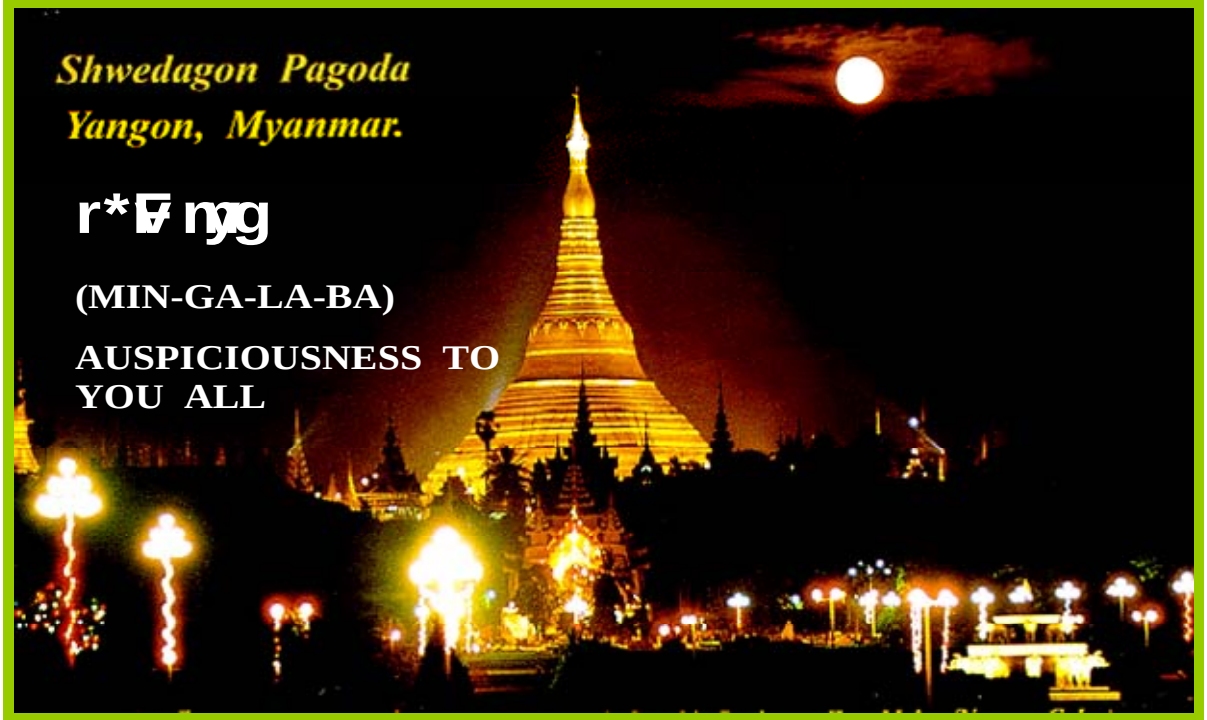
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ENERGY POLICY(A) – LEADERS TRAINING TYPE

COUNTRY REPORT

Presented by

Ms. Khin May Myint

Deputy Director

Energy Planning Department, Ministry of Energy

Myanmar

INTRODUCTION

Myanmar is the Largest Country on the mainland South-East Asia with a total land area 676,577 square kilometer. It has population of 57 million and GDP growth rate of 12.7% for fiscal year 2006-07 . As Myanmar is a Agro-based developing country, most of the GDP is coming from Agricultural Sector which is about 40% . Mechanization for agricultural activities are still in its initial stage and still striving with limited capacity.

Myanmar is geographically located at the tip of the South East Asia Peninsula and enjoys heavy monsoon and abundant sunshine all year round , which makes it ideal for accumulating water resources for hydro power and for agriculture activities .

Its topography features favor the existence of numerous rivers , mountain ranges and sedimentary basins where mineral deposits and mineral resources have abundantly accumulated . The two major river systems enter the Bay of Bangal and the 2832 kilometer coastal strip along the southern part is also the good area for the development of marine ecosystems and an abundant source for marine products and chemicals .

Myanmar is basically an agriculture country but recent development trends is to have a balance between emphasis on agriculture and industry . The change of economic system to market oriented created many economic activities leading to increasing demand for energy .

Myanmar is richly endowed with both renewable and nonrenewable types of energy sources . The need for increased production of commercial energy (such as Crude Oil , Natural Gas , Hydropower and Coal) is emphasized to meet the requirement of industrial development program .

The Myanmar Ministry of Energy is responsible for the development of Oil and Gas Sector . It is one of the largest sector in the Myanmar Economy and have attracted substantial foreign direct investment . Intensive exploration and development activities for Oil and Gas onshore and Offshore has been taking place since the early nineties and plans have been made for the development of its downsteam sector .

The government of the Union of Myanmar , through the Ministry of Energy , has developed policies focus on energy efficiency improvement , development of alternative and new and renewable energy in all sectors , the maintenance of emergency oil stockpiles , exploration & development of new energy resources and to reduce dependency on oil import .

With the adoption of market oriented economy in 1989 , the government prescribed the Myanmar Citizens Investment Law , Myanmar Foreign Investment Law and Ministry of Energy has invited the multinational oil companies for exploration , drilling and production of Petroleum Products and Natural Gas on a Production Sharing Basis .

(1) CURRENT ENERGY POLICY AND MEASURES

The Government of the Union of Myanmar , through the Ministry of Energy , has also developed policies focused on energy efficiency improvement , development of alternative and new & renewable energy in all sectors, the maintenance of emergency oil stockpiles , exploration & development of new energy resources and to reduce dependency on oil import.

The Myanmar Energy Policy in general strives towards maintaining the status of energy independence by increasing indigenous production of available primary energy resources through intensive exploration and development activities. It also

addresses electric power as the main driving power source for economic development and the need to generate and distribute in terms of volume, density and reliability.

The guidelines advocate the utilization of water resources, a renewable energy source for generation of electricity to save non-renewable sources of energy such as fossil fuels for alternative and future use. Conservation of energy is emphasized in order to save energy through effective energy managements and to reduce energy consumption so as to minimize the impact to the environment.

The guidelines encourage the development of renewable energy sources especially solar and wind which are abundant under Myanma's climatic conditions. It also accepts the fact that utilization of traditional energy sources such as fuelwood and charcoal still needs to be practiced and regulatory and anticipatory action is necessary for the sustained harvesting of this primary energy source.

To meet the challenges of demand growth in the 21st Century, the following Myanmar Energy Policy will be pursued -

ENERGY POLICY

- To maintain the Status of Energy Independence
- To promote wider use of New and Renewable Sources of Energy
- To promote Energy Efficiency and Conservation; and
- To promote use of Alternative Fuels in household

TO MAINTAIN THE STATUS OF ENERGY INDEPENDENCE

The Oil and Gas sector placed as high priority in the Myanma development agenda, following the policy initiative to transform Myanma's economy to a market oriented. Present crude

oil production from onshore fields is about ten thousand barrels per day, while onshore gas production is on the average of 100 million cubic feet. From offshore areas, over 12,000 barrels of condensate is produced from Yetagun Gas Field and the production of Natural Gas from Yadana and Yetagun Gas Fields are over 1.2 billion cubic feet per day.

Present domestic consumption level far exceeds this production level and to have sustainable development of the national economy, emphasis for intensive development for oil and gas resources is required.

The Myanmar offshore area has very good prospects for discovery of natural gas. There are at present the Yadana Gas Field having a reserve 7.84 Trillion cubic feet of gas and the Yetagun Gas Field having a reserve of 4.345 Trillion cubic feet of gas and 86.35 million barrels of Condensate. In the year 2007-08, 476.83 BCF was produced from these resources, exported to Thailand, amounting to over 1.2 billion cubic feet per day and Condensate produced together with Natural Gas from Yetagun field is used to fulfill for domestic consumption. According to BP's Statistical Review 2008, Myanmar is at the 11th position by mean of pipeline export in the world.

Shwe Gas Project, discovered by Daewoo in block A-1 and A-3 and Zawtika Gas Project, discovered by PTTEPI in block M-9 are in progress to sell to China and Thailand respectively. Many other multinational oil companies are now working at exploration stages, with encouraging results.

Coal Sector

The Coal Sector in Myanmar is under the Ministry of Mines and its exploration, production and marketing for the government

sector is carried out by an Enterprise organized under the same Ministry.

Following the promulgation of the Myanma Mines Law in 1994, which permits Private Sector participation in the mining industry, the Coal reserves have been significantly improved to 711 million tons and the production of Coal was significantly increased. This increase is due to seven private sector companies working under large scale mining permits, compared to two from the government sector. In recent years , the production of Coal has increased significantly from 992.00 Tons in 2004.2005 to 1,118 Tons in 2007-2008.

Due to the location of the resource, the Coal produced in various parts of the country are utilized for local industrial usage or sold as cross border Coal trade. Several Coal fired Cement plants are already in operation in the Coal mining areas and Coal is in great demand. With the successful startup and operation of the newly Coal-fired power plant in the Shan State, the demand for Coal is expected to increase further.

On the other hand, the availability of primary energy resources in coal producing areas and the liberalization of the Power Sector, attracts potential investors to invest in both power generation and Coal development business ventures. Thus a significant increase in the share of Coal in the Myanma energy mix is anticipated within a few years time.

With respect to regional cooperation, the Myanma coal sector is a member of the ASEAN Forum On Coal (AFOC) and actively participated in all events connected with the development and utilization of coal resources in the region.

TO PROMOTE WIDER USE OF NEW AND RENEWABLE SOURCES OF ENERGY

(a) Hydropower

The total installed electricity capacity during 2007-2008 is 1,782.32 Megawatt, out of which 725.80 Megawatt is from Gas Turbine Power Stations, 802.73 Megawatt is from Hydro Power Stations, 120.00 Megawatt is from coal fired Thermal Power Stations and 65.39 Megawatt is from Diesel Power Stations.

Myanmar has three different seasons (Summer, Rainy and Cold) in a year, with a typical tropical climate. During the rainy season, Myanmar receives a minimum rainfall of 100 cm in Central Myanmar, 200cm in Northern Myanmar, and an average of 450cm in Lower Myanmar. Four major river systems drain along the four main basins of Ayeyarwady, Chindwin, Thanlwin and Sittaung.

The geographic and tectonic settings of Myanmar favor to have numerous rivers, streams and creeks and many mountain ranges, which makes Myanmar abundant with potential Hydro Power resources.

The Hydroelectric Power potential of Myanmar is estimated to approximately 108,000 Megawatt on an installed basis. In order to utilize the Hydro Power resources, the Ministry of Electric Power No(1) studied and identified 86 potential Hydroelectric Power sites with total installed capacity of 43,458.30 Megawatt.

(b) Geothermal

Myanmar has five distinct igneous alignments. Wide spread occurrences of hot springs had been known to exist not only in the younger volcanic age, but also in non-volcanic or metamorphosed areas, where ground-waters heated at depths have ascended through faults, fractures and fissures.

Hot springs are found in Kachin, Shan, Kayah, Southern part of Rakhine States and also in Central Myanmar area, Shewbo-Monywa area and especially in Mon State and Tanintharyi Division.

A total of 93 geothermal sites have so far been identified and 43 sites were preliminarily investigated by Myanma Oil and Gas Enterprise (MOGE) in 1986.

MOGE and Myanma Electric Power Enterprise (MEPE) conducted studies in cooperation with Electric Power Development Co., Ltd. (EPDC) of Japan in Mon and Shan States in 1987. Water samples of hot springs were collected and chemical analysis and X-ray diffraction performed from these samples.

MOGE in cooperation with UNOCAL of United States made preliminary analysis of geothermal data from reconnaissance sampling of 15 hot springs in 1990. Geothermal Energy New Zealand Ltd. (GENZL) also performed studies regarding the geothermal potential during the same period.

In 1995, MOGE and CAITHNESS Resources Inc. of United States also performed reconnaissance study by collecting water samples from 10 hot springs out of 43 hot springs which MOGE has preliminarily investigated.

Surface temperature recorded during the preliminary investigation on 43 hot springs indicate that the temperature ranges from 26.7°C (80°F) to 65.6°C (150°F).

(c) Solar

Producing energy from solar for the development of rural area is one of the priority areas of energy research . New Energy and Industrial Technology Development Organization (NEDO) of Japan performed in 1997 a study on renewable energy in Mekong Basin Countries and assessed that Myanmar has potential available Solar Energy of 51973.8 Terrawatt hour per year.

Research works on utilization of Solar Energy by Myanma Science, Technology and Research Department (MSTRD) of the Ministry of Science and Technology and Physics Department of the Yangon University under the Ministry of Education.

Some experimental installation of Photo-voltaic Power Systems in collaboration of Energy Planning Department have been performed in 1997 by Royal Thai Energy Industry and ESCAP Office and also by Energy Services and Income-Generating Opportunities for the Poor (Project-ENSIGN).

New Energy and Industrial Technology Development Organization (NEDO) of Japan also installed Wind and Solar measuring instruments in collaboration with Department of Electric Power and Myanma Electric Power Enterprise , feasibility study made on Solar-Wind Power Hybrid System in 1999.

(d) Wind

NEDO of Japan performed in 1997 a study on renewable energy in the Mekong Basin Countries and assessed that Myanmar has potential available Wind Energy of 365.1 Terrawatt hour per year.

Judging from existing available Wind data collected by Department of Meteorology and Hydrology (DMH), western part of the country is the potential area for development of Wind energy. Evaluation and study on wind resources using modern data acquisition systems are carried out since 1998.

NEDO also installed Wind and Solar measuring instruments in collaboration with DEP and MEPE and a feasibility study made on Solar-Wind Power Hybrid System in 1999.

Research works are being carried out to construct 10 KW wind turbine which provides sufficient electrical power for one village including 200 houses.

(e) Biofuels

To alleviate the dependence on import of liquid fuel, to overcome the current energy situation and to minimize the Global Warming condition, every countries effort to search ways and means of appropriate technology for renewable energy within the country.

Ministry of Energy issued specification for Biofuels and take responsibility of monitoring the distributed Biofuels' specification is acceptable or not. Plan is drawn for Biofuels distribution and preparing the Notification to be issued , for private sector involvement in Biofuels handling, storage and selling as per regulations and procedures.

As per Government's guidance for development of the Biodiesel production, Jatropha Curcas plants are grown in homesteads and cultivable land to use its oil as alternative fuel. It is planned to plant 7 million acres of Jatropha Curcas in every State and Division of the country within 5 years. This program is still on going. By the time the programme is fully on stream, Myanmar should be producing Jatropha Oil annually.

The present status of Ethanol production from sugarcane in Myanmar is large scale conducted by private sector. One of the private companies, has installed an alcohol distillation unit, capacity of 11 million gallons anhydrous ethanol per annum and already produced 860,000 gallons of anhydrous ethanol from sugarcane. Private companies are planning cassava and sweet sorghum in large scale for ethanol production.

In an unprecedented shift, the world cereals reserves are depleting and food supply is dwindling rapidly with food prices soaring to highest levels. With population growth , climate change, Biofuels and Fossil fuel prices are major factors contributing toward increase in global food prices. Already unusual weather events linked to climate change make to decrease production in major exporting countries.

The Government is making great efforts not only to ensure sufficiency of rice for country's population of 57.65 million people but also to share the surplus with needed countries. In 2007-2008 over 20 million acres of paddy were cultivated producing over 31.5 million metric tons. With the consumption of a little over 19.8 million metric tons at the rate of 206kg per person per annum, Myanmar has the total surplus of 11.7 million metric tons of paddy equivalent to about 7 million metric tons of milled rice. Myanmar still has 14.8 million acres of arable land yet to be utilized and rich water resources.

The Government is making arrangement to reduce the CO_2 emission by increasing natural gas utilization in industrial sector and power generation, by converting Gasoline, Diesel and LPG vehicles to CNG vehicles and also using Biofuels.

TO PROMOTE ENERGY EFFICIENCY AND CONSERVATION

Myanmar has abundant indigenous energy resources and measure are yet to be taken to utilize systematically, in order to have a sustained development of country's economy.

As the country's economy has been growing, the demand for energy is rapidly increasing than can be supplied. Initiatives are to be taken for promotion of energy conservation programme both at the supply side and consumer side.

The Promotion of Energy Efficiency and Conservation (PROMEEC) Project was started in 2000, and its on the ninth year of implementation . Phase-1 and Phase-2 was successfully completed in 2003 and 2008 respectively.

The Government has initiated the two administrative actions for government offices and vehicles such as all government building to use daylight for illumination during office hours as much as possible , all government vehicles have to observed two dry days a month except emergency circumstances and vehicles on duty and a high-level inspection team is constantly monitoring the compliance to the government energy conservation initiative .

TO PROMOTE USE OF ALTERNATIVE FUELS IN HOUSEHOLD

Myanmar having a tropical climate with three general seasons is richly endowed with forest resources. According to the Forest Resource Assessment in 2005 , 49% of the total land area (32.2 million hectares) is covered with different types of forest in Myanmar.

The 1995 Myanmar Forest policy stipulates to keep 30% of the total land area of the country PFE (Permanent Forest Estate) and 5% under PAS (Protected Area System) .

As a developing and agricultural based country , woodfuel and charcoal are the main sources of the bio – energy used in Myanmar . About 76% of total population are residing in rural areas and mainly used the woodfuel for cooking. The urban population has been using charcoals , accounting for 4% - 6% of the total woodfuel .

In order to protect the environment and climatic conditions of the country , deforestation measures are seriously being undertaken by the government , especially in the dry and arid areas of the country . Forest Department has taken measures for meeting bio-energy

demand of country within its capacity by establishing fuelwood plantations and community forests .

On the other hand , the department has encouraging use of energy in efficient way by distributing efficient stoves and use of alternative energy sources such as agricultural wastes and briquettes as woodfuel substitutes.

As a measure to use alternative fuel , emphasis has been made to use Liquefied Petroleum Gas households . The Forest Department has established a total of 0.93 million ha of forest plantations until 2008 , of which 22.8% are the fuelwood plantations for village supply .

Dissemination of efficient stoves was initiated by Forest Department as project activities which were implemented in cooperation with UNDP/ FAO in 1990s . FD has been implementing the Bago Yoma Greening Project (Since 2004-2005) and project activities include dissemination of efficient stoves and utilization of woodfuel substitutes such as briquettes and agricultural wastes .

Generally , although the project activities are being implemented and monitored by FD , The activities like dissemination of of efficient stoves and utilization of woodfuel substitutes are mainly being implemented by Dry Zone Greening Department , Ministry of forestry .

Up to January 2009, 0.2 Million of efficient stoves including A1 stoves and rice-husk stoves has been distributed free of charge or at an affordable price with the object of reducing energy waste under Bago Yoma Greening Project .

A1 stove can save 40% of woodfuel . Similarly , the project achieves in encouraging production and utilization of 4.3 million briquettes and use of 0.56 million ton of agricultural wastes as alternative energy.

(2)ENERGY DEMAND AND SUPPLY

Myanmar is a developing country and its economy is based mainly on agricultural products. Most of the GDP is coming from agriculture sector which is about 40% where as industrial sector is contributing 10% during early 1990s. As such , the consumption of crude oil / petroleum products has never been very large before 1988-89. Myanmar has launched the Market Oriented Economy in 1989 , the state has made tremendous efforts to improved the nation's basic infrastructure such as roads , bridges , communication systems created many economic activities leading to increasing demand for energy .

The primary energy supply in Myanmar during 2001-02 to 2007-08 are as follows -

	2001-02	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**
Crude Oil & Petroleum	1991	1924	1924	1961	1756	1751	1753
Natural Gas	1033	1264	1428	1512	1480	1582	1775
Coal	71	76	123	196	351	501	558
Hydro Power	772	743	788	926	1154	1278	1416
Biomass	8036	8249	8615	8528	8691	9045	9280
Total	**11903**	**12256**	**12878**	**13123**	**13432**	**14157**	**14782**
Growth Rate		**(+)2.9%**	**(+)5.1%**	**(+)1.9%**	**(+)2.4%**	**(+)5.4%**	**(+)4.4%**

Energy consumption in Myanmar is mainly dependent upon traditional energy such as Fuelwood and Charcoal . Commercial energy (Crude Oil , Natural Gas , Hydropower and Coal) makes up of only 40% of the total energy consumption . Woodfuel energy constitutes as much as 60% to 65 % .

In 2007-2008 total energy consumption of Myanmar amounted to 14,782 KTOE where as Crude Oil at 1753 KTOE , Natural Gas at 1775 KTOE and Electric Power generated from Hydel sources at 1416 KTOE respectively .

The total supply and consumption amount in the last four year period has been significantly increased due to the infrastructure development , new investments , rising population and expension of human activities in the country.

Myanmar is richly endowed with both renewable and nonrenewable types of energy sources. The need for increased production of commercial energy is emphasized to meet the requirement of industrial development program.

To meet the increasing demand , the following efforts have been made to boost the current production of energy –

- The import volume of crude oil /petroleum products has to be reduced and at the same time administrative / management measures are taken to effect the efficient consumption of crude oil / petroleum products
- The government has been implementing awareness campaign for efficient and effective use of energy by publicizing the energy efficient slogans on the media
- The government is also implementing the substitution of natural gas for liquid fuel in the transport sector . So far a

total of over 25,000 vehicles have been converted to Natural Gas Vehicle.

- On the other hand , the government is guiding development programs in research on bio fuel such as Ethanol , Gasohol and Bio-diesel as an alternative energy to be used in Transport Sector

- In the electric power generation sector , the government is converting from liquid fuel based generation to natural gas based generation , more than 60% of domestic natural gas production are supplied to power generation plants . Furthermore the government is putting a higher priority to development of hydro power plant , so that hydel based generation will eventually become a based load generation

- The demand side measures are also taking into account in order to reduce the import quantity , the supply of products to the government sector was tightly controlled and allowed with respect to the work loads and project priorities

- For private sector the quota system is applied on monthly basis , as the government is heavily subsidized on the price of Motor Gasoline and High Speed Diesel.

- For private Industries and Manufacturing Sectors , the government is selling in US $ / FEC earned from their business without limiting the quantity

- For the time being, Myanma Petroleum Products Enterprise, under the Ministry of Energy is practicing the daily floating price mechanism based on Singapore Platt's Oil price

(3) MAJOR DIFFICULTIES AND BOTTLENECKS CURRENTLY FACED IN FORMULATING ENERGY POLICIES

- Measures for increased production of Commercial Energy to replace the Traditional Energy
- Acquisition of Modern Technology
- Acquisition of Financing Support
- Development programs in research and development on Alternative Energy (Ethanol, Gasohol, Biodiesel etc:)
- Arrangement to implement the Energy Efficiency and Conservation

(4) SUBJECTS I WOULD LIKE TO STUDY IN THE ORDER OF PRIORITY AND THE REASON

The subjects I would like to study and the reasons are as follows -

Introduction of Market Principle in Energy Field

Due to current financial crisis faced all over the world , Market Principles are important to formulate in Energy Sector . Therefore I would like to acquire sound knowledge so as to formulate the Energy Market Policies .

Survey Technique for Energy Statistics Data

In order to meet the day by day increasing demand, the guidelines of Survey Techniques are in need to collect the Energy Statistics Data .

Energy Demand Forecasting in the World

Energy demand has been rapidly increasing due to economic development , new investments, rising population, expansion of human activities in the country.

In order to meet the increasing demand, efforts are need to boost the current production of Energy. I believe that this lecture will surely provide more & more knowledge to focus the energy demand.

CONCLUSION

With the economic development and new investments in the country, demand for energy has been increasing . In order to cope with the increasing demand , utmost efforts are being made firstly to balance the supply – demand gap and to make plans for the fulfillment of future energy requirement .

Plans are in progress to construct Onshore Natural Gas Pipeline Network , so as to transport Natural Gas from surplus region to deficient region . On the otherhand , execution of plans to discover new energy resources will be put as high priority .

Natural Gas reserves in offshore area are being developed and produced . Plans are being laid to construct a pipeline from Myanmar offshore area to onshore area , to utilize offshore gas for domestic use. Also plans are underway to sell the Natural Gas from Shwe Project in Rakhine offshore area to China via pipeline to Myanmar- China border .

To meet the increasing electricity demand of the Country, more Hydroelectric Power Projects will be implemented and also Electricity Power Plant utilizing Natural Gas will be utilized as step gap measure before Hydro Electric Power Plants are operable.

Plans are in progress to perform more research and experimental works to utilize renewable energy sources such as

Geothermal, Wind and Solar in place of nonrenewable energy sources.

Being a member of ASEAN , In order to strengthen the regional integration of economic cooperation, Myanmar is actively participating in the Energy Sector Cooperation Programs.

ENERGY POLICY IN MYANMAR

お問合せ：report@tky.ieej.or.jp