

Country paper on the rural energy development and utilization

Mongolia is a Central Asian country, with about 2.5 million population and 1,565,600 km² territory, neighboring with the Russian Federation (on north, 3,485 km border line) and the People's Republic of China (on south, 4,677 km border line). Mongolia is one of the scarcely populated countries in the world. Capital city is Ulaanbaatar with approximately 0.965 million population. Other major cities include Darkhan, an industrial center near the Russian border in the northern part of Mongolia, and Erdenet, known with its large copper plant, also in the northern part. About 40% of the population lives in the countryside, primarily nomadic livestock herders.

Since the collapse of the Former Soviet Union and COMECON in 1990 (withdraw of Soviet assistance was equivalent to the loss of 30 percent of GDP), Mongolia has 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 impressive results. Annual growth rate of real (1995 prices) GDP increased from 2.4 to 4.0 percent during the last half of the 1990s, despite the effects of the 1997-1998 Asian financial crises.

Mongolia has implemented a series of economic reforms a) implementation of tough monetary, fiscal and exchange rate policies, b) successful privatization of virtually all livestock herds and small scale enterprises, and c) steady Government commitment to reforms since 1990, aiming at stabilization of the economic performance and restructuring the economy into a market based system.

The transition of the economy to a market based regime is showing a positive result, but the progress is still slow. Between 1995 and 2005, an average annual growth rate of GDP per capita was 1% with annual growth rates of 0.8-6.2%. In 2005, preliminary GDP was MNT2,266.5 billion at current prices and MNT1,329.5 billion at the constant prices of 2000. Per capita GDP at current prices in 2005 has reached MNT899.3 thousand opposing to MNT141.1 thousand in 2004.

Energy Overview

Mongolia is served by a power system that consists of three detached segments, the Central Energy System (CES), the Western Energy System (WES) and the Eastern Energy System (EES), comprising six thermal power plants with heat extraction (combined heat and power plants) and seven distribution systems.

The CES is based on five coal-fired power generating plants and it is connected to the Russian Power Grid System. The other two grids are quite small. The WES operates on imports of electricity from the Russian Federation. The EES is centered in Choibalsan town.

The CES with the poor peaking capability of the essentially base-load plants is unable to properly follow the daily system demand.

Losses in the transmission and distribution systems are high; technical losses were about 12% in distribution and about 2% in transmission.

District heating is usually provided from 15th September to 15th May each year for all sectors, but to 1st of May for governmental offices. Steam and hot water is provided

all year round.

The major suppliers of coal to the power industry are the Baganuur, Shivee Ovoo and Sharyn Gol mines with annual capacities of 2.8 million, 1.2 million and 0.45 thousand tons, respectively. Total coal production is 7.7 million tons per year, of which some 5.0 million is used for power generation.

The most recent available data on energy consumption in Mongolia's regional heat and electricity systems shows that they consume about 4 million tons of coal or 76 percent of total coal production used domestically (5.23 million tons). In addition to the regional coal-based energy systems, there are isolated diesel-power generators that account make up the remaining two percent of electricity production

The CES has an installed power generating capacity of about 782 MW in five power plants with 24 generating units. They produce about 3028 GWh annually. Peak demand in the CES amounts to 583 MW in 2006. The industrial sector is the largest consumer of electricity, accounting for about 62 percent of the total. The residential sector is the second largest consumer at 24%, followed by transport (4%), agriculture (1%) and others (9%). Mongolia imports oil products and electricity from the Russian Federation. Coal which is the only fossil fuel produced in Mongolia.

Per capita energy consumption has decreased from 1.612 TOE in 1990 to 1,058 TOE in 2000. However, after the year of 2000, it has increased to 1,224 TOE in 2005.

The development of the economy of any country is heavily dependent on energy supply. State-owned enterprises that generate, transmit and distribute electricity and heat, were a significant part of the infrastructure. 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. Low and controlled prices, subsidized services have endangered the financial viability of the energy enterprise and have subsequently resulted in the introduction of inefficiencies into the economy.

Monopolies 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.

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.

Restructuring, including the privatization of some of the components, appeared to be the obvious answer and the government has been evaluating various options regarding ownership arrangements and structures.

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 the creation of an independent regulatory body for licensing, pricing and monitoring.

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 unbundled large state-owned enterprise into 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.

Mongolia began recently oil explorations and started to export crude oil to China, and for the development of oil industry there is a need for investment to oil sector and related infrastructure. At this moment all petroleum products imported from the Russian Federation and China.

To create necessary institutional framework for private sector participation (PSP), to improve efficiency of energy sector, to facilitate the development of renewable energy, to accelerate commercialization of energy companies and gradually privatize them. The Government believes that the strong legal, institutional and regulatory framework, which reduces investors' risk and encourages investors' long term commitment (concessions, independent power producers (IPP), power purchasing agreements (PPA)), is necessary to bring the private sector in building new capacities, in developing power links, introducing energy efficient technologies, and promoting the use of renewable energy sources etc.

In 2002 the Great Khural (Parliament) adopted and revised in 2007 the "Mongolia Integrated Power System" (MIPS) program, and the program will contribute to energy access development and will help to reduce operational expenses, to create favorable socio economic conditions for regional development, and create reliable electricity supply. The ultimate goal of "Mongolia Integrated Power System" (MIPS) program is create a unified power grid connecting Central Energy System (CES) of Mongolia with the Western and Eastern Systems thus creating a network, which will improve the reliability and cost effectiveness.

The Government of Mongolia approved in 2002 the "Mongolia Sustainable Energy Sector Development Strategy Plan (2002-2010)", and it reflects goals reinforced in the Poverty Reduction Growth Facility (PRGF) program, which is endorsed by international and donor community. The main objective of the Energy Sector Strategy of Mongolia is to create a financially sustainable energy sector that will provide cost-effective energy access, thereby enabling poverty reduction and greater private sector and civil society participation. Mongolia's energy sector will be developed within a regional energy context, while at the same time taking advantage of new technologies and sources of energy that might further promote economic efficiency and environmental sustainability.

The Energy Research and Development Center (ERDC) was organized by Government of Mongolia on October, 2004. ERDC is an organization under direct supervision of the Ministry of Fuel and Energy and responsibilities are

- Implementation and technical supervision of projects and programmes in the fuel and energy sector of Mongolia
- Planning of short and long term energy prospects
- Carrying out research and evaluation to improve efficiency of energy utilities

- saving and conservation of energy
- Introduction of new technologies and know-how
- Enhancement of codes and norms of the fuel and energy sector

Mongolian energy industry can be characterized by its mid growth rate of energy demand. The features of projects and programs, implemented in the fuel and energy companies of Mongolia by loan and grant aid from international and foreign organizations from 1990, would be defined as following:

a. The first stage (1990-1995): during this period aid and loans mainly received and spent to renew the technique and technology of the energy companies and supply spare parts, materials and fuel necessary to cover winter peak demand for every year

b. The second stage (1996-2001): during this period aid and loans mainly received and spent to improve reliability of energy resources and to increase efficiency of generation companies by implementing extension of coal mining and thermal PP and renovation of technology.

c. The third stage: from 2001 the aid and loans utilized to construct new energy facilities, to reduce losses from transmission and distribution, to improve the efficiency of energy supply-consumption and to save the energy consumption.

As mentioned above, although major power and heat outages have been avoided, the power and energy sector still faces efficiency, financial problems that remain to be addressed in the master plan and sustainable energy strategy above mentioned. These include continuing low levels of efficiency in energy use, long-standing technical and non-technical losses, inadequate resource mobilisation, poor performance efficiency of assets and indebtedness of the energy entities, a developing regulatory framework yet to be tested, continuing cash flow problems affecting winter preparedness, payment arrears between fuel suppliers and fuel users, and ineffective institutional and asset management arrangements.

Therefore it is necessary to speed up reform in the fuel and energy sector, promote foreign and domestic direct investment, carry out privatization, build competence, improve management of energy companies, conduct the research in present situation of efficiency in energy sector and develop the plan to increase efficiency in accordance with the government action plan.

There is general agreement that the reliability and efficiency of the energy sector, in other words the energy supply security of the country, should be ensured on the basis of an optimal combination of the available indigenous primary resources (coal, hydro etc.). A sound mix of power generating sources is very essential for the reliability of supply.

Mongolia's energy industry is exclusively based on coal-fired thermal power plants, which caused the major problems of Mongolia's generating system such as the unsatisfactory reliability and efficiency and the lack of an internal source of peaking and standby capacity and heavy dependence on imported fossil fuels and electricity.

To have an appropriate energy mix of power generation, Mongolia has a plan to use renewable energy sources such as hydro, solar, wind, geothermal, etc. and integrated gasified combined cycle power plants, and to connect to energy systems in Mongolia with an aim of creating an independent reliable energy system with an

acceptable level of security focusing our attention on IGCC and renewable energy technologies to avoid from environmental pollution, GHG emission and introduce highly efficient and least-cost methods into our practice of energy generation.

Mongolia has the policy and also needs and requirements to construct larger hydropower stations in the central, mountainous northern and western regions in the mid- and long-term with a view to use hydropower resources gradually more and more. However, because of lack of refinery in Mongolia will import oil and gas from foreign countries in the future. To lessen the oil dependency from other countries we have a plan to process crude oil exploited in our country to meet certain portion of our needs.

Apart from this, Mongolia has a tremendous potential (150 billion tons of coal reserve) to export coke and final coal products to the North-East Asian countries. The country has also a large solar energy potential (to construct extra large solar parks) in the south and hydropower (about 50GW) potential in the northern and western mountainous region to generate electricity for reliability of our energy system and for export.

Rural energy supply

Out of the total 331 soums and settlements in Mongolia only 200 soums are connected to power systems. Renewable energy power sources will supply 12 soums and 90 soums will be connected to grids by 2009.

Isolated soums, connection of which to grids is unfeasible, will be furnished with small capacity coal gasified plant or solar or wind or diesel-hydro/diesel/wind hybrid generators in the nearest future.

Connection of soums to grids shall make power supply in soums reliable and create conditions for rural development. A policy to increase power consumption in soums by fostering and underpinning SMEs will result in an improved efficiency of investments.