

## Chapter 3

# Policies and Strategies Related to Energy Development Planning in Myanmar

### 1. Introduction

Myanmar is endowed with rich natural resources in quantities that, if fully developed, would be sufficient to meet most of the country's daily energy needs. Myanmar's energy policy is generally aimed at ensuring energy independence by increasing national production of available primary energy resources through intensive exploration and development activities. It also acknowledges electricity as the main power source driving economic development, and addresses the need to generate and distribute more power in terms of greater volume, density, and reliability. The Myanmar Energy Master Plan (MEMP) 2015, so far the only strategic policy document being used to guide future energy-related policies, also advocates the utilisation of water resources as a source of renewable energy for generating electricity, thus saving non-renewable sources such as fossil fuels for alternative and future use. The MEMP is a mixed guiding strategy rather than a policy itself because Myanmar is in the process of formulating separate policies for both the upstream and downstream energy sectors. At present, Myanmar's general strategy encourages energy self-sufficiency and independence. The MEMP highlights the current energy situation, predicts future energy consumption, and draws several policy implications.

This chapter reviews key strategies and policies related to energy development in Myanmar, especially in the gas sector. It also looks at associated policies, such as electricity access and energy efficiency and conservation, which aim to (i) save energy through effective energy management, (ii) reduce energy consumption, and (iii) minimise harmful environmental impacts through the utilisation of new and renewable energy sources (especially solar and wind, which are abundant in Myanmar).

Myanmar faces many obstacles as it works to develop comprehensive energy policies that will guide the sustainable use of natural resources, and will stimulate infrastructure investment quickly enough to secure an adequate energy supply to meet the rapidly growing demand. It is critically important to develop a strategy for the utilisation of Myanmar's domestic resources (including natural gas, oil, coal, and renewables) to enable the country to plan energy infrastructure investment. It is also necessary to prepare a policy that will ensure the best energy mix possible, such as the amount of coal and gas used for generating power, and the amount of gas used for transportation, residential, and commercial purposes (such as cooking and heating). Sooner or later, Myanmar's natural gas, coal, crude oil, and renewable energy resources will play a significant role in the country's energy mix, and will help ensure Myanmar's energy independence and security.

## 2. National Energy Policy

The objectives of Myanmar's overall national energy policy are as follows:

- (i) To invite local and foreign investment in the extraction and utilisation of natural resources to meet the nation's energy needs while minimising environmental impacts; following the Health, Safety, and Environment Policy; and practicing corporate social responsibility activities;
- (ii) To adopt plans that prioritise energy efficiency and conservation;
- (iii) To define energy pricing by observing the energy pricing policy of the Association of Southeast Asian Nations (ASEAN) and international market to ensure affordable and reliable energy prices for end users and customers;
- (iv) To formulate nationally appropriate energy standards and specifications that comply with ASEAN and international practices;
- (v) To promote private sector participation or privatisation in keeping with the state's economic policy;
- (vi) To formulate both short- and long-term plans to increase the power-generation capacity of hydropower, renewable energy sources, and thermal power plants, as well as other feasible alternative energy sources;
- (vii) To encourage regional cooperation for energy by expanding the power grid and pipeline network to neighbouring countries;
- (viii) To implement full energy independence through short- and long-term plans to stabilise power generation;
- (ix) To establish an energy database system, and to draw and execute energy supply plans after surveying the nation's annual energy demand;
- (x) To stockpile energy to boost energy security; and
- (xi) To formulate short- and long-term plans to fulfill the country's requirements for petrochemical products by constructing innovative refineries and plants.

The objectives of Myanmar's petroleum sector policy are:

- (i) To fulfill domestic energy requirements as a priority;
- (ii) To implement sustainable energy development;
- (iii) To promote wider use of new and renewable energy sources;
- (iv) To promote energy efficiency and conservation;
- (v) To promote the household use of alternative fuels;
- (vi) To use discovered crude oil and natural gas resources effectively in the interests of the entire nation, including the regions where the resources are discovered; and
- (vii) To promote more private participation in the energy sector.

The objectives of Myanmar's electric power sector policy are:

- (i) To expand the national power grid to utilise effectively power generated from available energy resources such as hydropower, wind, solar, thermal, and other alternative sources;
- (ii) To generate and distribute electricity using advanced technologies, and to boost and enhance private participation in regional distribution activities;
- (iii) To conduct environmental and social impact assessments for power generation and transmission in order to minimise these impacts;
- (iv) To restructure the power sector with cooperation from boards, private companies, and regional organisations to encourage more participation from local and foreign investors and the formation of competitive power utilities; and
- (v) To formulate electricity acts and regulations with the assistance of local and international experts to align more closely with the current open economic policy.

The objectives of Myanmar's coal sector policy are:

- (i) To study the coal policies of ASEAN member countries;
- (ii) To conduct a comparative study of coal resources, development programs, and supply and demand in Myanmar and other ASEAN member countries;
- (iii) To collaborate with ASEAN member countries in coal sector development projects;
- (iv) To implement advanced technology for the use of coal instead of firewood to prevent deforestation;
- (v) To collaborate with ASEAN member countries in constructing coal-fired power plants equipped with clean coal technology to supplement energy requirements;
- (vi) To collaborate with ASEAN member countries in developing coal-based industry;
- (vii) To collaborate with ASEAN member countries in developing quality specification laboratory techniques and coal marketing techniques to promote the trading of coal amongst countries;
- (viii) To coordinate with other relevant ministries in Myanmar and other ASEAN member countries in carrying out environmental impact assessment studies for coal projects;
- (ix) To be responsible for and lead the collaboration program with relevant countries;
- (x) To allow coal exports with the approval of the Government of Myanmar;
- (xi) To exploit coal resources safely using the open pit and underground methods;
- (xii) To reuse old mines after the coal has been extracted.

The objectives of Myanmar's renewable energy sector policy are:

- (i) To formulate a national renewable energy policy, strategy, and roadmap based on international practices and in cooperation with the concerned ministries;
- (ii) To enhance research projects;
- (iii) To train local practitioners and transfer technology to small and medium-sized enterprises;
- (iv) To develop renewable energy standards and provide testing services to the renewable energy market; and
- (v) To strengthen international cooperation and collaboration in the renewable energy sector.

Myanmar's initial energy efficiency target was a 5% reduction in total energy consumption from 2005 to 2015, and an 8% reduction by 2020 to align with the targets set by ASEAN. The energy policy framework aims to:

- (i) Maintain Myanmar's energy-independent status,
- (ii) Promote the wider use of new and renewable sources of energy,
- (iii) Promote energy efficiency and cooperation, and
- (iv) Promote the use of alternate fuels for households.

### **3. Institutions Overseeing the Oil and Gas Sector**

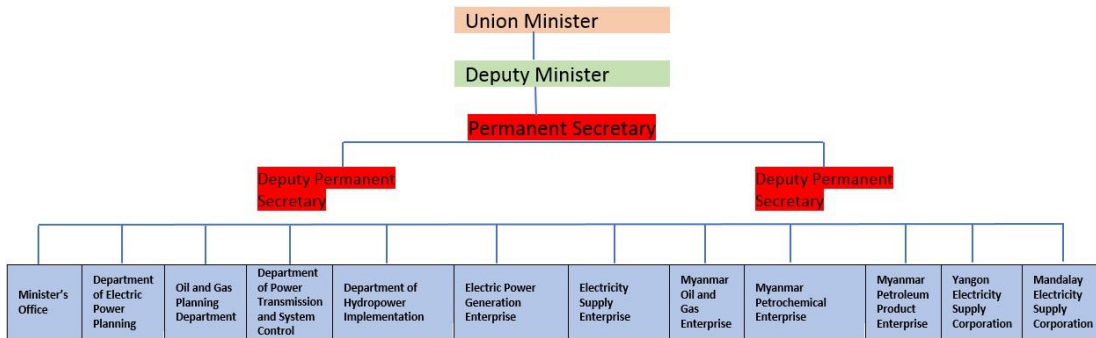
The Ministry of Electricity and Energy is responsible for the oil and gas sector, and for generating electricity and power. In terms of oil and gas, the Ministry of Electricity and Energy oversees three state-owned enterprises: Myanma Oil and Gas Enterprise (MOGE), Myanmar Petrochemical Enterprise, and Myanmar Petroleum Products Enterprise. It also oversees the Oil and Gas Planning Department. The natural gas sector is the responsibility of MOGE, which is entirely state-owned. MOGE is also responsible for the upstream petroleum subsector, and has four basic responsibilities: (i) to explore and produce oil and gas using its own resources, (ii) to supply domestic natural gas by constructing its own pipelines, (iii) to supply compressed natural gas as a substitute fuel for vehicles, and (iv) to participate in and oversee production-sharing agreements in cooperation with foreign oil companies.

### **4. Policy Related to the Oil and Gas Sector**

The laws and regulations that govern Myanmar's oil and gas sector mostly date back to British legal codes in pre-independence Indian statutes. A few of these laws and regulations remain important and applicable, including the Oilfield Act (1918); Oilfield Rules (1936); Petroleum Rules (1987); Essential Supplies and Services Law No. 13/2012; Oilfields (Labor and Welfare) Act (1951); Petroleum Resources (Development Regulation) Act (1957); Law Amending the Petroleum Resources (Development Regulation) Act (1969); Myanmar

Petroleum Concession Rules (1962); Petroleum and Petroleum Products Law (2017); Hand Dug Well Law (2017); and Notification No. 100/2013, relating to the import, storage, transportation, and distribution of petroleum and products.

**Figure 3.1: Organisational Structure of the Ministry of Electricity and Energy**



Source: Government of Myanmar, Ministry of Electricity and Energy (2015).

MOGE plays an important role in Myanmar’s economy. According to the State-Owned Economic Enterprises Law, the government has the sole right to carry out exploration for, extract, and sell petroleum and natural gas, and produce products of the same. However, the government may, in the interest of the state, permit such activities to be carried out jointly between the government and a private or foreign investor, through MOGE, or solely through any other organisation. MOGE has recently tried to promote private participation in Myanmar’s oil and gas sector. Foreign investment has been attracted by production-sharing contracts and improved petroleum recovery contracts. Under the current tax policy, companies in the oil and gas sector are subject to a 25% tax on profits under the Income Tax Law, and a 12.5% royalty on all available petroleum is payable by the contractor.

According to the State-Owned Economic Enterprises Law, MOGE is responsible for the exploration and production sector under production-sharing contracts with private companies. Several rules and regulations were issued in 2017 to guide investments; these include the MIC Notification No. 35/2017, or the Foreign Investment Rule (passed on 30 March); MIC Notification No. 10/2017, or the Designation of Development Zones (passed on 22 February); MIC Notification No. 13/2017, or the Classification of Promoted Sectors (passed on 1 April); and MIC Notification No. 15/2017 regarding types of restricted activities (passed on 10 April).

## 5. Liquid and Gaseous Fuel

In 2015, natural gas accounted for 45% of all primary energy production. Natural gas has mainly been used for domestic electricity production and industrial purposes, whereas most

gas produced in Myanmar was exported (MEMP, 2015). Currently, most gas produced off-shore is exported to Thailand and China. However, locally produced gas could also be allocated to pharmaceutical and chemical industry processes, fertiliser production, the production of refined petroleum products, power production, fuel for passenger vehicles, and fuel for cooking. In recent years, the government has considered establishing a terminal to receive imported liquefied natural gas (LNG) to supplement domestic natural gas supplies. It has also considered developing and upgrading existing gas pipelines and distribution networks in keeping with the gas master plan, which outlines the need for gas infrastructure in Myanmar.

In addition, biodiesel and bioethanol production in Myanmar is currently limited to a few production facilities; several other existing bioethanol facilities have stopped production due to a lack of subsidies, and no information indicating the construction of new facilities has been found. So far, only pilot-scale biodiesel facilities have been built in Myanmar, which are producing small amounts of biodiesel for use by agricultural machinery.

## **6. Refined Oil Products**

There are three small refineries currently operating in Myanmar, but they are old, their operating efficiency is low, and their production is insufficient to meet the increasing demand. Hence, the only feasible strategy for liquid fuels must involve the construction of new capacity and/or imports. However, if Myanmar chooses to construct new refineries, the country has the right to use the Sino-Burma pipeline (with a transfer capacity of 50,000 barrels per day), which could be used as a feedstock for a potential new refinery. An inland refinery adjacent to the pipeline could create a competitive advantage by locating production close to consumption, which would reduce transportation costs.

## **7. Natural Gas**

The gas supply–demand projection shows that the outlook is tight (see Chapter 4). However, if natural gas supplies do not develop as anticipated, fuel imports can be used to supplement the supply for the transportation and agriculture sectors, in order to release the capacity required by the industry and power sectors.

Based on the MEMP 2015, three different scenarios involving different energy mixes are being considered (Table). Under Scenario 3 (power resource balance), the total installed capacity will reach 23,594 megawatts by 2030 (the lowest of the three scenarios), with hydropower accounting for 38% of generation, coal 34%, gas 20%, and renewables (solar, wind, etc.) 8%.

**Table 3.1: Installed Capacity and Power Supply Scenarios for 2030**

No.	Scenario 1 (Domestic energy consumption)			Scenario 2 (Least cost)		Scenario 3 (Power resources balance)	
	Energy resources	Installed capacity		Installed capacity		Installed capacity	
		MW	%	MW	%	MW	%
1	Hydropower (large)	12,147	42	12,147	43	1,412	6
2	Hydropower (small and medium)	6,891	24	6,891	24	7,484	32
3	Gas	4,986	17	2,484	9	4,758	20
4	Coal	2,760	10	5,030	18	7,940	34
5	Renewables	2,000	7	2,000	7	2,000	8
<b>Total</b>		<b>28,784</b>		<b>28,552</b>		<b>23,594</b>	

MW = megawatt.

Source: Government of Myanmar, National Energy Management Plan (2015).

If Myanmar chooses to pursue Scenario 3, large investments will be necessary to secure a gas supply from domestic sources in addition to importing LNG, and it will be necessary to develop LNG-receiving terminals and other gas pipelines and distribution networks. As domestic gas prices are fully regulated, and any future LNG terminal would deliver gas at international prices, the government would incur significant costs if it continues to subsidise gas prices partially for the power sector. Instead, gas policy could be based on international LNG market prices to increase the viability of an LNG terminal if one is developed. In this case, the general strategy would be to reserve gas for industry and the power sector, and to meet other demands by alternative means. The decision to pursue alternatives, such as an LNG terminal, can be decided as a matter of government policy to secure the natural gas supply-demand balance in the medium and long term (through 2040). Using biofuels (biodiesel and bioethanol) for transportation could notably reduce the use of diesel and gasoline.

## 8. Electrification and Related Policies

Myanmar is the largest country in mainland Southeast Asia, but it has one of the lowest population densities in the region. This creates a diseconomy of scale for the development and expansion of a conventional centralised electricity grid. Electrification varies widely between urban and rural areas. Although about 27% of the country's 64,346 villages are electrified, only about 7% are covered by the national power grid (Ngwe, 2014). Considering its abundant and broadly distributed renewable energy resources (including biomass, hydropower, solar, and wind), Myanmar can accelerate on- and off-grid electrification to deliver universal electricity much more quickly than would be possible through conventional centralised generation and grid expansion.

The Government's National Electrification Plan 2015, which was developed with technical assistance from the World Bank, aims to electrify 7.2 million households and achieve universal access to electricity by 2030. The plan calls for \$5.8 billion in investments over the next 15 years to extend the distribution grid and electrify off-grid areas. The government has also developed the Myanmar Energy Master Plan with technical assistance

from the Asian Development Bank, and a Power Sector Master Plan (for the generation and transmission subsectors) with assistance from the Japan International Cooperation Agency. After decades of operating in a closed economy, the energy sector's institutional and regulatory framework is fragmented, particularly in the sphere of rural electrification. Having realised these challenges, Myanmar has been undertaking reform in all sectors, including the energy sector, since the 2015 national election. Major energy-related master plans in Myanmar as seen in the most recent developments include the following:

- (i) The MEMP 2015 is a comprehensive energy strategy document covering all energy-related sectors. The MEMP 2015 was formulated by utilising the inputs of studies and research carried out by multiple institutions and supported by various players, including the National Electrification Plan (NEP) by the World Bank, and the Power Sector Master Plan by the Japan International Cooperation Agency.
- (ii) The NEP 2015 targets universal electricity access or 7.2 million new connections by 2030. The plan involves a two-pronged approach: the rapid extension of the national grid, and the use of off-grid electricity (including modern solar home systems and mini-grids). The first phase of the plan calls for 1.7 million households to be connected to electricity by 2020 and an investment of approximately \$700 million. The plan started with an initial fund of \$400 million from the World Bank's International Development Association, of which \$80 million was earmarked for off-grid electrification. Total grid investment could be as much as \$6 billion.
- (iii) The Power Sector Master Plan 2013–2030 highlighted strategies to ensure a sustainable, affordable, and secure energy supply for Myanmar over the longer term. The plan also aims to develop a mix of energy sources to provide a stable and reliable energy supply through 2030, in which coal-fired power generation as a share of the total energy mix will increase from 2% in 2015 to 20% in 2030. The plan targets the following primary energy mix by 2030: 33% biomass, 22% oil, 20% coal, 13% gas, 11% hydropower, and 1% renewable energy. The plan estimates that Myanmar's energy sector will need \$30 billion–\$40 billion over the next 15–20 years.
- (iv) The National Energy Efficiency and Conservation Policy, Strategy and Roadmap for Myanmar 2015 was supported by the Asian Development Bank and Japan Fund for Poverty Reduction. Based on the calculated potential energy savings, the National Energy Efficiency Policy targets the following objectives by 2020, using 2012 as a baseline: (i) to reduce the national electricity demand by 12%, (ii) reduce biomass consumption by 2.3%, and (iii) reduce national carbon dioxide emissions by 78,690 tonnes. To reach the overall energy efficiency objective, it is necessary to develop a strategy to save energy for all important energy-intensive sectors such as industry, transport, commercial, and residential sectors.



If Myanmar follows the National Electrification Plan, it will electrify almost 100% of households by 2030. This implies a huge installed generation capacity from different fuel-based generators. These will not be limited to coal, gas, and hydropower; instead, small distributed energy systems such as renewable energy will play a significant role in providing electricity access. Off-grid renewable energy and distributed energy system generators are expected to account for 7%–10% of the generation mix.

Currently, about 7.2 million households are not yet connected to modern electricity sources. The NEP 2015 primarily addresses this issue with the ultimate aim of achieving 100% electrification in Myanmar. The NEP also recognises that distributed energy systems require off-grid electricity. It is estimated that about half a million new connections will be needed every year to meet the full electricity demand. This is an enormous task and will require huge levels of investment and coordination. The plan should be realistic and mention distributed energy systems for both off-grid and on-grid distributed energy systems in Myanmar.

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