Important issues such as implementation of International Accounting Standards have been undertaken.

The creation and funding of the Energy Regulatory Authority and issuing of licenses to the entities were a big step towards commercialization. The first steps of issuing an interim tariff structure, and creating reporting systems for each of the license holders to request new tariffs has been made.

Since the companies are newly formed mid 2001, one full year of financial data for the new companies is not yet available. However, management is in place at each of the new companies and significant progress made towards establishment of profitable entities.

The work currently underway by consultants from USAID will assist in beginning the full commercialization of the sector.

7.0. Appendix

7.1. Existing Interim Tariff Structure

2002 Electricity Tariffs – Tg per kWh

UB 2 Power Station	32.21
UB 3 Power Station	42.94
UB 4 Power Station	23.05
Darkhan Power Station	36.43
Erdenet Power Station	42.12
UB Electricity Distribution Network	5.70
Darkhan-Selenge Electricity Distribution Network	3.85
Erdenet Electricity Distribution Network	2.06
Baganuur Electricity Distribution Network	7.16

7.2. Generation Station Use

2002 Forecast

Generator	Generated (Thous. KWhr)	Station Use, %	Delivered to Transmission (Thous. KWhr)
UB 2 CHP	99,121	18%	81,389
UB 3 CHP	540,118	26%	399,687
UB 4 CHP	1,956,264	20%	1,575,184
Darkhan	216,569	19%	175,421
Erdenet	115,265	26%	85,296

7.3. Transmission Losses

	2001 (Estimated)	2002 (ERA Approved)
Purchased (thous. kWhr)	2,328,898	2,316,977
Transmitted (thous. kWhr)	2,208,499	2,234,782
Internal Use (thous. kWhr)	11,857	11,858
Losses (%)	4.7%	3.0%
Loss (thous. kWhr)	108,542	70,337

7.4. Distribution Losses

Ulaanbaatar Electric Distribution Network

	2001 (Estimated)	2002 (ERA Approved)
Purchased	941,292	964,200
Sold (Billed)	635,350	676,868
Technical and Commercial Loss (%)	32.5%	29.8%
Technical and Commercial Loss (thous. kWhr)	305,919	287,331

Darkhan Electrical Distribution Network

	2001 (Estimated)	2002 (ERA Approved)
Purchased	307,609	334,461
Sold (Billed)	235,542	247,059
Technical and Commercial Loss (%)	23.4	26.1
Technical and Commercial Loss (thous. kWhr)	72,068	87,402

Erdenet Electrical Distribution Network

	2001 (Estimated)	2002 (ERA Approved)
Purchased	762,340	718,869
Sold (Billed)	668,130	703,215
Technical and Commercial Loss (%)	12.4	2.2
Technical and Commercial Loss (thous. kWhr)	94,210	15,653

Baganuur Electrical Distribution Network

	2001 (Estimated)	2002 (ERA Approved)
Purchased	177,230	217,252
Sold (Billed)	153,304	177,838
Technical and Commercial Loss (%)	13.5	18.1
Technical and Commercial Loss (thous. kWhr)	23,926	39,414

Total for Electrical Distribution Network

	2001 (Estimated)	2002 (ERA Approved)
Purchased	4,245,800	4,469,564
Sold (Billed)	3,359,698	3,609,962
Technical and Commercial Loss (%)	20.9%	19.2%
Technical and Commercial Loss (thous. kWhr)	886,103	859,602

Applicability of Power Sector Reform Experiences in Selected Developing Countries to the Mongolian Energy Sector

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1.0. Executive Summary

Mongolia's reform of its power sector is at a critical stage. Energy legislation has been passed, corporatization has occurred, and a regulator has been constituted. As policy for implementation is considered, it is useful to review relevant experience from elsewhere in the world.

This paper reviews experience drawn for its relevance to the Mongolian power/heat sector with the intent to provide useful guidance to Mongolian policy-makers at this critical time. Systems reviewed include five in Latin America (offering the greatest wealth of experience in pursuit of reform to advanced levels, plus experience in reforming small systems), Hungary (offering relatively advanced experience in reform in a former Warsaw Pact country plus district heating experience), and Georgia (offering relevant experience in the NIS).

Central conclusions are:

- Properly motivated international participation in the generation sector may greatly improve operability. This could be a great benefit, both for minimizing costs overall and for limiting the need to encumber the new system with inflexible power purchase agreements (PPA's).
- System size significantly limits options for generation deregulation and for attracting investors to a fragmented system. Nevertheless, institution of a cost-based-bid-plus-capacity-payment pool system should be workable and is likely to be highly beneficial.
- The international power industry has proven very successful in solving the threshold problems of distribution as they exist in Mongolia today, and it should also be possible to attract their involvement here.
- Price cap regulation of distribution has benefited many systems, should be adaptable to and should be seriously considered for Mongolia.
- Concerning power and district heat, the most important things to do are actively pursue metering of the unmetered, billing, and collections. Again, private investment has proven most capable of implementing this.

For the foreseeable future, there is no power market-based reason to fragment the system as it has been corporatized. Price cap regulation would bring full benefits of international power industry participation with one distributor, and cost-based-bid-plus-capacity-payment pool structure could bring most benefits of a market with two generators (if necessary, proper rule formulation would allow recombining of the distribution with the small power plants with little or no loss of market discipline). However, size itself will limit international interest to enterprises this size or larger. And the threat of abuse of market power will preclude application of the sort of free-price based bidding pool applied in some larger systems.

2.0. Introduction

Mongolia's reform of its power sector is at a critical stage. Energy legislation has been passed, corporatization has occurred, and a regulator has been constituted. At this critical juncture, USAID Office of Energy, Environment and Technology and USAID Mongolia requested this review of global experience to identify examples of policy implementation-good and bad-that are relevant to the Mongolian situation. It is hoped that the results can serve as effective inputs to Mongolian policy makers and implementers as well as to donors.

2.1. Taxonomy of the issues

Looking at global experience in electric market reform, one is struck by the commonality of most problems/issues, at least outside of the US and Western Europe. In particular, technical/commercial problems are not venue-specific. Basically technical/managerial problems like improving thermal power plant performance and (to a lesser extent) reducing theft losses are common problems with solutions little changed among venues. On the other hand, options for market structure is highly size-dependent, as are many issues encountered in attracting international power industry participation-for systems below a threshold size, only experience from like-sized systems is relevant. And tariff/ social issues for a country with Mongolia's history may be most relevantly informed by considering former Soviet Bloc societies. Resulting classification of issues in summarized in Table 2.1 below.

Table 2.1. Issues facing former Soviet Bloc societies

Non-Venue-Specific Issues	Issues Driven by System Size	Issues Affected by History in the Soviet Bloc
Power Plant Performance Theft Loss Control Collections Adaptation of Existing PPA's in a Reformed Power Market Need for Regulator Independence	Wholesale Power Market Structure Corporatization/Fragmentation of Existing System	Feasible Tariff Levels Sources of Subsidy for the Poor Role of District Heat Social Consequences of Staffing Reductions

Mongolia's situation clearly suggests two characteristics to emphasize in seeking "relevant" experience:

- It is a small system, in ways that affect operation and will limit options for structure, attracting investors, etc.
- While never part of the Soviet Union, it shares many characteristics of the post Soviet Newly Independent States (NIS).

On the other hand, several key value drivers have no venue-specificity and can benefit form experience gained in numerous places. Accordingly, this paper draws on experience from the following venues:

- Latin America, both because it offers the richest source of experience on generic issues, particularly as concern highly mature reform programs, and because it offers examples of market reform in systems that share Mongolia's small size.
- Hungary, both for experience in a former Warsaw Pact country (albeit not NIS) that has successfully progressed to a relatively mature level of market development and for experience with district heat.
- Georgia, for the most relevant experience in the NIS.

Venues and relevant experience are summarized in Table 2.2 below.

Table 2.2: Venues and relevant experience

Country	Vertical Unbundling?	Generation Privatization?	Distribution Privatization?	Are Old Power Purchase Agreements A Factor?	Small System?
Argentina	Complete	Complete	Complete	No	No
Brazil	Complete	Begun	Largely Complete	No	No
Colombia	Largely Complete	Largely Complete	Largely Complete	Yes	No
El Salvador	Complete	Partial	Complete	Yes	Yes
Guatemala	Complete	Begun	Largely Complete	Yes	Yes
Hungary	Complete	Largely Complete	Complete	No	No
Georgia	Begun	Begun	Begun	No	No

2.2. Focus: Electric System Scale

Functional electric systems range from remote power systems of a few watts or less to strongly interconnected, centrally operated systems of one hundred gigawatts and more. The significance of size for generation in general and for Mongolia's Central Energy System in particular is in how it affects industry organization and management. In particular, a system can be usefully thought of as "small" if its size causes either of the following to be critical economic trade-offs:

- Between the needs of system reliability and operability on the one hand and (new) generating unit capital cost, thermal efficiency, and non-fuel operating costs on the other.
- Between the need to disperse capacity ownership among enough unrelated parties to assure competition on the one hand, and the inefficiency of fragmenting a system into too many subscale pieces on the other.

With any need for new capacity confined to simple cycle gas turbines (which exhibit very limited economies of scale), the first indication does not apply to Mongolia. However, the second definitely does (this situation will be developed more fully below).[1] The experience of El Salvador, and to a lesser extent that of Guatemala, illustrate the significance of size.

Scale is less of an issue with energy transmission and distribution than with generation since economies of scale are much less pronounced and because (being a regulated natural monopoly) there is little need to split the system physically in order to foster competition. That leaves the issues of minimum enterprise scale required to attract international power industry involvement and whether efficiency gains afforded by re-aggregation might tend to recombine any deliberately partitioned enterprise. Estimating minimal cost of international power corporation intervention at perhaps \$1MM per year[2] makes this clearly an issue for Mongolian distribution, with only one of the distribution companies (the one serving Ulaanbaatar) having operating income significantly exceeding this amount. Again, the experience of El Salvador may be instructive.

2.3. The Mongolian Situation

2.3.1 Context

The Mongolian power and heat sector was formerly operated by a vertically integrated, highly centralized state-owned monopoly, known as the Energy Authority (EA). Over time, this entity gradually consumed its internal capital, experienced cash flow shortages and was unable to invest in maintenance and refurbishment or in augmenting generating capacity. The operation of the energy facilities has depended substantially on donor funding and on soft loans during the past few years. Inadequate legal basis and enforcement procedures had compounded the financial problems of the EA, so that amounts of receivables and payables, together with the outstanding international debt had become significant deterrents to customary solutions to the problems of this

[1] *This is particularly clear when one considers the prospect of one owner owning Power Plant 4, with 78% of generally operable capacity.*

[2] *Three expatriates at \$ 300,000 each plus minimal accounting and legal support would exceed this amount, while a more limited intervention with two expatriates might fall slightly short of it.*

industry. The energy sector is an important component of the national economy, yet the performance of the EA was recognized by the GOM as likely to have significant adverse consequences for the economic development of Mongolia. The problems of the sector were multifold: absence of a workable, market oriented legal regime; continuing self-regulation by the industry, circular debt problems, and the impending repayment of concessional loans that sustained the system until now.

The current Government has taken steps to rectify the problems of the energy sector. The first step in this process has been the passage of an energy law, encompassing both electricity and heat supply, based largely on previous work by USAID/Mongolia. The energy law went in to effect in April 2001 and specifies setting up a National Energy Regulatory Authority (ERA) as well as local regulatory authorities for small, disconnected power systems. A wide variety of tasks are being implemented as a result of this enabling legislation, with USAID assistance provided in the areas of regulation, corporatization, commercialization, and privatization.

2.3.2. Regulatory reform

A. The regulatory bodies themselves

The Energy Regulatory Agency (ERA) was established in April 2001 with the passage of enabling legislation: *The Law of Mongolia on Energy* and subsequent resolutions that defined the organization, functions, and responsibilities of the ERA. The mandate of the ERA is concentrated in the following areas:

- Establish an independent regulatory body;
- Support broader energy sector restructuring;
- Establish a framework of licensing and tariffs that encourages efficient operation and attracts investment;
- Promote social and economic development of the country;
- Protect consumers;
- Address poverty issues;
- Ensure adequate electricity and heat supply.

The ERA, with technical assistance from USAID, has made significant progress in areas. Status is more fully accounted in Appendix A.1.

B. Tariffs and the tariff-making process

Development of tariff policy for Mongolia will be an evolutionary process that begins with the foundations laid down in the Law on Energy, proceeds with the development of an interim tariff methodology, is updated with enhancements, and eventually results in a long-term policy. The interim tariff methodology has been developed by the ERA and recognizes the following requirements of the reform program:

- Electricity and/or heat production tariff for each generator licensee that recognizes its cost structure;[3]
- Fee for the Dispatch licensee to cover its cost of operation;
- Fee for the Transmission licensee to cover its costs of operation and maintenance of the 220 and 110 kV system;
- Tariff for the wholesale purchase of power and heat by electric distribution organizations (EDOs) and heat distribution organizations (HDOs), recognizing the source of the generation;
- Tariff for each EDO and HDO to recognize costs of distribution system operation and maintenance and to supply activities (customer billing and collection, etc.);
- Customer tariffs.

The calculation follows a traditional rate-of-return methodology using current costs and output levels, and is structured to allow licensees to recover prudent costs associated with:

- Operating and maintenance costs (including depreciation);
- Interest on short-term debt;
- Return on investment (rate base, including fixed assets and working capital) allowing for recovery of long-term debt costs (international and local) and return on equity.

The result will be that if licensees control their costs to the levels assumed in their tariff filings, they will have the opportunity to recover all their costs. While this closely monitored cost-based approach to tariffs should not be viewed as immutable, current plans for further tariff development merely call for further refinement of it, not departure to more market-oriented approaches.[4]

C. Generation management and governance

The Law on Energy has established the Dispatch Center as a separate GOM-owned entity that will eventually be responsible for dispatch operations within the main grid.

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[3] Inherent in the concept of a tariff here and as discussed subsequently in this paper is the idea that a regulator determines the amount charged to a customer. Pursuit of reform leads systems to move wholesale power supply out from under regulatory scrutiny to be determined either in a market or quasi-market environment or by terms of a contract. At this writing, the revenues of power plants are still the stuff of "tariffs" in Mongolia, whereas their determination is generally treated in discussion of "generation management and governance" in systems under reform, and except as noted otherwise discussion of tariffs is limited to the charges assessed to retail customers by distributors.

[4] Moving forward, the ERA plans to build upon a solid base of interim tariff setting policy by:

- *Identifying basic tariff principles to be followed,*
- *Incorporating those basic tariff principles into the long-term tariff strategy,*
- *Prioritizing the changes, and recognizing that change takes time, effort, and in many cases financial resources to adopt a program of "Continuous Improvement".*

Some of the future enhancements to the tariff setting policy will include:

- *Establishment of a true cost of service basis,*
- *Define the cost allocation between electricity and heat,*
- *Redesign of the time-of-use tariff,*
- *Consider performance based regulation,*
- *Develop a lifeline tariff, and*
- *Development of a coal price adjustment mechanism.*

However, as the transmission network is established under a GOM owned separate transmission company, the ERA will have to address the issue of generation management and governance in the future. Currently Mongolia has little reserve capacity; as a result, existing plants are operated on a "must run" basis in high demand times.

2.3.3. Unbundling and technical/commercial issues

A. Overview

The power system consists of three detached segments: the Central Energy System, the Western Energy System, and the Eastern Energy system. By far the largest is the Central Energy System, which serves Ulaanbaatar and the industrial towns of Darkhan and Erdenet (the latter containing a large copper/molybdenum mine discussed below). This central grid contains the preponderance of the electric development in the country and its principal interconnection with Russia. Except as noted, it is the subject of the rest of the discussion.

The economy has shrunken considerably since the disintegration of the Soviet Union (whose aid once amounted to one third of the GDP). As recently as 2000, it continued to shrink, albeit slowly. Electric prices are below international price levels, at approximately 3.1 cents per kilowatt-hour. The resulting inadequate revenue is at least partially responsible for the inadequate maintenance of the electric system.

Essentially all power generation is derived from burning coal. Coal is abundant in Mongolia, and is delivered to the power plants at prices equivalent to approximately $9-10 per metric ton. Natural gas is not currently available, and the effective cost of oil to Mongolia is tied to world market prices. Given these fuel prices, it is most unlikely that use of a different fuel for power generation is appropriate except possibly for serving peak demands.

The existing operations of the power sector are substantially overstaffed, previously reported as 8500 employees associated with the power plants and transmission lines alone. However, with limited economic growth at best, the direct and indirect job losses that would occur in rectifying this could leave many people unemployed for extended periods.

B. Threshold needs: Generation

The Central Energy System contains 710 MW of generating capacity (out of a total of 806 MW in the country), of which 453 MW are available for operation. The reasons for the shortfall in generating capacity from the nameplate levels are numerous:

- Equipment originally installed was not new;
- Inadequate funds available for maintenance
- High rates of parasitic power consumption in the plants (maximum values over 20%).

Imports from Russia contribute significantly to electric supply; nevertheless, service of annual consumption totals of approximately 2100 GWH with the available capacity in its current condition results in significant non-service of load. It is further recognized that current power generation does significant environmental damage, both air pollution and solid/liquid waste discharge on and into the ground.

Additional funds and managerial and technical expertise are needed to improve performance of existing assets.

C. Threshold needs: transmission, distribution and commercial

The electric transmission and distribution system contains approximately 1000 km of high-voltage power lines (220kv), 7000 km of low voltage power lines (35-110kv) and approximately 200 electric substations. Peak electric demand reaches approximately 500MW; as mentioned previously, peak demands often go unserved. Losses on a system are high, with estimates on the order of 2% technical losses in transmission, 12% technical losses in distribution and 12% non-technical (i.e., theft) losses. Available data does not allow diagnosis of the magnitude of commercial fraud, but this bears further investigation.

D. Issues resulting from system scale

Looking at the system as a whole, it is and for the foreseeable future will remain small in important ways. Total peak demand is less than the size of a single world-scale power plant (say 600-1600 MW, depending on the fuel and system frequency).

E. Issues posed by district heating

District heat is available from September 15th through May 15th. It is supplied through approximately 500 km of parallel pairs of hot water pipelines. It was constructed in two stages, the first in 1990, with the second constructed intermittently since. Despite its relatively recent installation, numerous sections of pipeline and many of the pumping stations and compensators need repair. Losses within the system are high, estimated at 18% of peak supply to residential and commercial users of as much as 44% of peak supply to industrial users almost a decade ago, and maintenance since has continued to be inadequate. In addition, there are substantial losses at the point of end use. The result often is excess heat near the power stations with inadequate heat reaching remote customers, and inefficient operation for all. Many end-users are not metered at all, and the role of building managers as heat supply intermediaries leads to further commercial losses (heat not paid for or paid after much delay). With delivered heat averaging ~$3.70/GCAL (modest even in the context of low coal costs), this contributes to the cash shortfall in the power/heat sector.

2.3.4 Legal framework

A. System adaptability subsequent to passage of initial laws

The system is only beginning implementation, too new for judgment of adaptability.

B. Government policy bodies and their roles

The Government of Mongolia passed the Law on Energy in April 2001, and with this landmark legislation dismantled the existing state controlled vertically integrated utility, the Energy Authority. Subsequent resolutions and a fast-track program of reform have resulted in:

- The establishment of a regulatory agency known as the Energy Regulatory Authority (ERA) with authority to regulate an unbundled energy sector (see Section 2.1.1);
- The establishment and corporatization of 18 new GOM joint stock companies (JSC's, including 5 generating companies and 6 distribution companies [4 electric, 2 heat] in the Central System alone) which have assumed the assets, personnel, and functions of the old EA unbundled into generation, transmission, distribution, and dispatch; and
- Subsequent resolutions clarifying the intent of the Law on Energy.

While the reform program can be categorized as still in the early stages of implementation, the progress has been substantial and the reform program is now firmly proceeding with full GOM support and the support of the international donor community.

At this point in the process, the legal framework is sufficient and credible to the point that the reform program can continue well into the near future. The GOM has also established a precedent of clarifying resolutions to further ensure the intent of the legislation is fulfilled.

However, one void in the current reform process is that of vesting a Government body with energy sector policy development. While the Law on Energy deals specifically with sector operations, the policy issue is deferred to the highest levels of the Cabinet and the State Ikh Khural. The current mood in Mongolia is one of short-term planning and immediate action in order to bring reliable and cost-based electricity and heat to the population. While this is an ambitious and arduous task in itself, the long term need for energy sector policy development and enactment will have to be addressed.

3. Summary of Power Sector Reforms

3.1. Latin America

3.1.1 Context

Precursors of modern electric sector reform began in Chile in the 1980's. However, with the Chilean sector dominated by indigenous corporations, international participation was limited. In the early 1990's, energy sector reform that attracted broad international participation began in Argentina. It subsequently spread to Peru, Brazil, Colombia, El Salvador, Guatemala, and elsewhere in the region.

3.1.2. Regulatory reform

A. The regulatory bodies themselves

Each country discussed below established an independent regulator and an independent market operator at the outset of reform. Both are listed in Table 3.1 below; more is said about characteristics of market operators in Section 3.1.2.C.

Table 3.1: Independent Regulators and Market/Pool Administrators in Latin America

Country	**Electric Regulator**	**Market/Pool Administrator**
Argentina	Ente Nacional Regulador De La Electricidad (ENRE)	CAMMESA (central manager/ single buyer/single seller)
Brazil	Agencia Nacional de Energia Elétrica (ANEEL)	Mercado Altacadista de Energía Eléctrica (MAE)
Columbia	Comisión de Regulación de Energía Y Gas (CREG)	Interconexión Eléctrica S.A. (ISA)
El Salvador	Superintendencia General de Electricidad (SIGET)	Unidad de Transacciones (UT)

The regulators are all established under law as independent and run by appointed chairmen or commissions who serve for fixed terms. All regulators are appointed by elected officials or ministers and serve at the pleasure of these elected officials. All issue relevant licenses in the electric sector, and all administer various types of price cap regulation. These regulators were created with understanding of the need for independence from pressure by elected officials and, for the most part, have succeeded in establishing this independence.[5]

B. Tariffs and the tariff-making process

With transmission and distribution being natural monopolies, virtually all reform in Latin America has been undertaken with the corporatized assets (privatized, operating concession only, or government corporatized but still government owned [virtually all distribution experience is with privatized assets]) operating under a concession contract, subject to price regulation. Under these, some form of "price cap"[6] regulation is almost universal. In this arrangement, a formulation is established for tariffs with surety that it will persist for a set period of years. During this period, the owner or manager of the property is permitted to keep results of any performance improvements implemented. At the end of this initial period, tariffs are to be revisited by a regulatory body, presumably to re-determine/reformulate them and pass through to customers some of the efficiency gains achieved by the operator.

However, Latin America has employed importantly different versions of this simple concept. Related specifically to Transmission and Distribution corporate viability, several considerations are critical:

- Period of time under (and, implicitly, surety of) original price cap;
- Implicit expectations or T&D charge change at the end of the price cap;
- Provision (if applicable) for retail competition.

Table 3.2 shows a partial list of original concession rate cap periods. While there is a trend down since the beginning (the original federal properties in Argentina, Light in Brazil), an initial term of 4-5 years is now common, and may be the minimum necessary for giving adequate incentive to the concessionaire.[7]

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[5] Principal criticisms of these regulators, apart from legitimate policy disagreements have focused on:

Limited incidences in which they favored government-owned generation;

Their lack of universal jurisdiction in their fields, with politicized state government organizations imposed in their roles in some cases.

[6] For clarity, it should be made clear that all Latin American price cap systems provide for pass-through of the cost of suitably procured power supply. The "price cap " is applied to the balance of electric costs-those under the managerial control of the distribution company. This is critically distinct from the failed system in California in which the distribution companies were expected to bear this risk, which experience would show was both beyond their control and beyond their means.

[7] As the end of a tariff period approaches, the concessionaire inevitably begins to think in terms of representing the immutability of current cost structure to the regulator, and planning further improvements to implement during the NEXT price cap period.

Table 3.2: Price Cap Tariff Practices in Electric Sector Reform

Country	Distribution Company	Year Privatized	Original Tariff Term	Domestic Inflation Pass-through	Foreign Exchange Pass-through	Energy Pass-through
Brazil	Light	1996	8 Years	Yes	No	Capped
Argentina	EDENOR, EDESUR, EDELAP	1992	10 Years	Yes	Yes	At Spot
Brazil	Eletropaulo	1998	5 Years	Yes	No	Capped
Colombia	EPSA	1997	5 Years	Yes	Some (defined formulaic)	Yes (complex mix of spot and contract purchases)
El Salvador	CAESS, EEO, DELSUR	1998	4 Years	Yes	Some (defined formulaic)	Yes (at spot, with time lag)
Brazil	ESCELSA	1995	4 Years	Yes	No	Capped

However, closer examination shows the effective lives of these arrangements as an international investor would perceive them is somewhat different. Furthermore, some arrangements have had potentially long-lasting consequences for the electric systems to which they are applied.

The Argentine companies EDENOR, EDESUR, and EDELAP presented conceptually the most attractive offering to investors: power cost pass-through, effectively dollarized until the current crisis, with a cap term of 10 years in which to enjoy the full benefit of operational improvements. It is essentially two parts, passing through spot energy prices and giving the distributor a margin over that.[8] This system was conceived to combine adequate distribution return (at least with diligent management) with the market-determined price of power; it is expected to receive ratemaking treatment normal for price cap incentive ratemaking (probably some modest margin reduction with re-visitation in less than ten years). The Argentine system was created as a functional and functioning whole; it has been adapted to allow increasing retail competition while protecting the rights of existing concessionaires as assured in their contracts.

The Colombian system is arguably the most complex of those shown here, with tariffs composed of five summed components: generation (inherently paying for capacity in a kWh charge since the charge assessed at dispatch that funds the capacity payment pool is passed on to users), transmission (conceived as separate from generation and distribution from the founding of the system), distribution ("wires" charge, intended as remuneration to the distributor regardless of who supplied retail energy),

[8] *In offering pass-through of the spot price the Argentines arguably limited the development of a wholesale power contracts market in their country.*

"commercialization" (intended to compensate the distributor for retailing costs in the event that they remained the retail supplier), and a fifth minor charge covering government assessments. This system has proven sound insofar as described here, and lent credibility to the Colombian deregulation effort; its weakness in the area of cross-subsidization will be treated in the next section. The Colombian system rationally passes through the cost of each segment of the power value chain, and could expect new tariffs set as a slow reduction from those of today at the time of the first tariff reset.

The Brazilian system was created as a "work in progress." As is described further below, the principal locus of problems in the Brazilian system was distribution, principally rapidly growing rates of theft. So distribution was privatized first and tariffs were arrived at by the following process:

1. Increase tariffs to politically/economically feasible limits;
2. Allocate sufficient charges to distribution to attract investors companies in operational distress;
3. Reserve the remainder for wholesale energy suppliers.

This was feasible only because generation is more than 90% hydroelectric, with almost no variable operating costs. Distribution companies were then privatized without a full framework for generation in place. Furthermore, the privatizations occurred with the implicit understanding that the distribution margins were higher than international standards and higher than would result from tariff re-evaluation on a reasonable rate of return basis at the end of the initial period: that is, distribution margins were expected to come down more than normal price cap regulation would cause. So while the other examples sited above were of distribution margins that were reasonable at privatization and therefore could be expected to be the point of departure for any downward adjustment at the end of the initial period, Brazilian margins were understood to be no basis going forward, suggesting an unpredictable, possibly more politicized process to set new rates.

C. Generation management and governance

The history of electric generation reform in Latin America at this point is primarily about pools. Power purchase agreements (PPAs) have played a role, but the main lessons that PPAs offer today are in terms of their interaction with pools.

Pools operate to compensate generators according to four conceptual patterns, as portrayed in Table 3.3 below. Figure 1 also locates the various Latin American pools within the matrix, along with several notable pools elsewhere.

Table 3.3: Wholesale Market Concepts

	Significant Capacity Payment?	
Determination of Supplier Bids	YES	NO
Price at Will	Colombia (hydro), PJM,	El Salvador, Nordpool, California
Cost-Based	Argentina, Colombia (thermal)	Brazil

Consider first the approach to determination of bids: allowing suppliers to bid as they please approximates operation in most free commodity markets, while cost-based bidding clearly implies continuous oversight of individual behavior. Owners decide what to charge, whether or not to supply with no more sanction than lost revenue for not supplying, and whether to add or withdraw capacity according to prices that they bid themselves. In the extreme case, they decide whether or not to install new or maintain existing capacity that is very seldom used (but may be critical to power supply reliability) based solely on the uncertain prospect of intermittent sales at very high prices. The obvious limitation is the opportunity that this approach affords for abusing market power where it exists.

By contrast, cost-based dispatch systems require generators to submit bids that auditably reflect their marginal costs of operation.[9] This approach offers assurance that individual generators are bidding their capacity into the system at short-run marginal cost. It assures short run efficiency and minimizes chances for market power abuse. It requires auditing and oversight, but has proved workable. The inherent limitation is that, by itself, it does not provide adequate remuneration to own and maintain seldom-used capacity.

This leads to the second market structure dimension: the presence or absence of a (significant) capacity payment. Such payments are the rule in cost-based bidding systems (the presence of only a nominal capacity payment in Brazil is merely one of a list of problems that have hindered market-based construction of much-needed capacity there).

A third useful way (having no particular interaction with the other two) to characterize pools would be whether or not a central authority that clears transactions exists (whether the "one buyer model" or not). Latin America offers several useful examples of the variety of approaches and their consequences, both intended and unintended.

Argentina is a long-operating (and based on price performance and induced new construction, highly successful) case of cost-based bids with capacity payment. The role of CAMMESA buying and selling power at its determined spot price (historically

[9] For thermal systems this is based rigorously on auditable fuel cost, unit thermal efficiency, and possibly some (justifiable but generally small) variable operation and maintenance cost. Most importantly, the unit inherently has to justify any CHANGE in bid price over time. Inherently, this process is different with hydroelectric power, but with this not an issue in Mongolia it will not be discussed here.

in $US) further assured investors operating there. However, it has had continual problems with capacity payment formulation. Prior to the current crisis, Argentina was considering moving to a price bid system.[10]

Colombia likewise offers a low-hydrology-hypothetical capacity payment, also based on minimal simple cycle GT economics, and maintains a strict cost-based bidding system for thermal units. However, hydroelectric owners are basically free to declare a price (although system rules state otherwise). Nevertheless, this system has also functioned well to date in all respects except two of relevance to Mongolia:

- It has a central authority that sets prices and also clears transactions. However, it is not a "one buyer" by any means, with most power bought and sold under bilateral contracts. Rather, it has wound up as a supplier of last resort to poor municipalities dropped by other suppliers for non-payment. It is entirely self-funding, and when such supply obligations cause it to be short of cash it pays all suppliers pro rata to what they are owed.
- It absorbs (primarily as burdens on otherwise sound power industry companies, in some cased blocking their privatization) a collection of high cost PPAs signed before the market was opened.

Brazil is a case of a cost-based bid system with no capacity payment, which is one of a list of reasons why Brazil has had difficulty building needed plants. However, with more than 90% hydroelectric power, it offers no other lessons on generation organization and governance for Mongolia.

El Salvador is a case of a system conceived to be a wide-open market that proved unstable. As will be described below in Section 2.4.3.C, its effective reversion to a PPA mode resulted directly from system scale. It also suffers from a large, high-cost PPA that has interfered with privatization of its off taker, CEL.

Guatemala has a cost based system with capacity payment. Its principal problem has been that it must accommodate nine inflexible and high cost PPAs that collectively limit the benefits of a pool.

3.1.3 Unbundling and technical/commercial issues

A. Threshold needs: Generation

Power systems subjected to market liberalization or other forms of unregulated investor participation throughout the world (whether through government agency signature of PPAs, privatization of government assets, or deregulation as in the United States) began

[10] *Its approaches that pay ~$10/MWH bonus on energy for 90 on-peak hours per week (at various times paid for actual energy or for hypothetical energy delivered in low hydrology conditions; the amount was chosen to offer minimal profit to an investor in new simple cycle gas turbine capacity) have been undermined by generator gaming. Most recently they have been criticized for not compensating seldom-used capacity sufficiently to keep it operable.*

this process with a few characteristics that critically pointed them toward some paths of reform and away from others. Generic problems include:

- Critical shortage of generation/power supply of any sort;
- A need to shift or diversify the generation mix;
- A need to improve operation of existing generation.

Of course, some systems have progressed sufficiently under market discipline to move from one of the first two classes to the third (Colombia and El Salvador, for example).

Absolute generation shortage. Several countries in Latin America, notably Colombia, El Salvador, Guatemala, and Brazil, began reform perceiving a shortage of generation. Sooner (the others) or later (Brazil), all responded by entering into government-backed PPAs.[11] [12] Conceptually, this was appropriate:

- While merchant plant[13] development has occurred at sustained rates in several First World and a few Third World venues, this has worked best in venues with large stable markets and prices where a shift in generation mix is the primary motivator[14].
- The political turmoil (and re-emergence of the government PPA) resulting from sustained shortage and the attendant high prices that naturally occur in a supply-short price-bidding pool that recently occurred in California serve to illustrate the possible complications of trying to address a fundamental supply shortage by merchant plant/pool price means only.

However, to greater or lesser degrees, none of these systems found the optimal solution for their shortage because they opted wholly or largely for inflexible base load capacity. In reality, some had need for minimal capital cost, maximum flexibility simple cycle gas turbine capacity, and El Salvador simply needed less capacity than was built. All were cases of government planning errors that cost the general public and that if made by investors in an open market would cost those investors instead.

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[11] *Recent work by PA Government Services has further investigated and quantified/correlated the relationship between degrees of reform of the electric sector in particular and of an economy in general (as reflected in international measures of sovereign and other credit worthiness). The central conclusion on PPAs was that relatively limited levels of reform were required to sustain power plant construction on this basis. However, sustaining power plant development on a merchant basis required the very highest levels of reform and establishment of international confidence, a level normally achieved after years of reform and generally only by societies significantly more affluent than Colombia in general and having high sovereign credit ratings in particular.*

[12] *In extreme cases, remediation of a generation shortage may delay other sector reforms as pre-existing government generation, distribution, or integrated electric enterprises are required to remain intact or be replaced by the treasury directly as off-takers of (generally high priced and inflexible) PPAs. Such was definitely the case in Colombia, where negative value of PPA obligations led to no-bid responses to auctions of PPA off-taker Corelca Generation (in spite of development of a sound power pool on top of these PPAs) and may limit the ability to privatize CEL in El Salvador (see further discussion of El Salvador below).*

[13] *A "merchant plant" is one built on speculation based on understanding of the wholesale power market in which it is built, with no power purchase agreement or other sale contract to offer security to the owner of financer.*

[14] *Examples range from Argentina (initially a case of a country that most needed improved operation of existing plants) to the UK to several historically coal-dominated systems in the US. In all of these, the emergence of modern combined cycle power plant technology plus availability of secure, inexpensive natural gas offered market penetration opportunities at the expense of pre-existing generation. That economics would not warrant new construction of pre-existing generation types (coal fired steam-electric, oil/gas-fired steam electric, or gas fired simple cycle gas turbines) until demand had grown substantially, but would support a new type of generation with the particular advantages of gas use, efficiency and flexibility of combined cycle.*

Need to shift or diversify the generation mix. Origins are typically a mix of over-reliance of the existing system on one generation source (hydro in several Latin American systems built by government or coal built by public or private bodies in the US and Europe/NIS) and the new opportunities presented by availability of natural gas and modern combined cycle technology. However, this does not apply to Mongolia's situation, with abundant very cheap coal and no present availability of gas.

Need to improve operation of existing generation. Broadly, thermal electric generating plants offer four classes of opportunities for improvement by involvement of international power corporations:

- Poor plant operation, maintenance, and capital allocation practices, leading to reduced maximum generating capacity, impaired unit availability, and elevated unit heat rates;
- Poor fuel purchasing and contract management practices, leading to unnecessarily higher costs and in extreme cases impairing generation output;
- Other poor purchasing/outsourcing practices leading to unnecessarily high costs;
- Overstaffing, often to the point of impairing adoption of best practices.

Of these, available information on Mongolia's situation does not allow comment on the second or third. With better data available, overstaffing will be discussed below in Section B:ii.

Concerning plant/unit availability, the record of improvement resulting from involvement (given proper incentive) of international power corporations is encouraging, as Figure 3:1 below indicates. In particular, in the Argentine case the unavailability of the government-owned system at the beginning of reform was roughly as poor as that in Mongolia. Note that in both Argentina and Colombia the generators received a significant portion of their net compensation (revenue minus fuel cost) in the form of capacity payments that were and are availability sensitive.[15]

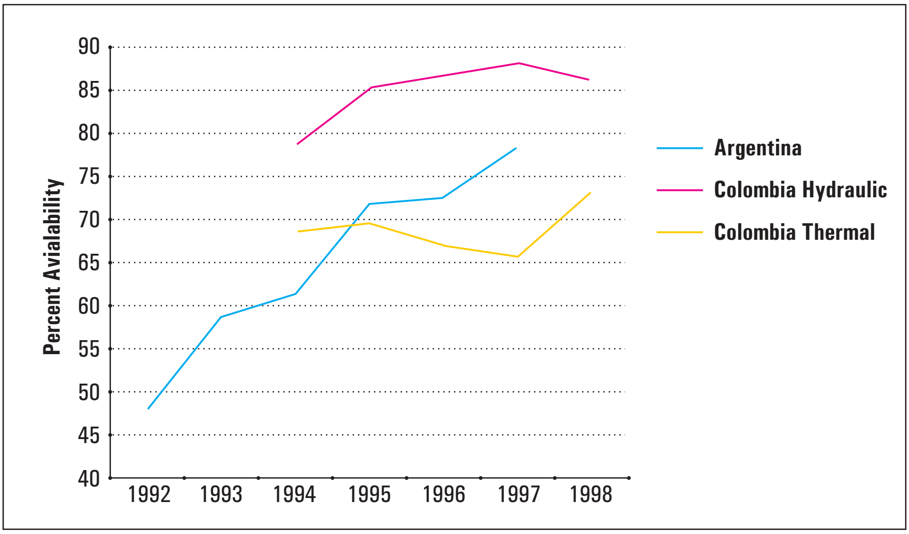
One further issue bears noting from Latin American experience: impact of financial debt. Few organizations prepared for privatization carry significant debt of any kind, let alone hard currency denominated financial debt. One Brazilian example was CESP Restructured, a 7000 MW hydro system obliged to bear the burden of ~$4 billion of mostly construction debt. In this case, the effect was to block the privatization of an otherwise highly valuable property.

B. Threshold needs: Transmission, distribution and commercial

Transmission and distribution differ from generation in terms of the scope of problems commonly confronted in that they all fall under the category analogous to "a need to improve operation of existing (transmission and distribution)." There is no real analogue

[15] Note that, of the systems considered here, these are the two with substantial populations of pre-existing thermal units that are still of economic use.

Figure 3.1: Improvements in Generation Availability



of the emergency need for new power plant construction or the need to shift the technology base that can drive generation reform.[16] And the drivers for improving operation are sufficiently similar that they tend to lead down the same reform policy path: privatization or transfer of operating rights,[17] with either executed under a concession agreement and subject to some sort of price regulation regimen.

The need for better operation usually includes remediation of:

- High levels of power and/or heat theft, both by physical diversion and by fraud, and/or historically legal non-metered delivery and use;
- Poor physical condition of the electric or heat grid, so severe that technical losses or grid failure-based loss of service substantially exceed international norms;
- Poor rates of collections of monies owed, often with the worst offenders being other government bodies;
- Poor purchasing/outsourcing practices leading to unnecessarily high costs;

[16] The closest physical analogy to the problem of acute need for new plants in the case of generation is electrifying unserved (mostly poor, residential) customers. Rightly or wrongly, this is usually treated as a social issue, pertinent to these people and those who protect their interests but not to the economy as a whole. Unlike the others above, this is a natural activity of government, and has generally suffered in the wake of reform. If accomplished at all, it typically results either from some explicit subsidy or by a new owner who is legally obligated to do so and who debited the cost from his bid price for the property. Fortunately, with most practically electrifiable customers already served in Mongolia, this is not an issue there.

[17] Transfer of operating rights as distinct from privatization will be covered in "The Society" below. For now most discussion will refer to privatization but could apply to either. Will be covered is an approach to conveying full operational control to an international power company in circumstances in which either legal issues (for example, the constitution reserves this activity to the government or to nationals, property law is inadequate to establish the necessary real estate titles to international satisfaction, etc.) or market conditions (for example, given international power market trends and current sovereign debt rating, it seems unlikely that privatization would fetch a fair price) make full privatization inappropriate at present.

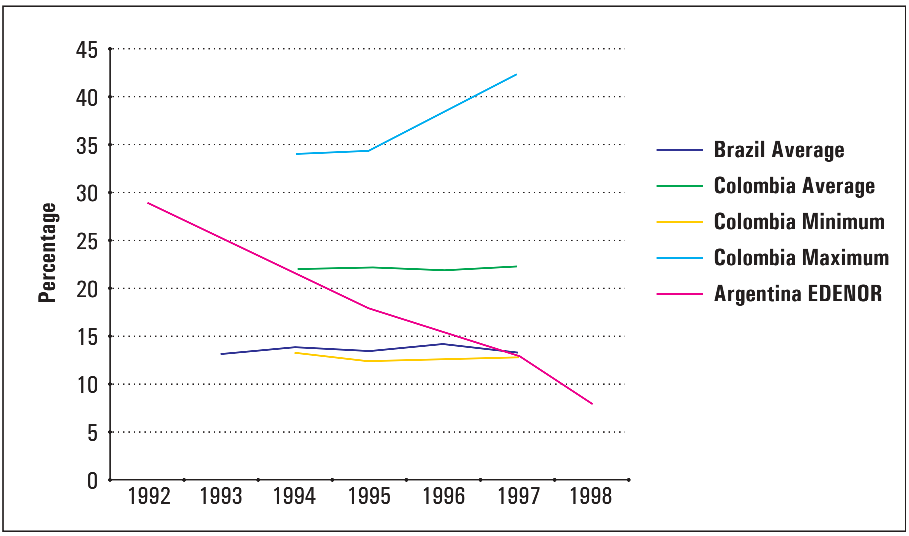
- Overstaffing, often including numerous phantom employees (individuals with a position on the payroll and a salary but no actual job) as well as too many actual employees;
- Poor cash/balance sheet management, needlessly locking value in the enterprise.

Again, Latin America offers excellent examples of all of the above, both successes and failures, although hard, publicly available data sometimes combines the results of two or more. Lacking useful data on purchasing practices (this is the extreme case of several of the above problems that are best fixed quietly and without public documentation) and with balance sheet optimization not relevant in Mongolia, the treatment below will focus on the other categories.

I. HIGH LEVELS OF THEFT AND TECHNICAL LOSSES. [18]

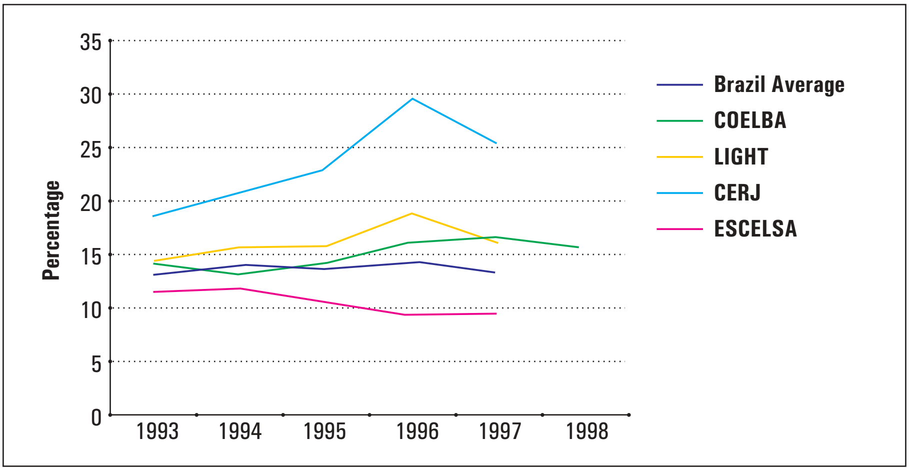
The record of power sector reform on transmission and distribution system losses control has been mixed. Figure 3.2 below shows results ranging from the stunning success of EDENOR in Buenos Aires to the limited success in most utilities in Brazil to the mixed results of Colombia.

Figure 3.2: Electric Transmission and Distribution System Losses by Nation



[18] *Theft ("non-technical losses") and technical losses (physical dissipation of electric energy in the electricity system) are treated separately here, as is common in analysis and in management of loss control for good reason: they are completely different problems requiring different solutions. However, it is important to note that only one parameter is actually measurable: total losses. This is simply the difference between the energy put into the system (net of the utility's own consumption and flows out to other systems; as conventionally accounted, does not include power used inside power plants) and power billed. Technical losses are then estimated via calculation using an engineering model of the system, and non-technical losses are the difference. Inherently, there is dispute about the calculated technical losses, although on a well-documented system this should amounting to less than 0.5%. This is also distinct from under-collection, where a bill is rendered but n ot paid.*

Figure 3.3: Title: Electric Transmission and Distribution System Losses by the First Privatized Utilities in Brazil



However, even where losses have remained stubbornly high, there is great benefit in stopping an acceleration of losses like that seen in the 1995-1996 timeframe in Brazil.[19] As is typical, all of these totaled data reflect an unknown mix of technical and non-technical losses; where information is available, improvements appear to result mostly from curtailing theft.

II. POOR RATES OF COLLECTION OF MONIES OWED

Government enterprises not paying each other for services is a common problem. No regional statistics analogous to the above on losses are available on this problem, but one outstanding anecdote may illustrate. Documents prepared for sale of a controlling stake in Eletropaulo (the distribution company serving ~5 million customers [13 million people] in urban Sao Paulo) attested that it was owed ~$600 million by local governments at the then current exchange rate, mostly for street lighting. This was equivalent to approximately two month's billings for the entire company.

Inherently, results of efforts to control this problem are not actively publicized. Accounts suggest that results of go-forward control are good, with retroactive collections much less successful, although forgiveness of old obligations can be applied in settling other disputes. For example, related to the problem of uncollected receivables are possible outstanding commercial payables. Just as a government user may not pay its electricity supplier, so a government electric supplier may not pay its government fuel supplier

[19] Examination of the losses problem from inside a typical Brazilian distribution company reveals a dynamic, potentially; mushrooming problem that requires continued effort to stay even. Actual losses are controlled as urban squatters have their service normalized, but the continual flow of Brazilians to the major cities continues to spawn new losses even as the old ones are controlled, and without this effort losses would grow without limit.

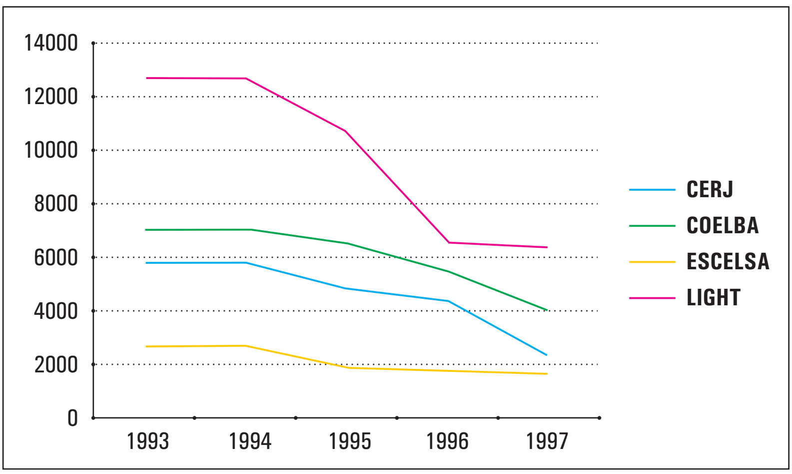
(for example). While in extreme cases the Treasury might assume such a commercial debt if not offset, it would be better settled against commercial receivables first.

III. POWER REFORM AND THE JOB MARKET

Reduction in employment in the power sector almost always accompanies reform. It is a major source of cost reduction, particularly in the transmission/distribution/ commercialization sector, allowing new owners/operators to increase prices paid for assets or the right to manage them, to manage to continue subsidized supply, and to discharge other obligations such as improved service quality or new connections. While there are incidences of associated staff reductions and service quality deterioration, most reductions are possible without loss of service because the pre-existing government organizations were overstaffed.

Figure 3.4 below shows the decline in employment in the distribution segment of the power sector in Brazil. Note that employment actually peaked prior to the beginning of privatization in 1995, with substantial reductions occurring prior to privatization and continuing afterward. This occurred at least in part as a result of reforms undertaken within the government in response to a national financial crisis, but is not uncommon in anticipation of privatization.

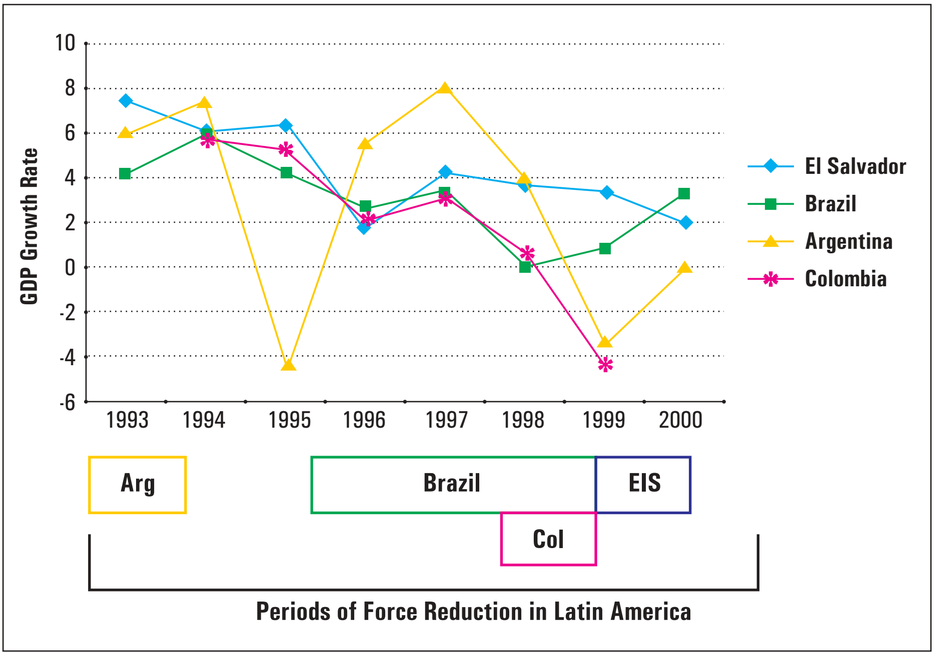
Figure 3.4: Staffing Levels in Privatized Brazilian Distribution Companies



Despite this record, such force reductions often met with very limited resistance. Reasons include:

- While no statistics exist, there is evidence of return of substantial numbers of former power industry workers as contractors to their former employers in Brazil, in Guatemala, and in the US;[20]
- Oftentimes, substantial severances were paid (up to 2 years' salary in Colombia);
- Many of these societies were experiencing rapid economic growth, as shown in Figure 3.5 below, offering new job opportunities and easing at least the immediate perception of the consequences of the change.

Figure 3.5: Gross Domestic Product Growth Rates During Forced Reduction Periods



C. Issues Resulting From System Scale

I. EL SALVADOR

The electric system of El Salvador began the reform process in the early 1990's by agreeing to cover its growing power demand with the 144.5 MW Nejapa low speed

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[20] These countries had pools of private management/entrepreneurial talent to provide leadership in the contract services organizations that re-employed many of the former electric system employees. Another consequence of this aspect of the job markets in Latin America is that they offer pools of talent that international power companies often hire to represent them locally and eventually to take leadership roles in these private power investments there. Often these individuals were educated in the US or Europe and had years of experience working for international operating companies or professional services firms. This both increases home country opportunities for these individuals and decreases the international parent's minimal cost of participating in a country's power system. Finding such talent in Mongolia may prove problematic, forcing international participants to rely more heavily on expensive expatriates, increasing the minimum size of investment in which it would be practical to participate as discussed below.

diesel power plant to be developed by an international independent power developer and secured under a long term PPA. Since then it has largely privatized its former state system, leaving only some hydroelectric and geothermal plants in government hands. With generating capacity of 1112 MW and annual generation of 3800 GWH, it exhibits many characteristics/problems of small power systems endeavoring to reform.

Generation. El Salvador's electric supply is produced by four hydroelectric plants on the Rio Lempa totaling 406MW, two geothermal plants totaling 160 MW, and four oil fired thermal power plants totaling 546 MW. All of the hydroelectric and geothermal plants are still owned by CEL, the government organization originally chartered with developing the hydroelectric resource. Of the thermal plants, the Nejapa plant is still owned and controlled by its original developer (now El Paso Corporation) and runs at substantially base load per the terms of what now is seen as a high cost, inflexible take-or-pay power contract. The balance of the thermal plants was sold as a lot in a public auction in 1999 (discussed further below).

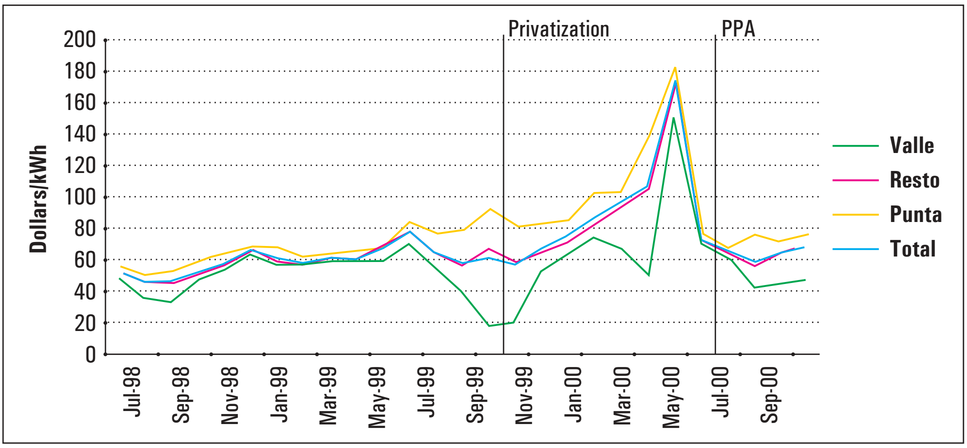
Generation is managed in a centrally dispatched pool with supply and demand bidding and spot price determination on the Nordpool model, which leaves suppliers and users free to bid as they choose for electric supply in the pool, or to make bilateral arrangements exterior to the pool. Although distributors/retailers are obliged to bid to cover their load, the value of lost load is set at a very low value (both as an absolute price when compared with most other international examples and relative to the marginal generation cost of the most expensive thermal unit of ~$55/MWH). The Nejapa plant has the right to buy power that it is obliged to deliver, but seldom does so. With 144.5 MW supplied inflexibly and at a price substantially exceeding system marginal cost, it limits the benefits of reform to the system as a whole in three distinct ways:

- It runs at times when other generation could have delivered the power with lower cost of fuel burned;
- Its inflexible physical presence forces other generation to effectively operate at a lower load factor, forcing more starts and part load operation;
- CEL's contractual obligation to continue paying the price of Nejapa's power has arguably forestalled the privatization of the remaining assets, with CEL's total revenue serving to cover its costs and pay Nejapa.

Privatization of the CEL fossil fuel plants reveals some of the problems inherent in reforming a small system, especially with a discretionary price bidding system used to manage the pool. In considering the options, it was clear that the government was determined to pursue reform/privatization as far as practical. The fossil fuel burning thermal plants were viewed as a class of asset that would receive a favorable international reception because their condition (after extensive US government funded rehabilitation) was quite good, their operation and fuel supply were recognized as activities in which an international power corporation could add value, and because an additional premium beyond their current value would be forthcoming in an auction in consideration of expandability of one of the sites: Acajutla. The dilemma was that it was most beneficial to CEL to be out of the fossil fuel thermal generation business entirely, but the San Miguel and Soyapango plants, small and remotely located, were unlikely to attract any buyers at all if sold separately and certainly not if buying them meant that the same bidder could not buy Acajutla. But these plants were critical to system reliability in droughts and to system stability in their proximity, so they could not be abandoned. The decision was therefore made to sell these plants as a group, despite the fact that to do so was tantamount to putting dominating market power on the auction block.

The result was predictable, as shown in Figure 3.6 below. The solution, reached in early 2000 (approximately six months after privatization) was for the new owner (Duke Energy) to enter into a PPA with CEL that provided revenues suitable to them while effectively bypassing the pool mechanism.

Figure 3.6: Market Power in a Small Price Bid Pool



II. GUATEMALA

Guatemala began the liberalization process as did El Salvador, with signing PPAs to induce new generation construction. Nine PPAs were signed altogether, with the largest being two with Enron (110 and 124 MW) for barge-mounted oil fired capacity, and one with Teco Power Services for 120 MW (coal fired). It corporatized its principal distribution property, EGGSA (serving Guatemala City and two adjacent provinces), and privatized it in 1998 (for an unexpectedly high $520 million). It corporatized the remainder of the centralized distribution plus the hydroelectric plants as the National Electrification Institute (INDE), planning to privatize them (but has not yet done so).

Generation. The resulting mix of variously structured PPAs and INDE's hydro plants operates in a centrally dispatched pool. The pool dispatches by ascending marginal cost, although this is viewed through the lens of the PPAs where they are present (i.e., marginal cost of inflexible delivery power is zero, without regard for actual marginal cost). This has limited the efficiency benefits of the pool to date. Nevertheless, cost-based dispatch effectively prevents exercise of market power in the pool.

Distribution/Commercialization. Empresa Electrica de Guatemala (EEGSA, now called DECASA) distributes and sells 70% of Guatemala's electricity, with INDE, municipals, and the private generators selling the balance. Distributors have an obligation to contract with generators to cover their foreseeable demand. Regulation of their margin over purchased power costs is "price cap" type, based on the hypothetical cost of an efficient distributor. The law further has explicit prohibitions on anticompetitive behavior, a check on possible abuse of market power by quasi-monopolist DECASA.

D. Issues posed by district heating

There is not district heating of any consequence in Latin America.

3.1.4 Legal framework

A. System adaptability subsequent to passage of initial laws

The systems described above can be characterized as durable and on the whole, highly successful. They have survived through the Russian debt crisis and Brazilin devaluation. The Argentine system survived the Mexican debt/currency crisis in 1994 as well. The Colombian system has even survived depression brought on by guerrilla war. This has required adaptation of both regulation and law.[21]

B. Government bodies and their roles

All countries considered in Latin America had pre-existing ministries in charge of formulating and carrying out government energy policy, so their creation was not part of the reform effort.

[21] *If there is a negative lesson to learn about system adaptability in Latin America, it comes from two incidences in Brazil: establishment of incomplete frameworks in the hope that collegial/judiciary bodies could finish work that should have been enshrined in legislation. As mentioned above, Brazilian reform began with minimal basis created to support distribution privatization. This left some important policy issues unsettled or ambiguous, most notably the limitation of regulatory oversight of purchased power cost pass-through. While the clear intent of the original approach to reform was to allow market forces (or an agreed computer-simulated substitute for market forces, said to be necessitated by the nature of the hydroelectric resource base) to determine wholesale prices and these be passed on to ratepayers, ANEEL effectively extended its right to regulate retail tariffs to pre-empt wholesale contracts at prices beyond levels that it set. ANEEL took this step with most generation still in government hands, and has effectively ended further privatizations for now.*

In a separate development, the independent system operator and wholesale market administrator were constituted to be governed by a large board consisting of representatives of generation, distribution, large users, and ANEEL. This might have been appropriate even if that had been the only task at hand, but they were originally convened with the charge to create and pass complete operating rules. Not surprisingly, this large and inherently disunited group proved incapable of such a task, and was relieved of the duty after eighteen months of effort.

3.2. Hungary

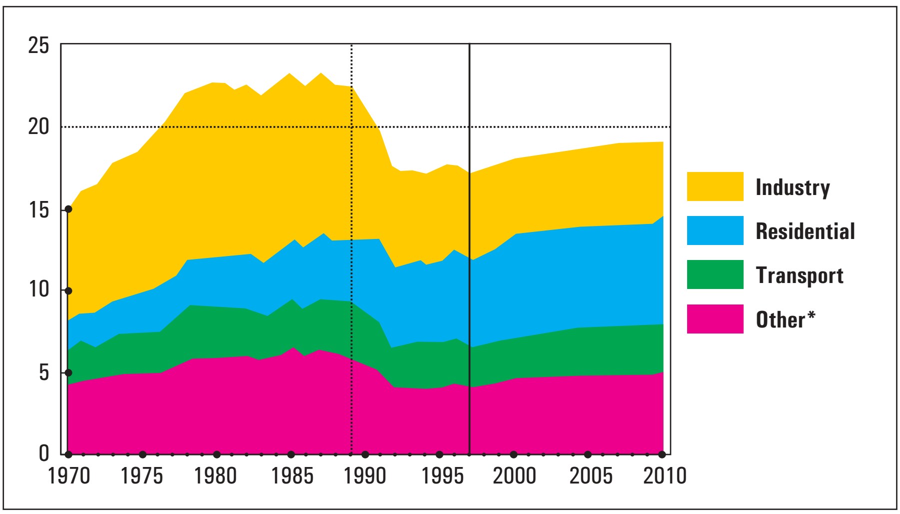
3.2.1. Context

After the dissolution of the Soviet Union, Hungary, like the rest of the former Warsaw Pact and Mongolia, faced formidable tasks in legal, economic and social reforms. Each of these encompassed a multitude of problems to be solved expeditiously. There was dedication to the cause of transformation, notably in the legal framework and in property rights, the redistribution of the State's assets and in attracting foreign investment. The process of transformation remained on course, but concentrated more on various political issues, less on economic issues and even less on social issues.

The restructuring of the entire economy was critical. Hungary's GDP fell by more than 20% between 1989 and 1993, foreign trade by 23-24%, industrial output by 30%, and agricultural production by 35%. The aggregate fall in services was much less at 7.5%. The economy hit bottom after four years, as GDP grew by 2% and industrial production by 9% in 1994.

Similarly, electricity consumption peaked in 1989, and then declined due to a sharp drop in industrial production and an economic recession that accompanied the initial phase of transformation of the economy. The historical record for consumption of energy, shown in Figure 3.7, indicates the precipitous decline for the industrial sector, starting in 1989.

Figure 3.7: Decline in Industrial Energy Consumption



Of the total energy need in Hungary, 51% was imported, and the share of electricity was 28%. This left Hungary squarely facing a problem not found in Mongolia: much of its energy supply suddenly set to world market prices. In addition, reform of the

Hungarian energy sector is now propelled by the need to conform the requirements of the EU.

3.2.2 Regulatory reform

A. The regulatory bodies themselves

Legislation commonly referred to as the “Gas Law” established the regulatory body, the Hungarian Energy Office (HEO), for overseeing both the electricity and natural gas sectors. Jurisdiction over district heating was added later with passage of a law on district heating. The HEO’s principal function is to set up the methodology for and calculate the resulting tariffs for electricity, gas, and district heat. In addition, it issues licenses for operations, and for construction, commissioning and decommissioning), monitors the financial viability, technical performance and monopolistic tendencies of licensees, enforces compliance and issues fines, has the ability to revoke licenses, sets criteria for suspension of service, holds public hearings, measures customer satisfaction and arbitrates consumer complaints, guarantees service quality, and inspects and audits companies books.

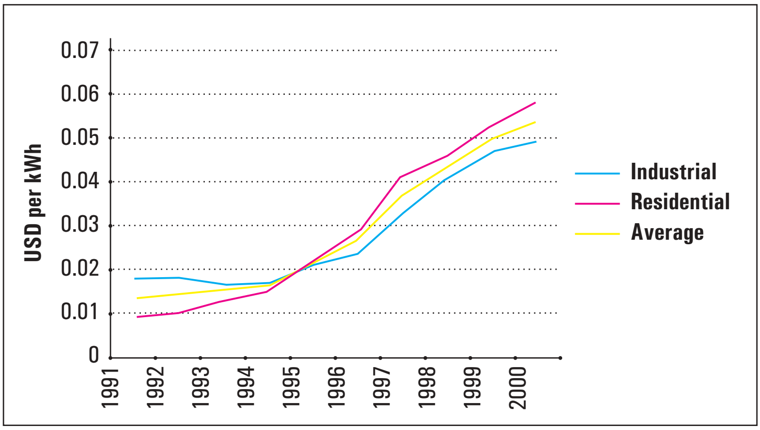
Historically, the Government has not accepted the full independence of the regulatory body and kept tariff rate approval decisions, appointment of the head regulator and administrative supervision of the regulator for itself. These are expected to be corrected in preparation of a new Electricity Law currently underway due to EU requirements.

Subsequent to setting up the HEO, a series of secondary legislation had to be enacted. Among these were the requirement on the MVM (the Hungarian national electricity company) to develop an operational code (grid code-dispatch code-distribution code), setting criteria for network access rules, revising the tariff structure and tariff levels to reflect cost of service, develop power purchase and power sale agreements (PPAs and PSA’s), establish business rules and detailed consumer protection procedures among the principal topics.

B. Tariffs and the tariff-making process

It was clear already in 1992, that a wave of bankruptcies of the corporatized electric/district heat sector could be imminent under the then current tariff levels, jeopardizing the entire economy and creating security problems. There were signs of danger concerning lack of funds for maintenance and replacement of equipment and about consequences of postponed investments. Accordingly, tariffs were increased over time as shown in Figures 3.8 (electricity) and 3.9 (heat).

Figure 3.8: Electricity Prices in Hungary



C. Generation management and governance

Hungary chose a single-buyer model, with the transmission licensee (MVM) responsible for dispatching the generation as well as buying their power and reselling it to distributors (based on PPAs and PSA's)[22], although independent power production (IPP's) was also allowed. It is prices determined by these contracts (and not a pool [as may exist in the future] that determines generator revenue). This law did not allow open access to the grid.

Under EU requirements (Directive 96/92/EC), competition in generation is being designed. As Hungary expects accession to EU membership by 2004, the Hungarian electricity market will be liberalized starting in 2003. At that time, a third of the major consumers will be allowed to choose among distributors, and after accession the requirement to purchase half of their demand from domestic sources will be lifted. The other 2/3 of the consumers will continue buying power at regulated prices until such time when full competition is reached. The Government is preparing legislation to implement these changes.

3.2.3 Unbundling and technical/commercial issues

A. Threshold needs: Generation

When reform started, total capacity stood at 7200 MW (or 0.6 kW/citizen). The system consisted of 9 power plants, 7 distribution companies, and national grid consisting of 5530 km of transmission lines, dispatching power through a central dispatching center assisted by six regional and 39 local centers. The nuclear power plant at Paks supplied

[22] *This works on the basis of MVM averaging the producers' prices (widely varying as to which fuel source they use), adding its own costs and allowable ROR, and selling it to the distribution companies. Producer prices include a stand-by charge, and energy charge and a coal mine capacity charge (where applicable). Wholesale prices contain and energy charge and a capacity charge and vary according to when the delivery is peak or off-peak.*

forty percent of the power generated. Seven of the rest of the plants were coal-fired plants with the last operated on heavy oil. With the exception of the Paks nuclear power plant, the power plants were antiquated and polluting. With no financial sources for investing in plant rehabilitation or in constructing new plants, foreign investment had to be sought.

Today, after unbundling and privatization of the distribution companies and the generating companies (Figure 3.5), competition is maturing and the Government is considering privatization of the transmission company also (MVM). Toward this step, it had removed the dispatch function and established it as a separate entity. Aside from one unsold power plant, all generating companies are now independent producers (IPP's). Regional distribution companies are without generating capacity. The MVM has no commercial contact with end-users only with sellers and buyers on the wholesale level. The benefits of this model are that activities and assets are not commingled and commercial relations guide business between companies. Private ownership has notably brought greater cost efficiency, notably via personnel reductions of up to 40%. These are discussed more fully in the next section.

B. Threshold needs: Transmission, distribution and commercial

Theft, collections, and debt of any kind were limited problems in the Hungarian electric system. The main area of efficiency improvement was in reduction of personnel costs. Here, reductions of up to 40% were common, but with two mollifying effects:

- As a condition of the privatizations, force reductions were conducted over periods of up to three years, accompanied by retraining and severance payments equal to as much as three years' pay.
- By good fortune, by the time the force reductions were actually occurring in the 1996-8 timeframe the Hungarian economy was growing at an average annual rate approaching 4%, generating ample new job opportunities.

C. Issues resulting from system scale

Hungarian generating capacity now totals 7703 MW, and Hungary buys approximately 9500 GWH from and sells approximately 6100 GWH annually to its neighbors. This is too large for the problems of "small" systems to manifest themselves, and in fact they do not.

D. Issues posed by district heating

District heating became mandated during the accelerated industrialization period under Soviet pressure in Hungary; most other countries in this sphere experienced the same pressures, namely to provide prefabricated housing and heat and hot water for workers brought to industrial centers. In Hungary 650,000 residential units are connected to some form of district heating system, representing 16% of the total housing.

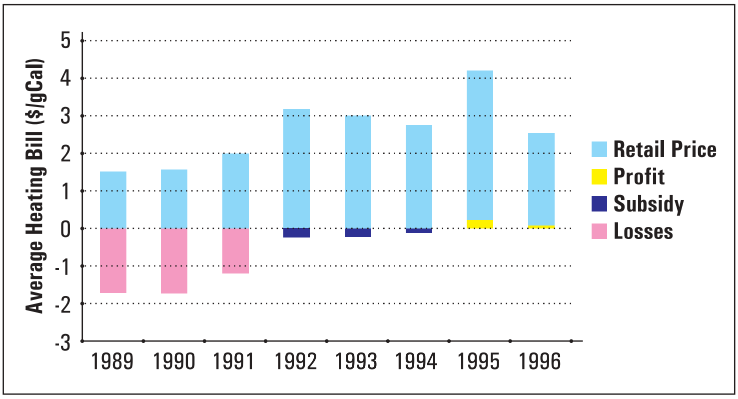
The system also feels the impact of the decline in heavy industry, which used 50% more heat than today prior to the disintegration of the Soviet Union. This has been offset only partially by increased use in institutional buildings.

Of the total supplied, 70 % of district heat furnished by combined heat and power plants (CHP), with natural gas being the most utilized fuel (69% of the total). The total amount of energy supplied by district heat is substantial. With a peak demand of 6,500 MW turnover from sales of 18.5 TWh district heat is roughly equivalent to $291 million per year.

Ownership is complex, leading to still more complex tariff formulation and subsidization. Motivated at least in part by a desire to shed problems, the central government conveyed ownership and control of local grids to the municipalities. They in turn own some of the CHP plants, while the national electric grid company MVM owns most of the rest.

Figure 3.9 shows the withdrawal of direct subsidies and attendant increase in tariffs in the early days of reform. This and further increases have left a state of affairs in which there are still hidden subsidies in the form of unrecovered municipal costs and cross-subsidies between classes of gas users that favor municipal CHP plants. However, even though the resulting prices of heat are not high by European standards, the costs of heating to the individual consumer is high relative to income, and many have difficulty in paying their bills. Converting to individualized systems is, however, also very expensive, so most stay with district heating.

Figure 3.9: Effects of Subsidy Removal on Tariffs – Heat in Hungary



In summary, district heat has struggled through energy reform in Hungary. Tariffs have increased multifold, perhaps to their feasible limits, and still operation depends on hidden subsidies. Three effects that are not necessarily present in other former command economies have mollified difficulties:

- Penetration at 16% was still far from universal, even in the cities;
- The alternative of natural gas is becoming available;
- Hungary has enjoyed substantial economic growth in recent years, raising customers' ability to pay.

3.2.4 Legal framework

A. System adaptability subsequent to passage of initial laws

The basis of the modern electric system is the two laws discussed above that were passed in 1994. They have since been amended to include district heat as well. Important examples of limits of flexibility and of need for new law (rather than a change in regulation) are MVM's success blocking retail access and the willingness of the players to "let EU accession fix it."

B. Government policy bodies and their roles

The Energy Ministry formulates and carries out government policy in the energy field. As mentioned previously, a failing of the system to date has been the retention of power to set tariff levels in the Ministry, even as lesser regulatory duties were delegated to the Hungarian Energy Office. It is expected that submission to the rules of the EU will force remedy of this problem in the near future.

3.3. Newly Independent States

3.3.1. Context

The fall of the Soviet Union brought the Newly Independent States into being out of the Soviet Union itself. All of these states have made efforts to open their economies, to introduce the benefits of market forces and to attract outside investment.

None of these states have progressed nearly so far in power sector reform as Hungary, let alone some of the states of Latin America. In particular, there is little if any reform experience mature enough to reveal unintended outcomes like those in El Salvador. Nevertheless, they offer important parallels with Mongolia that are lacking in these other countries:

- They were under communist domination longer, with deeper social consequences;
- In general, they entered reform in worse economic condition than the other countries mentioned, particularly in terms of output, labor force skills, and infrastructure;
- They suffered extra dislocation from having been tightly integrated into the Soviet economy.

As such, their experience warrants review. Based on available data, level of reform advancement, and country size, this review focuses on experience in Georgia[23] Regulatory Reform.

A. The regulatory bodies themselves

The sector's regulatory authority, the Georgian Energy Regulatory Commission (GNERC), began functioning in June 1997. The GNERC is an independent regulatory agency with jurisdiction over the rates, terms and conditions of service for electricity and natural gas sector enterprises. GNERC is authorized to establish a system of licenses and tariffs to regulate the country's energy enterprises, with different requirements for electricity generation, transmission, dispatch, and distribution licensees.

B. Tariffs and the tariff-making process

The Georgian Government is committed to gradually bring electricity tariffs in line with costs. The GNERC adopted a full cost recovery principle for electricity tariffs, and has raised electricity tariffs three times since 1997.

Tariffs for residential customers in Tbilisi now stand at $.04/kWh. Despite the steep increases of recent years, it is widely acknowledged that the current tariffs are still not sufficient to fully recover operating expenses. AES Telasi, the privatized distributor in Tbilisi, informed the GNERC through a tariff modification notice that tariffs should be increased to $.08/kWh to reflect full cost recovery. However, GNERC has expressed reluctance to increase tariffs further, considering that electricity consumption now accounts for 21.5% of a household's average monthly salary for those who do pay, and that the distributors' main revenue problem is theirs to solve: the collection rate is below 20%.

The IMF has also issued a special requirement to the Government of Georgia regarding the imposition of higher electricity tariffs. The IMF insists on adding the foreign debt service component to the existing tariff. If approved, the tariff increase will result in the IMF offering a new assistance program to the country.

C. Generation management and governance

In 1999, as part of the Law on Electricity and Natural Gas, the government also implemented the centralized funds administration/settlements organization known as the Georgia Wholesale Electricity Market (GWEM). Georgia's current method of organizing the power system is quite varied. It includes a number of direct bilateral contracts between suppliers and wholesale customers, and also has much of the power moving through the GWEM, which serves as a wholesale contractor for supply on behalf of its customers. However, this organization's performance has not met the expectations of either outside observers or inside participants. Corruption within the organization is

[23] *In particular, Armenian experience was reviewed but not included here due to lack of progress with reform.*

also alleged. Most recently, management of GWEM was conveyed to a consortium headed by Spanish utility Iberdrola, in the form of a five-year management contract.

3.3.2 Unbundling and technical/commercial issues

A. Threshold needs: Generation

Georgia's nameplate generation capacity is about 4,800 MW:

- 1,938 MW in three thermal plants – Tbilsresi (Gardabani), Tkvarcheli, and Tbiltetsi (combined heat and power). The Tbilsresi plant accounts for 1,700 MW of nameplate generation, but not all of its units are currently operational.
- 2,700 MW in 103 hydro plants: 6 large storage plants, and 17 large and some 80 small run-of-river plants. The largest of these, Enguri, has an installed capacity of 1,300 MW, but only four of its five units are currently operational.
- 160 MW in industrial cogeneration plants and diesel units.

For the past ten years, the country's generating capacity has been less than its installed capacity, as a result of deteriorating generation equipment, lack of funds for fuel purchases, and the politically sensitive locations of three plants, which are situated in or close to the breakaway Abkhazia region.

In 2000, the government sold Units 9 and 10 (representing 600 MW of installed capacity) of Georgia's largest thermal plant Tbilsresi, to AES Silk Road Holdings (an affiliate of the US-based AES Corporation). The privatization established Tbilisi as the first capital city in the former Soviet Union to be served by a private investor-owned distribution company receiving most of its power from a privatized power plant.

B. Threshold needs: Transmission, distribution, and commercial

The state-owned transmission enterprise Electrogadatsema operates, maintains, and develops Georgia's high-voltage transmission network. This network consists of 576 km of 500 kV lines, 1,690 km of 220 kV lines, and 3,911 km of 110 kV lines. In addition, the interconnection with Azerbaijan includes 21 km of 330 kV lines. The Georgian power system is also heavily interconnected with the neighboring systems of Russia, Turkey, Armenia and Azerbaijan through seven tie lines.

The 550 kV east-west backbone line of Georgia and all of the international lines except for two are owned by Kakrusenergo, a company that is 50% owned by RAO United Energy Systems of Russia and 50% by the State of Georgia. Electrogadatsema (which owns over 9,800 km of transmission lines and 19 substations) operates the lines under contract with Sakrusenergo.

Network reliability is also hampered by theft and vandalism, and by daily load shedding to cope with winter supply shortages. This has damaged substation batteries and switches. Electrogadatsema estimates that technical losses on the high-voltage system have reached

5-6%, while Dispatcherizatsia (the state-owned enterprise responsible for system dispatch) estimates these losses at 12-15%.

There is widespread recognition throughout the power system that much of the sector's financial crisis stems from the poor performance of the distribution utilities. Collections are poor for the state-owned utilities, officially averaging 20% or less (although there are some exceptions, such as in Adjara, where reported collections exceed 50%). Electricity supply to the utilities is especially poor during the winter, when is not uncommon for households to receive no power for days or even weeks on end. The government did make some missteps, however, when it transferred operational responsibility for the distribution utilities to the municipal governments and also created far more distribution utilities than economic efficiency would dictate. The result was that the distribution utilities' operational performance remained very low and the cash collected was often diverted to meet the needs of the municipality rather than remaining in the electricity or natural gas sectors. Accordingly, the Ministry of State Property Management, the Ministry of Fuel and Energy and other related bodies have considered consolidating existing state-owned electricity distribution companies into four utilities: Telasi, eastern Georgia, western Georgia and Adjara.[24] [25]

C. Issues resulting from system scale

With its overall scale and generation diversity, Georgia does not manifest the characteristics of small size described for Mongolia, El Salvador, and Guatemala.

D. Issues posed by district heating

District heating systems existed in Tbilisi and several other large cities in Georgia during the Soviet era, but were allowed to collapse in the early 1990's. This was an acceptable outcome because the country has extensive municipal gas networks, allowing residents and businesses the opportunity to cheaply retrofit this efficient, low maintenance alternative. This experience does not apply to Mongolia since no such gas networks exist, nor is there a supply of gas.

[24] *The International Finance Corporation (IFC) has been retained by the Government of Georgia to prepare a privatization offering for the state-owned distribution utilities and five hydropower stations. The IFC's concern about implications of scale for privatization viability is such that they have encouraged the consolidation of the state-owned utilities into a single distribution utility in order to best attract potential investors. PA's view is that the Georgian system (which is several time the size of the Mongolian system and spread over rugged terrain) can be effectively privatized in smaller increments, as the Ministry of State Property now plans. However, the fact that IFC raises this issue on a system substantially larger than Mongolia's reinforces the concern expressed here for need to reconsolidate Mongolia's distribution in order to attract much-needed international power industry interest.*

[25] *Due to political considerations, the privatization of utilities in the autonomous region of Adjara will likely be delayed.*

3.3.3 Legal framework

A. System adaptability subsequent to passage of initial laws

The privatization of Georgia's energy sector became possible when parliament amended the law on Privatization and the State Property in 1998 to create the conditions for the private ownership of larger companies.

B. Government policy bodies and their roles

The Ministry of Fuel and Energy establishes state energy policy on behalf of the government. In addition, the Ministry of State Property Management owns, manages, organizes, and is responsible for privatization of state electric assets.

4.0. Analysis of Effects of Reform in Mongolia

4.1. Issues Surfaced to Date by the Reform Process

4.1.1. Independence of the regulator

Legal independence of the ERA is now established with passage of the Energy Law creating it. Nevertheless, it is made up largely of former Energy Authority personnel and depends on the energy authority for interim operational funding, office space, etc., as well as the accumulation of years of close interpersonal ties with personnel now scattered among the new government and corporatized organizations. The leadership of the new body will need to recognize that full organizational and intellectual independence will only be achieved as a result of conscious effort, and that observers will watch for demonstration of this independence.

4.1.2 Disposition of pre-existing debt

Both the ERA, the government, and the newly corporatized electric companies recognize that existing debts inherited from the Energy Authority are substantial, probably beyond being repaid with cash flow from any societally acceptable tariff rates with any level of efficiency.

4.2. Anticipated Issues

4.2.1 Adequacy of generation resources

The generating plants as currently run do not supply adequate electricity to the system. Furthermore, they are a major source of air pollution. However, their original capabilities total almost twice current output, suggesting substantial rehabilitation potential.

4.2.2 Distribution operations

Concerning distribution, losses data clearly implies high levels of theft, levels in a regime that has proven profitably controllable (with proper tariffs) in other venues. Additionally, improved maintenance may reduce technical losses as well. Available data does not allow diagnosis of the magnitude of commercial fraud within the organization or between it and suppliers, but bears further investigation.

4.2.3 Tariff reform

Tariffs are inadequate to sustain current operations, perhaps in any of the operating companies. They are also inadequate to attract international participation to enough of the sector on terms likely to be attractive to Mongolia for such participation to work the needed improvements. They need to be raised, but with the following conditions:

- Continue to assure affordable service;
- Take maximum advantage of the indigenous cost structure of the existing system; and
- Assure the government and people of Mongolia that this approach to tariff reform leads to stable, sustainable tariffs in the future.

4.2.4. Staffing

Staffing reductions would almost certainly improve operating efficiency. Indeed, levels of overstaffing like those present in the generating and transmission sectors commonly increase system costs beyond their direct impact by retarding adoption of best operational practices. However, dismissing large numbers of workers in Mongolia today could have difficult to predict long term negative effects if these workers prove unable to find other work.

4.2.5. Special issues resulting from system size

The Mongolian system exhibits important characteristics resulting from its small size that limit the applicability of some power market reform models. Because of this, the Mongolian system poses special problems attracting international participation on a basis most beneficial to the country.

4.2.6. Special issues posed by district heating

District heat is an integral part of the Mongolian energy system, and the only practical means for many citizens to have heat from native coal. Maintaining this system physically and economically viable is likely to complicate electric sector reform, not make it easier nor be separable from it.

5.0. Lessons Learned: How Experience of Other Countries Applies

5.1. Regulatory Structure

The regulatory system and the ERA are so embryonic at this time that international experience offers little guidance.

5.2. Debt Disposition

The relevance of international experience to debt disposition comes primarily indirectly, from its guidance on tariff formulation, as discussed more fully below. Tariffs need to be increased to cover ALL ongoing costs. For the credibility of the electric sector and the reform process, no government assumption of debt should support continued inefficiency or under-cost operation (that is a subsidy, and the government should recognize it as such). At the same time, it would be questionable (if indeed feasible) to increase tariffs still further solely to retire a pre-existing debt. However, it would also not be appropriate for the Mongolian Treasury to assume a commercial payable that is offsite by a commercial account receivable: the new electric sector needs to learn to collect its own bills. What is therefore needed in association with tariff formulation is the examination of commercial assets as well as liabilities to ascertain what portion of extraordinary payables should be expected to be payable from extraordinary recoverable receivables and then ascertain what debt assumption (commercial and financial) might be appropriate to allow go-forward viability on feasible tariffs.

5.3. Generation Resource Issues

Existing generation needs an infusion of international power industry capital and technical and managerial skill. If this proves insufficient in itself to serve power/heat needs, the same means used to attract the needed capital and skill (see 5.7 below) should be able to induce new construction while limiting application of inflexible PPA mechanisms.

5.4. Distribution Operations

System losses are in a regime that international experience shows can sometimes be remedied with dramatic (and profitable) results. Just as important, however, such levels of losses tend not to be static, but to get worse with tariff reform. They need to be attacked to avoid further (possibly dramatic) deterioration even if not reducible in numeric total. It is of highest importance that the new distribution companies make this effort. The international power industry has shown significant capability to enhance the performance of indigenous power operators in this endeavor.

5.5. Tariff Reform

Mongolia has corporatized its power sector, now needs to give it the means to survive on its own. The mechanism that has worked repeatedly to fire managerial zeal and foster credibility in the government and the public is the combination of some form of price cap rate system applied to distribution charges and a cost-based-bid pool system (see 5.7 below) to govern and price wholesale energy. Critically, that the tariff system must set a tariff methodology that leaves several years of annual adjustments to a purely administrative process. It offers the management a chance to profit from their efforts, while it assures the public that it is management that will get burned if management is incompetent and government that management will suffer ahead of seeking yet another subsidy or rate increase. Mongolia can maximize chances for reform success by adopting tariffs and policies (not entirely those implied in some existing law) that make this possible. An outright subsidy, scheduled to phase out, would be preferable to an endless series of (inevitably politicized) short-term fixes.

5.6. Staffing

There is no doubt that employment levels in the Mongolian energy sector are excessive. Such levels not only cost payroll, but also may retard adoption of best operational practices like modern process controls in the name of protecting jobs. International experience is full of successful examples of societally accepted downsizing in the wake of reform. However, it is also appropriate to note that “successes” sited here had the good fortune to occur during periods of healthy economic growth, in most cases in societies with well developed indigenous entrepreneurial capabilities. Accordingly, some caution may be in order in considering large reductions in force. As a minimum, it may be appropriate to offer generous severance, partly in retraining services.

5.7. System Scale

The Mongolian electric and heat sectors are of such limited size as requires specific address/consideration in choosing an approach to generation governance/pool structure and in deciding the degree of system fragmentation to be pursued. Concerning pool structure, Mongolia is fully capable of realizing the benefits of a power pool to direct its generating plants and determine wholesale prices on a market-like, cost-efficient basis. However, it needs to use cost-based bidding with a capacity payment to avoid abuse of market power that will inevitably be in the hands of generators in such a small system.

Concerning the feasible limits of system fragmentation, it is noteworthy that Mongolia has taken the courageous step of corporatizing its electric and heat sectors. However, it has exacerbated the size problem by dividing the system into so many segments, most of little likely interest to outsiders. The government should seriously consider allowing international investors to buy into combinations of companies, including all distribution companies together, and even the possibility of aggregation of smaller power plants with these distribution properties, so long as any combination leaves at least two generators.

5.8. District Heating

District heating appears likely to remain an important part of the Mongolian energy industry for many years. International experience shows that (in addition to rational tariff relief like that described for power above) the best thing the heating company can do is to get meters in place, render bills, and collect them. This will both increase revenue and reduce the obvious waste described today in Mongolia.

Appendix A:

A.1. Developmental Status of the ERA

With USAID assistance, the ERA has made significant strides toward building the capabilities that it needs to discharge its responsibilities as mandated by law. Particular areas of progress include:

- Institutional Development;
- Established an organizational structure;
- Established job descriptions;
- Staffed most positions;
- Acquired office space and facilities;
- Initiated training for ERA staff;
- Established a framework of self-sustaining financing through: regulatory service fees and license fees; and
- Structured a transparent framework of internal operations through: code of professional conduct, protection of confidential information, and financial accountability.

Technical Capacity Building:

- Licenses – Award, suspension, and termination;
- Contracts – Power supply/sales and utility services;
- Tariffs – Policy, structure (cost-of-service, adjustment mechanisms, tariff design);
- Regulatory Compliance – Reporting, monitoring, and penalties.

Currently the ERA is working in all these areas:

Activity	**Status**
Training of ERA Staff	Ongoing
Transparent Hearing Process	Implemented
Licenses:	
· Interim	· Issued
· Final	· In Progress
License Fees	Proposal pending
Metering	To be developed
Tariffs:	
· Interim	· Completed
· Final	· Ongoing
Business Rules	In progress
Reporting	In Progress

Going forward, the ERA has significant work ahead to establish itself as a credible and competent agency that is capable of exerting regulatory oversight over an energy sector in transition. Those areas most in need of strengthening are:

- Autonomy – The ERA was staffed with individuals from the Energy Authority (the old vertically integrated utility organization) and still receives office space and interim operational funding from the EA. It is important that the ERA achieve independence as soon as possible so as to be able to carry out its mandate in an autonomous fashion.
- Training – Ongoing training for ERA staff will be essential to strengthening the capacity and competence of ERA staff members.
- Licenses – Issue final licenses.
- Tariffs – Continue to develop and modify the tariff design until an adequate system is in place and is understood by licensees who can then begin submitting their own rate cases.
- Business Rules – Complete the process of establishing business rules among sector participants.
- Hearings – Institute a transparent system of conducting hearings.
- Fees – Establish a sustainable system of collecting user fees in order to ensure the autonomy of the ERA.

Promotion of a strong and sustainable Energy Regulatory Authority will be essential to supporting the energy sector reform process in Mongolia.

A.2. Summary of Legal Basis of Tariffs

The Law of Energy establishes ERA and its authority to establish tariffs, both interim and long term.

Article 9, Powers of the Regulatory Authority:

- 9.1.4. To develop methodology to determine tariffs, define the structure of tariffs; to review, approve, inspect and publish the tariffs of licensees;
- 9.1.5. To establish a pricing and tariff system that enables supply of energy at the lowest possible cost and allows an adequate rate of return.

Article 26, Principles for Setting Tariffs:

- 26.1. Tariffs shall be determined separately for each licensed activity including generation, transmission, distribution, dispatching and supply of electricity and heat.
- 26.2. The following principles shall be observed in determining tariffs:
    - Tariffs should be based on real costs of operations;
    - Costs should be allocated to different consumer classes according to their requirements on electricity and heat supply;

- Tariffs should enable regulation of energy consumption;
- Tariffs should ensure price stability;
- Tariffs should ensure that revenues of licensees are sufficient to support their financial viability;
- The tariff structure for electricity and heat should be clear and understandable for consumers;
- The least-cost principle should be followed while tariffs should be sufficient to enable compliance with the requirements of technical and technological safety in energy generation, transmission, distribution, supply and dispatching;
- The cost should be determined based on prior years' performance; however, depreciation of future investments or renewals should not be incorporated in the cost.

• 26.3. The Regulatory Authority shall be responsible for assessing justification and accuracy of cost estimations by licensees. It shall return the cost estimates to the licensee for a revision in case the estimates are not adequate. The Regulatory Authority shall develop and publish tariff determination methodology and procedures for review and examination of tariffs.

Article 27, Tariffs and Contract Prices:

• 27.6. Tariffs and contract prices may differ for certain groups of consumers depending on the following factors of energy supply in addition to other factors:
  - Maximum load requested and consumption specified in the contract;
  - Load factor or pattern of load;
  - Ability of the consumer to manage its load or willingness to accept interruptions in the supply;
  - Geographical area served by the supplier;
  - Duration of the contract;
  - Other factors.

Article 25, Obligations of Licensees:

• 25.1.3. To keep financial and accounting records for each licensed activity separately from records of activities not specified in the license;
• 25.1.4. To submit its audited financial statements to the licensor every year;
• 25.1.8. To provide accurate information required by the licensor necessary to evaluate technical and economic performance of the licensee on a timely basis.

A.3. Tariff Formulation and Subsidies/Cross-subsidies

A.3.1. Affordability and cross-subsidies

Without question, subsidies of some sort are essential to allow reform in a relatively poor society. However, no mechanism is without problems, and Latin America offers lessons both good and bad. Conceptually, two problems confront the developer and administrator of a subsidy program:

- What is the source of funds?
- Who is eligible (and at what level)?

Sources of funding include:

- A national trust funded by the government treasury, as used in Argentina for rural electrification and formerly employed generally in Colombia.
- A national trust funded by above-norm tariffs collected from other customers deemed able to pay, as is now used generally in Colombia.
- Directly from other customers of the distributor, as used generally in Brazil.

Of these, the one that has had the least problems is self-collection from other customers. Non-payment and late payment by treasury-funded trusts are not surprising: in most instances, governments began reform in the power sector because they could no longer afford to fund the losses.

Funding through a pool collected by all distributors requires that those who collect more than what covers subsidies for their own customers pay the rest into the pool. The collective system must collect enough premium to cover all subsidies, a much more difficult proposition to monitor than each distributor monitoring its own. All of this was further complicated by lack of effective means to compel surplus collectors to pay, by ambiguous rights to make up previous losses accumulated during periods of non-payment from the national trust, and the fact that one surplus collector, Medellin, remained in municipal hands.

The self-collection system functions well enough as long as each distributor has a sufficient pool of able-to-pay customers to cover it. This is common in Latin America with its socio-economic stratification, but may not apply in the former Soviet Bloc. And the presence of multiple distributors in a country will mean different tariffs from each.

The primary methods to determine subsidy eligibility have been by location and by quantity used. Standout problems have been the arbitrariness and corruptibility of determination by location (as practiced in Colombia). Determination by amount used has been shown repeatedly (in the US as well as Latin America) to anomalously benefit the affluent who have two homes (a particularly big problem in Sao Paulo, where the combination of very poor quality of life in the city and the onerous commute lead unusually large numbers of those with the means to have two dwellings, one of which typically qualifies for a low use defined reduced rate, one approach used in Brazil). Inclusion by membership in some other entitled group presupposes pre-existing grouping systems created by government and the integrity of those systems (also partially used in Brazil).

Regulatory Issues of the Mongolian Energy Sector

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Regulatory Issues of the Mongolian Energy Sector

1. General principles for Regulation of the Mongolian energy sector

The Law on Energy of Mongolia gives the following full powers and obligations to the Parliament, the Government the Ministry of Infrastructure, and the Energy regulatory authority.

Parliament:	formulate the state policy on energy, make decisions regarding construction of a nuclear power plant.
Government of Mongolia:	organize implementation of state policy and legislation on energy.
Ministry of Infrastructure:	implement the Law on Energy and the decisions of the Government.
Energy Regulatory Authority:	regulate relations concerning production, transmission, distribution, dispatching of energy, importation and exportation of electricity, construction of energy facilities and energy consumption.

2. Objectives of the Energy Regulatory Authority

The Resolution #83 of the Government of Mongolia has defined the following objectives of Energy Regulatory Authority:

- Issue license for energy activities;
- Review and approve tariffs;
- Protect equally the right of Licensees and the Consumers;
- Create conditions for fair competition among producers and suppliers

3. Management and Structure of the Energy Regulatory Authority

The Rule of the ERA indicates optimal and liberal form of management with cost effective and compact structure. The ERA is governed by the Board of Regulators consisting of three Regulators, with one of them as the Chairman. The Chairman and two regulators are appointed and can be released by the Prime Minister based on a proposal from the Minister of Infrastructure. They are appointed initially for 2,4 and 6 years, respectively, and thereafter for 6 years, so that expiration of their term of service have two year intervals. The terms of service may be extended once. The Chairman shall manage the daily work of the Authority. When the Chairman is absent, one of other two Regulators shall be deputized provided that he is older or worked as a regulator for more years. The Regulatory boards of aimags and the capital city are within the structure of the ERA. The ERA has a duty to provide them with professional and methodological assistance. The Authority shall have the following departments: (I) Licensing department, (ii) Price and tariff department, (iii) Legal, Information and administration department. The Board of Regulators shall appoint the department heads and shall approve the Rules.

4. Entities under Energy Regulation

The following energy entities are under the energy regulation:

- Central energy system consisting of five Power plants with total installed capacity of 796 MW, imported electricity from Russia and six electricity and heating transmission and distribution networks;
- Western energy system, which supplies three western provinces (Bayan Ulgii, Hovd, Uvs) with imported electricity from Russia;
- Eastern energy system, which supply the consumers of two eastern provinces from Dornod Power plant with capacity of 36 Mw;
- Dalanzadgad Power plant with capacity of 6 Mw.

In addition to above four parts the ERA approve and regulate the energy tariffs of Diesel stations of Bayankhongor, Gobi-Altai, Zavkhan, Khuvsgul provinces and around 300 soums (counties).

5. Peculiarities for Regulation the Mongolian Energy Sector

- One year has past since the implementation of commercialization process of Mongolian energy sector.
- The commercialization process was started early in Autumn 2000 by the Resolution of the Minister of Infrastructure and began in full by the Resolution #164 of the Government of Mongolia in July 2001. At this time the energy entities were restructured into the independent shareholding companies. Full commercialization according to law and regulation has not yet established.
- Eight months have passed since the establishment of the ERA. In this short time 79 licenses for 29 entities have been issued and the tariff for the Central energy system has been reviewed and approved. Since 1st January 2002 the CES has followed the approved tariffs. Due to time limitation and lack of experience there could, however have been some inaccuracies and mistakes.
- Due to non-existence of a united Mongolian energy system the regulator is faced with several difficulties in regulation of entities, particularly the smaller markets and those in sparsely populated areas.

- Due to the harsh climate and the peculiarities of energy production, the difference of energy consumption between day and night and the winter and summer is very high. For example the difference of maximum and minimum electricity demand is 100 MW, which create difficulties in regulation of the sector.
- The difference of price and tariffs between energy entities is very high. The tariff from PP4 is the lowest at 23 Tug./KWhr and the tariff of PP3 is the highest at 43 Tug./KWhr. Also the tariff for energy distribution is very high. The cost in the Erdenet electricity distribution network is 2 Tug./kVh, while that in the Baganuur electricity distribution network is 7 Tug./kVh. These high differences in tariffs lead to disputes among the Licensees.
- The Mongolian energy sector is directly dependant upon Russia. It is technically impossible for the CES to operate independently. The Western energy system imports 100 percent of its electricity from Russia. The countries have a good relationship with each other but Mongolia is still dependant upon this electricity, and the payment for the electricity delivered by Russia.

6. Facing Issues

The ERA has been facing several issues during its short term of operation. I would like to introduce some of those issues:

- There is no possibility of introducing full competition. Upon the establishment of independent shareholding companies, the licensees and the consumers raised directly the issue of purchasing the electricity on a competitive basis. Due to the existing installed capacity of the power plants and the amount of investment for rehabilitation it's impossible to create competition. In the case of competition, the UB PP3, Erdenet and Darkhan Power plants would be in bankruptcy.
- Low capability of consumers to pay the bill for the energy purchased directly reflects the financial ability of the licensees and commercial settlement between them. Energy receivables have been increasing every year. Receivables that amounted 11 billion togrogs in 1999, increased to 14 billion in 2000 and 17 billion togrogs in 2001. Specifically, receivables of household consumers have been increasing every year, these receivables were equal to 4 billion togrogs in 1999 and increased to 6 billion in 2000, and 9 billion togrogs in 2001.
- Supplied and received energy between the licensees is not calculated adequately. A total of 600 additional meters are required.
- The percentage of the fuel cost is 40-50 % in the cost structure of energy and the price of coal has risen incrementally. However, the price of energy is not allowed to increase the required amount and this restriction creates negative financial results and the poor economic situation of the energy entities. It should be understood that the coal price has been increased according to a World Bank agreement.

- The ERA was established only 8 months ago. Well-experienced professionals with some knowledge of English who were working in responsible positions in the energy sector were employed at the ERA. But it is clear that there remains a lack of theoretical knowledge and experience in the regulatory system for all employees.

7. Methods to Resolve the Problems

- The following measures have to be accomplished in order to provide a competitive environment in the energy sector. For example, construction of new sources able to compete with Power plant #4 (generating almost 70% of the energy production at the lowest tariff), and construction of a new hydro-station to eliminate the foreign electricity monopoly in the western electricity system. It may be necessary to accept the bankruptcy of those energy entities, which are unable to operate profitably under their current cost structure and tariff regime.
- In order to improve the payment capability of the consumers the Government of Mongolia has to implement measurable socio-economical steps with support and assistance of donor countries.
- Utilize complex measures to install meters to calculate purchased and supplied energy precisely at the ownership boundaries for all the Licensees, starting from Production Licensees to the final consumers. This will require considerable effort that could lower the technical loss, which now approaches 30%. It is also necessary to start implementation of the Refurbishment Project for Low voltage (distribution) facilities in Ulaanbaatar and 6 aimags funded by the World Bank.
- We believe that any price increase of the coal, which is the major component of operating costs at power plants, should be made, based on through analysis by taking into account all possible outcomes.
- It would be of great support if donor countries provide some assistance on training of the newly hired ERA employees to acquire experience and improve their professional knowledge and skills.

8. USAID Technical Assistance to ERA

Providing USAID Technical Assistance to ERA from its establishment is a great contribution to the proper operational start and practical operation. Technical assistance is in amount of $225,000.00. Highly specialized consultants on regulatory, price and tariff issues are supporting the operation of the ERA. It is necessary to realize the valuable contributions of the USAID for development of Tariff Methodology of the Licensees, Ethical Code, and development and approval of the Procedure on the Board of Regulators' Meeting. The consultants also provide daily advice for employees of the ERA. It is a great pleasure to express our gratitude to USAID from the stage of this honorable conference for the Technical Assistance with essential significance.

Conclusions and Recommendations

The Mongolian energy sector, like the entire Mongolian economy, is in a transition phase moving towards a market-based system. The sustainable energy strategy provides a framework for a smooth orderly transition for the energy sector. There are many subsidies in the current system but most of these will be phased out over the short to medium term. An interim tariff schedule based on the costs of licensees under the auspices of the ERA will enable a phase out of operating subsidies from the central budget. Commercialization of the energy companies accompanied with implementation of accounting standards and business practices will help preclude the demand from customers for new subsidies.

In certain circumstances, it will still be possible to make a case for targeted subsidies to achieve specific objectives. It is recommended that such subsidies should only be implemented after a detailed economic financial analysis of the proposal to ensure that it is the least-cost and most effective means to achieve the objective at hand. The tariff setting procedures of the ERA should help ensure that the basis for the subsidy, its implementation and targeted impact are transparent to customers and the general public. This venue would also ensure a regularized review of the subsidy to ensure that it is still appropriate over time in the light of changing circumstances.

Preliminary Thoughts on Electricity Sector Subsidies in Mongolia

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Introduction

The Mongolian energy sector is currently quite inefficient both technically and financially and requires a number of subsidies throughout the energy system in order to operate. Large subsidies are provided, for equipment as well as operating costs, and there is no mechanism to manage these subsidies or to bring them under control or phase them out.

The Government of Mongolia (GOM) has developed a **sustainable energy strategy** for the medium term that will in part, reduce the need for continuing subsidies to the energy sector. One of the objectives of the strategy is to make the energy sector an engine supporting economic growth of the Mongolian economy rather than a financial drain. During the transition phase to a fully sustainable energy sector, there will a continuing but diminishing need for direct, indirect and/or cross subsidies to various components of the energy system.

In this paper, the various types of subsidies in place or envisaged for electricity and heat are discussed along with the potential means leading to their reduction/elimination over time.

Subsidies for Electricity Market

The three different electricity markets in Mongolia (inter-connected grid, isolated diesel, and decentralized individual rural household supply) each require a different approach for the most optimal use of subsidies. Two of these markets are run by public or semi-public organizations (utilities), and are financially troubled; the third is run entirely by the private sector without any public assistance.

In the ideal case, objectives of the subsidies should be:

(i) to increase the financial sustainability of the utilities;
(ii) to provide modern energy services to as many households as possible;
(iii) to increase loads as much as possible.

The subsidies should be as much as possible targeted to obtain maximum efficiency in terms of the above objectives. The subsidies should also be time-bound, until the utilities have obtained financial sustainability, although it may take years to actually achieve this.

The **interconnected systems** (CES, WES, EES) are the largest electricity system, and the most viable. Implicit subsidies provided by the State could amount to about 30% of the costs of supply. As there are not many unconnected clients, the most optimal use of subsidies would be to increase the consumption of electricity, particularly off-peak. See Table 1 for an overview of estimated subsidies.

Table 1. Indicative costs and tariffs of electricity supply

	Inter-connected grid	Aimag diesel	Soum Diesel
Approximate cost of supply (Tg/kWh)	65-70	120	180
Approximate tariffs	45	75	120
Implicit subsidy (%)	30%	50%	40%

MOF assumptions

The second market concerns Aimag and Soum systems. For Aimag systems, implicit subsidies currently could amount to more than 50% of the costs production, built up from tariff and cost differences, not valued depreciation of equipment, and delayed or not carried out maintenance. Some 8% of the population in Aimag centers are not connected, and average consumption is fairly low, at 40 kWh per connection per month. The financial situation of Aimag utilities is so precarious that it is understood that subsidies are required for quite some time to come. The strategy is to connect 100% of potential clients, and then try to increase their consumption. Three possible subsidies could be effective in solving the financial problems: first, a subsidy for each newly connected client that consumes at least 20 kWh per month; second, a progressive tariff, with a low kWh charge for the first 10 kWh, gradually increasing to above the cost of supply for higher consumption (this is a cross-subsidy targeting the poor, as the average tariff over all currently existing customers does not decrease); and third, an operational subsidy that is bound to decrease over time. External subsidies should be made explicit and appear as a cost element in the tariff; initially the operational subsidy could cover all costs currently not counted (depreciation of equipment, etc.).

For Soum systems, the situation is quite different. Subsidies could amount to some 40% of the costs of supply as tariffs are much higher and costs of operating the Soum systems lower than the Aimag systems. Some 16% of the population is not connected, and average consumption is 10 kWh per month or less. Often the generators do not operate more than 4 hours per day. Overhead costs are smaller than for Aimag systems, as the Soum operate the systems themselves. The strategy is that all potential clients need to be connected as soon as possible, and the average consumption should increase as much as possible. The quality of supply is often very poor, so increased reliability is likely to result in a higher average consumption. Subsidies to help this process could be structured as follows: 1) a subsidy for each newly connected client; 2) the tariff could be progressive, with the first 5 kWh below costs to help the poorest and to get people fully acquainted with electricity use (history around the World shows that once connected, electricity clients will continue to increase their consumption, even with high tariffs); and 3) a time-bound operational subsidy to reflect the new state of equipment and (delay depreciation charges), but again, all cost elements need to be accounted for in the tariff (no hidden subsidies).

The third market consists of rural areas. Currently, there are no provisions to supply electricity, and rural households are on their own. They can buy solar or wind equipment, at costs, incl. VAT and other taxes. A “100,000 Solar Ger” program exists, but this is developing very slowly because of lack of financing. One way to assist rural households is through a subsidized financing mechanism to purchase solar and/or wind equipment: the interest rate would be lower than normal obtained from a bank. In addition, a supporting institutional mechanism should developed, paid for through subsidies.

There are basically three types of subsidies: direct, indirect and cross-subsidies. The first two involve budgetary expenditures by the state or a donor organization and the third type transfers across customers. All have the effect of altering the price to be paid for a good or service from that which the market would otherwise determine. As a general principle, budget deficits and subsidies often go hand-in-hand and ought to be avoided or eliminated. That said, there are circumstances where both can be justified, usually as a transition measure. There is always a continuing requirement to ensure that a temporary measure does not become in effect a semi-permanent measure.

If subsidies are not properly accounted for, they will become a problem for taxpayers, and this include those who do not have access to modern energy services. For obtaining better targetted subsidies, they should be further broken down into Generation, Transmission, Distribution, and Consumer subsidies.

Production (Generation) Subsidies

a) Grid-connected

There are three independent grid systems operating in Mongolia (east, west and central electrical systems). Approximately 30% of their operating budgets are covered by transfers from the state. The sustainable energy strategy incorporates an interim tariff schedule for 2002-2004 based upon costs that in theory will result in full cost-recovery for the generators and eliminate the need for direct subsidies from the state to cover costs of generation.

An indirect subsidy has effectively been in place for some time through delayed payments to coal suppliers. The amount has been growing and amounts to an interest-free loan from the coal producers to the power stations. In this paper, it is assumed that this indirect subsidy has/will be eliminated and that future payments to coal producers will be made according to contract terms and conditions to preclude future arrears.

With regard to the coal prices themselves, effective with contracts between coal producers and power stations as of 2002, the negotiated price will be approved by MOI after an examination to ensure that they are cost-based. This should avoid any direct or indirect subsidies to the power sector from the coal mines as well as the reverse situation.

b) Stand-alone Diesel Systems

Off-grid, there are numerous stand-alone generation systems throughout the country, usually operated by the local Aimag or Soum authorities. These generation systems are for the most part based on diesel fuel and have been subsidized from two perspectives. The generators themselves were provided at less than full cost and the operating budgets were supplemented by the GOM. Furthermore, the tariffs in place do not normally provide for replacement of the generation equipment at the end of its normal operating life, leading to a perpetuation of this subsidy situation.

Given the GOM's policy decision to strive towards equal access to energy, these subsidies will not be eliminated over the short term. Several measures included in the **sustainable energy strategy** will help reduce the magnitude of the subsidies required over the medium term: technical guidance in establishing cost-based tariff structures; capacity building for improved financial management and technical maintenance of these systems; and assistance in the evaluation of alternative sources of energy such as wind and solar power.

c) Decentralized Rural Supply, Individual Households

In order to provide access to electricity in isolated areas, measures such as the 100,000 Solar Gers program are envisaged. To minimize direct and indirect subsidies, the private sector is expected to play a prominent role. Already, households are importing small wind, solar and internal combustion generators for such uses as satellite TV systems without any financial assistance. As a general principle, any subsidies will be targeted and provide for an explicit phase out. GOM will continue to provide information on financing and maintenance of such technologies.

This continued cost to the central budget might be termed a “learning curve subsidy” for information and technical advice to the rural sector and is justified on grounds of social equity. There are international precedents and the long-term continuation of such a subsidy can be rationalized from several perspectives:

a) small, localized generation is the least-cost solution to provide such users access to electricity;
b) there are costs involved in obtaining information to select, maintain and operate such equipment. Technical advice and information collected and passed on by the government (or a private firm contracted to do so) to the rural population is much more cost effective than each individual nomad trying to seek out this information. The cost (or subsidy) involved serves to support the nomadic life-style and indirectly, this sector of the economy.[1]
c) as long as urbanized consumers are benefiting from a subsidization of their electricity consumption, it can be argued on equity grounds that rural consumers should enjoy a comparable benefit during the transition period to a sustainable system.

[1] *In theory, a detailed cost/benefit analysis could be undertaken to support the decision, but the net benefits are normally self-evident.*

Access Subsidies

As a general rule, there are no access fees charged to consumers in order to hook up to a distributor. Nor are there implicit access charges included in the tariff structures in place or proposed on an interim basis as all such costs are rolled into the per kWh tariff charged for each kWh metered. On this basis, it could be argued that customers with higher consumption levels are already cross-subsidizing consumers with lower consumption patterns.

a) Grid-connected

Where distribution lines are already in place, access costs for new hook-ups are quite low. Moreover, in grid connected areas there are very few non-served households. Since the incremental energy supply costs for a new customer close to zero, a new in-fill customer would normally result in a lower overall average cost of distribution, directly contributing to an increasing in the operating profits of the distribution licensee. Thus, any requests for access subsidies to cover additional costs for new in-fill customers should be strenuously resisted.

Where the distribution system would require expansion to serve new customers, higher additional costs would be incurred, increasing the average cost of distribution. If these costs are rolled into overall system costs at the next tariff setting hearings before the ERA, existing customers will effectively be cross-subsidizing the access costs of the new customers. Where the resulting tariff increase is minimal, in part because of the economies associated from adding new in-fill customers outlined above, the ERA could be expected to just roll these costs into the system tariffs. In these circumstances, there would be no need for any subsidy.[2]

b) Stand-alone Diesel Systems

Customers of the stand alone systems generally pay more for the electricity used and suffer poorer service continuity than their counterparts on the grid connected system. To address these situations, consideration is given on a continuing basis to providing transmission links with the grid. Provided a full cost/benefit analysis of possible transmission links demonstrates net benefits and the licensee establishes tariffs on a full cost recovery basis, there may still be situations where the particular conditions justify a subsidy to the project. In such cases, it is preferable to make the subsidy explicit and transparent both to users and the general taxpayer.

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[2] *Where distribution costs increase significantly because of an expansion, some regulators decide that an add-on tariff for the new customers only would be equitable, avoiding once again the need for any subsidies.*

Transmission and Distribution Subsidies

The commercialization of the transmission and distribution entities subject to supervision of the Energy Regulatory Authority with cost-based tariffs should eliminate the need for any operating subsidies from the central budget for the facilities currently in place.

In the future, there will undoubtedly be proposals to extend the grids and to expand transmission capacities. Cost-based tariff structures provide for replacement of existing capacity but do not provide for investments required to expand capacity. Prior to privatization, the **sustainable energy strategy** envisages a full financial analysis of any investment proposals to expand capacity. (After privatization, the companies would undertake this analysis in their own interests.) In either case, the costs incurred would normally be eligible for inclusion in the rate-base and for full cost recovery based upon usage of the new facilities.[3]

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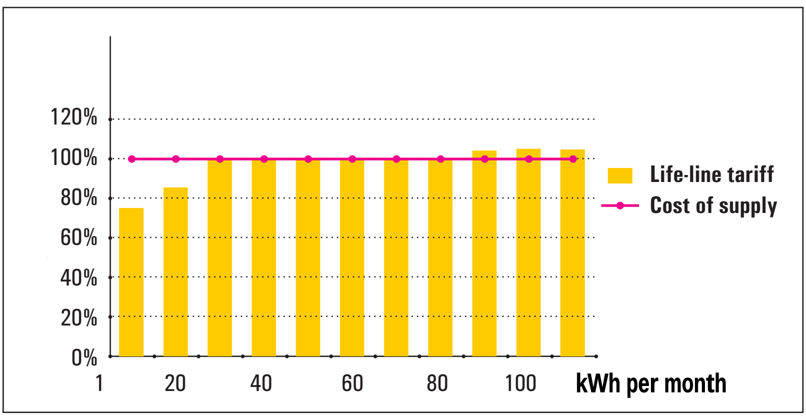
[3] The ERA may determine that rolling the new costs into the existing rate base would involve a cross subsidy by existing customers to the new customers and require that the tariff be set on an add-on basis for equity reasons. In either case, customers would end up paying for the new facilities over time through the tariff system and no direct subsidy would be required.

Consumer Subsidies

Lifeline Electricity Tariffs:

The **sustainable energy strategy** envisages consideration of a lifeline electricity tariff for low-income consumers connected to the grid. In most jurisdictions, the equivalent to the ERA would need a policy directive from the responsible Minister to encompass a lifeline tariff into a cost-based tariff structure.[4] As part of the prior consideration involved, GOM would undertake analyses to identify the target population, compare the lifeline tariff option to alternative measures to attain the same social welfare objective, and evaluate how the lifeline tariff might best be designed to achieve the objective. The resulting structure would then be superimposed on the normal cost-based tariff structure approved by the ERA. Depending upon the selected design of the lifeline tariff, there may be a direct financial subsidy required from the central budget in addition to the cross subsidization associated with most lifeline tariff designs.

Lifeline tariffs are not an energy issue, they are a social welfare issue. The tariff may be structured to achieve any number of objectives e.g. energy efficiency, pollution abatement, regional development etc. In all instances, the additional costs can be covered by a direct subsidy from the central budget, shared among customers of the licensee (cross subsidization) or a combination of the two. The cost of service based tariff setting system provides for explicit allocation of these costs with the information available in the public domain for debate and input into the policy making process.



[4] Lifeline tariffs typically involve cross-subsidies among customers or a direct subsidy from the government to the distributor to cover the costs (foregone revenues).

Impact of Tariff Adjustment in Low-income Consumers: Mongolian Experience

Although electricity costs do not weigh much on the average household budget (3-5% of non-food expenditures), there is a fairly large part of the population that will find it difficult to cope with further tariff increases. For heating, costs are higher than for electricity, and even more households will have a problem with increased tariffs. There clearly is an element of perception in the difficulty to accept higher rates, as one only needs to look at heating costs paid by households in ger areas, or at electricity costs paid by Soum households. As part of the regulatory reform, GOM will implement certain safety nets to protect poor households and guarantee them with minimum levels of service. One of such mechanisms is a lifeline tariff, whereby – for all customers – the first few kWh are below costs, while further kWh consumed increase in price to slightly above the cost of supply (see graph below). This would not cause a financial strain on the utility, as average tariffs would still cover costs.

At the same time, it allows poor households to enjoy a certain minimum quantity of electricity at low costs. Those households that consume more pay a slightly increased tariff, but since they are among the better off, they will be able to afford it.

Finally, a special effort could be put in place to address electricity supply in ger areas in Ulaanbaatar, Aimag and Soum centers. This will need to be done by the distribution companies. One of the options could be as follows. As it clearly is not feasible to meter all households at this time, simple bulk delivery could be made possible. This implies that per 10 -20 households, one household will get a meter and pay for all electricity consumed. He will supply electricity, using low-cost distribution systems, to his neighbors, and they will agree on fees among themselves. A more formal distribution system with individual meters will be set-up once the average consumption per household with electricity exceeds a certain threshold (say 20-30 kWh per month per household that informally receives electricity). In this way, ger households will be allowed to use a minimal electricity service, while paying for the costs of supply, and increase their consumption. This is a win-win situation for both the households and the utility.

The following are concrete steps proposed to develop activities for increasing access to electricity in Mongolia. First, it is necessary to obtain more basic information about customers and future customers (specifically about their willingness and ability to pay for decent electricity service) and testing promising approaches in practice, with special attention to institutional set-up and financial recovery mechanisms. (1) Willingness to pay/expenditure survey; This is baseline information needed for many different purposes, whether for adjusting electricity tariffs in all zones of Mongolia, for developing financing mechanisms, and for identifying appropriate institutional solutions to increase access to modern energy services. This study should be carried out in all areas, ranging from modern urban (UB) to deep rural (migrating herders). The willingness to pay/ expenditure survey should quantify people's actual expenditure level for energy other than for heating and cooking (drycell batteries for flashlights and radios, petroleum fuel for lamps, candles, batteries for TVs, electricity from the (local) grid if available, etc.); qualify the desired level of services (how many hours per day, weeks per year), estimate power requirements (how many light points, radios and other equipment); and determine the preferred way to pay for the energy bill and the connection (if not already connected). (2) Identifying the appropriate institutional environment to develop decentralized energy supplies; until now, this responsibility is shared in theory between the Energy Regulatory Authority, the Energy Authority, and the Ministry of Infrastructure. This study will identify the need for a specialized decentralized energy supply agency, a specific rural electrification financing mechanism, as well as their modus operandi. (3) Aimag and Soum Wind Generation Study; Although not required for better access to electricity, this pre-feasibility study provides an interesting opportunity to increase the financial viability of non-interconnected Aimag or Soum utilities. The study will determine the prospects for adding wind generators to the existing diesel generation park in Aimags and Soums and identify the best mechanism to realize this. Different project alternatives such as wind generation at one Aimag only to a project that considers all four at the same time will be investigated; separate activities with individual or several Soum centers combined will be considered. Mechanisms to assist with the financial closure of such project will also be identified. (4) Develop the institutional and financing mechanism and awareness campaign needed for promoting solar and wind electricity generation solutions to herders.

Conclusions and Recommendations

The Mongolian energy sector, like the entire Mongolian economy, is in a transition phase moving towards a market-based system. The sustainable energy strategy provides a framework for a smooth orderly transition for the energy sector. There are many subsidies in the current system but most of these will be phased out over the short to medium term. An interim tariff schedule based on the costs of licensees under the auspices of the ERA will enable a phase out of operating subsidies from the central budget. Commercialization of the energy companies accompanied with implementation of accounting standards and business practices will help preclude the demand from customers for new subsidies.

In certain circumstances, it will still be possible to make a case for targeted subsidies to achieve specific objectives. **It is recommended that such subsidies should only be implemented after a detailed economic financial analysis of the proposal to ensure that it is the least-cost and most effective means to achieve the objective at hand.** The tariff setting procedures of the ERA should help ensure that the basis for the subsidy, its implementation and targeted impact are transparent to customers and the general public. This venue would also ensure a regularized review of the subsidy to ensure that it is still appropriate over time in the light of changing circumstances.

Draft law on energy conservation: Issues and framework

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Introduction

This paper addresses issues related to the development of a draft law on energy conservation. Other papers have presented information describing the inefficiencies of the energy sector. In addition, there have been presentations on energy savings potential and the need to facilitate the growth of an energy services industry in Mongolia. Collectively, these presentations have highlighted the need to establish an energy conservation law that encourages energy conservation and promotes energy savings.

Following the introduction, the paper presents the rationale for enacting the energy conservation law. The next section describes recent international trends in the development of energy conservation laws. The fourth section outlines the issues that should be addressed by the proposed energy conservation law. The issues are presented within a draft framework of the proposed legislation.

Rationale

As noted, the energy sector has considerable inefficiencies, including the high level of technical and management losses. Some of these can be corrected through proper billing and collections. However, what is also clear is that Mongolia has seen few examples of energy savings technology and measures implemented. Instead, focus has been on the generation and supply of energy, and this means that very little attention has been given to the technologies and measures that consumers can utilize to reduce their demand for energy.

The paper on energy savings potential highlighted some of the technologies and other measures that can be utilized to reduce demand for energy. An example of an energy savings measure that Dr. Dorjpurev might term “good housekeeping,” is that by keeping a car’s engine tuned and the tires inflated at their proper level will typically reduce gasoline consumption by 15 to 25 percent. As an example of technologies, refrigerators of today use a small fraction of the electricity that refrigerators used in the 1950s. Similar advancements have occurred for industrial processing equipment. Importantly, end-users or consumers of energy, directly benefit from utilizing these technologies and other energy savings measures—they use less energy to do the same job, which means they not only save energy but also save money. The economy benefits from these savings because money that would otherwise be spent on energy can then be used to purchase other goods and services. The environment also benefits because there are fewer emissions.

Given the potential benefits to be gained from increasing energy efficiency, MOI is proposing the development of an energy conservation law. The purpose of the proposed law would be to emphasize the importance of energy efficiency, provide the legislative mechanisms necessary to facilitate the increased use of energy savings measures, and establish a basis for the partnerships between agencies and the private sector that are essential for the energy sector’s becoming more energy efficient.

International trends in energy conservation legislation and programs

Formalized institutional structures that promote energy efficiency and energy savings measures are relatively young. The oil price spikes of 1973-74 and 1979-80 triggered the development of energy conservation programs, legislation and executive orders throughout the world. Concurrent to this emerging legislation, energy departments and ministries were being established. Most of these early efforts focused on immediate measures that could reduce energy consumption and the development of renewable energy resources. The results of these early efforts were generally mixed—while there was reduction in energy intensity and some new technologies were developed, the promises that were indicated for renewables and other technologies proved too optimistic.

As a result, more systematic programs and comprehensive legislation evolved during the roughly 15-year period from the late 1980s to the end of the 1990s. These built on the early efforts but were more targeted and more "user friendly." Examples range from *Japan's Law Concerning the Rational Use of Energy* (1979) that was amended in 1984 and again in 1993, to the United States where a number of laws were enacted from the mid-1970s to the *Energy Policy Act* (EPACT) of 1992. However, energy conservation legislation and programs cannot be considered in isolation from broader energy sector trends. One of the basic problems with the early efforts was that there were few linkages to the "marketplace," or in meeting consumer needs. As a result the legislation and programs that evolved in the late 1980s and 1990s have been based on more comprehensive approaches to energy management. These include, for example, that traditional energy supply and demand forecasting has been superseded by integrated resource planning (IRP) which considers energy savings measures as a potential source of supply, and utility deregulation that forces market competitiveness and more attention to consumer needs. The result has been that many countries have provided tax credits and utilities customer rebates, among other mechanisms, for the use of energy savings measures.

Significantly these more recent comprehensive efforts have also led to a broader understanding of how to implement energy savings measures. For example, architects and materials developers have become key players in providing the tools and information necessary for a builder or investor to decide whether to pay the extra initial capital cost for energy savings measures in order to capture longer term savings in the operation and maintenance of a facility. And, that says nothing about energy efficient building codes that are becoming an increasingly important component in energy conservation legislation and programs. Similarly, new financing techniques such as energy savings performance contracts have emerged, and have been based on the involvement of accountants, engineers and facility managers.

Collectively, the more recent comprehensive legislation, technology and design advances, and the involvement of a wider range of professionals have helped spur the development of the energy services industry (commonly based on energy service companies, or ESCOs). The ESCO industry is now well established in several countries but it is also emerging in many more—the structure of the ESCO industries varies from country to country, reflecting local market conditions. The combination of ESCOs and more market-driven utilities is providing the basis for the necessary linkage between technology, finance, human resources, and consumer needs.

Even more recently, energy conservation programs and legislation are beginning to incorporate water and waste management in their activities. The rationale for their inclusion is straight forward: water has to be pumped and waste has to be moved and transformed—and both require energy in these steps.

Importantly, there is no one set model for energy conservation legislation. Rather, there is considerable variety reflecting a country's overall legislative system. Generally however, legislation sets forth government policy promoting energy conservation and savings. The following briefly summarizes examples of energy conservation legislation.

Australia

With a federal system based on the Westminster form of government, Australia and its states (e.g., see *Sustainable Energy Development Act, 1995* for New South Wales; *Electrical Products Act, 1988* for South Australia) give broad powers to designated ministers to set specific requirements for a range of energy savings measures, including appliance standards, fuel efficiency for vehicles and building codes. However, the responsible minister is also held accountable for direction and control. The standards and specific requirements are not stated in the laws but subsequent ordinances provide the appropriate detailed information, and these are issued by the responsible minister.

China

Similarly, *the Energy Conservation Law of China* (adopted in 1997, came into force 1 January 1998) gives broad powers to the "competent administration" under the State Council to set specific standards and goals. But the legislation itself is very comprehensive and enables standards and codes to be changed without further legislative approval. The standards are issued separately.

There are several important statements included in the law:

- There is the recognition that "Energy conservation is a long-term strategy for national economic development" (Article 4). This statement highlights that energy conservation has to be a long-term and on-going program that will have major benefits to the economy.
- While recognizing that energy (supplies) development and energy conservation have to be "pursued simultaneously," the "first priority" is given to energy conservation (Article 10). Implicit to this article is the fact that energy conservation has the potential to reduce costs—whether economic, environmental or social.
- Articles 12 through 20 require government agencies and new investments to include energy conservation measures in their proposals and building designs, purchase equipment that is more energy efficient, and appoint facilities managers to ensure that energy conservation measures are utilized and people are given the necessary training.
- Articles 21 through 31 target measures that end-users or consumers need to adopt in order to reduce energy consumption and improve energy efficiencies. This set of articles includes the requirement that energy efficiency labels have to be attached to all energy consuming equipment. In addition, "key energy using" entities are required to submit annual energy utilization and management reports.

Japan

Japan's *Law Concerning the Rational Use of Energy* (enacted in 1976, amended in 1984 and 1993) also gives broad powers to specific ministers, and to cabinet to authorize various changes in standards. Specific sections highlight measures for factories, buildings, machinery and equipment, and sets up an examination board to ensure that energy conservation plans are developed and implemented. As with Australia and China, the list of accompanying regulations and ordinances is quite lengthy and comprehensive.

Russia

The Federal Law on Energy Saving (1996) is relatively short but comprehensive. It gives broad powers to the federal government, and sets forth the policy priorities for the energy sector. As with the other countries that have already been mentioned, the actual law is complemented by a number of regulations and ordinances that list and describe standards for energy production and consumption.

Article 4 states that "Efficient energy use shall be a priority." Article 8 states that "The national energy savings policy shall be implemented on the basis of the federal and trans-regional energy savings programs through:

1. Promotion of fuel/energy saving equipment, production and operation;
2. Organizing energy flow metering and control over energy consumption;
3. Supervision over efficient energy use at the government level;
4. Energy audits at the companies;
5. Energy expertise of construction project documentation;
6. Demonstration projects of high energy efficiency;
7. Economic, informative, educational and other trends of activities in the field of energy saving."

Thailand

The *National Energy Conservation Promotion Act* (1992) again gives the minister considerable powers. However, the Thailand legislation also specifically targets priority consumer groups, including factories and buildings. The standards that these consumer groups must follow are based on recommendations set forth by the National Energy Policy Council (which relies on other agencies and groups such as the Building Control Committee to provide specific technical guidelines) and approved by the responsible minister. As with other countries (e.g., Japan and China), surcharges or fines, are authorized for failing to adhere to the published standards.

United States

The *Energy Policy Act* (EPACT) of 1992 is a very broad, comprehensive and lengthy piece of legislation. The section on energy efficiency is far longer than those of the other listed countries, and includes details authorizing research, development, funding and incentives for buildings (and even specifies building codes, windows, lighting, mortgages and other items), appliances, industry, and federal facilities.

EPACT has provided the basis for a series of further acts or amendments targeting federal facilities. Important to the subsequent legislation is that specific efficiency evaluation criteria such as life-cycle costs, and procurement procedures such as energy savings performance contracts, are defined and permitted. EPACT and the other energy efficiency acts and amendments have been complemented by a wide range of executive orders authorizing energy savings measures in conjunction with specific targets for reducing consumption in federal facilities. The combination of legislation and executive orders for federal facilities have provided a basis for the implementation of the Federal Energy Management Program (FEMP), and its role in the evolution of the ESCO industry. The energy savings performance contracts established through FEMP have been the leading revenue source for the ESCO industry in the USA, especially during its formative years.

Uzbekistan

The *Law on the Rational Use of Energy* (1997) is similar to other legislation including Russia's in that it establishes the government's authority to set, implement and enforce energy savings measures, and does not state specific standards. As with a number of other countries, the law sets forth government's broad energy efficiency policies.

Thus, one can see that the last 25 years have produced an evolving body of legislation, executive orders and programs that have reflected both the realities of capabilities as well as needs. 25 years ago, high expectations were created by the promise of "magic" solutions that would provide alternatives to dependence on hydrocarbons. While there have certainly been advances in the development of renewable energy resources, the longed for "magic" solutions have not appeared and the high expectations have turned into more pragmatic searches for solutions that can be utilized today. Clearly, there is the recognition that there are some renewable energy technologies that are commercially viable for certain applications. But these technologies are not going to be viable replacements for current large-scale generation technologies for at least a decade—if not longer. However, this does not mean that people should wait for the "magic," instead focus has to be on reducing energy consumption—and the advances and revisions in energy conservation legislation and programs reflects this.

Importantly, the evolving legislation, regulations and executive orders rely on a major role for the private sector, including consumers or end-users of energy. This recognition of the marketplace has provided the impetus for the development and use of a wide range of energy savings measures. Included in the development and use of energy savings measures have been the evolution of procurement guidelines and regulations facilitating the use of energy savings performance contracts. In turn, these contracts have played a key role in the development of the ESCO industry.

A Framework for the Proposed Energy Conservation Law

The proposed Energy Conservation Law should include the following chapters and articles with the intent of providing a legal framework that promotes and supports energy conservation.

Chapter 1. General provisions

Article 1. Purpose of the law

The purpose of this law is to facilitate energy savings throughout society, improve the efficiency of energy use, increase energy savings to the benefit of the national economy, protect the environment, and to ensure that energy conservation is a priority for all energy consumers.

Article 2. Legislation on energy conservation

Legislation on energy conservation shall consist of this law and other legal acts adopted in conformity with this law.

Article 3. Definitions

Chapter 2. Full powers of state authorities with regard to energy conservation

Article 4. Full powers of the State Ikh Khural

Article 5. Full powers of the Cabinet

Article 6. Full powers of the State Central Administrative Authority

This article designates the Cabinet member in charge of energy to implement legislation and decisions by Cabinet on energy conservation, and to develop and approve the necessary policies, regulations and guidelines on energy conservation.

Chapter 3. Energy conservation management

Articles under this chapter should include provisions on energy conservation management that:

- State that the Government of Mongolia and all local authorities shall strengthen the leadership in energy conservation, and shall plan, coordinate, supervise, examine and promote energy conservation.

- Authorize the Cabinet member responsible for standardization to establish national standards for energy conservation.
- Prohibit the use of out-dated technologies in the construction of new industrial projects and commercial facilities.
- Approve the establishment of a National Energy Management Program.
- Require energy conservation and energy efficiency criteria to be included in GOM procurement guidelines.
- Authorize the use of energy savings performance contracts and energy services companies under GOM procurement guidelines.

Chapter 4. Rational utilization of energy

Articles under this chapter should address measures that energy-using entities need to establish in order to improve energy conservation management. Specifically, the articles should include:

- Requirement that energy-using entities should act in accordance with this law, and design and implement measures that will reduce energy consumption in their entity.
- Authorization for energy-using entities to establish a responsibility system for energy conservation, and be able to grant awards to groups and individuals who have contributed to energy conservation.
- Requirement that key energy-using entities regularly submit reports on energy utilization, including levels of energy consumption, analysis of energy use efficiency, benefits of energy savings and energy conservation measures.

Chapter 5. Advancement of energy conservation technology

Articles under this chapter should emphasize that the GOM supports and encourages the introduction of energy savings technologies and management measures. Specifically, the articles should require that building designs and construction, energy generation and transmission, and industrial processing utilize current and emerging energy conservation technologies. The articles should also include support for the use of renewable energy technologies where appropriate.

Chapter 6. Legal liabilities

Articles under this chapter should authorize the Cabinet member responsible for energy to issue orders stopping construction of new industrial and commercial facilities that do not comply with the provisions of this law. The articles should also provide for issuance of fines for non-compliance with this law.

Chapter 7. Supplementary provisions

Articles under this law should state the date when the law becomes effective.

Conclusion

Energy conservation can provide significant potential benefits to the economy and the environment. Globally, energy conservation efforts have reduced energy intensities, facilitated the development of energy services industries, and reduced expenditures on energy. Importantly, energy conservation has to be recognized as a high priority and long-term component of national development if the necessary energy savings measures and technologies are to be utilized.

The proposed energy conservation law will provide the structure to increase energy conservation throughout the country. The proposed law recognizes that energy conservation is not solely an issue for the energy sector, and requires participation by all of the population. This means that while government can target “key” energy-using entities and require them to design and implement energy savings measures, individuals have to take responsibility for energy conservation—and individuals will also be able to directly benefit from their “market” decisions to consume less energy.

Establishing a National Energy Management Program

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Introduction

The Ministry of Infrastructure is proposing the establishment of a National Energy Management Program (NEMP). NEMP will be aimed at 1) increasing the utilization of energy savings measures, 2) increasing the efficient use of energy by various consumer groups, 3) promoting partnerships between government and other stakeholders that facilitate energy efficient economic growth, and 4) providing for increased energy security by broadening the mix of supply options.

This paper outlines NEMP. Following the introduction, the paper presents the rationale for the establishment of NEMP. The paper then describes a possible structure that is followed by key components of the proposed NEMP.

The Rationale for NEMP

As noted in previous papers, considerable effort has been given to rehabilitating production and distribution systems over the last decade. In recent years, additional effort has been given to restructuring and commercializing the energy sector in order for it to become a more efficient supplier of energy. However, these are important but only beginning steps in the evolution of the sector into a dynamic economic force.

There is much more that needs to be done, including actions that can be undertaken by individual enterprises, agencies and households—in other words, all energy consumers. It is also necessary that the policies and regulations that facilitate these actions be enacted.

As indicated in the paper on energy savings potential in Mongolia, energy efficiency technologies and other energy savings measures can reduce demand in many buildings, factories and households between 15 to 35 percent. This range is similar to that found in countries throughout the world. Moreover, energy management programs for government facilities that have operated for a number of years in countries such as the United States, have produced actual results similar to the estimated potential energy savings for Mongolia.

As we move into the 21st century, Mongolia has to utilize more energy efficient technologies and energy savings measures. An argument can be made that by saving energy we are also saving the environment because of reduced pollution. A second argument can be made that by saving energy we are also reducing our energy costs by deferring construction of additional generation and distribution investments. A third argument for saving energy is that the bills of individual business entities, government agencies and households will be reduced. All of these arguments are valid—but we should also note that if we approach energy savings in a systematic manner, jobs will be created—and these jobs will be based on state-of-the-art global electronic and information technologies. Thus, by promoting energy savings, we will be helping to transform the energy sector into a dynamic leader in the nation's economy.

Clearly, the first priority for the energy sector has to be ensuring efficient operations of the current system including the necessary planned upgrades and expansion. However, the energy sector and in particular the various energy utility companies, also need to begin to assess consumer needs and design programs to meet them—in other words, the utility companies have to look beyond the basic supply of energy to helping customers more efficiently utilize energy.

Several steps are required for the establishment of a National Energy Management Program. These include upgrading data collection and analysis, increasing the flow of information to consumers, and providing mechanisms for the government to work with the private sector in order to “get it right.”

As data collection and analysis are upgraded—and they will have to be because the energy companies will have to demonstrate the need for specific tariff rates, opportunities to design programs to increase the efficient use of energy by consumers will become apparent. The resulting energy savings has to be incorporated into broader energy planning—again, investments in system upgrades and expansion can be postponed if people become more efficient users of energy.

One method now used in a number of countries to assist with matching supply and demand is integrated resource planning (IRP). IRP is an approach to utility planning that evaluates all potential energy options, including supply-side (energy production by conventional fuels and renewable resources) and demand side management (DSM) based on energy conservation, increasing energy efficiency and load management. In addition, IRP evaluations include assessing the social, environmental and economic costs of the various options. The goal is to meet consumer energy needs in an efficient and reliable manner at the lowest reasonable cost. Thus, the goals of IRP are the similar to the goals set forth in the 2001 Energy Law.

Importantly, IRP is typically based on a long-term or, for example, a 15 - 20 year planning horizon, and not in response to system problems or fuel price spikes. In addition, IRP requires public input as a means to ensure that programs are designed based on consumer needs.

IRP or something similar, needs to be included in the process of planning for Mongolia’s future energy system. We simply cannot continue to rehabilitate or build new plants without considering whether saving energy is a more cost-effective means to meet future energy demand. Supply and demand have to be balanced for an efficient system—and we need to begin taking these measures in the very near future.

A Structure for NEMP

A basic requirement of NEMP is that it has to be based on both a philosophy and a structure that encourages and facilitates a lead role for the private sector and consumers. It is felt that this requires an operating structure that places NEMP outside of traditional government authority. Thus, it is suggested that NEMP should be formed as a non-governmental organization, although it would include a major government presence. This possible structure is described below.

Energy association of Mongolia

As the key structure for the National Energy Management Program, it is recommended to establish the Energy Association of Mongolia. Mongolia is currently a member of the World Energy Association, and it is proposed to adapt this structure to Mongolia through the formation of a non-governmental organization. The Energy Association of Mongolia (EAM) would bring together a wide range of skills and perspectives related to energy issues. Importantly, EAM would draw on resources from throughout Government and the private sector. The purpose of EAM would be to provide a forum for discussions of energy issues, and specifically set up mechanisms for flows of information and expertise that could facilitate improved management of energy supply and demand. Inherent to this concept is the need for the energy sector to become more aware of and responsive to consumer needs in order that resources are more efficiently allocated. In addition, EAM would be authorized to undertaken certain demonstration projects and programs that further energy efficiency and savings. The Ministry of Infrastructure would appoint selected members to this advisory group but meetings and seminars would seek far wider participation. Described below are some of the potential groups, agencies and others that could participate in EAM.

Ideally, EAM would focus on the issues outlined below as other NEMP components. For example, working groups could be established to address demand side management issues including building codes and material standards, and appliance standards.

Government

As noted in previous papers, there are a number of government agencies beyond the Ministry of Infrastructure and the Energy Regulatory Authority involved in the management and operations of the energy sector. These include those agencies responsible for the environment, building codes, appliance and other product standards, the Ministry of Finance and the Economy, the Bank of Mongolia, and the Ministry of Justice. In addition, there are other agencies that are major consumers of energy—often with unique needs, such as Education and Defense. All of these agencies should have an opportunity to participate in EAM in order to reflect the resources and requirements they contribute to the energy sector.

Private sector

Key private sector participants include major energy producers and suppliers, major energy consumers such as commercial centers and mines, financial institutions, and technology suppliers. In addition, the Chamber of Commerce would be an excellent participant in discussions of energy issues. Non-governmental organizations would also be welcomed participants in EAM.

Universities and research institutions

There are a number of research groups and universities that conduct research on or have expertise in energy related issues. In addition, programs that provide degrees in engineering, technology, business, accounting, economics, law and policy analysis would generally have skills and interests that could be applicable to the assessment of energy issues. The resources of the various training, teaching and research centers should be utilized for EAM activities.

Professional associations

A number of professional associations could be utilized in discussions of energy issues. These include associations for lawyers, engineers, and accountants, and should be invited to participate in EAM.

International linkages

An important role for EAM would be establishing and maintaining contacts with similar organizations in other countries. This could be especially important because other countries could provide key information on new technologies and other advancements in managing energy that could greatly benefit Mongolia.

Improving Supply and Production Efficiences

As discussed in previously presented papers, the focus of efforts over the last decade has been on restoring power and heat production, including the rehabilitation of equipment and the addition of new units. Many of the older equipment and plants are coming to the end of the working lives—and will be replaced over the next decade.

The older equipment and plants are very inefficient compared to units now available on the market. But these inefficiencies are only part of the problem—as noted, focus was on restoring production, meaning that attention was given to keeping old equipment operating and reducing outages. While this has largely been accomplished, very little attention has been given to increasing efficiencies and reducing losses. Considerably more effort has to be given to these key issues. NEMP will provide a vehicle to assist with both the efficiency and the loss issues.

Technology Assessment

We are now taking decisions to broaden our mix of energy supply options—different energy resources and technologies will be utilized. In addition, more attention has to given to assessing demand side options—whereby we can use “saved” energy to meet additional demand. Important to this concept is that losses in the heat and electricity systems must be reduced if the energy companies are to become financially sustainable. Thus, there are many aspects to improving the efficiency of the energy system, and we need to get a better understanding of the potential benefits and costs from utilizing different technology and energy resource options. In order to do this, we need to mobilize all of the relevant professionals—both in government and the public sector, and task them with assessing these options.

In addition to thermal plants, we plan on using wind, solar, and hydro to produce electricity. We also intend on assessing the viability of coalbed methane and facilitating LPG development. Having mentioned the various energy resource possibilities, we need to specifically evaluate the range of technologies that will provide the most efficient and economical use of these resources. It is important that we develop the capacity to assess current and emerging technologies because this will become an on-going activity for the energy sector. The ADB master plan includes a chapter on generation and transmission development options. This provides an important reference point for future technology assessments.

As part of the technology assessment, we also need to be conscious of the potential environmental and social impacts of the energy resources and technologies that we are considering. In the past, little attention has been given to these important issues, and we need to more fully address them. Again, through the EAM, we will be able to bring together our professionals and academics to explore these issues.

Fuel and Production Supply Options

Mongolia has 20 billion tons of proven coal reserves and an estimated resource totaling 150 billion tons, ranking as the country with the tenth largest coal resource in the world. Because of this wealth, coal has been the primary source for our heat and power generation—and this will likely continue well into the 21st century. Currently, 64 percent of our primary energy comes from coal, 32 percent from liquid fuels, and 4 percent from wood, dung, and renewables. Of the roughly 5 million tons of coal consumed annually, 84 percent is used for electricity and heat generation, 6 percent by households, and 9 percent by industry.

In the future, coal will continue to be our primary source for heat and power generation. However, it will be complemented by production from hydro, wind and solar. These renewable resources will be especially important for electricity generation in isolated rural areas that are too expensive to connect to the grid systems.

In order to provide safer, cleaner and more efficient fuels for households, we are also promoting the use of LPG. An LPG industry is already developing in Mongolia, and we will facilitate this private sector effort. We are requesting international technical assistance to assist with the development of appropriate safety and environmental guidelines for handling LPG.

As mentioned, coalbed methane could become an important fuel source. Over the last decade, coalbed methane has been developed in the Canada, China, the United Kingdom, and the USA. In fact, coalbed methane is the fastest growing source for natural gas in Canada and the USA, and already accounts for 8 percent of total gas production in the United States. Coalbed methane gas could be used as a substitute for natural gas. Thus, this could have tremendous implications to the energy sector and the economy as a whole. As a result we have had discussions with the United States Geological Survey (USGS) about assessing the coalbed methane resource. The USGS is very interested in jointly conducting the resource assessment, and we are seeking funding support for this activity from donor countries, including USAID. In addition, the USGS and the MOI have a draft agreement for the USGS to assess the quality of Mongolia's coal mines, and the results will be included in the *World Coal Quality Inventory* which is published by the USGS.

Demand Side Management

There are a number of demand side management (DSM) technologies that could reduce energy consumption while producing the same if not an improved product. These technologies range from lighting to motors. Two of the key DSM technology areas are building and materials and appliances. Both of these have broad applications—to the commercial sector, to government, to industry and to households. The list of DSM technology areas could be easily expanded if necessary.

Buildings and Materials Standards

The design of buildings and the materials utilized in their construction have become increasingly energy efficient over the last several decades. Codes for new building construction and specifically heat transmission were revised in 1997. In 1999, codes for pipelines and engineering networks as well as for industrial production equipment and technologies were revised. Materials standards are currently being reviewed with the intent that revisions will be forthcoming.

Under the Ministry of Infrastructure (MOI), the Fuel and Energy Department is responsible for policies concerning codes and standards and participates in their development. Also under MOI, the Construction and Urban Development Department and its associated Construction, Urban Development and Public Services Agency are responsible for approving applications for new buildings. This department and its associated agency additionally provide technical services and recommendations for building design and construction.

The MOI and its departments and agencies work closely with the Mongolian National Center for Standardization and Metrology in setting codes and standards. The Center is the agency officially responsible for all standards in Mongolia.

Although building codes and standards have been implemented, some contractors and investors complain about the cost of meeting the new requirements. However, it should be stressed that this is not unique to Mongolia—it is a common complaint globally and despite the fact that energy efficient building codes ultimately save the investor considerable amounts of money over the life of the building. This suggests that more information on potential savings could be publicized.

As stated above, building design and materials are becoming more energy efficient. A range of resources—many are available over the internet—can be drawn on to monitor technology advances. It is recommended that a working group under the EAM that includes appropriate professionals be established to monitor energy efficient advances in design and materials that could be applied in Mongolia.

Appliance Standards

Countries have pursued two different tracks for energy efficient appliances: voluntary and compulsory compliance. Under compulsory programs, manufacturers and retailers are allowed to distribute or sell only products that meet set standards. This approach tends to require an institutional structure that includes administration and enforcement, and a research or laboratory testing arm.

The voluntary approach utilizes recommended standards, and the standards can be established based on local testing or the application of standards from other countries. There are a number of sources for information on appliance standards available over the internet. Because it would require a substantial investment to establish a testing laboratory for appliances, it may be wiser to utilize external sources.

Whether a compulsory or the more likely, voluntary approach is adopted, a major effort has to be given to informing suppliers, retailers and consumers on the energy efficiency of a particular appliance. A common method used is the placement of labels (termed "labeling") that rates the energy efficiency on the appliance at a retail outlet. The labels are often accompanied by an information or user guide explaining how to read the energy efficiency labels and what it means to the consumer in terms of savings on their electricity bill.

It is recommended that a working group under the EAM be established to investigate how best to increase the use of energy efficient appliances including information for consumers.

Government Energy Management

Government can take a number of actions to facilitate energy efficiency, including revising its procurement guidelines and serving as the central processing facility for information flows and capacity building.

Procurement Guidelines

A new procurement law was approved in 1995, and fully implemented in 2001. The procurement law is based on an open bidding process whereby specifications for a particular purchase are stated in a publicized request for proposals. The concept behind law was to provide a transparent mechanism that would result in reduced government expenses and improved quality of purchases such as equipment, construction and consulting services. However, the procurement law made no reference to energy and specifically no requirement for energy efficiency to be included as one of the selection criteria. Government can reduce its energy costs by including energy efficiency in its procurement guidelines.

A second procurement area should also be addressed, energy savings performance contracts. One of the keys to developing an ESCO industry is the use of energy savings performance contracts. These contracts utilize private sector financing and expertise to retrofit government and private sector facilities with energy efficient technologies. The private company providing the retrofits meets its cost and profit requirements by receiving the amount saved on the monthly energy bill by a government agency (or a private company) for a specified time period. Details on the costs, profits, time periods, technologies, and performance are spelled out in the contracts. At the end of the specified period, retrofits including all equipment become property of the particular agency. Thus, government (or a private company) benefits from what would generally be a very expensive retrofit at no initial capital cost—and captures all savings after the end of the contract period. The company responsible for the retrofit benefits because it covers costs and receives a reasonable profit on its investment.

There are literally thousands of energy savings contracts currently operating in a number of countries. These contracts are different from traditional government procurement contracts that typically specify purchase and thus ownership of a product or service. This alternative financing arrangement enables government (or a private company) to avoid having to submit expensive retrofits in its capital budgets based on accepted accounting and reporting principles.

It is recommended that under the proposed Energy Efficiency Law include a section specifying that energy efficiency should be used as a criteria in purchasing equipment and construction services. It is further recommended that the Energy Efficiency Law permit the use of energy savings performance contracts within government procurement regulations.

Information

As noted above, there are considerable information sources on energy efficiency. Government could facilitate the flow of this information to the private sector and consumers. In conjunction with EAM, MOI should consider establishing a repository for this information and, when appropriate, ensure that it is being transferred to consumers, contractors, financial institutions, and other interested parties.

MOI can take a supporting role in promoting awareness of energy efficiency through a wide range of mechanisms—from developing educational materials for schools to awards for best practices in government agencies and the private sector.

Capacity Building

The National Dispatch Center has been tasked with responsibility for training under the 2001 Energy Law. However, this role should be focused on providing the training to meet actual day-to-day job requirements. From a broader perspective and as the paper on capacity building discusses, developing the energy sector into a dynamic economic force requires different approaches.

MOI in conjunction with the Ministry of Education should assume a lead role in addressing long-term capacity building needs for the sector. This would include the ERA and the National Dispatch Center. A working group under EAM could be formed in order to provide a vehicle for private sector input—including from the energy companies. The working group could recommend requirements to government which would then evaluate capacity building requirements in terms of its resources. An implementation plan could then be developed with MOI responsible for it.

Policy and Implementation

In addition to the programs and activities described above, the following are the legislative and policy actions that need to be undertaken in order to further the objectives of the National Energy Management Program.

Legislation

As noted in other papers and in the preceding discussion, there are several pieces of legislation that need to be developed and/or submitted for approval. These include:

- **Energy Efficiency Law**
  This is currently being drafted and should be ready for review by July 2002.
- **Amendments to Procurement Law**
  As discussed the Procurement Law should be amended to include energy efficiency as a criteria for government purchases. In addition, an amendment allowing energy savings performance contracts should be included.
- **Gasoline Tax Increase**

Mongolia imports roughly 225,000 to 235,000 tons of gasoline per year. Gasoline is taxed at a lower rate than diesel. It is recommended that the import charge (now $38/ton, or $0.04/liter) for gasoline be increased to equal the charge ($48/ton, or $0.053/liter) for diesel. The increased charge would result in additional revenues valued at approximately $2.77 million (for 235,000 tons), and these funds should be allocated to road repair and maintenance. It should also be stressed that Mongolia's taxes on gasoline and diesel are among the lowest in the world. Additionally, it should be noted that the concept of applying gasoline taxes to road repair and maintenance is widely accepted as a necessary "user fee." A "user fee" gasoline tax could be considered a measure to reduce gasoline consumption by increasing its cost.

Funding

As discussed above, EAM will be established as a non-governmental organization that will be empowered to collect annual membership fees, negotiate and undertake contracts and grants, and operate under standard accounting principles. Under these terms, EAM will not require government subsidy.

For NEMP activities under government, it is anticipated that existing resources will be reallocated where appropriate. In addition, maximum use will be made of grant funding and energy savings performance contracts financed by the private sector.

Developing an ESCO Industry

One of the keys to the long-term success of NEMP and the evolution of the energy sector into a dynamic economic force will be the development of a local energy services, or ESCO, industry. As noted in an earlier paper, there is tremendous potential for energy savings measures in Mongolia. If the private sector can provide the necessary expertise and financing to implement energy savings measures, it should be facilitated and encouraged by government and other private enterprises. Under EAM, a working group will be established to assist with the development of an ESCO industry and, as noted above, MOI will recommend the necessary policy and legislative actions that need to be undertaken by government to support an ESCO industry. It should also be noted that by making a commitment to ESCO development today, this may create opportunities for the ESCO industry to capture opportunities in other countries that have not taken these steps.

Energy Savings Potential and Developing Energy Service Companies (ESCO's) in Mongolia

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Introduction

The energy “saved” through Energy Conservation Measures (ECM) can be used to offset production or additional capacity expansion at a generating station. This is an important concept because the use of ECMs means that energy efficiency is increased and consumption of coal at generating plants is reduced. This has benefits to both the economy and to the environment. Moreover, there are a wide range of ECMs that can be utilized by industry, commercial facilities, and households—in other words, all consumers.

Energy service companies (ESCOs) have played a significant role in promoting energy efficiency in many industrialized countries. Many policy-makers and development experts consider Energy Savings Performance Contracts that are applied through ESCOs as an important mechanism for boosting energy efficiency in developing countries as well.

This paper first reviews the energy saving potential in Mongolian for industry and other energy consumers. The paper then discusses ESCO’s and the importance of developing an ESCOs industry in Mongolia.

1.0. Energy Savings Potential in Mongolia

1.1. Industry

1.1.1 The current situation

The industrial sector consumes roughly 70 percent of the electricity and 28 percent of the heat produced. The Mongolian industrial sector may be categorized as having four major components:

- *The Erdenet Mining Company* is by far the largest industrial concern in Mongolia and consumes 65 percent of the electricity and 47 percent of the coal used by industry.
- *The main industries* There are some fairly large industries established by the State to supply the domestic market. These industries are mainly in the food, textile, leather and building materials sectors. They are in the process of privatization.
  - *Smaller industries* According to the Ministry of Agriculture and Industry there are about 6,000 small industrial enterprises registered in Mongolia. Many of these are established in the outlying regions including the soum centers but little is known about their current activity. They include enterprises in the food and wood processing sectors.
  - *Modern industries* A few small modern industries using packaged plants designed for low levels of production have been established to provide products for either the domestic market or for export.

1.1.2. Energy efficiency activities

There is significant potential for energy savings and/or reduced greenhouse gas emissions through the use of ECMs in the industrial sector. These include energy savings potential for **motors, lighting, heating and ventilation systems and industrial processing**. Over the last several years detailed energy audits have been carried out for several industries and public buildings. Energy audits for the Brewery and Textile mill in Ulaanbaatar were conducted by the Swedish Company AF-Energykonsult. These two surveys suggested possible energy savings of about 20 percent in the brewery and 10 to 15 percent in the textile mill based on improved energy management and only low cost ECMs.

In 1996, detailed energy audits were carried out for two food factories, a tannery, a kindergarten, and a hotel (all in Darkhan) by the Danish company COWI together with Mongolian Energy Conservation Company. In addition, four preliminary audits were conducted, one in the food industry, and three dealt with building and construction materials. The audits indicated that energy consumption in the Darkhan operations is 3 to 4 times higher than for similar European industries, indicating a large potential for savings

According to the results of 5 demonstration projects implemented by TACIS Program at the five industrial sites in Ulaanbaatar in 2000 the investment payback period of energy saving technology was 1-3 years. It shows that installation of energy saving equipment at Mongolian industries is efficient and profitable.

1.1.3. Energy saving potential in industry

The energy saving potential in industries can be divided into "easy" (no- and low-cost) savings, medium-cost savings and long-term possibilities. The total saving potential in industries is in the range of no less than 50-60 percent of the present consumption, comprising:

1. a 15-25 percent saving potential by "easy" savings with a payback-period of less than one year.
2. a 15-25 percent saving potential by medium-cost actions with a payback-period of less than 3 years.
3. a 20-30 percent saving potential by long-term possibilities with a payback-period of 5-10 years.

1.1.4. Priority areas for ECM

Important areas of ECM activities relevant for most industries Mongolia include the following:

1. *Good Housekeeping:* of electricity and heat including energy management: Energy conservation efforts are made without much equipment investment, including elimination of the minor waste, review of the operation standards in the production line, more effective management, group activities, and improvement of operating technique. Mongolian industry has considerable potential to save energy through good housekeeping and energy management. Energy saving potential by "easy" (good housekeeping and energy management) savings is 15-25 percent and a pay back-period of less than 1 year.
2. *Motors and Drives:* Mongolia, like other developing countries, is relying upon motor systems to power the expansion of its industrial sectors. Motor systems consume about 70 percent of industrial electricity in Mongolia, and these motor systems are often less efficient than those in industrialized countries. Electric motors and drives are generally oversized and badly maintained with a significant decrease in efficiency. Especially in milling factories and tanneries/textile factories, a very high number of electric motors are installed. The audits have assessed the load of such machinery to be as low as 20-30 percent, typically resulting in efficiencies in

the range of 50-60 percent. This should be compared to an efficiency of more than 80 percent for properly designed and maintained motor-installations.

Motor efficiency improvement measures include

- energy-efficient motors;
- improvement of power factor;
- variable speed drives;
- improved operation and maintenance;
- correction of previous oversizing;
- improved mechanical power transmission,
- efficiency of driven equipment.

3. *Rehabilitation of Steam Systems*:Many steam systems are badly operated and maintained. The losses in the audited steam sub-stations and piping systems are estimated to be as high as 20 percent of total heat consumption (or even more) due to steam traps out of operation, lack of insulation for piping and valves, leakages in valves and fittings, and loss of condensate. Rehabilitation of the steam systems inside the industries, e.g. return of condensate, insulation, repair of steam traps, installation of meters etc. should be carried out and combined with installation of new industrial boilers where appropriate.

   Most of industries have been privatized and divided into many small independent factories. Therefore it is necessary to change current steam pipe dimensions and the whole steam and condensate system.
4. *Waste Heat Recovery:*Only a few heat exchangers for waste heat recovery are currently used in industry, and all of them are based on older types (drum heat exchangers), which are inefficient (mixed flow heat exchangers) and difficult to maintain. There is a large saving potential by waste heat recovery in the major sectors of food industry, tanneries and textile companies. For example by utilization of condensate cooling, recovery of heat from cleaning or processing water, or for process heating, production of cleaning water, and building heating. For such installations, modern type plate heat exchangers are very well suited, providing simple installations, high efficiency with equipment that is easy to maintain and repair. These heat exchangers can further be used for heating of technical water by district heating, a solution that is highly recommended as an alternative to the present use of steam for low-temperature heating purposes.
5. *Process Technology*:Most process technology in the Mongolian industry is of Russian or Eastern European origin, having a low efficiency in terms of energy usage and capacity (product-rate related to size and cost of equipment) compared to Western European technology. For this activity a large investment will be needed. For example, current wet technology used for processing cement at the Mongolian cement factories is considered very inefficient with high - energy consumption.

There is a possibility to reduce coal consumption almost in half replacing the cement processing wet technology with dry technology. According to the estimate by Japanese experts at the cement factories in Darkhan and Hutul it is calculated that during wet process energy of 1,500 –1,700 kcal/kg (klinker) is used while replacing it with dry technology it will consume 1,000 –1,200 kcal/kg (klinker) of energy. It means total coal consumption for cement production will be reduced by (40-45) per cent.

1.1.5. General barriers to implement energy efficiency for industry

General barriers to implement energy efficiency for industry have been identified, such as :

- The general industrial crisis
- The comparatively low price in Mongolia. Energy tariffs that do not reflect full costs of production—by subsidizing energy tariffs, companies and individuals have less incentive to save energy.
- The shorter working hours. Few factories are working more than one shift. Three-shift operation can reduce the payback time on an investment by as much as 66%.
- The uncertain future of much of the factories.
- Lack of metering of consumption.
- Lack of capital for energy saving investments
- Lack of awareness of potential profits from energy efficiency measures
- Lack of institutions and strategies for energy efficiency
- Lack of skilled personnel.
- Most of industries have no energy managers;

1.2. Residential/Household Sector

1.2.1. The current situation

Households are a major consumer of heating. Households can be classified into 3 categories: flats, traditional gers, and houses. About 50-74 percent of the inhabitants of the larger cities and provincial centers live in flats, the remainder in gers or houses. The gers are usually located in suburbs of cities, provincial centers and provincial units. As gers were initially designed to be a mobile accommodation, the stoves are of basic design. Gers or houses annually consume 4 tons of coal and 2.5 tons of wood to produce 30 GJ of heat on an energy input basis for heating. The efficiency is only 25-35 percent. Herdsmen prepare the fuel themselves. It is estimated that herdsmen use dung for 80 percent of their energy production and 20 percent is from firewood.

About 54-60 percent of the population lives in cities and province centers, 25 percent in province units and settlements, and 20 percent live in the countryside and far from any settlement. 70 percent of total population lives in gers, houses and use 330-360 thousand furnaces/stoves.

Ger households annually consume on average 700, 650, 1100 thousand tons of coal, firewood, and dung a year respectively (**Table 1**). Together this accounts for as much as 12 percent of total fuel consumption of the country. Greenhouse gas emissions from household stoves and furnaces are shown in Table 2.

Table 1. Fuel consumption of households

Year	Fuel type	Number of households, thousand			Fuel per household, tons	Annual supply of fuel, thousand tons
		City	Province	Herdsmen		
	Coal	132	60,0	–	4,0	768,0
1990	Wood	131	98,7	15,6	2,5	614,0
	Dung	5,3	20,2	62,0	11,0	962,5
	Coal	102,1	51,0	–	4,04	618,5
1998	Wood	120,3	119,0	14,8	2,68	681,0
	Dung	4,8	24,3	59,2	11,8	1042,0

Source: Mongolian Statistical Yearbook, National Statistical Office of Mongolia, Ulaanbaatar, 1999.

Table 2. GHG Emissions from household stoves and furnaces

Year	CO_2	CH_4	N_2O	NO_x	CO
1990	1100.0	10.2	0.03	1.1	79.2
1993	1175.0	11.6	0.03	1.1	86.8
1995	1232.0	12.5	0.03	1.2	94.4
1998	1275.0	12.7	0.03	1.2	95.2

Source: Mongolian Statistical Yearbook, National Statistical Office of Mongolia, Ulaanbaatar, 1999.

Currently, most households and about 30 percent of service and commercial buildings have incandescent bulb lamps and rests are using fluorescent bulbs. Lighting demand of households and service sectors accounted for 380 GWh in 2000.

1.2.2. Efficiency improvements for residential/household sector

Main measures of Efficiency improvements for residential/household sector are:

1. Efficiency improvement of district heating system in buildings
2. Improvement of building insulation

3. Implementation of efficient lighting
4. Increasing the efficiency of the ger's or households stoves and furnaces

1. Efficiency improvement of district heating system in buildings

Losses in the heat distribution systems are high, and urgent measures such as minimizing leakage, replacement of valves and compensators, and reducing radiation losses are required. Building losses are also high and residential consumers have no means to regulate temperatures.

Results of the Ulaanbaatar Heat Rehabilitation Project[1] shows that the total loss (end-use heat and hot water and thermal losses) could reduce the heat demand/consumption by 268 Tcal/year with an investment cost of US$38.00 million. This mean that heat losses of 42 percent in the base year can be reduced up to 27 percent by year 2020.

Main barriers:

- District heat tariffs for apartments are not reflected in the costs of energy supply. Low energy prices, in general below the cost price, do not encourage energy saving and the installation of heat meters.
- Most of the heat consumption and total usage of hot water is unmetered. The rate of the energy consumption is charged according to size in m^2 of an apartment or volume (m^3) of offices (heat), and number of persons living in an apartment (hot water). Therefore consumers have no interest to save energy and install any heat and hot water measuring and regulation equipment. It is the main barrier for implementation of this option.
- There is not a clear separation of responsibility between Energy Authority, District Heating Company, City government and City Housing Company.

2. Improvement of building insulation

The study on heat losses found out that nearly 40 percent of heat is lost in houses and buildings. The heat losses occur through windows, walls and doors: design and construction of most multi-family buildings in bigger cities are very similar to buildings found in many places of the former Soviet Union.

A study of local building standards[2] found that heat demand in multi-family buildings could be reduced by about 60 percent. This study proposed the following energy saving measures package:

- Weather strips in windows
- Installation of thermostat radiator valves and balancing valves

[1] *Asian Development Bank, TA 2610-MON, Ulaanbaatar Heat Rehabilitation Project. Final Report , May 1997. COWI-AF Energykonsult Syd AB in co-operation with ECC, Energy Conservation Company, Mongolia.*

[2] *Project TA 1750-MON. Mongolia: An energy audit, efficiency and conservation study. Part C, Local building standards and efficiency of household appliances. AF-Energykonsult Syd AB, August 1994*

- Balancing of heating system
- Insulation of roof with 100 mm mineral wool

Barriers for implementation:

- Initial investment is too high for flat-owners
- Lack of economic interest of flat-owners
- Lack of management and leading organization
- Lack of regulation to implement building standards
- Flat owners income is too low to improve existing houses consisting of prefabricated structural concrete elements

3. Implementation of efficient lighting

This demand-side management option concerns the use of energy-efficient compact fluorescent lamps (CFL) to replace inefficient incandescent light bulbs (ILB). CFLs provide the same amount of light as an incandescent lamp but use roughly 70 percent less electricity. Although CFLs are more expensive than ILBs, they are more economical on a life-cycle basis due to savings in electricity costs and much higher lives.

Currently, most households and about 30 percent of service and commercial buildings have incandescent bulb lamps and the rest are using fluorescent bulbs. It is known, that the most efficient CFLs' specific electricity consumption is 30-70 percent lower than incandescent bulbs and fluorescent lamps.

Barriers for implementation:

- Cost of Compact Fluorescent Lamps (CFL) is too high compared with existing incandescent lamps which is usually used for almost household lighting;
- Lack of awareness of profit from energy efficient lighting;
- Lack of management and a lead organization;
- Lack of electricity metering of households (gers);
- Lack of targeted information material;
- Lack of skilled personnel;

4. Increasing the efficiency of the ger's or households stoves and furnaces

One of the most important socioeconomic issues in our country is to improve the energy efficiency of small and medium sized heating systems. If 250,000 stoves will be modernized or replaced by improved stoves their efficiency will increase by 60 percent. This will make it possible to save 300,000 tonnes of coal, 350,000 tonnes of firewood and 200,000 tonnes of dung a year. Also CO_2 emissions will decrease by 0.92 million tonnes. Fuel consumption per household will decrease by 2,3 tonnes of coal and 2 tonnes of wood and reduction of CO_2 emissions will be 3.56 tonnes a year.

In addition, environmentally sound fuels for household furnaces and stoves should be promoted. Therefore, the following activities are envisaged:

- Gain experience with the production and marketing of coal briquettes
- Introduce liquid fuels or – preferably – LPG, or coal bed methane gas for household use.

Expected barriers

- Initial investment is too high
- Presently, the improved household furnaces and stoves are too expensive.
- Lack of management and a lead organization
- There is limited gas and oil, so coal is used.
- In most instances, the main obstacle for introducing of smokeless coal briquetting technology in Mongolia is financial constraints. The current financial situation of the country is difficult, compared with initial capital cost of advanced coal briquetting technology and plants. At the same time, the production cost of coal briquettes is rather high (approximately US$20/ton). Therefore, subsidies from central and local government institutions to cover high briquette prices would be doubtful.

1.3. Individual Heat Suppliers (Heat Only Boilers)

1.3.1. The current situation

Mongolia has a continental climate, with long cold winters and temperatures falling to -30 or -40^{0}C. Thus it is impossible to imagine life without warm or heated accommodation. Only 23 percent of total fuel is used for electricity generation, and the remaining 77 percent for heat generation. Again, it shows the importance of heat generation for the nation.

The heat is generated by burning coal, wood and dung in various types of boilers and burners. Boilers and burners used in Mongolia is classified into 2 categories as

- Heat generating water and steam boilers;
- Furnaces and stoves

Medium sized heat (steam) boilers

There are around 30 steam boilers with distribution systems that operate in 10 provincial centers. They generate steam with pressure of 1.0-1.4 MPa and have efficiency rating of h=0.7-0.8. The average load of these steam boilers is 25-30 MW. Average annual coal consumption reaches 20-25 thousand tons. However, the heat boilers now operate at up to only 30 percent of capacity due to the collapse of national industry. But costs of heat are increasing from year to year.

Small heat boilers

30 percent of total annual coal use, or 2.2 million tones of coal, are for heating in over 340 residential areas throughout the country. The efficiency of heating is quite low. Typical boilers in provincial administrative units use on average 800-1200 tonnes of coal per year. These boilers provide heating for schools, hospitals, kindergartens and other public institutions at very low efficiency (0.4-0.5) rates due to outdated designs. Maximum load of a province unit is 0.8-1.2 MW. The average price of 1 ton of coal was US$21in 1999.

There are over 400 small sized heat boilers with 1200 burners operating in Mongolia, of which 20 percent are located in province centers or large residential areas. Since 1990, due to price increases for gas, lubricants and coal, transportation costs have increased many times, and keep rising. This is the primary reason for increased heating costs in the provinces and rural areas, especially for those located far from coalmines.

1.3.2 Efficiency improvement measures

One of the important socioeconomic issues in our country is to improve the energy efficiency of small and medium heating systems. By solving this problem it is possible to reduce coal consumption by 50 percent. In order to increase the efficiency of small and medium sized heat boilers and household stoves and furnaces, it is necessary to analyze each category of heaters.

1. Medium-sized heat boiler

The following methods should be analyzed and implemented in order to increase efficiency of small and medium sized heat boiler:

1) Where possible, convert to thermal power plants with capacity of 5-10 MWt. This will allow heating and power supply for the province centers and nearby province units.
2) Modernization of fuel combustion technology and design of boilers:
   - Change the design of boilers, introducing of coal fluidized bed combustion technology.
   - Change the design of boilers, installing steam boilers.
   - Utilize technical innovations aimed to improve the efficiency and decrease of CO_2 emissions.

2. Small-sized heat boilers

One of the most difficult problems facing Mongolia is raising energy efficiency. If we can increase the energy efficiency to 80 percent, then coal consumption can decrease by 50 percent. Environment pollution would be reduced dramatically. At present, around 30 percent of province centers (soums) are connected to the central power grid.

In the future, this ratio will increase. There are a number of options for increasing the energy efficiency of small sized heat boilers, including:

- Terminate the boilers located in places far from coalmines, but connect to the central power grid and install electric boilers or use heat pumps.
- Install newly designed boilers with high efficiency in places not connected to the central power grid

1.3.3. Implementation measures

For the purpose of achieving a reduction in GHG emissions through decreasing fuel consumption by small sized heat boilers and coal stoves in gers, it is necessary to take the following measures:

- To raise awareness among stakeholders by means of workshops on increasing the efficiency of small sized heat boilers and coal stoves. Target participants will include representatives of the aimag (province) center administrations and specialists.
- Each aimag shall determine the actual level of local province center's heat boiler efficiency and increase it over the next 5-10 years in accordance with pre-set targets for the annual consumption of coal and other fuel.
- To establish support lines and punitive measures for non-compliance for administration officials, who fail to achieve the pre-set targets for (the reduction of) coal consumption and environmental pollution without compromising on the quality of service of energy supply to the aimag.
- To provide technical assistance to aimag centers in designing and implementing the plans to improve the efficiency of small sized heat boilers.
- To make allocations in the annual budgets of the aimags centers for the financing requirements for implementing the plans to improve the efficiency of small sized heat boilers.
- To find foreign sources of finance to the extent necessary.

2.0. Importance of Establishment of ESCO’s to Implement Energy Conservation Measures

2.1. What are ESCO’s

An ESCO is a company that identifies options to increase energy efficiency in other organizations, arranges finance for organizations that are interested in its services, procures the equipment needed, and installs it. It gets repaid by sharing in the savings of the energy bill of its client. Provided that proper options for increasing energy efficiency are selected, it will make a profit.

The main a priori advantages of the ESCO concept are:

- Because it involves a commercial enterprise, it will aim for an efficient and effective implementation of energy efficiency projects. This is a key requirement for the ESCO’s survival.
- By creating a commercial enterprise, the sustainability of the project’s benefits is more secure than for other (donor) projects that require continuous flows of funds to sustain themselves.

An Energy Service Company (ESCO) will inspect a building or industrial facility for energy saving opportunities, recommend energy efficiency measures, and implement those measures acceptable to the owner at no up front cost to the owner and gets reimbursed for its service. The client could be any entity such as a commercial business, manufacturer, public corporation, residential household or a government agency.

ESCO services are based on Energy Performance Contracting (EPC). When performance contracting is implemented in cooperation with an ESCO, a number of benefits are available to the local economy.

2.2. International Experiences of ESCO’s

EPCs have been established in France for over fifty years. The concept originated for a single hospital contract and has since developed rapidly, initially in the building sector, followed by the industrial and other sectors. Currently, the total number of companies engaged in Energy Performance Contracting approximately 140, and the industry employs over 20,000 people.

The EPC industry in France is one of the most mature and best organized in the world. The business concept for ESCOs was initially pioneered in the USA in the mid 1970s into the early 1980s. At that time, the industrialized countries were being forced to rapidly adjust to increased oil and energy prices. In the USA, as in other countries, energy conservation was actively promoted by the federal and many state governments. A variety of financial incentives were offered to encourage private and public investments in energy conservation, including industrial retrofits. A rather large number of ESCOs were established, and formed their own association, the National Association of Energy Service Companies.

The Federal Energy Management Program (FEMP) under the US Department of Energy has had a major impact on the development of the ESCO industry. FEMP EPCs have resulted in annual energy savings well over $1 billion, and the creation of more than 6,000 jobs in the private sector. This partnership between government needs and private sector skills and financing has obviously been mutually beneficial. One of the important aspects of the FEMP EPCs is that they are based on bundling of energy efficiency retrofits. For example, if expensive and long payback-period chillers or heat systems need to be replaced, then they are combined with other retrofits that have short payback-periods such as lighting and insulation. This combination provides the basis for an ESCO to invest—the financial rate of return becomes attractive with the short payback-period items and this enables the larger investment in the longer payback-period items.

Compagnie Generale de Chauffe (CGC) is one of the largest multinational EPC companies in France. The de Chauffe Group employs in excess of 29,000 staff, and manages some 51000 MW of thermal energy, and 1000 MW of electrical energy. CGC has a presence in some 29 countries, including the USA, Canada, throughout Western Europe, Asia, Australia and Latin America. In the UK, CGC's presence is through its subsidiary, AHSEmstar. It employs around 900 staff, and it offers the broadest spectrum of energy services in the UK. AHSEmstar offers both demand and supply side energy management services and has a strong investment capability.

The energy services sector throughout Central Europe is underdeveloped compared to Western Europe. Energy efficiency in Central Europe has not been a concern until very recently. Facilities desperately need upgrading and energy prices have had to be increased from their historical subsidized costs. The most prevailing concern has been the struggle to move to a market economy, with the inherent economic instabilities and limited domestic financing sources.

The Czech Republic had the first performance contract in Central and Eastern Europe. Energy performance contracting in the Czech Republic is showing potential with about 50 companies operating. They offer services ranging from simple boiler type maintenance operations by small firms with only 5 to 10 staff, to larger firms offering more specialized services.

In Hungary, most ESCOs are small and concentrate on a narrow segment of the EPC market. They are typically formed as subsidiaries or affiliated organizations of larger western ESCOs such as ENSI from Norway, SRC and HESCO from the USA, Vattenfall from Sweden, Prometheus and Pervin from France. Under a typical contract, the ESCO conducts an energy audit at its own expense and if the customer agrees to the recommendations, the project investments can begin. A contract is typically signed for 5-7 years. The profit from the project is shared between the ESCO and the customer for the first 4-5 years.

Poland has seen little development in EPC in the past. Stabilization of the economy, a continuing drop in inflation rates and a government policy to increase energy costs have created a more favorable environment. In 1994, Elektro Remont Serwis started an EPC by installing heat meters on 14-months contracts. Customers traditionally paid for heat by the occupied square meters. The first installation of heat meters showed a 15 percent savings.

Movement is now underway for EPC to penetrate in countries of the former Soviet Union. The European Bank of Reconstruction and Development (EBRD) is working with the Ukrainian government to set up a state ESCO. Under the aegis of USAID, studies of the feasibility of EPCs are taking place in other countries. EBRD has announced its intention to develop a state ESCO in Russia if a private sector ESCO effort cannot be launched. EBRD is also helping to create an ESCO in Nizhny Novgorod with the support of the regional government and Gasprom, a large gas utility. At the same time, an American based ESCO, Energy Performance Services (EPS), has signed a performance contract with Karelsky Okatysh, a mining and iron pelletizing factory in Kostomuksha in Northwestern Karelia, Russia.

In many countries in Southeast, South and East Asia, energy production and consumption have grown tremendously over the last two decades, in particular with regards to electricity, but also in respect to primary fossil fuel consumption. Despite the often ambitious capacity expansion plans for power generation and refineries, demand from industrial, commercial, institutional and residential users is expected to continue to grow much faster than supply. The growing number of consumers and the growth of their consumption also represents a growing number of potential clients. Therefore, energy engineering and consulting business may well become a rather lucrative activity.

ESCOs are beginning to quickly emerge in the Philippines and Thailand. Some of these are subsidiaries of deregulated utilities, in other cases, new companies have been established—including by former executives of transnational ESCOs. All of these companies are highly optimistic that they will have successful futures—and the governments are supporting this private sector-led development. EPCs are being used to upgrade power factors in government facilities, and HVAC and other building retrofits in the private sector.

2.3. Importance of Establishing an ESCO Industry in Mongolia

In October 2001, the Royal Netherlands Embassy in Beijing with the Mongolian National Chamber of Commerce and Industry began to implement the ESCO Development project "NEW21". The main objective of the "NEW-21" project is to promote energy efficiency investments in the Mongolian economy through the creation of a commercial and sustainable Energy Service Company, or ESCO.

The implementation of the project "NEW-21 has the following 5 phases:

1. Creation of a favorable business environment for ESCOs in Mongolia
   - An information campaign;
   - Legal initiatives.
2. Business plan development and internal development:
   - Training on the running of an ESCO;
   - Training on Clean Development Mechanism /CDM/;
   - Development of new ESCO product lines or establishment of 5 demonstration projects;
   - Development of new CDM service lines;
   - Identification and development of funding sources for the ESCO and for the ESCO projects;
   - Client identification and development;
   - Writing of a corporate business plan.
3. Establishment of an energy efficiency/CDM fund:
   - The design of the energy efficiency/CDM fund;
   - The establishment and implementation of the energy efficiency/CDM fund.
4. ESCO development:
   - Commercial ESCO trial period and taking of a go/no go decision;
   - Optionally, the full implementation of the commercial ESCO, depending on success of the ESCO trial.
5. Information campaign on the PMO/ESCO' s service

The ESCO development project will assist enterprises through:

- Raising awareness of the importance of energy efficiency;
- Raising awareness of an ESCO concept;
- Consulting on energy efficiency options;
- Consulting on selection of energy saving equipment;
- Consulting on energy management;

- Provide information on how to find funding sources for energy efficiency project;
- Involvement of enterprises in 5 demonstration projects.
  Every enterprise can receive consultation from the project. Demonstration projects can involve enterprises using innovative management with high potential for savings and with potential for profits. The enterprises will receive the following benefits from ESCO services:
- The ESCO helps to overcome lack of information and perceived risk within the host enterprise by making the ESCO responsible for identification, implementation and risks;
- ESCOs reduces transaction costs for small projects through development of a high volume of technically similar product lines within an ESCO, so that costs can be spread over a large number of projects instead one;
- ESCOs eases financing constraints in host enterprises by utilizing savings in operating costs to directly pay for investment. An ESCO takes over the burden of financing the investment from the host enterprise;
- The host-company will not spend any money, will reduce energy costs, and at the end of contract period will receive the equipment that will make even greater savings for the company during the rest of the life of the equipment.

Institutional Capacity Building in the Energy Sector

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Introduction

The transition from a centrally planned economy to a market oriented economy has brought many institutional changes, and since April 2001 when the new Energy Law came into force, fundamental changes have occurred in energy sector as well. By passing the new Energy Law, the Parliament enabled the legal basis for restructuring the energy sector. Under the new law, the Government of Mongolia has implemented several important steps towards creating market conditions in the energy sector, such as separation of ownership from regulation, separation of regulation from policy-making, and creation of independent regulatory mechanisms. However, some important issues remain to be addressed, including planning functions.

Another of these issues is capacity building. The transformation of the sector from one that had been centrally planned into a market oriented one requires more than legislation. The personnel that are responsible for planning, operating, and regulating the sector also have to undergo major changes in terms of their skills and perspectives. This paper attempts to provide a framework to understand what changes may be needed in terms of capacity building.

Following the introduction, this paper describes the institutional structure of the energy sector. The next section discusses capacity building needs in key players in the energy sector—the Ministry of Infrastructure, the Energy Regulatory Authority, the National Dispatch Center and the energy companies. The fourth section describes the recent ADB proposal to establish an Energy Planning Group. The final section presents future issues that could shape capacity building initiatives.

Institutional Structure of the Energy Sector

This section outlines the key institutions involved in managing and operating the energy sector, including their responsibilities. As the section indicates, there are a number of institutions with some potential for overlap of functions. Importantly, the section shows that one effect of restructuring is that considerable effort has to be given to coordinating capacity building and avoiding duplication of effort.

Ministry of Infrastructure

According to the new Energy Law the Parliament of Mongolia (Great Khural) is in charge of approving the state policy in energy sector. The Ministry of Infrastructure (MOI) is a line ministry in charge of policy-making for the sector. The policy areas under MOI include: development of energy resources; energy use; import and export of energy; construction of power plants, lines and networks; energy conservation; use of renewable energy sources; monitoring the sector; approving rules and regulations for the sector; and, international cooperation. Prior to the new Energy Law, MOI was an owner of all assets in the energy sector, it implemented regulation functions, such as technical supervision, tariffs setting, and was responsible for operations and maintenance.

In addition to energy, MOI is responsible for policies for the postal service, telecommunications, information technology, road development, development of transportation infrastructure, construction, construction materials production, urban development, water supply, housing, public services, infrastructure technical supervision, geodesy and cartography, and development of tourism.

Ministry of Finance and Economics (MOFE)

The Ministry of Finance and Economics (MOFE) is responsible for socio-economic development policy, strategy, sustainable development strategy, economic security, economic conditions, regulation, investment credit and aid integrated policy, balance of payments, and economic cooperation policies, which are aimed to provide a balanced macro-economy. Other MOFE activities/foci include:

- State of the economy, social development policy, state budget, credit and financial planning
- Sector and inter-sectoral, regional development policy
- Research on central budget, and budget planning
- State budget expenditures management

- Budget supervision of ministries, agencies and local authorities
- Creation of universal accounting structure, and management and implementation
- Customs structure development, and monitoring its operations
- Tax revenues planning, tax collection, tax policy implementation
- State insurance policy
- State property supervision, accounting

Since energy sector enterprises are state-owned, major investments such as building transmission and distribution lines and networks have been implemented by MOFE. Due to the financial situation of the country (budget deficit approximates 10 percent of GDP) and recent low rates of economic growth (1 percent in 2001), the further reliance on the state budget for investments in the energy sector is not feasible.

Energy Authority (EA)

The Energy Authority (EA) was established in 1965, and served as the implementing agency responsible for Government's policies on energy utilization. Previously the EA was called the Central Energy System (CES).

The main objective of the EA was to provide a reliable supply of electricity and heat, based on the most effective means of generation and distribution. In the Energy Authority's code set by the Government there was a provision: "… The Energy Authority has the right to acquire assets, to utilize them and own them . . . ". There was also the provision that the Energy Authority had the authority to supervise and monitor all professional activities regarding power production, dispatching, transmission and distribution. The main functions of the Energy Authority included ownership, operations, and supervision functions. It operated as one large company, exercising authority over all power plants, transmission and distribution companies of the Central Energy System (CES), and the major diesel stations in aimags (provinces) which were not connected to the central grid. The Energy Authority was responsible for all aspects regarding financial performance, such as collection of revenues, payments for coal, railway transportation, and tax settlements. Energy Authority (EA) power plants used to follow a pre-set plan, which determined monthly minimum limits for power and heat production based on a planned number of boilers and turbines. The EA also assumed certain planning functions.

Since August 2001, the Energy Authority is serving as a government agency in charge of implementing international projects and loans, procurement services for energy sector enterprises based on their requests, and implementing investment projects financed under the state budget.

Energy Regulatory Authority (ERA)

According to the Government Resolution #83 of 2001, the Energy Regulatory Authority (ERA) was established, and its code was approved. The ERA is the regulatory body in charge of regulating energy production, transmission, distribution, supply and dispatch according to the Energy Law. The main objectives of the ERA include: to award licenses to operators, to approve and supervise the tariffs of operators, to protect evenly interests of both consumers and operators, and to create a competitive environment for producers and distributors.

The ERA consists of licensing, tariff, and legal/administrative divisions. The divisions submit proposals to the ERA Regulator's Council, which consists of three members, including the Chairman. The Council's members are nominated and dismissed by the Prime Minister upon recommendation of the Minister of Infrastructure. The Council will vote on the proposals, which will be adopted upon a majority vote.

Energy Corporation

The Energy Corporation was established in 1959 as a research institute designed to conduct long-term planning for the energy sector. It includes representatives from MOI, the Ministry of Education and other government agencies. The Energy Corporation has been forced to conduct commercial activities to survive due to government budget difficulties. Therefore, it has been focusing on design and engineering work for energy-sector entities, rather than on long-term planning.

Renewable Energy Corporation

As with the Energy Corporation, the Renewable Energy Corporation was established as a scientific organization aimed at increasing the use of renewable energy sources and providing research to the government. It now focuses primarily on commercial activities.

18 Corporatized Energy Entities

As stated in the restructuring section, the energy sector has been unbundled into distinct generating, dispatching, transmission, and distribution companies. Currently, all of these companies are state-owned, and are assuming responsibility for the finance and operation of their businesses.

National Dispatch Center (NDC)

NDC is tasked with organizing the implementation of energy projects based on short- and long-term policies and needs, and developing contingency plans for the sector. NDC is also responsible for providing technical and methodological assistance to local authorities and other organizations.

Energy Training Center

The Energy Training Center provides short-term technical (non-professional) training for energy sector personnel.

Capacity Building Needs in the MOI, ERA, NDC and the Energy Companies

In order to proceed with the structural reform of the energy sector, Mongolia must increase the institutional capacity of both its government agencies as well as its energy companies. Currently lacking are adequate numbers of trained staff to undertake a range of functions from management to planning to financial analysis. Because of MOI's broad responsibilities for the entire sector, it will have to develop capacity to assess and develop policies and projects that are implemented by other energy agencies and companies—it will have to develop the same skills. Described below are broad capacity building needs for key players in the sector.

The ERA is tasked with issuing licenses for the generation, transmission and distribution of heat and electricity. The ERA is also responsible for monitoring licensees and their compliance with terms of the licenses, establishing pricing and tariff systems, and settling disputes between licensees and between licensees and consumers. Inherent to these functions is the need for the ERA to establish a substantial database that includes considerable technical and economic information. In other words, the ERA has to know how it wants the energy companies to operate, and it has to be able to justify the resulting terms and conditions. Said from another perspective, the ERA has to know the business of energy generation and distribution at a level equal to if not superior to the energy companies themselves—and generation and distribution are the business of energy companies. Clearly then, the focus of ERA capacity building has to be on engineering, energy technologies, and energy financial management.

As implied in the discussion of ERA capacity building needs, the energy companies have similar requirements with respect to engineering, energy technologies and energy financial management.

The NDC is tasked with organizing the implementation of energy projects and programs based on short-term and long-term policies and needs, and developing contingency plans for the sector. In addition, NDC is responsible for providing technical and methodological assistance to local authorities and other organizations. The NDC is also responsible for the organization of training in the energy sector. Collectively, these tasks would seem to suggest that the NDC should have a major role in planning for the energy sector—especially in terms of forecasting system requirements and assessing options. Thus, the ADB's staffing recommendations for the Energy Planning Group (see below) would seem in line with the requirements of the NDC—although it could be argued that someone specializing in transmission and distribution would seem a logical addition.

In total, MOI, the ERA, the energy companies and the NDC will need to become familiar with a range of planning and evaluation tools. Importantly, the ADB recommended the use of planning software for generation, transmission, and energy and power supply and demand. The ADB recommended the ENPEP software for the energy and power supply and demand evaluation. In addition, it is recommended that the appropriate agencies become familiar with IRP submissions, including their use in tariff setting. This could be a key to long-term decision-making because as energy efficiency and renewable technologies advance and their commercial viability improves, assessment of supply and demand options will become increasingly complicated—and have significant long-term cost implications.

Specific training needs have been identified for the sector in the following areas:

- Energy sector planning,
- Transition to a market oriented economy,
- Energy sector regulation,
- Demand forecasts (including long-term),
- Tariff setting mechanisms,
- Revenue collection in distribution networks,
- Technical losses calculation in transmission lines,
- Asset evaluation at the energy sector enterprises,
- Heat and electricity combined power plant production and cost estimation,
- Electricity and heat pricing and customer categories,
- Foreign loans, interest rates, currency exchange rate fluctuations, adjustment mechanisms,
- Return on Investment (return on equity),
- Energy supply in central grid and off-grid (remote) areas,
- Customer service discounts and bonus (e.g., for advance payments) mechanisms,
- Bill collection in the distribution networks (clearing and settlements),
- Metering in the distribution networks, time diversified metering devices,
- Assessment and monitoring of the financial situation of the energy sector enterprises,
- Research and analysis from a regulatory standpoint.

ADB Proposed Energy Planning Group

The 2001 Energy Law separates the regulatory and policy implementation functions, with the Energy Regulatory Authority (ERA) assuming the regulatory role and the Ministry of Infrastructure (MOI) the policy implementation. The Energy Authority had previously been responsible for energy system planning, although MOI has also had a major role in system planning especially with respect to fuel and energy resources, and MOI has been exclusively responsible for non-grid planning. There has been some indication that grid planning will fall under the National Dispatch Center.

The Asian Development Bank (ADB) recently (February 2002) submitted a draft report for the project "Capacity Building in Energy Planning," that has been commonly termed the master plan for the energy sector. Although it does not recommend a particular agency or ministry to be responsible for energy planning, the ADB report recommends the establishment of an Energy Planning Group (EPG) tasked with the following (master plan, page 224):

- Monitoring energy consumption and demand
- Development of long-term energy forecasting and modeling capability
- Developing energy emergency preparedness measures
- Integrated resource planning with resource efficiency evaluation
- Economic analyses (energy intensity versus economic output)
- Research and development of options for capacity expansion
- Evaluation of site options for new facilities
- Planning for environmental and economic sustainability
- Rural energy development planning
- Evaluating market model options
- Maintaining a statistical data base

The ADB master plan recommends staffing the EPG with a planning group manager, an electricity expert, a district heating expert, a renewable energy expert, and a planning economist. The master plan further recommends that the EPG be provided with appropriate energy planning software including for energy and power evaluation (ENPEP Windows program), generation expansion planning (WASP program) and transmission (ERACS program).

In addition to the above tasks and gaining familiarity with the various planning programs, the ADB master plan recommends that the following activities be undertaken by the EPG as part of an on-going capacity building effort (master plan, page 228).

- Establish and continuously update the database required for the different activities (the above tasks) of the group; establish own data collection and processing procedures where required; tap existing databases where available and establish data exchanges.
- Follow the real development of energy demand and its driving forces (population, households, urbanization, economic activity, Gross Domestic Product, etc.), comparing them with the Demand Forecast of the master plan and its assumptions; update the master plan Demand Forecast at regular intervals.
- Keep abreast with the results of on-going and future exploration activities for energy resources, with the planning and development of energy infrastructures (for production, transformation, transmission/transports, distribution), and with the

corresponding technologies for energy supplies and utilization in Mongolia and abroad.

- Monitor the national and international discussions on environmental issues, the environmental concerns and abating measures in the energy sector.
- Interlink with other institutions, national and foreign, involved in similar tasks, in order to exchange experiences, coordinate activities and collaborate, and thus avoid unnecessary double tracking of efforts.

As noted, the master plan does not recommend placement of the EPG in a particular agency, stating that that can be determined at a later date. The master plan also notes that the tasks and activities listed above are "commonly those of energy planning units in various countries." While the master plan is correct in stating that these are common functions, some of the outlined tasks and activities are also being carried out (or will be) by other agencies and companies. For example, the energy generation companies will be submitting justifications for tariffs to the ERA. It is assumed that part of the tariff setting process will ultimately involve preparing integrated resource planning (IRP) documentation. As another example, long-term forecasting and modeling capability may be best positioned in the National Dispatch Center (NDC). However, developing these capabilities would not necessarily be a negative for the EPG—rather, it would strengthen overall planning in the energy sector, which should be a key objective for all concerned parties.

Capacity Building to 2020

Traditionally, the energy sector has been supply driven. Focus has been on the use of conventional fuels for generating heat and power. Limited attention has been given to meeting consumer needs or utilizing a least-cost methodology in the evaluation of fuel and technology options. With unbundling, commercialization, and ultimately privatization, the energy sector will have to take a much broader and longer term view of the sector, and become more aware of global experiences with technologies, policies, and energy management.

A key question in assessing capacity building needs for the next 20 years, is what do we want the energy sector to look like in 2020? While there may be some disagreement in terms of how to reach specific goals, there could be agreement among us that we would like to see the energy companies operating as successful private enterprises that provide reliable heat and power at reasonable cost to the consumer. This would imply financial sustainability, and not a drain on government resources. We could also agree that we would like to see the sector utilize energy resources as efficiently as possible and have minimal negative impacts on the environment. We could additionally agree that the sector should be using the best technologies available, and thus establishing itself as a positive contributor to the overall economy.

Since the first oil price shock in 1973, there have been promises that renewable energy technologies would end the world's dependence on hydrocarbons. Despite many failures, the next 20 years may come closer to fulfilling these promises. Wind and photovoltaics have already established themselves as viable options under certain conditions—and the technologies are improving and the cost of production is falling. Fuel cell technologies are also advancing, with indications that between 2010 and 2020 this could become a commercially viable option for vehicles and electricity generation. There are now promises that co-generation technologies utilizing increasingly efficient microturbines could do for electricity generation what the personal computer did for the information technology industry—whether as stand alone or interconnected systems. Beyond supply technologies, the energy efficiency of equipment and building designs continues to improve.

While these are global trends that could be beneficial to Mongolia, there are also important advances occurring here. The MOI is currently proposing to conduct a resource assessment of coalbed methane. Coalbed methane is the fastest growing segment of the USA and Canadian gas industries, and its development could have a major impact on Mongolia's fuel supplies—for off-grid isolated energy generation based on microturbines, for the evolution of an LPG industry, and possibly for grid supplies. The 100,000 Solar Gers program will make Mongolia a global leader in the implementation of photovoltaic projects—and possibly result in the development of a solar-based industry that exports products and expertise. If we commit now to facilitating the growth of an ESCO industry, it could find niche markets in a number of other countries where that commitment has not been made.

Thus, there are options and opportunities that were not apparent even just a few years ago. How to capture these opportunities? How to meet the goals of developing the energy sector into a dynamic contributor to the economy? The answer to these questions lies in ensuring that there are sufficient financial resources to comprehensively assess and utilize the most efficient technologies and the best practices based on least-cost methodology. This means that we have to become leaders in energy management. This is the goal of our long-term capacity building, and it is the key to transforming the energy sector into a market oriented and efficient sector.

Capacity Building for Decision Making on Energy Investments

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1.0. Introduction

For several decades now, there has been a widespread consensus among governments and financial institutions that infrastructure investments should be evaluated and ranked on the basis of financial and economic analysis. This consensus extends to multilateral financial institutions and most governmental institutions involved in Official Development Assistance (ODA). As well, there is widespread agreement on the methodology to be followed in carrying out financial and economic analysis as an examination of the relevant documents and guides produced by such institutions as the World Bank and the Asian Development Bank will attest. To be sure, there are difficulties both of a technical and empirical nature in carrying out financial and economic analysis especially in taking account of the so-called non-economic factors such as the environment, but the basic approach to the assessment of infrastructure investments is well known among the practitioners in this field.

Thus, the calculation of rates of return and net present values has become old hat with regard to proposed infrastructure investments, as has the distinction between a financial analysis carried out from the perspective of a corporate entity and an economic or benefit-cost analysis carried out from the government or society perspective. In the former case, taxation must be taken into account while in the latter case the aforementioned environmental costs as well as such factors as market imperfections and national security should be considered.

So much by way of introduction to the general topic of investment evaluation and the comparative analysis of projects. However, what is the relevance of the above discussion for energy investments in the case of Mongolia? For obvious reasons, the heat and power sector is crucially important for Mongolia. As well almost 50% of the outstanding sovereign loans to the country reflect investments in energy. At the same time, Mongolia is a country in transition, and hence, has had a limited experience with the classical evaluation methods employed in a market economy setting. Therefore, the capacity to undertake comparative financial and economic analysis to derive rates of return and net present values remains underdeveloped.

Further complications include the rapidly changing institutional structure in the energy sector of Mongolia and the widening range of energy options including demand side management and renewables. These observations suggest that the need for evaluating and ranking energy initiatives is greater than ever, and that it is important to identify who is and might be involved in such an exercise with a view to building up capacity where it is needed.

Therefore the next section of this background paper covers the evolving institutions of Mongolia's Energy Sector. This is followed by sections on where the gaps in the capacity to undertake evaluations are, how these might be filled, and finally who might fill them.

2.0. The Changing Institutions of Mongolia's Energy Sector

Any discussion of capacity building in Mongolia's energy sector must start with the recognition that the major institutions have evolved considerably over the past year, and will continue to evolve over the coming years. As well, a reallocation of human and physical resources has taken place and will also continue to take place. As a result, the need to build up capacity in terms of knowledge, capabilities and skills has changed and will continue to change.

In specific terms, how have the institutions evolved? As other speakers have already noted, the starting point in Mongolia was a vertically integrated, state owned monopoly in energy operating in a planned economy setting. In terms of policy-making and planning, the single energy entity was complemented by a Ministry, an Energy Authority and an Energy Research Institute. Certainly, important changes occurred in this set up between 1990 and 2000. However, prior to the passage of the Energy Law in April 2001, one could still identify the main features of the past such as an interventionist Ministry of Energy, an Energy Authority responsible for project implementation (and much else besides), and a state monopoly carrying out generation, transmission and distribution of heat and power.

On the financing side, almost all investments were funded through generous concessional loans from donors who, among other activities carried out the necessary evaluations. In this kind of environment, there is real question whether a lot of capacity building should actually occur within the Government of Mongolia (GOM) and its agencies.

However, as already indicated elsewhere, the situation changed dramatically after April 2001. Indeed, by the end of the year, the structure of the energy sector had been transformed through the establishment of:

- 18 corporatized energy entities to replace the vertically integrated monopoly
- An independent regulatory authority which had issued its first set of licences and had approved the first round of tariffs for heat and power based on submissions by the entities

Other presentations have explained the implications of this turn of events in relation to the objectives of financial sustainability, affordability of energy and access to energy. However, the impact in terms of capacity-building requirements are no less significant, and in fact, are the foundation for achieving the above objectives. This point can be illustrated by going into detail on the activities and resources of the institutions which exist in Mongolia's energy sector today, namely, the Ministry of Infrastructure (especially the Department of Fuel and Energy), the Energy Authority and the above-mentioned ERA, and last but not least, the 18 energy entities.

2.1. The Ministry of Infrastructure-Department of Fuel and Energy

It is important to recognize that the Ministry of Infrastructure is responsible for a wide variety of functions ranging from most forms of transport to tourism and utilities. Within the Ministry, the Fuel and Energy Department carries out the energy related responsibilities with a professional staff of eight people consisting of a Director-General, his deputy and specialists for the various energy sub-sectors (coal, renewables etc.) Although there has been some shifting of responsibilities from before the implementation of the Energy Law (April 2001) and today (April 2002), the number of employees has remained unchanged. (See Annex 1 for more details)

The Department of Fuel and Energy remains responsible for energy policy development, for monitoring the performance of the sector in general terms (operational, financial, rates) and for implementing GOM decisions and resolutions. However, some regulatory functions (e.g. supervision of license issuance) have been shifted to the new Energy Regulatory Authority (ERA). As well, the Ministry is not responsible for project implementation which continues to be in the Energy Authority (EA) domain.

Nevertheless, the responsibilities of the Department of Fuel and Energy (DFE) remain extensive especially when one considers that "Policy" includes imports and exports of energy, investment requirements and international cooperation. In addition, with the transformation of the Energy Research Institute into the Energy Corporation came the transfer of the responsibility for long term planning of the energy sector to the DFE (MOI).

Given these institutional changes, it has become clear to the GOM and also donors such as the ADB (see Masterplan) that some expansion of personnel as well as upgrading of personnel is required. Indeed, by April of 2003 it is envisaged that there would be 13 employees and that salaries would also have increased. This leaves the what and how of capacity building left to determine. In other words, what capabilities and skills does the existing staff and the new staff need to acquire and how will this be achieved. This issue will be covered in a later section of the paper.

2.2. Energy Authority (EA)

Before the passage of the Energy Law (April 15, 2001) the EA was arguably a more important institution than the Ministry itself since it carried out several key functions such as: management (technical and financial) of the state owned energy monopoly, project implementation, human resource development (training) and procurement. As well, the EA did the short and medium term supply and financial planning for the energy monopoly. The management and the planning functions have now been shifted, for the most part, to the new energy entities, but the EA remains responsible for project implementation, training, and procurement notwithstanding that the energy entities are being commercialized and prepared for privatization.

Therefore, one could argue that over time training and procurement should be shifted to the commercializing energy entities. With respect to project implementation, the same argument holds and, as well, some energy projects will undoubtedly be implemented by new private sector entrants in the future.

However, the new $30 million World Bank loan which is scheduled to be disbursed between 2002 and 2006 has the Project Implementation Unit (PIU) of the EA as its counterpart. This decision would appear to run counter to the institutional evolution taking place.

For the time being, the WB loan means that the EA will continue to implement projects and the training and procurement functions will probably stay as well. Thus, Annex 1 shows that the number of employees of the EA fell from 120 to 80 between April 2001 and the present, but shows no further decline to April 2003.

The World Bank loan contains funds for capacity building but this training is focused on project implementation. With the shift in functions away from management and planning, no capacity building in the EA on investment evaluation is required.

2.3. Energy Regulatory Authority (ERA)

The ERA was established subsequent to the Energy Law in July 2002. Its numerous responsibilities are outlined in Annex 1, but the main functions are first the issuance and compliance monitoring of licenses of energy sector entities, and second the approval of rates (or tariffs) put forward in submissions from the licensees. Subsidiary activities include the approval of business rules for licensees and the guidance of local (aimag) regulatory boards.

The need for capacity building arises in several respects, but two stand out in particular. One involves the need to analyze the tariff submissions and this involves cost analysis given that Mongolia has a cost based regulatory system. The other involves the decision to allow or disallow particular costs, including investments, to enter the rate base.

The need for capacity building is enhanced because of the recent establishment of the ERA, the newness of the regulatory system, and the relatively small size (18 employees) of the ERA. By April 2003, the ERA is expected to have 26 employees, but there may also be increased requirements for financial and cost analysis given the function of guidance to aimag regulators who have to deal with quite different energy options and the possibility of modifying the regulatory system to include performance incentives and lifeline tariffs.

2.4. The 18 Energy Entities

These corporatized entities are now responsible for the generation, dispatching, transmission and distribution of heat and power. The need for capacity building in financial and economic analysis is not immediately apparent for these entities. However, one should not jump to any conclusions in this regard. First, the entities are the ultimate source of financial and operational data for the other energy institutions (MOI, EA, ERA) as well as other GOM agencies, and second they must eventually evaluate all of their own energy investments if only to be able to satisfy the regulators. In the past, one could argue that MOFE had to satisfy itself because of the onward lending for projects to the energy sector, and one might also argue that the MOI and EA had to satisfy themselves about the financial and economic feasibility of a project. However, at the time of loan approval by the GOM, the Donors would have already done the required evaluations. Moreover, how much scrutiny should and would any agency of the GOM really undertake for a project where financing on very concessional tonns appears forthcoming.

From now on, the situation will be somewhat different. The foreign loans of the past have been allocated to the various entities, and the servicing of these loans has been included in the rate base. Thus, future loans for future investments raise the spectre of having to ask the ERA for rate increases, and hence, there will be the need for justification. Therefore, the energy entities will have to build up their capacity for financial analysis from the corporate perspective.

2.5. Other Energy Institutions

In April 2001 (and also today) two other relevant energy institutions existed in Mongolia. The first was the ERI or Energy Research Institute which was responsible for long term planning and Energy R&D (see Annex 1). The long term planning function will probably be transferred to MOI and the ERI has been renamed (Energy Corporation) and restructured. As well there is the Renewable Energy Corporation (REC) which is relevant for some of the other sessions of the Conference.

However, capacity building in financial and economic analysis is not a key requirement for these organizations.

2.6. Other GOM Agencies Relevant for Energy

There are several organizations which should make sure that the capability to evaluate energy investments exists, and that it is effectively used. Among these are the SPC which is the owner of the energy entities, the MOFE which is involved in subsidies, transfers and lending, the Ministry of Nature and Environment because of potential environment impacts and the key committees (Economic, Budget) of Parliament (Ikh Hural).

The important role that these organizations have in ensuring that any assessment of energy evaluations includes all the important impacts is discussed further below. However, capacity building for these organizations themselves is beyond the scope of this background paper.

3.0. The Gaps in Capabilities to Evaluate Energy Investments

In the previous section, the need for capacity building was discussed in terms of the changing functions of energy institutions, and in this section, the requirements will be considered in terms of changing priorities and changing concerns. Finally, the specific capabilities and skills required for financial and economic evaluation of energy investments will be discussed.

3.1. Changing Priorities

In previous sessions, speakers have already indicated that in the future in Mongolia's energy investments, there will be less emphasis on the rehabilitation of plants and less emphasis on increasing the supply of energy. In turn, this implies less emphasis on concessional loans and project financability. Instead, energy investments of the future will need to focus more heavily on improving efficiency on both the supply **and** demand side. At the same time, a greater emphasis on access for the urban and perurban poor and in rural areas is a priority. Finally, financial sustainability at the macro level and in the energy sector are important objectives for the future.

The above observations imply that a wider range of energy options will need to be examined and in consequence, a wider range of analytical tools will need to be accessed for evaluating the proposed initiatives.

3.2. Changing Concerns

The wider range of energy options also requires that these be evaluated in a consistent way with a similar methodology and a similar set of assumptions about the escalation of costs (inflation) for example, and a whole host of other considerations. As well, the impact on the private sector (competitiveness) and household consumers will need to be considered given the cost based regulatory system. In addition, the preparation for privatization implies that investments at the entity level should be evaluated on the basis of the ability to recover any loans in the sales price. Finally, a greater desire for a healthy environment means that the impact for environmental degradation must be adjusted in an appropriate way probably in an upward direction for coal fired plants.

3.3. The Analytical Tools

The basic criteria for making decisions on energy investments have already been referred to above in terms of rankings by **rates of return (IRR)** and **net present values (NPV).** This paper is not the place for going into details on how these calculations are undertaken in practice because the documents listed in the bibliography (ADB, Tom Smith) provide the needed explanation. From a corporate (energy entity) perspective, it is sometimes useful to also provide less sophisticated criteria. Thus, one can calculate **payback periods** which are admittedly biased against investments whose payoff comes later down the road (investments with a long gestation period). However, these numbers on the payback period are easier to understand for decision makers. As well, in an economy where interest rates are high, investments with a short payback period have a real advantage or attraction if the concessional loans are no longer available. Similar arguments can be made with regard to ranking energy investments in terms of **tugrik per kilowatt hour (kWh).** It is relatively easy to understand that an energy investment in the CES (Central Electricity System) above Tg 45 per kWh the regulated tariff will lead to upward pressure on electricity rates. The Tg 45 rate, of course also includes transmission and distribution, but not the VAT.

From a government perspective, the same NPV and IRR criteria are relevant, but adjustments are necessary to take into account market imperfections, environmental costs and national security. Here, it is important to recognize that these adjustments do require data and analysis which reflect the local situation, that is, Mongolia. However, some caution is necessary in making these adjustments. Only so much in terms of adjustments is affordable. A premium for locally produced over imported electricity, for example, may be justified, but when this premium starts exceeding a certain level, one must begin to worry about the effect of the additional cost on households and industries. For the former, the issue becomes one of affordability and for the latter, the issue becomes one of competitiveness.

3.4. The Specific Knowledge and Skills Required

Up to this point in the background paper, reference has been made to the need for capacity building in financial and economic analysis, but what kind of capabilities and skills are required or need to be expanded in this regard? Since the stream of revenues and costs of an energy investment need to be projected into the future, expertise in forecasting techniques is necessary. At the same time, in Mongolia, it is essential to have an ability to project future trends in technical and non technical losses. As well, familiarity with sensitivity analysis is required in order to test the impact of different assumptions about costs, revenues, losses and also the discount rate. (for NPV comparisons).

For most energy investments, one should also undertake a risk analysis which would cover question marks related to the particular technology to be used and also risks associated with the operating performance of the plant or equipment over time.

A wholly different class of risks is associated with the exchange rate. As already explained the foreign loans have been allocated to the energy entities but these remain in fragile financial shape and have only local currency (tugrik) sources of revenue. Thus, the exchange risk of taking on additional foreign currency loans need to be assessed. To be sure, the existing foreign loans carry a sovereign guarantee which ultimately the GOM must honor, but the entities and ERA should nevertheless take this particular risk into account for future loans.

The specific skills required have then already been stated implicitly if not explicitly. They include data collection and data management, forecasting and simulation with economic models and the calculation of various investment criteria (NPV, IRR, payback period). As the ADB Masterplan makes clear, an understanding and ability to use the related software packages is part and parcel of the capacity required.

4.0. Filling the Gaps and Building Capacity

As already indicated, one can argue that for the foreseeable future as long as energy investments in Mongolia are largely financed by donor loans, capacity building in financial and economic analysis is premature. The donors, especially the multilateral financial institutions, have a lot of expertise in this domain that they can readily tap. To a lesser extent, the same is true for bilateral donors. Therefore, it is possible to conclude that capacity building for the GOM energy organizations will lead to waste and duplication at least in the short and medium term.

However, one can also take the contrary view. Thus, the GOM requires a comparison of returns and/or costs for all significant energy investments. However, when donors make their evaluations, they focus on those investments that are of interest to them in terms of lending for example, or those they consider to be relevant for comparison purposes. As well, they sometimes make particular choices with regard to least cost alternatives when other alternatives are available.

In addition, and not surprisingly, the assumptions used for energy investments will differ among donors. Therefore, it is unlikely that any one donor or group of donors would ever evaluate the complete range of energy options on a consistent basis. This is one rationale for a unit within the GOM likely MOI to carry out financial and economic analysis for the sector as a whole. As well, presumably concessional loans from donors will decline in importance over time and at that point the GOM should have the capacity to undertake the evaluations which the donors will no longer be carrying out.

If the case for capacity building in economic and financial analysis within the GOM is accepted, and most of the donors involved with the energy sector believe that it should be, then where should it occur and who should support it? From the discussion above, it is clear that the MOI Fuel and Energy Department, the ERA and the energy entities are the logical locations for capacity building activities.

In this connection, the Fuel and Energy Department should be expanded and an energy planning group should be added. This recommendation is consistent with the ADB Master Plan, and makes good sense considering the wide range of functions of the Fuel and Energy Department and the limited number of personnel. In this connection, the role of the Department in financial and economic analysis for the whole range of energy investments should be made explicit. As well, given the ADB's expertise and involvement in capacity building as outlined in the Master Plan and other ADB documents, this is the most logical donor to take the lead.

With regard to the ERA, USAID has signed an MOU which includes a training component and procurement of hardware and software relevant for capacity building related to the ERA's activities. As well, the World Bank loan document mentions technical assistance for the ERA, and hence, provides another potential source of funding. Of course, the coordination of the activities of the donors will be important in achieving the required results in capacity building. The particular needs in terms of the relevant capabilities and skills of MOI and ERA differ somewhat, given their different functions, and donors will also have to take this factor into consideration.

Finally, the energy entities require assistance in building up their capacity for financial analysis from a corporate perspective. The commercialization process being carried out with USAID support can provide the groundwork for the capacity building because it will examine the management information systems, the accounting systems, and human resource development practices and make recommendations related thereto. However, this USAID activity does not incorporate expenditures on training, or the acquisition of hardware and software. Other donor support will be required and the EBRD may be one potential additional source of this support.

Eventually, the capacity building activities within the ERA and the commercialized energy entities should be covered by license fees for the former and the approved tariffs for the latter. These activities are a legitimate expense and should ultimately be incorporated into the rate base of a self sustaining energy sector. At that point in time, the role of donors will decline.

5.0. Conclusion

This background paper is based on the argument that the objectives of financial sustainability, wider affordability and increased accessibility for Mongolia's heat and power sector require capacity building specifically in financial and economic analysis, at the MOI, the ERA and the commercialized energy entities. Eventually, most of the costs of capacity building should be recovered from the rate base of the energy sector and be borne by energy consumers. However, in the interim, there is a role for donors to provide technical assistance in capacity building through grants for well structured and coordinated programs.

Annex 1
Evolving Intitutions in the Energy Sector

STATUS AS OF:

APRIL 2001

APRIL 2002

APRIL 2003

ANNEX 1. EVOLVING INSTITUTIONS
April 2001

AGENCY	FUNCTIONS	RESOURCES
Ministry of Infrastructure (MOI)	· Policy development; · To monitor the economical and financial outputs as well as the tariff of the energy sector · To authorize suitable professional agencies to issue licenses to construct energy generation and transmission facilities and to commence energy generation and distribution; · To adopt and implement basic rules and regulation for energy generation, distribution and consumption; · To adopt policies and procedures that balance energy generation with consumption and to regulate energy consumption in order to minimize any damage caused by any shortage of capacity; · To implement the State's supervision and control of the use of energy · To implement the Government's decision and resolutions	8 employees,annual salary: 7.4 mill. Tug.
Energy authority (EA)	· Financial and technical vertically management of state energy monopoly; · Financial, economic and supply planning of state energy monopoly; · Local and international project implementation; · Human resource development and training; · Supply of basic equipment of the state energy monopoly	120 employees annual salary: 172.8 mill.Tug
Energy corporation (formerly ERI)	· Long- term Planning of the energy sector; · Research and development; · Development of norm and standards related to the energy sector activities; · Design and engineering work for extension and addition to network and substation facilities of the local power system; · Engineering service for the heating sector · Participation in the international projects	22 employees annual salary: 22.3 mill.Tug
Renewable Energy Corporation (REC)	· Research and development of renewable energy sources; · Assessment of renewable energy resources such as solar, wind, hydro, geothermal energy; · Production in a small amount the solar and wind energy equipment · Training activities · Implementation of domestic and foreign projects on renewable energy · Supply the rural area and herdsmen with solar panels and small capacity windmills · Installation of the solar panels and wind mills in the rural area	43 employees annual salary: 18.4 mill. Tug.
Vertically integrated, state owned, energy monopoly	Generation (Power plants, Diesel stations in the provinces) Heating distribution network Electricity transmission network	7187 employees annual salary: 11.1 bill. Tug

Other relevant institutions: *Donors (Loans, Grants, Technical Assistance)*
MOFE (Budget, Onward Lending)
SPC (Owner)
Other GOM Agencies

ANNEX 2. EVOLVING INSTITUTIONS
April 2002

AGENCY	FUNCTIONS	RESOURCES
Ministry of Infrastructure (MOI), Fuel and Energy department	· Policy development on use of energy and energy resources, importation and exportation of energy and construction of PP, lines and networks; · To implement the Government's decision and resolutions; · To approve the general rules and regulations of the energy sector; · To monitor the local and international projects of the energy sector; · To review and issue decisions on disputes regarding licensing and revocation of licenses; · To approve methodology for setting prices of fuel to be used for energy generation and review estimations · International cooperation on energy sector	8 employees, annual salary: 8.2 mill. Tug.
Energy authority (EA)	· Local and international project implementation; · Human resource development and training; · Supply of basic equipment of the energy entities	80 employees annual salary: 115.2 mill. Tug
Energy Regulatory Authority (ERA)	· Regulate generation, transmission, distribution, dispatching and supply of energy; · To issue, amend, suspend and revoke licenses; · To set operational and licensing terms and requirements for licensees; · To monitor compliance with these terms and requirements; · To develop methodology to determine tariffs, define the structure of tariffs; · To review, approve, inspect and publish tariffs of licensees; · To approve the Business rules of licensees; · To provide technical and methodological guidance to Regulatory Boards of aimags and the capital city	18 employees annual salary: 64.8 mill. Tug
Energy Corporation (formerly ERI)	· Long- term Planning of the energy sector; · Research and development; · Development of norm and standards related to the energy sector activities; · Design and engineering work for extension and addition to network and substation facilities of the local power system; · Engineering service to the heating sector · Participation in the international projects	22 employees annual salary: 26.7 mill. Tug
Renewable Energy Corporation (REC)	· Research and development of renewable energy sources; · Assessment of renewable energy resources such as solar, wind, hydro, geothermal energy; · Production in a small amount the solar and wind energy equipment · Training activities · Implementation of domestic and foreign projects on renewable energy · Supply the rural area and herdsmen with solar panels and small capacity windmills · Installation of the solar panels and wind mills in the rural area	43 employees annual salary: 30.9 mill. Tug.
18 Corporatized Energy Entities (State owned)	Generation	4099 employees 6552.0 mill. Tug
	Dispatching	38 employees 53.3 mill. Tug.
	Transmission	649 employees 1101.7 mill. Tug
	Distribution	2439 employees 3419.4 mill. Tug

Other relevant institutions: *Donors*
MOFE, SPC, other GOM Agencies
Private Sector

ANNEX 3. EVOLVING INSTITUTIONS
April 2003

AGENCY	FUNCTIONS	RESOURCES
Ministry of Infrastructure (MOI),Fuel and Energy department · Planning group	· Policy development and impact analysis on use of energy and energy resources, importation and exportation of energy and construction of PP, lines and networks; · Long term planning of fuel and energy sector · To implement the Government's decision and resolutions; · To approve the general rules and regulations of the energy sector; · To monitor the local and international projects of the energy sector; · To review and issue decisions on disputes regarding licensing and revocation of licenses; · To approve methodology for setting prices of fuel to be used for energy generation and review estimations;	13 employees annual salary: 23.4 mill. Tug.
Energy authority (EA)	· International cooperation on energy sector · Local and international project implementation; · Human resource development and training; · Supply of basic equipment of the energy entities	80 employees annual salary:132.5 mill. Tug
· Energy Regulatory Authority (ERA) · Regulatory Boards of Aimags and Capital city	· Regulate generation, transmission, distribution, dispatching and supply of energy; · To issue, amend, suspend and revoke licenses; · To set operational and licensing terms and requirements for licensees; · To monitor compliance with these terms and requirements; · To review, approve, inspect and publish tariffs of licensees; · To provide technical and methodological guidance to Regulatory Boards of aimags and the capital city	26 employees annual salary: 93.6 mill. Tug 22 Regulatory boards of aimags and Capital city, 3 part time regulators
Energy Corporation (formerly ERI)	· Research and development; · Development of norm and standards related to the energy sector activities; · Design and engineering work for extension and addition to network and substation facilities of the local power system; · Engineering service to the heating sector · Participation in the international projects	19 employees annual salary: 2 6.7 mill. Tug
Renewable Energy Corporation (REC)	· Research and development of renewable energy sources; · Assessment of renewable energy resources such as solar, wind, hydro, geothermal energy; · Production in a small amount the solar and wind energy equipment · Training activities · Implementation of domestic and foreign projects on renewable energy · Supply the rural area and herdsmen with solar panels and small capacity windmills · Installation of the solar panels and wind mills in the rural area	43 employees annual salary: 35.5 mill. Tug.
17 Corporatized energy entities (some commercialized, a few ready for privatization)	Generation (except PP2) · Privatized PP2 Dispatching Transmission Distribution	3822 employees 6121.6 mill. Tug 38 employees 55.9 mill. Tug. 649 employees 1156.7 mill. Tug 2439 employees 3590.4 mill. Tug

Other Relevant Institutions: *Private Sector*
MOFE, SPC, other GOM Agencies
Donors