

Chapter 2

Electric Power Policy and Market Structure in ASEAN Member States

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Chapter 2

Electric Power Policy and Market Structure in ASEAN Member States

This chapter will provide an outline of the energy policies of the 10 ASEAN member states (Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam) and will look at the structure of their electricity markets, the circumstances relating to the liberalisation of their electricity markets, and the policy measures they use to achieve their electricity mix targets.

The roles of state-run electricity companies and independent power producers (IPPs) in the electricity sectors of the 10 ASEAN member states are listed in Table 2-1.

The information that has been gathered clearly shows that the electricity generation sector in many of the nations in the ASEAN region has been liberalised and that IPPs have entered these markets. Note, however, that many of these countries use a single buyer system in which state-run companies purchase all of the electricity generated by IPPs etc. and sell it on a monopolistic basis to electricity distribution companies. The single buyers (state-run companies) in such systems are able to select electricity sources. Conversely, in Singapore and the Philippines, where progress has been made with overall electricity market liberalisation, the involvement of the state has become limited.

Table 2-1: Electricity Market Structures in ASEAN Member States

| Country | Market Structure |
|--|---|
| Brunei Darussalam | <ul style="list-style-type: none"> - The electricity market has not been liberalised. The Department of Electrical Services (DES) and the state-run Berakas Power Company (BPC) carry out electricity source development. |
| Cambodia | <ul style="list-style-type: none"> - The state-run public corporation Electricité du Cambodge (EDC) accounts for 6.4% of total electricity generation capacity. It supplies electricity it has itself generated to major cities and also supplies electricity from independent power producers (IPPs) and electricity imported from neighbouring countries. - On the other hand, IPPs supply electricity to regions other than the major urban centres and play a major role in electricity generation. |
| Indonesia | <ul style="list-style-type: none"> - The state-run Perusahaan Listrik Negara (PLN) created a system of financial independence-oriented internal business units. - IPPs are developing electricity sources in anticipation of the need to satisfy rapid increases in demand for electricity. |
| Lao People's Democratic Republic (Lao PDR) | <ul style="list-style-type: none"> - Electricite du Laos (EDL) generates electricity for the main grid in the Lao PDR and exports excess electricity to Thailand, while also importing electricity from Thailand and Viet Nam into some areas which are not connected to the interconnected transmission system. They also invest in existing IPPs by holding a portion of their shares etc. - IPPs can, upon receiving permission from the government, participate in electricity development using the BOT and BOOT approaches,¹ and their electrical facilities are then transferred to the government 20–30 years later. - As of 2015, the proportion of electricity generated by IPPs was overwhelmingly large, accounting for 87% of electricity generation capacity. |
| Malaysia | <ul style="list-style-type: none"> - In Peninsular Malaysia and the states of Sabah and Sarawak, the companies Tenaga Nasional Berhad (TNB), Sabah Electricity Sdn. Bhd. (SESB), and Syarikat SESCO Berhad (SESCO) operate as a vertically integrated business with regional monopolies. - In addition to this, there are a large number of IPPs licensed by the Energy Commission (EC). |

| Country | Market Structure |
|-------------|---|
| Myanmar | <ul style="list-style-type: none"> - The jurisdiction of the Ministry of Electric Power No. 1 covers everything from the drafting of hydroelectricity-related development plans to the operation of electric power plants. The jurisdiction of the Ministry of Electric Power No. 2 covers the construction and operation of thermal power plants, as well as electricity transmission, distribution, and retail. - IPPs participate in the power generation sector through joint ventures and BOT frameworks after receiving permission from the Myanmar Investment Commission. - Myanma Electric Power Enterprise (MEPE) is a single buyer that purchases electricity from all power generation companies. - There are two distributors: Yangon Electricity Supply Board (YESB) and Electricity Supply Board (ESB). |
| Philippines | <ul style="list-style-type: none"> - Liberalisation is being carried out in the electricity sector and the electricity generation sector is operated by the state-run National Power Corporation (NPC) and IPPs. - It is the policy of the NPC not to develop any new sources of electricity other than small-scale sources for the purpose of electrification of rural areas. - IPPs are the primary developers of electricity sources. |
| Singapore | <ul style="list-style-type: none"> - Singapore's electricity generation sector has been liberalised and the country has no state-run electricity companies. - IPPs receive business licences from government organisations to develop electricity sources. |
| Thailand | <ul style="list-style-type: none"> - The state-run Electricity Generating Authority of Thailand (EGAT) purchases electricity from IPPs, small power producers (SPPs), and neighbouring countries (Lao PDR and Malaysia), supplies this on a wholesale basis to distribution companies (Provincial Electricity Authority (PEA) and Metropolitan Electricity Authority (MEA)), and provides electricity directly to major electricity consumers. - IPPs and SPPs engage in the development of electricity sources in order to satisfy the rapidly increasing demand for electricity. |

| Country | Market Structure |
|----------|--|
| Viet Nam | <ul style="list-style-type: none"> - The state-run electricity group Vietnam Electricity (EVN) purchases electricity from IPPs etc. and sells this domestically on a monopolistic basis. - Any company operating an electricity generator with an output of 30 megawatts or more is able to enter the market, and participation can be direct or through an EVN representative using a BOT-type framework. |

Note: *BOT stands for ‘build-operate-transfer’ and is a framework in which private sector companies are contracted to build and operate facilities and then, after a certain period, the property rights are transferred to a public department. BOOT stands for ‘build-own-operate-transfer’.

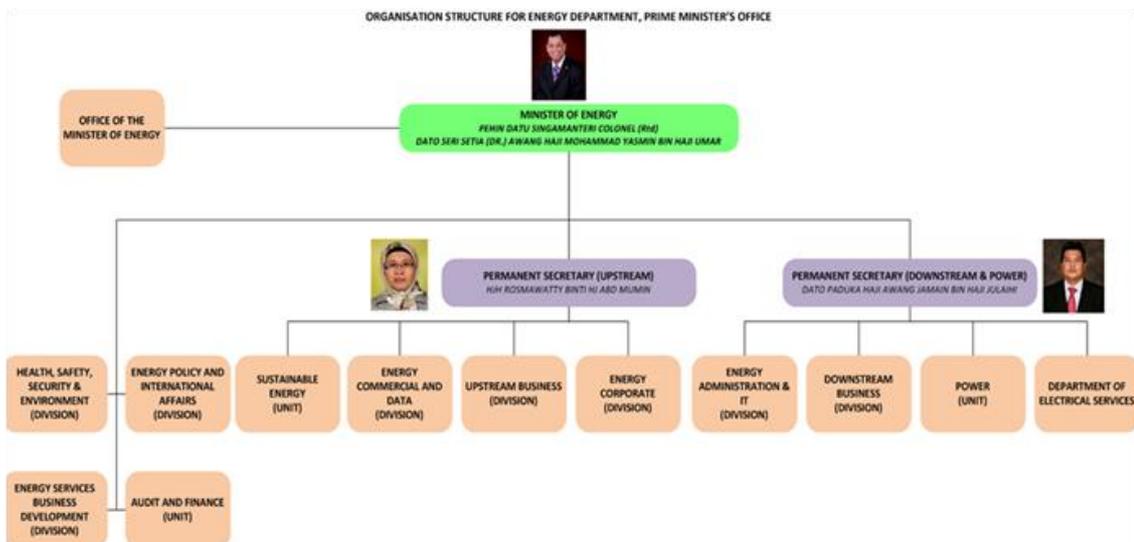
Source: Study team.

1. Brunei Darussalam

1.1 Electric Power Policy

The Ministry of Energy (MOE), which resides within the Prime Minister’s Office, is in charge of all energy policies in Brunei Darussalam.

Figure 2-1: Regulatory Framework of the Energy Sector in Brunei Darussalam



Source: Government of Brunei Darussalam homepage.

In 2004, the Government of Brunei Darussalam formulated a 30-year long-term development plan and a national vision task force. In January 2008, the 30-year vision called Wawasan Brunei 2035 was launched, and a 10-year development strategy and policy framework called Outline of Strategies and Policies for Development 2007–2017 went into effect.

According to the MOE's Energy White Paper 2014, the government defined the following strategic goals and outlined a plan to expand the 2010 oil and gas upstream and downstream activities to energy services companies, electric power, renewable energy, and other energy-related businesses by 2035, and to boost profits in the process:

- Strengthen and grow oil and gas upstream and downstream activities.
- Ensure safe, secure, reliable and efficient supply and use of energy.
- Maximise economic spin-off from the energy industry.

It also defines a 6-percent annual target growth for the energy sector between the 2010 and 2035 rates (Brunei Ministry of Energy, 2014).

1.2 Electric Power Market Structure

a. Market structure

Electric power businesses are handled by the Department of Electrical Services (DES), an electric utility company situated under the MOE, and Berakas Power Company (BPC), the electric utility company in charge of providing power to the Sultan's palace, other royal facilities, and the military. In addition, three oil and gas companies, Brunei Shell Petroleum (BSP), Brunei Liquefied Natural Gas (BLNG), and Brunei Methanol Co. (BMC), possess their own power generation facilities and sell any excess electricity generated to DES.

b. Deregulation

Although the aforementioned three companies are involved in the power generation sector, the remaining sectors have not been deregulated. We have yet to obtain any detailed information pertaining to the deregulation of the electricity market.

c. Mechanism of policy implementation

The electricity market has not been deregulated, and the two state-run companies, DES and BPC, are developing electric power sources in accordance with MOE's energy policies. For this reason, investments in power plants are the direct reflection of the electric power mix that the government aims to achieve.

2. Cambodia

2.1. Electric Power Policy

In Cambodia, the Ministry of Mines and Energy (MME) formulates energy policies and electric power development plans. Cambodia's Energy Sector Development Policy released in October 1994 set the following four goals:

- Provide an adequate supply of energy throughout Cambodia at a reasonable and affordable price.
- Ensure a reliable and secured electricity supply at a reasonable price to facilitate investment in Cambodia and the development of the national economy.
- Encourage exploration and environmentally and socially acceptable development of energy resources needed for supply to all sectors of the Cambodian economy.
- Encourage the efficient use of energy and minimise the detrimental environmental effects resulting from the supply and consumption of energy.

The Government of Cambodia's National Strategic Development Plan 2014–2018 aims to generate 10,823 gigawatt-hours (GWh) of power and to increase per capita annual power consumption to 544 kilowatt-hours (kWh) by 2018 (Royal Government of Cambodia, 2014). With regard to developing power sources, the development plan emphasises boosting power supply capacity by stepping up competitiveness, promoting economic growth, strengthening energy security, and raising the standard of living. It lists the following as priority targets:

- Further expanding the capacity of low-cost and high-tech electricity production and ensuring distribution to respond to development needs.
- Further encouraging the private sector to invest in electricity generation, and transmission and distribution infrastructure.
- Stepping up the implementation of the electrification strategy to realise the goal that ‘by 2020, all villages in the Kingdom of Cambodia will have access to electricity’.
- Further supporting the rural electrification fund aimed at achieving equitable electricity access for the population.
- Pursuing rationalisation measures for electricity consumption by reducing power tariffs during off-peak hours.
- Stepping up the exploration and commercialisation of the oil and gas sector which has enormous potential for ensuring energy security and economic development.
- Further strengthening institutional capacity [and] human resources.
- Continuing active involvement in energy cooperation under the regional framework.

With the action plan for the 5-year Power Development Plan (2012–2016), Cambodia aims to reduce the cost of power generation and increase the electrification rate using the following methods:¹

- Import cheaper electricity from neighbouring countries.
- Build and bring online large-scale hydroelectric, coal-fired, and biomass power generation facilities.
- Improve the transmission network and inter-regional links.
- Expand the power distribution network nationwide.

¹ Based on documents provided by the Ministry of Mines and Energy (November 2014).

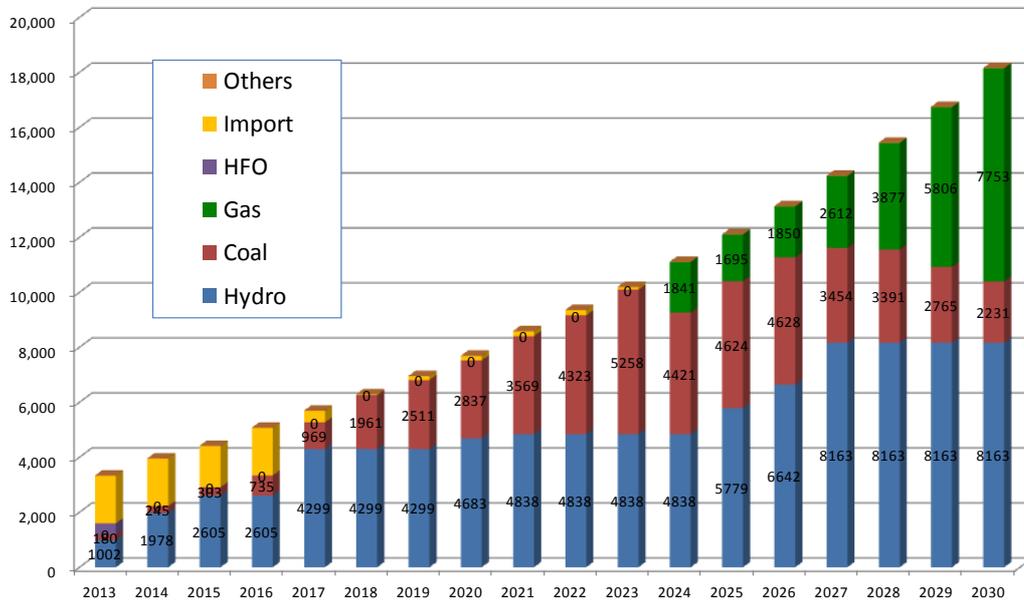
Cambodia's Power Development Plan is currently being implemented in accordance with the Master Plan on Power Sector Development of the Kingdom of Cambodia, which was formulated in 2008 by the state-run Electricité du Cambodge (EDC). The master plan lists the following objectives:

- Increase hydroelectric and coal-fired power generation, in addition to diesel power generation.
- Establish a power grid with links throughout Cambodia.
- Electrify outlying regions.
- Discuss an electricity trading scheme with Viet Nam, Thailand, the Lao PDR, and other ASEAN member states.
- Promote commercialisation and injection of private capital.
- Formulate policies for competition and regulatory measures in the electricity market.

Having reached 691.72 megawatts (MW) in 2013 and 805.84 MW in 2014, the maximum power demand in Cambodia continues to increase year after year. Meanwhile, although the supply capacity accounts for 1,986 MW in 2015, half of that came from hydroelectric power, and facility usage rates remained under 50 percent. According to the Master Plan on Power Sector Development of the Kingdom of Cambodia, the Cambodian government plans to diversify and expand the power mix, after which time it will improve transmission infrastructure. By doing this, it aims to move away from its current over-reliance on imports, so that by 2030 gas will account for half of the electricity supply, hydroelectric power and coal will account for the rest, and the electrification rate will reach 70 percent.

Figure 2-2: Prospective Energy Supply Mix in Cambodia

(Unit:MW)



HFO = heavy fuel oil.

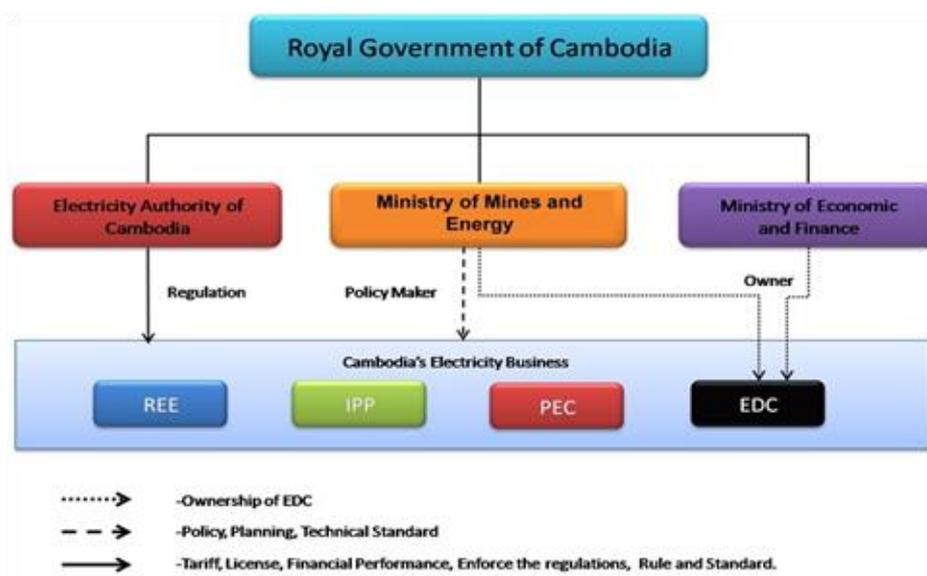
Source: Ministry of Mines and Energy, Cambodia.

2.2 Electric Power Market Structure

a. Market structure

Jurisdiction over Cambodia’s electricity sector belongs to the MME and the Electricity Authority of Cambodia (EAC). Electric utilities include EDC, public power companies, IPPs, and private sector/regional utilities.

Figure 2-3: Electric Power Market Structure in Cambodia



EDC = Electricité du Cambodge, IPP = independent power producer, PEC = Provincial Electricity Company, REE = rural electricity enterprise.

Source: Ministry of Mines and Energy, Cambodia.

The electrification rate in Cambodia is currently around 55.37 percent, which covers 1.76 million of the total of 3.18 million households, with supplies concentrated primarily in the national and provincial capitals. In addition to electricity provided by EDC and IPPs, electricity for major cities is imported from neighbouring countries. Private sector utilities and the Department of Mines and Energy (DME) supply electricity in regions outside of EDC's supply area.

Meanwhile, the role of IPPs in power generation is significant. EDC accounts for 6.4 percent of the country's total power facility capacity in 2013, while IPPs account for 88.5 percent (EAC, 2014). In Phnom Penh and other major cities, EDC supplies power in the form of electricity it generates itself or imports from IPPs and neighbouring countries, but off-grid distribution outside of the major cities is handled by rural electricity enterprises (REEs).

b. Deregulation

Cambodia is currently working on infrastructure improvements to encourage more private and foreign investment with the aim of expanding the electricity supply. The government has enacted a raft of laws, including the Law on Investment of 1994, to provide incentives for investment. It has stated that competitive bidding should be adopted in the electricity sector (with particular emphasis on unelectrified areas) (The Electric Power Industry in Japan, 2014).

Although there are no restrictions on the introduction of foreign capital, all enterprises, be they foreign or domestic, must obtain a licence from EAC to enter the electricity utility business. There are eight types of licences depending on the type of business: generation, transmission, distribution, consolidated (generation + distribution), dispatch, bulk, retail, and subcontract (Japan External Trade Organization, 2015a).

c. Mechanism of policy implementation

Power development by EDC, the state-run utility, directly reflects the government's electric power mix targets.

Meanwhile, power development by IPPs complies with the government's electric power mix targets since licensing serves as a form of indirect management. In other words, since IPPs need licences from the government, the government checks that their business plans are in compliance with the electric power mix targets during the licence screening process. If an IPP's business plan does not comply with the targets, the government may decide not to issue a licence.

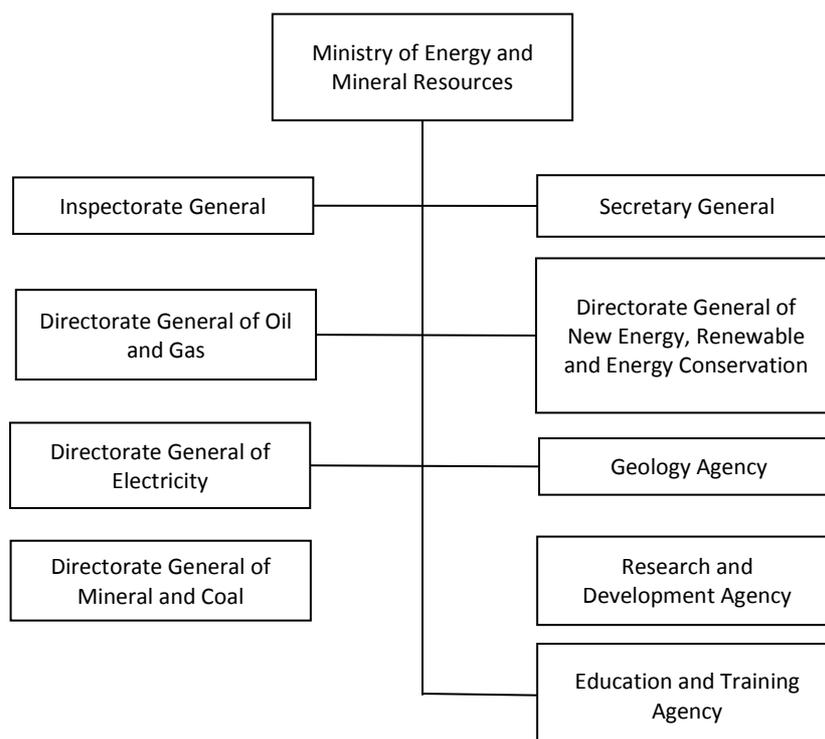
3. Indonesia

3.1 Electric Power Policy

Indonesia formulates basic energy policies and plans in accordance with its Energy Law, which went into effect in August 2007. The Energy Law mandated the establishment of the National Energy Council (Dewan Energi Nasional (DEN)), encouraged the development of resources, and emphasised the procurement of energy from domestic sources, among other things. In accordance with the Energy Law, DEN is in charge of formulating the National Energy Policy

(Kebijakan Energi Nasional (KEN)), while the Ministry of Energy and Mineral Resources (MEMR or ESDM) is responsible for formulating and implementing individual energy and mineral resource policies.

Figure 2-4: Structure of the Ministry of Energy and Mineral Resources in Indonesia



Source: Ministry of Energy and Mineral Resources, Indonesia.

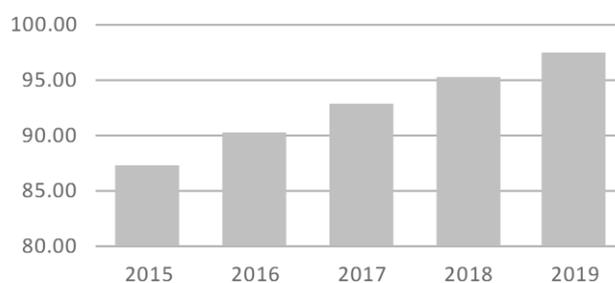
With regard to power development planning, MEMR has formulated the General National Power Plan (Rencana Umum Ketenagalistrikan Nasional (RUKN)), a comprehensive 20-year plan based on its energy and environmental policies, and Perusahaan Listrik Negara (PLN), a wholly-owned subsidiary of the government, has formulated a more detailed 10-year Electrical Power Supply Plan (Rencana Umum Penyediaan Tenaga Listrik (RUPTL)) (Japan Electric Power Information Center, 2011a).

RUPTL 2011–2020, the power development plan for 2011–2020, forecasts that electricity demand will increase at an annual average of 8.5 percent during that timeframe. The plan anticipates that not only will electricity demand continue to increase on the Java and Bali grids,

but it will also grow at an average annual rate of 10.8 percent in the poorly electrified regions of eastern and western Indonesia. To satisfy this demand, it will be absolutely essential for Indonesia to expand and reinforce equipment for power generation, transmission, and distribution. For this reason, the Government of Indonesia has released a plan to add 35 gigawatts (GW) of power over the 5-year span of 2015–2019.

Figure 2-5: Electrification Rate Plan in Indonesia

(Unit:%)



Source: Ministry of Energy and Mineral Resources, Indonesia.

Table 2-2: 35 GW Electricity Programme in Indonesia

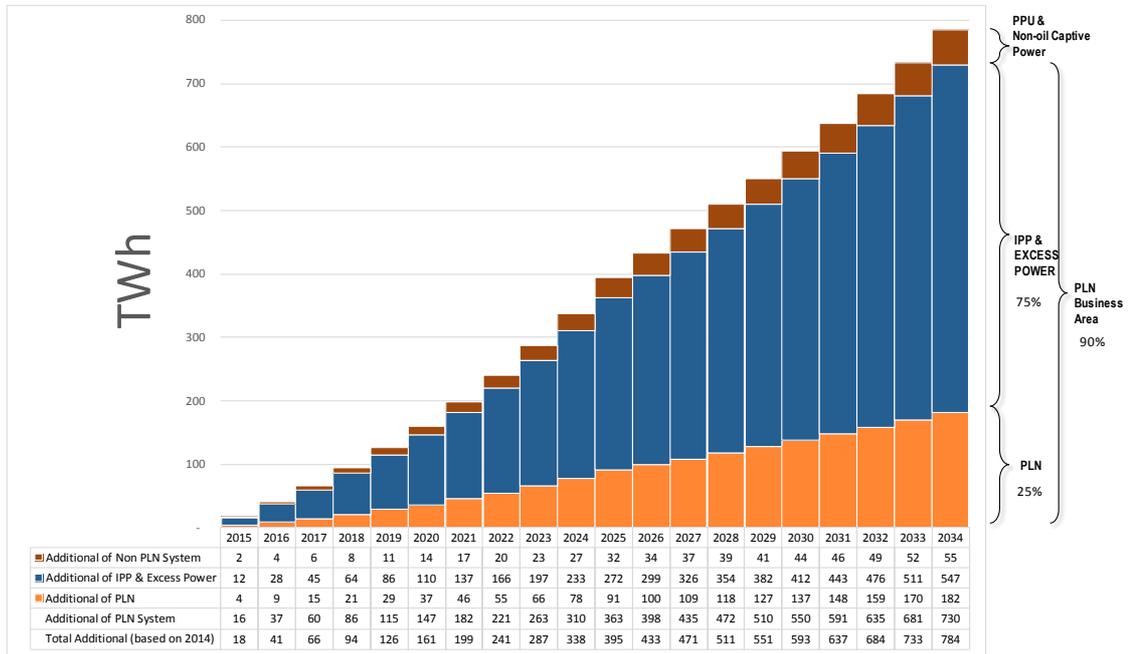
| | (GW) | | | | | |
|--------------|------------|------------|------------|-------------|-------------|-------------|
| source | 2016 | 2017 | 2018 | 2019 | Total | Percentage |
| Coal | – | – | 3.8 | 16.2 | 20.0 | 56% |
| Geothermal | – | 0.1 | 0.3 | 0.4 | 0.8 | 2% |
| Hydro | – | – | 0.1 | 1.4 | 1.5 | 4% |
| Gas | 2.2 | 5.3 | 4.5 | 0.8 | 12.8 | 36% |
| Others | – | 0.4 | 0.2 | 0.2 | 0.8 | 2% |
| Total | 2.3 | 5.8 | 8.8 | 19.0 | 35.9 | 100% |

GW = gigawatt.

Source: Agency of Natural Resources and Energy, Indonesia.

Furthermore, in the draft version of RUPTL 2015–2034, the power development plan for 2015–2034, the government aims to add approximately 780 terrawatt-hours (TWh) of power supply capacity by 2034, of which 75 percent will be covered by IPPs.

Figure 2-6: Electricity Supply Prospects in RUPTL 2015–2034 in Indonesia



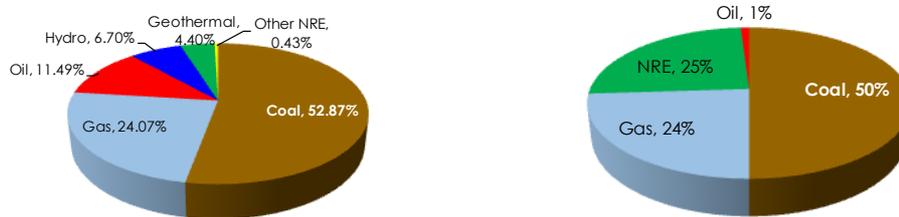
IPP = independent power producer, PLN = Perusahaan Listrik Negara, PPU = private power utility, RUPTL = Electrical Power Supply Plan (Rencana Umum Penyediaan Tenaga Listrik), TWh = terawatt-hour.

Source: Ministry of Energy and Mineral Resources, Indonesia.

Looking at the power development plans for 2025 for each type of generation, coal will account for 352 TWh, or 50 percent of the total power supply capacity of 703 TWh, with renewable energy accounting for 176 TWh (25 percent), gas for 169 TWh (24 percent), and oil for 7 TWh (1 percent).

Figure 2-7: Prospective Power Generation Mix in 2025 in Indonesia

(kWh basis, left: actual in 2014, right: target in 2025)



kWh = kilowatt-hour, NRE = non-renewable energy.

Source: Ministry of Energy and Mineral Resources, Indonesia (2015).

With regard to renewable energy, hydroelectric power has great potential, but development issues abound. For instance, while the demand is greatest on Java, all of the optimal areas for hydroelectric power stations are located on Papua and other outlying islands, which would make the cost of transmitting electricity to the areas with the highest demand more expensive.

3.2. Electric Power Market Structure

a. Market structure

At present, the structure of the electric utility industry is such that PLN, a wholly-owned subsidiary of the government, and its subsidiary companies handle generation along with some IPPs, but PLN has a monopoly over power transmission and distribution. PLN is working to split into separate companies and separate the duties of the supply and distribution divisions. It has established a power generation subsidiary and a subsidiary in charge of power transmission and distribution for designated development zones. By organising its internal workings into a system of business units, PLN has successfully become able to run operations with a focus on the profitability of each unit. In Java and Bali, where operations are the most extensive, power generation is handled by two subsidiaries.

b. Deregulation

To meet the demand for electricity that has been skyrocketing since the late 1980s, Indonesia began allowing IPPs into the electricity sector in 1992.

In August 1998, in an effort to open up the electricity market to competition, make the industry more transparent, and facilitate the entry of private enterprises, the Indonesian government announced a plan for structural reforms that would divide PLN into regional and functional units. In the draft version of the new Electricity Law, which aimed to deregulate the electric power sector and introduce competition into power generation, central and regional governments were granted authority to issue permits for electricity businesses under the supervision of the central government. The proposed law was ratified by the legislature in September 2009, thereby opening up PLN's monopoly on the electrical utility business to new players.

According to the Business Plan for Electricity Provision published in 2015, Indonesia aims for IPPs to account for 75 percent of all power providers by 2034. Furthermore, MEMR Regulation 01/2015 made the opening of the transmission network mandatory.

c. Mechanism of policy implementation

Power development by PLN, the state-run utility, directly reflects the government's electric power mix targets.

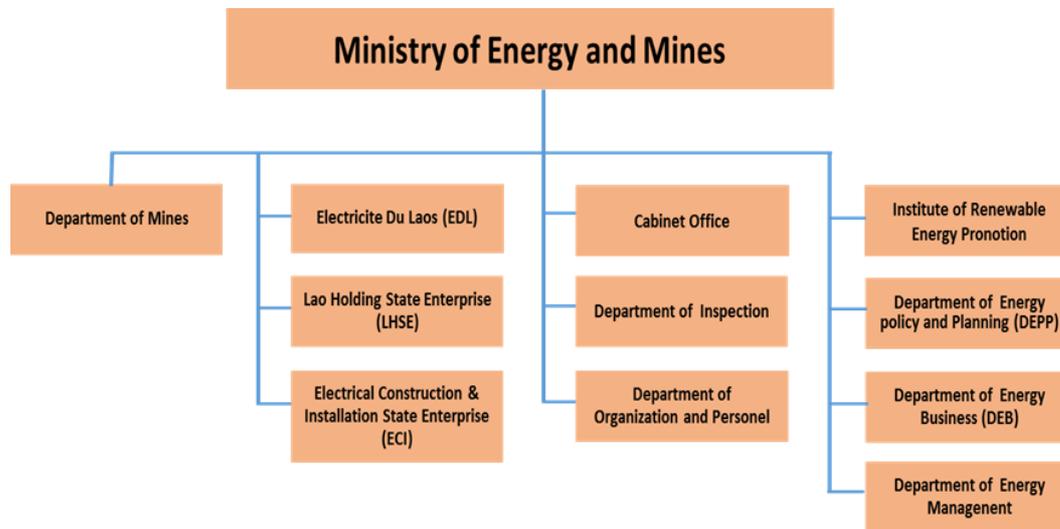
PLN also solicits applications from new IPPs, but IPP categories are not proposed by the enterprises themselves; rather, they are set by PLN according to the government's electric power mix targets. (This is called direct appointment and direct selection.) In other words, all power development complies with the government's electric power mix targets.

4. Lao PDR

4.1. Electric Power Policy

The Ministry of Energy and Mines (MEM) has jurisdiction over energy policy, strategy, and the management of the energy and mining sectors in the Lao PDR.

Figure 2-8: Structure of the Ministry of Energy and Mines in the Lao PDR



Lao PDR = Lao People’s Democratic Republic.

Source: Electricite du Laos.

The Lao PDR defines the electric power sector as an important element of the economy and has presented the following energy policy (Sithideth, 2011):

- Maintain and expand power supply with economic efficiency, reliability, and sustainability in order to promote economic and social development.
- Promote electric power development and expand electricity export in order to secure finances that are targeted by the government.
- Develop and strengthen laws and regulations in order to make the development of electricity sector effective through the government, the private sector, or partnership between the public and the private sector.
- Increase the nation’s capabilities while developing international standard techniques, know-how, and experiences.
- Achieve sustainable development by identifying impacts and responsibilities against society and environment.

The following concrete policy direction for the electric power sector is listed in the 2030 vision:

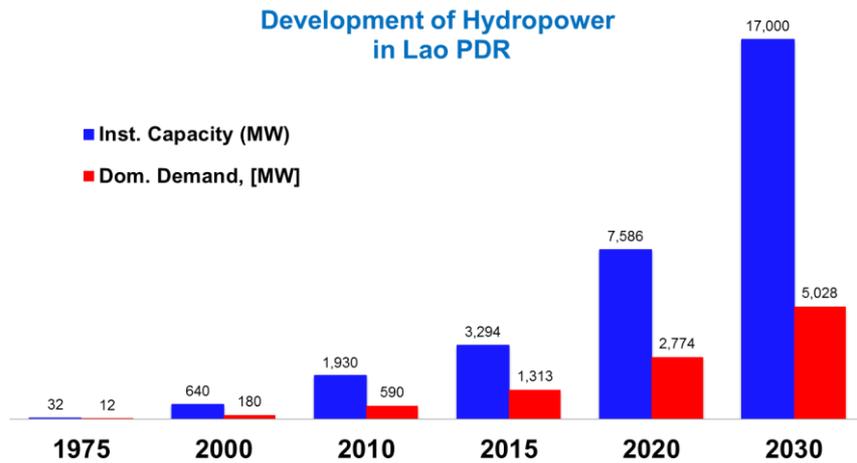
- Increase the electrification rate to 98 percent of all households by maintaining affordable cost.
- Develop all possible latent resources through competition, sustainability, and efficiency.
- Strengthen the domestic transmission network to improve inter-regional links.
- Ensure a reliable supply of electricity to all sectors in accordance with industrialisation and modernisation policies.

Furthermore, the government has indicated the following strategic power development initiatives for 2025:

- Develop all renewable energy and all hydroelectric power as soon as possible; promote the development of renewable energy projects. (By 2020, account for at least 25 percent of domestic power consumption with small-scale (under 15 MW) hydroelectric, biogas, biomass, and wind power generation facilities.)
- Develop over 12,000 MW of energy primarily from hydroelectric power.
- Supply sufficient amounts of electricity domestically at reasonable rates.
- Ensure a steady and reliable supply of electricity.
- Build 500-kilovolt (kV) back-born transmission lines connecting the north and the south; build control centres in the northern and southern regions.
- Promote cross-border power grid integration in the Greater Mekong Subregion (GMS) and ASEAN Power Grid (APG) with ASEAN member states.
- Implement a multifaceted electricity trade scheme with Thailand, Malaysia, and Singapore.

Meanwhile, in addition to hydroelectric power, the country’s mainstay, plans are in the works to bring online 600 MW of wind power and 500 MW of solar power.

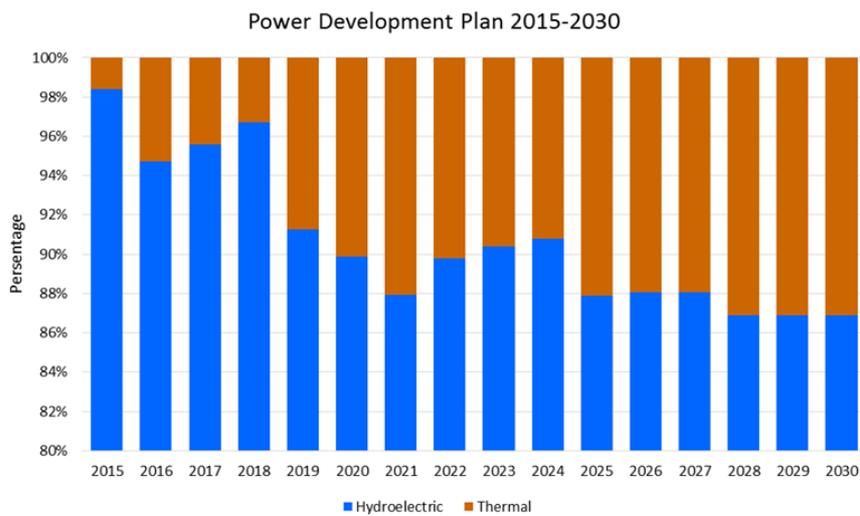
Figure 2-9: Development of Hydroelectric Power in the Lao PDR



Lao PDR = Lao People’s Democratic Republic, MW = megawatt. Installed Capacity (MW)
Domestic Demand (MW)

Source: Electricite du Laos.

Figure 2-10: Prospective Power Generation Mix in 2015–2030 in the Lao PDR



Lao PDR = Lao People’s Democratic Republic.

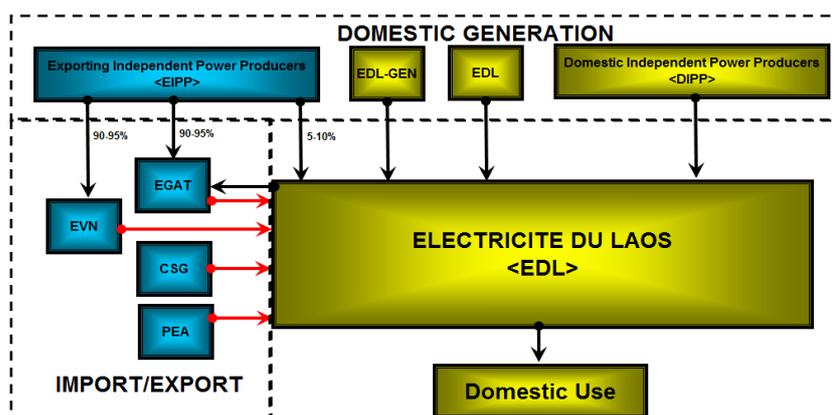
Source: Electricite du Laos.

4.2 Electric Power Market Structure

a. Market structure

The state-run Electricite du Laos (EDL) is a wholly-owned government subsidiary under the jurisdiction of MEM that handles all domestic power generation, transmission, and distribution on the primary grids in the country. While EDL exports some of its excess capacity to Thailand, it also imports electricity from Thailand, China, and Viet Nam for some of those areas that are not connected to the transmission grid. In addition to owning the hydroelectric power stations in the Lao PDR, EDL also holds shares in existing IPPs, among other investments.

Figure 2-11: Present Structure of the Energy Supply Industry in the Lao PDR



CSG = China Southern Power Grid, EGAT = Electricity Generating Authority of Thailand, EVN = Vietnam Electricity, Lao PDR = Lao People's Democratic Republic, PEA = Provincial Electricity Authority (Thailand).

Source: Electricite du Laos.

b. Deregulation

The Government of the Lao PDR permits the investment of private capital in electricity generation (i.e., hydroelectric generation by IPPs) by way of BOT and BOOT projects.² In many cases where IPPs develop power, electricity equipment is transferred to the government after

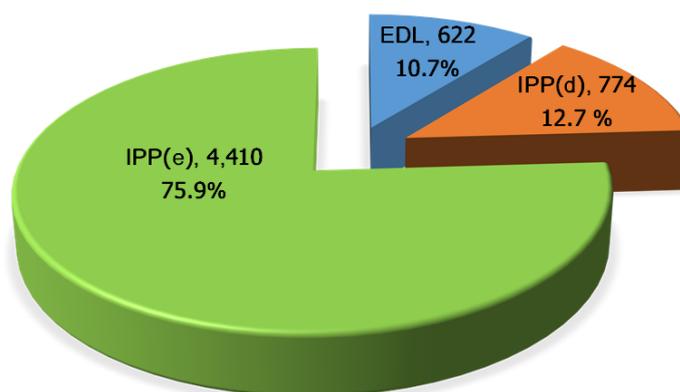
² BOT stands for 'build-operate-transfer' and refers to a financing scheme in which a private enterprise is contracted to build and operate a facility before transferring it back to the public sector after a certain period of time. Meanwhile, BOOT stands for 'build-own-operate-transfer'.

a span of 20–30 years. However, EDL holds a monopoly over power transmission and distribution.

Although there are almost no obstacles barring foreign investment, the Electricity Law that was revised in 2011 includes language barring foreign capital injections into small-scale (under 15 MW) hydroelectric power projects (Japan External Trade Organization, 2015b).

Looking at power generation capacity ratios in 2015, the IPP(e) share (IPP for export) was at 75.9 percent and IPP(d) (IPP for domestic) at 12.7 percent, followed by EDL-GEN, which is a functional subsidiary of EDL, at 10.7 percent and small-scale power generators at 0.1 percent (*Electricite du Laos, 2015*).

Figure 2-12: Structure of Power Generation in the Lao PDR



EDL = Electricite du Laos, IPP(e) = independent power producer for export, IPP(d) = independent power producer for domestic, Lao PDR = Lao People’s Democratic Republic.

Source: Electricite du Laos.

c. Mechanism of policy implementation

Power development by EDL, the state-run utility, directly reflects the government’s electric power mix targets.

Since IPPs need licences from the government, the government checks that their business plans are in compliance with the electric power mix targets during the licence screening process. If an IPP’s business plan does not comply with the targets, the government will not issue a licence.

5. Malaysia

5.1 Electric Power Policy

Malaysia's energy policy is overseen by the Energy Section of the Economic Planning Unit (EPU), one of the organisations under the direct jurisdiction of the Office of the Prime Minister, the highest decision making body in the country. The primary roles of the section are as follows:³

- Formulate policies and strategies for the sustainable development of the energy sector.
- Promote the development of oil and gas industries.
- Ensure an adequate, secure, quality, and cost-effective supply of energy.
- Promote the increased utilisation of renewable energy and energy efficiency in the energy sector.
- Provide allocation for energy-related development programmes and evaluate their achievements.

Malaysia's energy policy is stipulated in the National Energy Policy and it calls for the steady supply of energy resources at reasonable rates to the domestic market for the sake of ensuring sustainable growth. To do this, the Government of Malaysia has formulated the following three basic plans to serve as guidelines for its energy policy:⁴

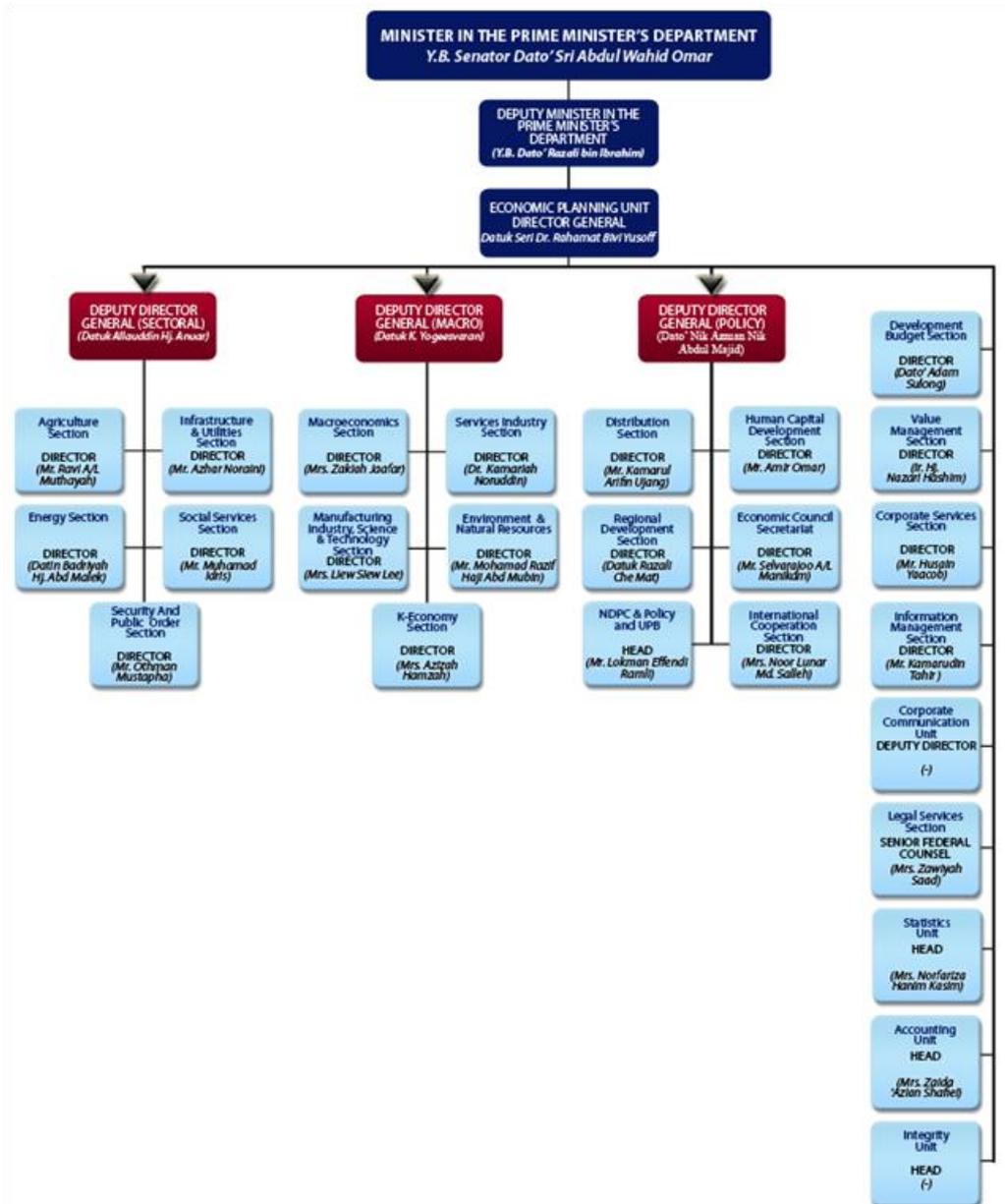
1. The Supply Objective: To ensure adequate, secure, and cost-effective energy supply by developing alternative sources of energy (both non-renewable and renewable) and diversifying the energy supply within and outside the country.
2. The Utilisation Objective: To promote the efficient utilisation of energy and discourage wasteful and non-productive patterns of energy consumption.

³ Taken from the Economic Planning Unit homepage (<http://www.epu.gov.my/>).

⁴ Taken from the Ministry of Energy, Green Technology and Water (MEGTW) homepage (<http://www.kettha.gov.my/portal/index.php>)

- The Environmental Objective: To minimise the negative environmental impacts on the energy supply chain, i.e. energy production, transportation, conversion, and consumption.

Figure 2-13: Structure of the Economic Planning Unit in Malaysia



Source: Economic Planning Unit homepage as of 1 September 2015.

In the 11th Malaysia Plan 2016–2020 released in May 2015, the Government of Malaysia defines the following six key strategic thrusts with the aim of transitioning to an advanced economy by 2020 (EPU, 2015):

1. Enhancing inclusiveness towards an equitable society
2. Improving well-being for all
3. Accelerating human capital development for an advanced nation
4. Pursuing green technology growth for sustainability and resilience
5. Strengthening infrastructure to support economic expansion
6. Re-engineering economic growth for greater prosperity

With regard to pursuing green technology growth, Malaysia has set a goal to reduce CO₂ emissions per unit of GDP to 40 percent of 2005 levels by 2020 and has laid out the following four policy measures (IEEJ, 2015):

1. Formulate a demand side management master plan and expand demand side management in buildings and the industrial and residential sectors.
2. Set the green procurement rate for government agencies at 20 percent
3. Boost power generation capacity via renewable energy from 243 MW in 2014 to 2,080 MW in 2020.
4. Set the household recycling rate at 22 percent.

In addition to these measures, the following initiatives have also been planned:

- Encourage the acquisition of eco-friendly building certification and strengthen the assessment system thereof.
- Expand the MyHIJAU labelling programme (for products manufactured in an eco-friendly manner).

- Use a carbon tax, green bonds, REDD+, and other tools to build a green financing scheme.
- Promote low-carbon mobility, in particular the use of highly efficient automobiles, compressed natural gas (CNG), and biofuel.
- Raise the biodiesel blend mandate from 7 percent to 15 percent.
- Adopt the Euro5 standards for emissions.

5.2. Electric Power Market Structure

a. Market structure

In Peninsular Malaysia and the states of Sabah and Sarawak, three vertically integrated companies – Tenaga Nasional Berhad (TNB), Sabah Electricity Sdn. Bhd. (SESB), and Syarikat SESCO Berhad (SESCO) – respectively operate as regional monopolies. In addition, there exist several IPPs licensed by the Energy Commission (EC).

b. Deregulation

In the power generation sector, private investment was deemed essential to respond to rapidly increasing electricity demand, so an IPP scheme was adopted; the first electricity purchase agreement with an IPP was signed in 1993.

In 2001, the government decided to cease efforts to unbundle vertically integrated enterprises and fully liberalise the electricity market due in part to the effect of the energy crisis that occurred in California (USA) in 2000 (Japan Electric Power Information Center, 2011b).

c. Mechanism of policy implementation

Power development by TNB, a state-run utility, directly reflects the government's electric power mix targets.

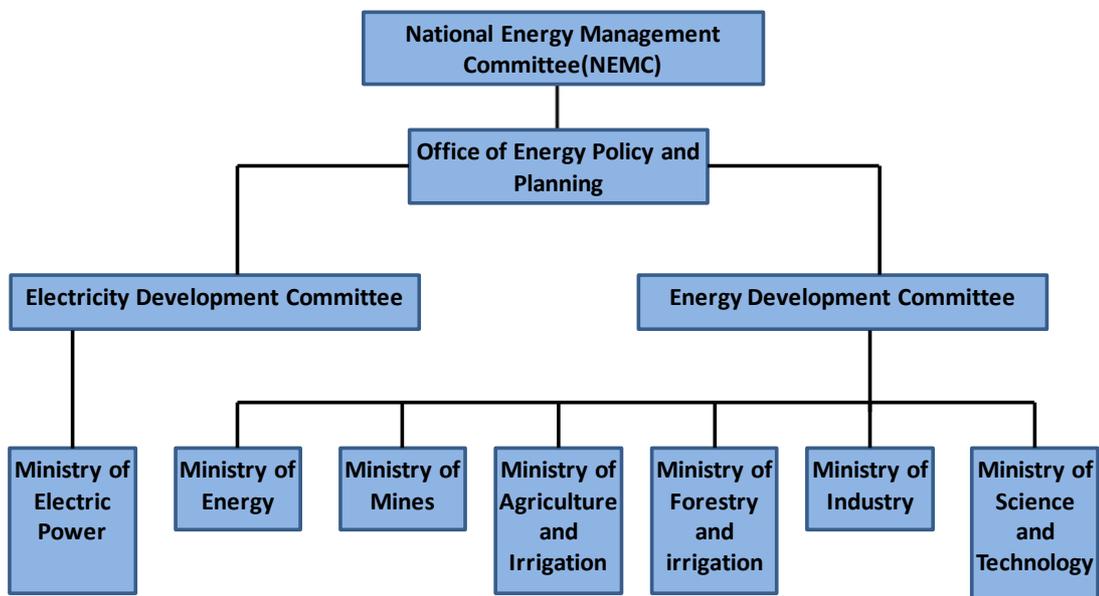
The power generation sector has been liberalised to allow the entry of IPPs, but they must obtain licences from the government to operate. This process allows the government to manage the selection of power sources to ensure compliance with its electric power mix targets. If an IPP’s business plan does not comply with the targets, the government will not issue a licence.

6. Myanmar

6.1. Electric Power Policy

The National Energy Management Committee, which was newly established in January 2013, oversees the entire energy sector in Myanmar. The Energy Planning Department in the Ministry of Energy (MOE) formulates energy policies as well as oil and gas development policies and plans, while MOE has jurisdiction over Myanmar’s oil and gas industry. The Ministry of Electric Power (MOEP) has jurisdiction over electricity businesses.

Figure 2-14: Regulatory Framework of the Energy Sector in Myanmar



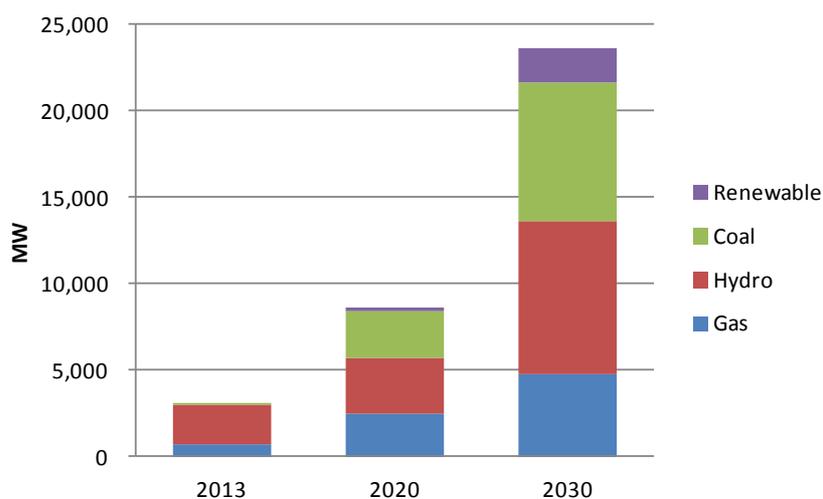
Source: Wint Thiri Swe (2013), country report presentation for JICA Energy Policy Training Course, 24 June–12 July.

Myanmar’s energy policy covers the following seven points:

1. Engage in sustainable energy development.
2. Promote the wide-ranging usage of renewable energy.
3. Encourage energy efficiency.
4. Promote the usage of alternative fuels in the residential sector.
5. Prioritise the response to domestic energy demand.
6. Effectively utilise oil and natural gas in such a way that benefits all citizens.
7. Encourage the participation of private companies.

The power supply mix in 2013 saw gas-fired power accounting for 715 MW (or 23percent of all generation capacity), hydroelectric for 2,259MW (73 percent), and coal for 120 MW (4 percent). However, Myanmar aims to adjust this composition to 29 percent gas-fired (2,484 MW), 32 percent hydroelectric (3,164 MW), 37 percent coal (2,760 MW), and 2 percent renewable energy (200 MW) by 2020, and further still to 20 percent gas-fired (4,758 MW), 33 percent coal (7,940 MW), 6 percent large-scale hydroelectric (1,412 MW), 32 percent small-scale hydroelectric (7,484 MW), and 9 percent renewable energy (2,000 MW) by 2030.

Figure 2-15: Electricity Supply Prospects in Myanmar



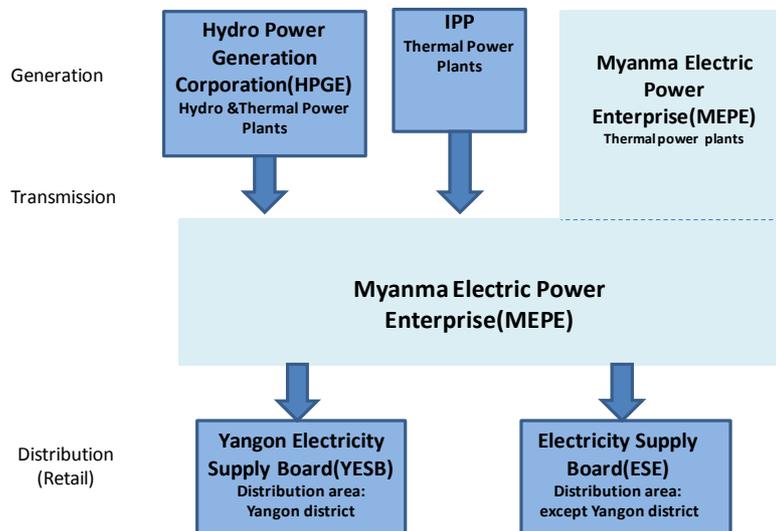
Source: Long-term Energy Master Plan.

6.2. Electric Power Market Structure

a. Market structure

Myanmar's electric utility industry is divided into three businesses: generation, transmission, and distribution. The Ministry of Electric Power No. 1 has jurisdiction over hydroelectric power, from development planning through to generation and operations, while the Ministry of Electric Power No. 2 oversees the construction and operation of thermal power plants as well as the transmission, distribution, and retail sale of electricity.

Figure 2-16: Electric Power Market Structure in Myanmar



Source: Japan Electric Power Information Center.

b. Deregulation

Since revising its Foreign Investment Law in 1994, Myanmar has permitted the injection of private capital into the electric power sector. In the power generation sector, participation in the form of joint ventures and BOT projects is allowed, provided operators obtain a licence from the Myanmar Investment Commission (Murakami, 2012). With low rates and other factors, the initial conditions for investment were not in place, and no companies attempted to forge into the electric power sector. More recently, however, a plan has been conceived for a joint IPP project with Thai and Chinese partners in which hydroelectric power will be

exported (ADB, 2012).⁵ Developments are also afoot that could see Japanese companies participating in an IPP project.

c. Mechanism of policy implementation

Given that the Ministry of Electric Power No. 1 and No. 2 oversee all aspects of the electric utility industry in Myanmar, only investment that complies with the government's power development plans is carried out.

IPPs participate in power generation, but they can only do so as joint ventures or BOT projects after having obtained licences from the Myanmar Investment Commission. During the licence screening process, the government checks that IPP business plans are in compliance with its electric power mix targets. If an IPP's business plan does not comply with the targets, the government will not issue a licence.

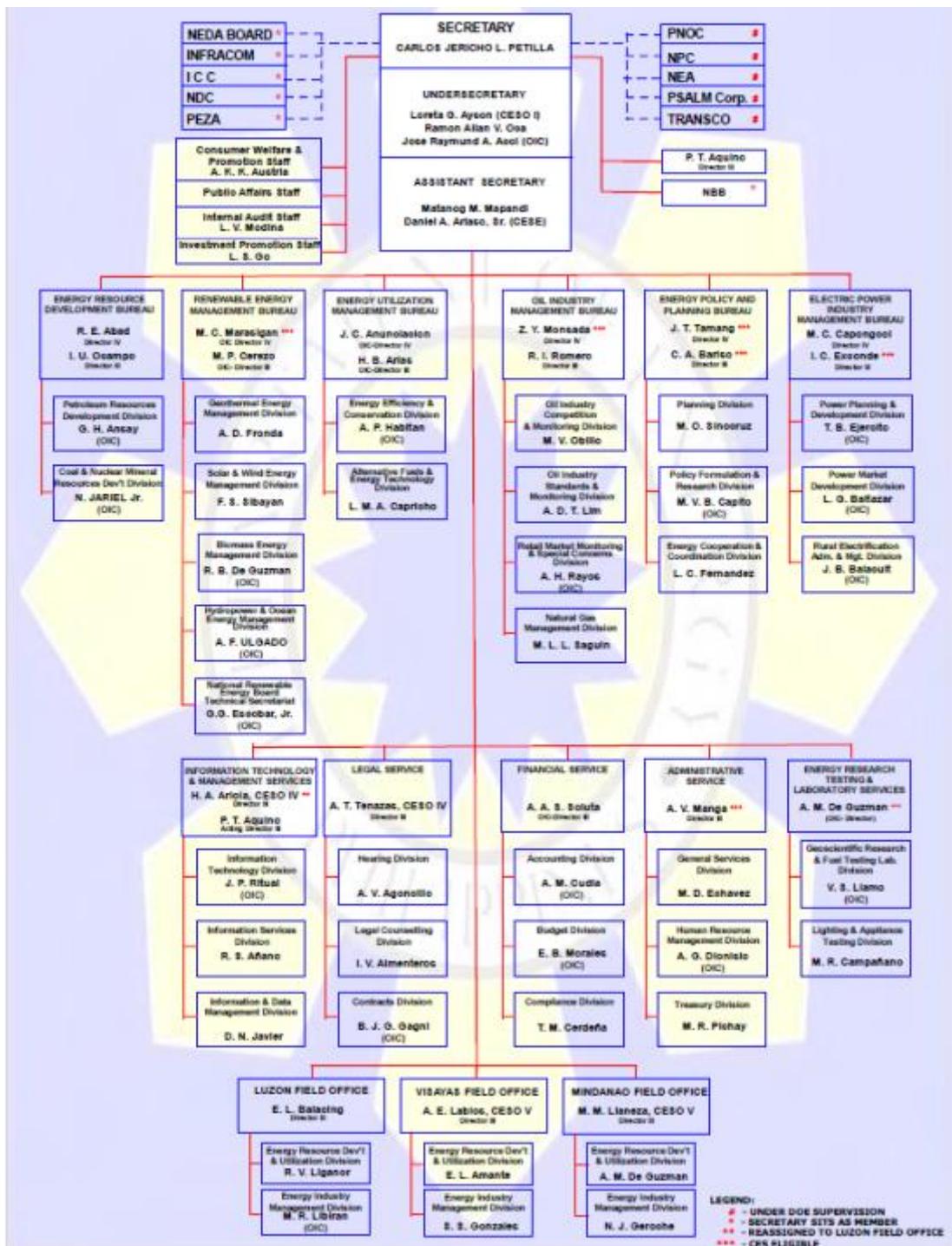
7. The Philippines

7.1. Electric Power Policy

The Department of Energy (DOE) holds jurisdiction over all aspects of energy policy in the Philippines. Its primary activities include the establishment, implementation, and management of DOE plans; the expansion, development, and application of energy sources; and the promotion of energy efficiency. The DOE directs the National Electrification Administration (NEA), which promotes regional electrification programmes, financing related to regional electrification, and the construction of power generation facilities.

⁵ Shweli-1 (600 MW, opened in 2009) and Dapein-1 (240 MW, opened in 2011) are already in operation. More recently, however, there have been two successive cases where plans to build large-scale power plants with foreign capital were cancelled. In October 2011, in response to strong opposition from local residents, the government ordered construction to halt on the 4,100 MW Myitsone hydroelectric power plant in Kachin that China Power Investment was working on with its partners in Myanmar, Asia World Corp and Myanmar Electric Power Enterprise. In January 2012, construction was also halted on a Thai-backed 4,000 MW power plant in the Dawei Special Economic Zone.

Figure 2-17: Structure of the Department of Energy in the Philippines



Source: Department of Energy homepage.

In the most recent Philippine Energy Plan (PEP) 2012–2030, issued by the DOE in December 2012, the following seven key policy targets were raised:

1. Ensure energy security.
2. Expand energy access.
3. Promote a low-carbon future:
 - Make energy efficiency a way of life for Filipinos.
 - Promote use of clean alternative fuels and technologies.
4. Climate proof the energy sector.
5. Develop regional energy plans.
6. Promote investment in the energy sector.
7. Identify and implement energy sector reforms.

7.2. Electric Power Market Structure

a. Market structure

Since the Electric Power Industry Reform Act (EPIRA) went into effect in 2001, as regards the business structure in the generation/transmission sector, generation is managed by the state-run National Power Corporation (NPC) and IPPs, while the transmission sector is managed by the National Grid Corporation of Philippines (NGCP). In addition to standard IPPs, there are NPC-IPPs, which sell power through power purchase agreements (PPAs) using existing facilities.

With regard to distribution, there are about 15 private companies headed by the country's largest power company Manila Electric Company (MERALCO), eight regional governments, and approximately 120 small-scale electrification cooperatives (ECs), which are collectively referred to as distribution utilities (DUs). These negotiate transactions with power generation companies and do business with wholesale electricity spot markets (WESMs) to procure power and sell it to customers in their supply areas.

b. Deregulation

Since EPIRA went into effect, power sector reforms have been implemented in the Philippines (o break up and privatise the NPC and improve infrastructure for competition in the power market. As part of these reforms, WESMs were established in both the Luzon and Visayas regions and the Philippines Electricity Market Corporation (PEMC) was established by the DOE to manage them.

c. Mechanism of policy implementation

The state-run NPC has a policy to not conduct new power development except for small-scale power sources for the purpose of regional electrification. This has made private capital investors (i.e. IPPs) the principal power developers.

Meanwhile, power development by IPPs complies with the government's electric power source mix targets since licensing serves as a form of indirect management. In other words, since IPPs need licences from the government, the government checks that their business plans are in compliance with the electric power source mix targets during the licence screening process. If an IPP's business plan does not comply with the targets, the government will decide to not issue a licence.

The government is now in a position where it cannot directly implement power development due to its policies, which aim to increase the efficiency of management of electricity businesses through the introduction of private capital. Therefore, while there are some projects being planned without defined development goals, the necessary facility capacity cannot be secured because the implementation of these projects has been postponed. This has created a need for the government to actively introduce policies to improve the investment environment and promote power development.

8. Singapore

8.1. Electric Power Policy

In Singapore, the Ministry of Trade and Industry (MTI) establishes and implements the country's energy policy. The MTI also supervises 10 governmental institutions (referred to as statutory boards), including the Singapore Department of Statistics and the Energy Market

Authority (EMA), which promotes the deregulation of electric power and gas markets and is the regulatory authority for energy markets.⁶

In November 2007, the national energy strategy, called Energy for Growth, was announced through the cooperation of agencies including the MTI, the EMA, the Economic Development Board, and the Ministry of the Environment and Water Resources. The framework of the strategy covers the following six points:

1. Promote competitive markets.
2. Diversify energy supplies.
3. Improve energy efficiency.
4. Build the energy industry and invest in energy research and development (R&D).
5. Step up international cooperation.
6. Develop a whole-of-government approach.

The strategy calls for the strengthening of Singapore's position as Asia's primary petroleum hub, the expansion of the scope of its energy trade to include liquefied natural gas (LNG), biofuels, and CO₂ emission credits as well as improvements in the field of clean and renewable energies including solar, biofuels, and fuel cells (MTI, 2007).

In April 2009, the Ministry of the Environment and Water Resources and the Ministry of National Development published the Sustainable Development Blueprint, which set goals to reduce energy consumption per GDP by 20 percent from 2005 levels by 2020 and by 35 percent by 2030. In addition, the plan incorporated an improvement of the waste recycling rate to 70 percent by 2030, as well as reductions in water consumption.⁷ In support of this plan, the Energy Conservation Act was implemented in June 2012.

Moreover, the government has pledged that Singapore's GHG emissions will peak around 2030 at the equivalent of about 65 million tonnes of CO₂, even if the economy continues to grow after that year. The country will also become more efficient in its economic activity and reduce the amount of GHGs emitted to achieve each dollar of GDP.

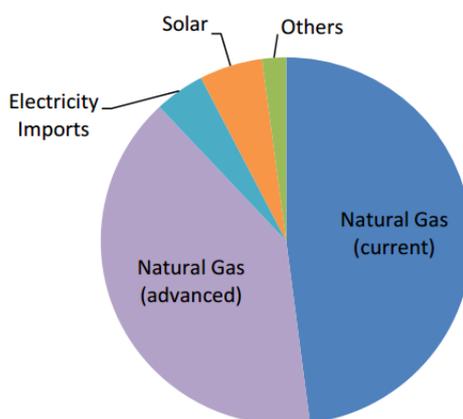
⁶ See MTI web page: <http://www.mti.gov.sg/AboutMTI/Pages/Statutory-Boards.aspx>

⁷ See MEWR web page: https://www.nccs.gov.sg/sites/nccs/files/Sustainable_Spore_Blueprint.pdf

Furthermore, the *Sustainable Singapore Blueprint 2015* was published in November 2014. This revises the *Sustainable Development Blueprint* published in 2009 and adds analysis of progress in regards to the plan as of 2013, while setting new goals for initiatives that had already met existing targets⁸.

According to energy source mix predictions for 2021 recently published by the government, Singapore plans to have almost half of its energy supplied by conventional, current thermal sources; another almost half by innovative, advanced gas thermal sources; and the remainder by solar power and electricity imports.

Figure 2-18: Electricity Supply Mix Prospects in Singapore



Source: Energy Market Authority 2015.

8.2. Electric Power Market Structure

a. Market structure

In Singapore, the control of the competitive fields of generation and retail are kept separate from the non-competitive fields of transmission and distribution. The companies SP Power Grid and SP Power Assets have exclusive permission for their business activities in the areas of transmission and distribution, and they manage and maintain the distribution network. Retailers procure electricity from the competitive wholesale power market and then supply it to contestable customers under contractual terms. Another company, SP Services, has a

⁸ See MEWR web page: <http://www.mewr.gov.sg/ssb/>

monopoly to supply power to non-contestable customers, and it also acts as a market support services provider, performing changes of providers for customers as well as meter reading.

Table 2-3: Supply Side Players in Singapore

| Market Participant | Registered Capacity (MW) | Market Share (%) |
|------------------------------------|---------------------------------|-------------------------|
| Senoko Energy | 3,300 | 27.4% |
| YTL Power Seraya | 3,100 | 25.8% |
| Tuas Power Generation | 2,040 | 17.0% |
| Keppel Merlimau Cogen | 1,310 | 10.9% |
| Sembcorp Cogen | 785 | 6.5% |
| Exxonmobile Asia Pacific | 220 | 1.8% |
| National Environment Agency | 180 | 1.5% |
| Others | 1,096 | 9.1% |
| Total | 12,031 | 100% |

Source: Energy Market Company, 2015.

Government institutions regulate the energy market and private enterprises participate in power generation and retail in line with applicable regulations. Private enterprises also set their prices and formulate infrastructure investment strategies according to policies announced by the government. Prices are set with an emphasis on multifaceted analyses that take into account supply and demand, market conditions, and regulations, which creates a need for appropriate price controls from the market operator. This is achieved by introducing price caps and by investigating price spikes happening in the market.

In recent years, futures trading markets have been established, bringing with them trends of loosening restrictions on power supply contracts and increasing the number of choices available to customers.

b. Deregulation

As of 2016, Singapore's electricity market is in an advanced liberalisation stage. Deregulation began in October 1995, when the government privatised the power company sector to promote market competition in the areas of power generation, transmission, and distribution. Three power generating companies (Tuas Power, Senoko Energy, and Power Seraya), a

transmission and distribution company (PowerGrid, which later became SP PowerGrid and SP Power Assets), and a retail company (PowerSupply, which later became SP Services) were established. At the same time, Singapore Power⁹ was established as a holding company for the four companies excluding Tuas Power.

In March 2000, as part of a policy push to further relax regulations for power companies, deregulation of the power retail market was enacted. In the first phase, deregulation for 5,000 large-scale (average monthly usage of 20,000 kWh or more) industrial and commercial users was completed by March 2009. In the second phase, deregulation began for 5,000 consumers with an average monthly usage of 10,000 kWh or more in December 2009. Combining the first and second phases represents the deregulation of 75 percent of the total electricity demand. Deregulation for the remaining 25 percent of consumers (approximately 1.3 million) has proceeded for users of over 8,000 kWh from April 2014, and for users of over 4,000 kWh from October 2014. With complete deregulation in mind, users of over 2,000 kWh were included in July 2015 (EMA, 2014b). Full retail contestability could be achieved in 2018. Transmission and distribution networks are exclusively maintained by SP Power Assets as a non-competitive sector.

Since January 2003, all power transactions have been carried out through the Energy Market Company (EMC).¹⁰ In October 2014, EMC became a wholly-owned subsidiary of the Singapore Exchange (SGX). The SGX uses EMC's trading platform to provide market participants with improved services with the goal of being the price-determining centre for power and gas in the Asian market (EMA, 2014a).

Some challenges currently facing the domestic power market are that supplied power exceeds demand by approximately 50 percent, that stagnant gas prices are destabilising electricity prices, which in turn is delaying investment recovery, that power companies do not desire any additional competition, that the solar power generation sector is growing rapidly and increases competition for gas-fired generators, and that customers are beginning to participate in the market by going off-grid, making further market controls more difficult to implement.

⁹ Singapore Power is itself a holding company of Power Gas, which is under the control of the state-run Temasek Holdings.

¹⁰ A joint venture company between EMA and M-co of New Zealand. (*Energy Asia*, 2003)

c. Mechanism of policy implementation

Singapore's power generation sector has been deregulated, with a market monitoring authority managing fair competition and the supply of power, but a government body continues to manage regulation such as the granting of business licences. Since power companies need licences from the government, the government checks that their business plans are in compliance with the electric power mix targets during the licence screening process. If their business plan does not comply with the targets, the government may decide to not issue a licence.

The following issues would remain even in the completely deregulated market:

- An excess of supplied power by gas-fired generators.
- Unstable wholesale power prices raise risks for new investors in the power generation sector.
- Many businesses in the generation sector do not want any additional competition
- The anticipated growth of solar power generation beyond 350 MW in 2020 can make controlling the market more difficult, because solar power is variable in output.
- The policy mechanism on integrating solar capacity beyond 600 MW has not yet been made public.

9. Thailand

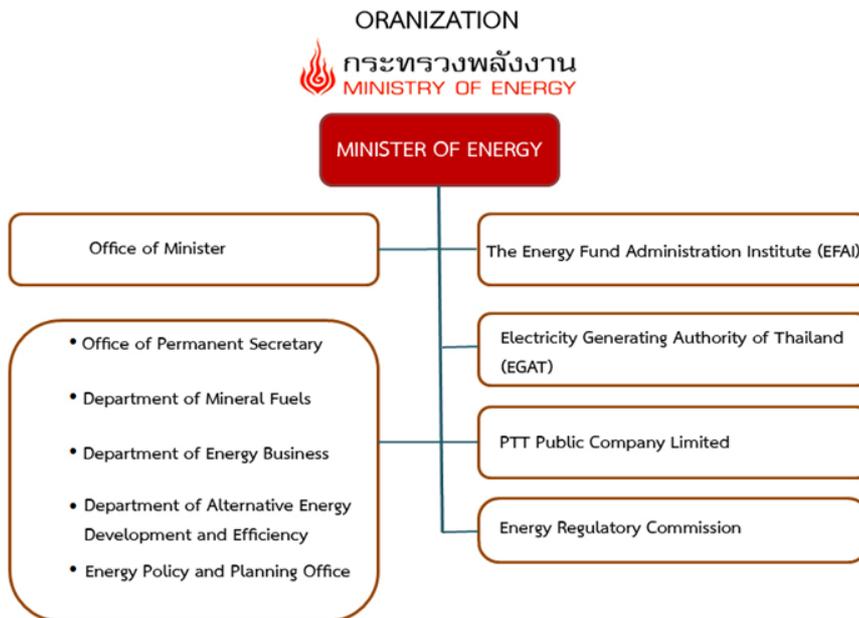
9.1. Electric Power Policy

The Ministry of Energy (MOE) manages the national energy policy. There are four divisions within MOE:

- Energy Policy and Planning Office (EPPO): Monitors energy supply and demand, establishes, implements, and evaluates energy policies, and coordinates policy making with related institutions. Also manages an 'Oil Fund' intended to stabilise prices and prevent domestic energy shortages.

- Department of Mineral Fuels: Holds jurisdiction over domestic petroleum and gas upstream sectors, and performs contract work for mining and development.
- Department of Energy Business: Has jurisdiction over energy businesses, and supervises related transactional, quality, safety, and environmental matters.
- Department of Alternative Energy Development and Efficiency: Has jurisdiction over regulations for energy efficiency and conservation as well as R&D of alternative energy sources.

Figure 2-19: Structure of the Ministry of Energy in Thailand



Source: Ministry of Energy.

The Government of Thailand aims to manage sustainable energy in order to secure the energy needs of the country. Specifically, they are striving to improve the country's self-sufficiency through the development of energy resources; the encouragement of the production and application of alternative energies; the monitoring and management of appropriate, stable energy prices and the efficient use of energy; and the development and application of environmentally friendly energy sources.

The Electricity Generating Authority of Thailand (EGAT) carries out power development planning, and their new power development plan, the Thailand Power Development Plan (PDP2015), was approved by the National Energy Policy Council in May 2015.

The three major criteria of the plan are as follows:

1. Security: Improve the security of power sources in the generation, transmission, and distribution sectors; diversify fuel sources to lower dependence on natural gas.
2. Economy: Supply power to all consumers at reasonable prices, most notably to support long-term growth.
3. Ecology: Alleviate environmental and social impacts in order to realise sustainable development.

PDP2015 includes the goal of expanding domestic power generation capacity, including power imports, from 37,612 MW in 2014 to 70,335 MW by 2036. The plan includes goals for the composition of primary sources of power generation in 2036 set to 30-40 percent natural gas (64 percent in 2014), 20–25 percent coal (20 percent in 2014), 15–20 percent hydroelectric power (7 percent in 2014), and 15–20 percent renewable energy (8 percent in 2014). The increase in the proportion of hydro and renewable energy is intended to reduce dependence on natural gas.

Table. 2-4: Prospective Power Generation Mix in the 2015 Power Development Plan in Thailand

| Fuel types | As of Sep 2014 (%) | 2026 (%) | 2036 (%) |
|----------------------|--------------------|----------|----------|
| Imported Hydro Power | 7 | 10–15 | 15–20 |
| Coal & Lignite | 20 | 20–25 | 20–25 |
| Renewable | 8 | 10–20 | 15–20 |
| Natural gas | 64 | 45–50 | 30–40 |
| Nuclear | – | – | 0–5 |
| Diesel/Heavy oil | 1 | – | – |

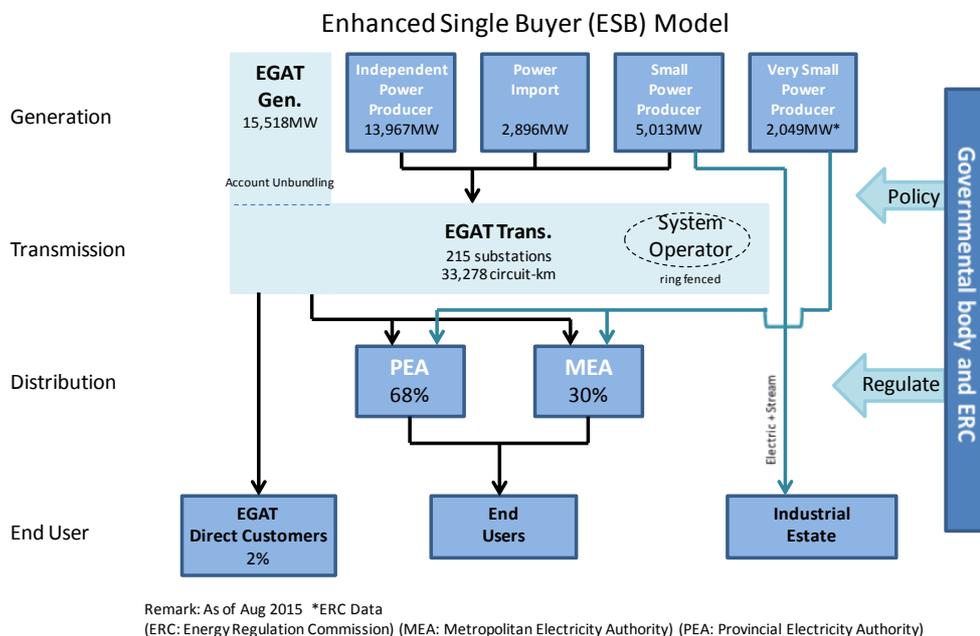
Source: Electricity Generating Authority of Thailand.

9.2. Electric Power Market Structure

a. Market structure

EGAT purchases power from IPPs and small power producers (SPPs) and from neighbouring countries (Lao PDR and Malaysia) and supplies it wholesale to the Metropolitan Electricity Authorities (MEAs) and Provincial Electricity Authorities (PEAs) which then distribute the power. Power is also provided directly to major customers. They also hold power transmission and supply facilities as an operator of the power grid.

Figure 2-20: Electric Power Market Structure in Thailand



Source: Electricity Generating Authority of Thailand.

b. Deregulation

Since 1992, the Thai government has encouraged the participation of private interests such as IPPs and SPPs in the power generation sector in order to promote competition. Until then, the state-run power company EGAT had exclusive rights for generation and transmission in Thailand, while MEAs and PEAs had sole control over distribution. However, it was difficult to keep up the pace of construction of power generation facilities to match the sudden rise in demand for power, creating a large investment burden for EGAT, which led to plans to introduce private investment.

c. Mechanism of policy implementation

Power development by EGAT, the state-run utility, directly reflects the government's electric power mix targets. MOE, together with EGAT, is developing and reviewing the long-term power development plan (PDP) periodically. The plan includes future possible and desirable IPPs which are consistent with the national long-term policy goal. If a new application for a power station appears as consistent with the PDP, the IPP business can smoothly obtain authorisation. In contrast, when a new application appears as controversial to the PDP, the IPP business may face tougher negotiations. This system enables the government to control the electricity supply mix of the nation.

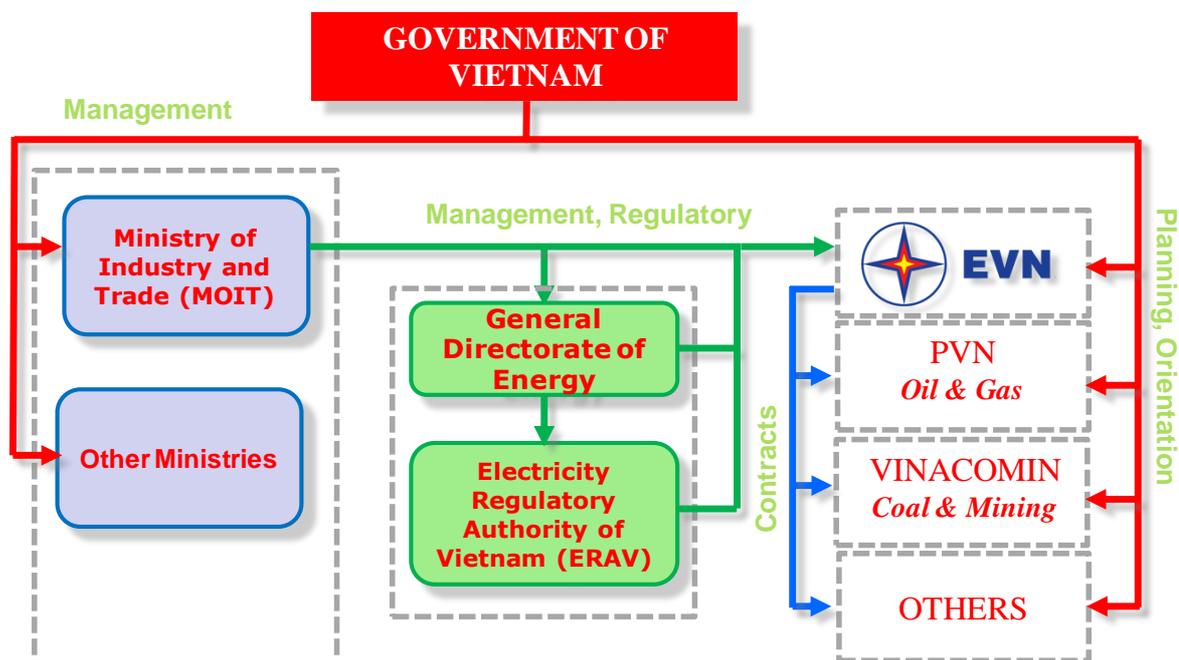
10. Viet Nam

10.1. Electric Power Policy

The Ministry of Industry and Trade (MOIT) oversees all aspects of the energy industry, including electricity, new energy, renewable energy, coal, petroleum, and gas. MOIT develops laws, policies, development strategies, master plans, and annual plans related to the energy industry, and submits these to the Prime Minister for issuance and approval. It also supervises and manages the energy sector. Under MOIT, the Electricity Regulatory Authority of Vietnam holds jurisdiction over the development and regulation of the electric power market, and the Institute of Energy proposes energy policies and establishes power development plans. The state-run utility Vietnam Electricity (EVN) follows these power development plans in its activities.

In July 2011, the 7th National Master Plan for Power Development was created, and power development planning has proceeded based on this document. The newest power development plan was established based on three cases (low scenario, base scenario, and high scenario) that predict power demand, with plans to increase power supplies by 10.5 percent per year from 2016 to 2020 to reach a total power supply of 265.4 TWh in 2020.

Figure 2-21: Regulatory Framework of the Energy Sector in Viet Nam



Source: Ministry of Industry and Trade.

Table. 2-5: Seventh Master Plan for Power Development in Viet Nam

| Item | Unit | 2014 | 2015 | 2020 | 2025 | 2030 |
|------------------------------|------|---------|---------|---------|---------|---------|
| Total power generation | GWh | 145 540 | 161 250 | 265 406 | 400 327 | 571 752 |
| Total commercial electricity | GWh | 128 434 | 141 800 | 234 558 | 352 288 | 506 001 |
| Pmax | MW | 22 210 | 25 295 | 42 080 | 63 471 | 90 651 |

Source: Ministry of Industry and Trade.

By 2030, coal-based thermal power will become the primary power source, with plans to add a portfolio of new power sources including nuclear power.

Table. 2-6: Power Generation Structure in Viet Nam

| Item | Unit | 2015 | 2020 | 2025 | 2030 |
|------------------|-------------|-------------|-------------|-------------|-------------|
| Sale Electricity | GWh | 143.300 | 234.558 | 352.288 | 506.001 |
| Power Generation | GWh | 164.300 | 265.406 | 400.327 | 571.752 |
| Pmax | MW | 25.254 | 42.080 | 63.471 | 90.651 |

Source: Ministry of Industry and Trade.

In 2020, installed capacity is predicted to be about 60,500 MW, of which thermal power is 25,700 MW (representing 30.1 percent), small hydro and renewable energy (RE) about 6,000 MW (10 percent), hydro 18,100 MW (30 percent), oil and gas thermal power 9,000 MW (14 percent), and imports about 1,400 MW (2 percent).

In 2025, installed capacity is predicted to be about 95,400 MW, of which thermal power is 47,600 MW (representing 50 percent), small hydro and RE about 12,000 MW (16 percent), hydro 19,200 MW (20 percent), oil and gas thermal power 15,000 MW (16 percent), and imports about 1,400 MW (1.5 percent).

In 2030, installed capacity is predicted to be about 129,500 MW, of which thermal power is 55,300 MW (representing 43 percent), small hydro and RE about 27,200 MW (21 percent), hydro 21,900 MW (17 percent), oil and gas thermal power 19,000 MW (15 percent), nuclear power 4,600 MW (4 percent), and imports about 1,500 MW (1.0 percent).

10.2. Electric Power Market Structure

a. Market structure

In July 2006, EVN was established as a limited company with the government as the sole owner. EVN possesses and manages power dispatching offices, major power plants, transmission companies, distribution companies, and power facility research and design

companies. Some of these companies are wholly-owned subsidiaries of EVN, while others are joint venture-style financially independent entities.

b. Deregulation

On 10 August 2015, MOIT opened up the wholesale electric power market, allowing all companies that manage plants with output of 30 MW or more to participate in the market (No. 8266/QD-BC). Even power plants with output less than 30 MW can participate in the market if their facilities meet certain criteria. For BOT-format proposals, either direct market participation or participation through a representative division of EVN is possible. Companies providing power imports, wind power, solar power, geothermal power, and hydroelectric generation below 30 MW are still not permitted to participate in the market. The five power companies in the northern, central, and southern regions, and in Ha Noi and Ho Chi Minh, are the sales destinations for this power (NNA-Vietnam, 2015).

As for sectors other than power generation, a deregulation framework for the retail sector has started from 2015. Following trial market operations starting in 2016, the goal is to achieve complete deregulation by 2019.

c. Mechanism of policy implementation

Since IPPs need licences from the government, the government checks that their business plans are in compliance with the electric power mix targets during the licence screening process. If an IPP's business plan does not comply with the targets, the government will decide to not issue a licence.

The government will revise the plan including speeding up the progress of some projects to ensure energy security.