

## SECTOR OVERVIEW

### A. Sector Framework

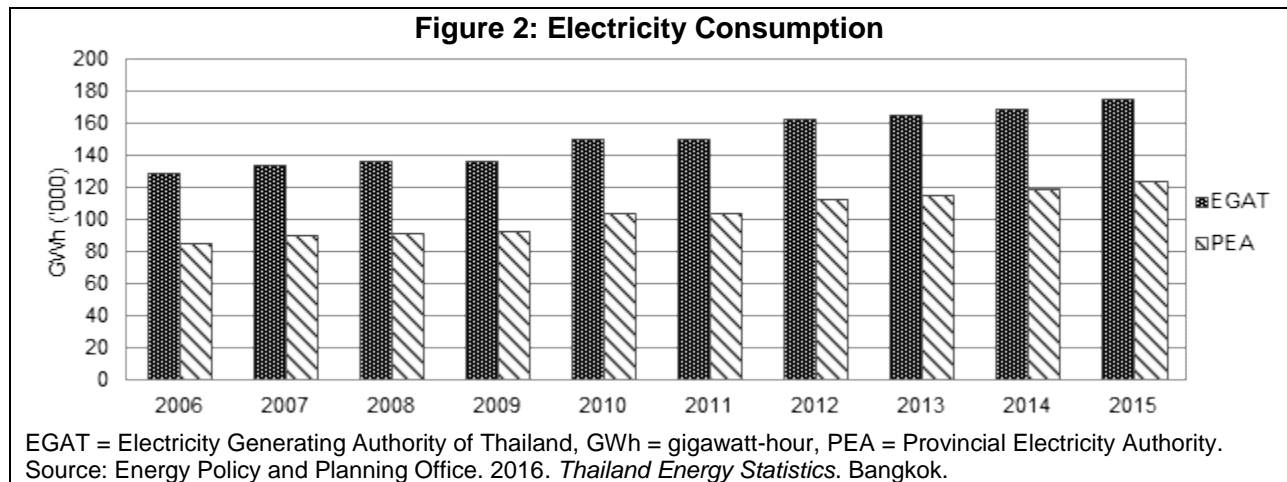
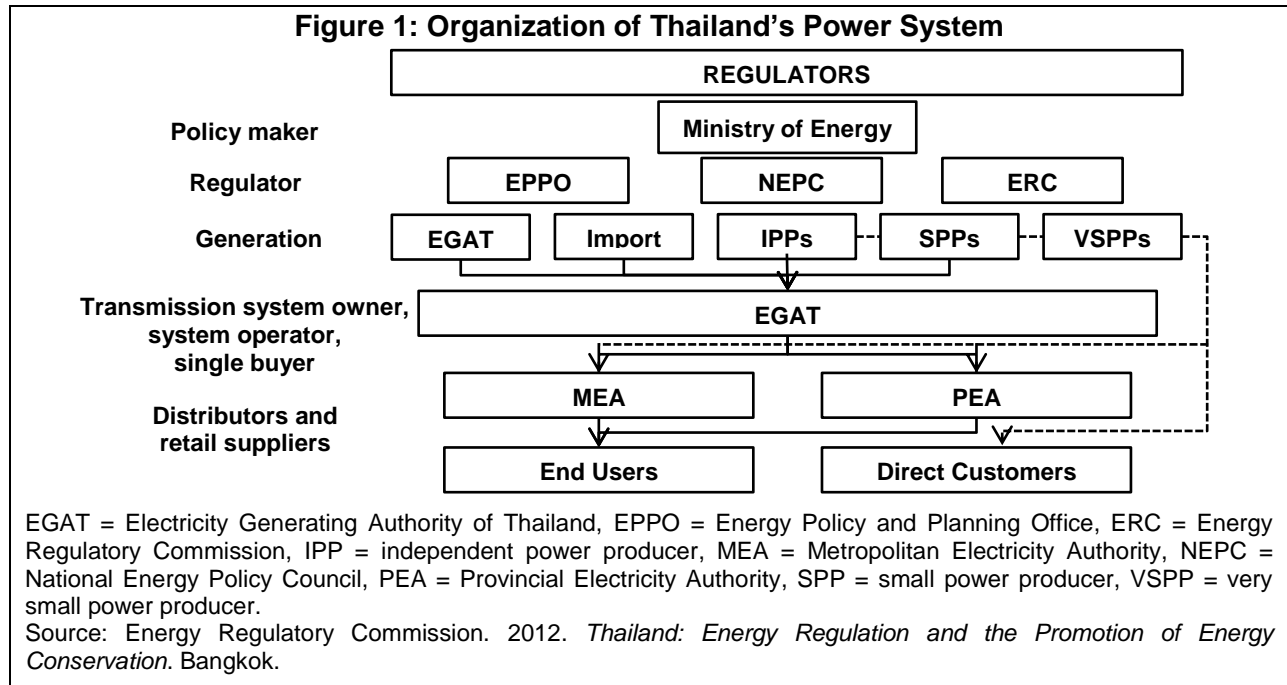
1. The energy sector in Thailand is governed by the Ministry of Energy and managed by the National Energy Policy Council (NEPC). The main duties of the NEPC are to recommend national energy policy and energy management and development plans to the government through the cabinet and to establish the tariff structure for energy sales in Thailand. The NEPC's secretariat, the Energy Policy and Planning Office, is responsible for drafting all energy-related policies and proposing development plans to the NEPC. The sector is regulated by the independent Energy Regulatory Commission, which monitors energy market conditions, reviews tariffs, issues licenses, approves power purchases, and reviews development planning and investment in the electricity industry. Thailand has adopted a single-buyer model in the power sector, under which the state-owned utility allows limited private sector participation in electricity generation while maintaining control over system planning, operation, and pricing.

2. The Electricity Generating Authority of Thailand (EGAT) is the state-owned utility. EGAT owns and operates most of the country's power generation capacity and all of its transmission network. It operates the system and is the principal offtaker. It sells essentially all the power it generates or purchases from private power producers and neighboring countries to two state-owned enterprises: the Metropolitan Electricity Authority (MEA) and the Provincial Electricity Authority (PEA). The MEA and PEA distribute power to retail, commercial, and industrial consumers throughout Thailand and own the electricity distribution networks in their regions of operation. MEA has the exclusive rights to distribute and sell power to end users in Bangkok metropolitan area, and PEA has these rights in all other areas. EGAT sells electricity to MEA and PEA at a regulated rate set by the Energy Policy and Planning Office.

3. The government has allowed the private sector to engage in renewable energy power generation. The small power producer program allows private developers to build, own, and operate renewable energy power projects in the 10 megawatt (MW) to 90 MW capacity range and to enter into power purchase agreements with EGAT. Under a separate program for very small power producers, private firms generating up to 10 MW of renewable energy can sell power to MEA or PEA. Small and very small power producers using renewable energy are eligible for a feed-in tariff on top of the wholesale electricity price. Thailand imports electricity from the Lao People's Democratic Republic and Malaysia, and exports electricity to neighboring utilities in Cambodia, the Lao People's Democratic Republic, and Malaysia. Figure 1 illustrates the current organizational structure of Thailand's power system.

### B. Electricity Demand

4. Demand for electricity increased by an annual average of 3.7% during 2005–2015. In 2015, total electricity consumption was 174,834 gigawatt-hours (GWh), 3.6% higher than the previous year's total of 168,685 GWh. Peak demand reached a record 27,346 MW in 2015, a 1.5% increase from 26,942 MW in 2014. The growth in electricity consumption was due to an economic recovery, mainly in the tourism, service, and construction industries. The rise in peak demand was largely caused by extremely hot summer weather. The Ministry of Energy expects electricity demand in 2016 to exceed the 2015 total by 4.1%. Electricity consumption in the PEA area closely tracks but consistently exceeds growth in total electricity consumption (Figure 2).



5. Electricity demand in Thailand has fairly predictable seasonal and daily cycles. Annual peak demand is generally from March to May when the temperature is highest. The lowest loads are generally in the coolest months, December and January. In 2016, summer heat brought record peak demand of 29,619 MW in May.

6. Industry has historically been the largest electricity consumer, consuming 43% of the total, followed by small general services and other businesses at 30% and residences at 24%. Electricity consumption by sector during 2005–2015 is shown in Table 1.

**Table 1: Electricity Consumption by Sector, 2005–2015**  
(gigawatt-hours)

Year	Residential	Small General Service	Business	Industry	Agriculture	Others	Total	Change from Previous Year (%)
2005	25,482	11,894	17,781	59,669	249	6,164	121,239	5.3
2006	26,847	12,558	19,097	62,432	240	6,704	127,878	5.5
2007	27,938	13,207	19,991	64,553	268	7,157	133,114	4.1
2008	28,691	13,730	21,052	64,148	281	7,618	135,520	1.8
2009	30,257	14,342	21,347	60,880	318	8,037	135,181	(0.3)
2010	33,216	15,586	22,996	68,039	335	9,129	149,301	10.4
2011	32,799	15,446	23,660	67,942	297	8,711	148,855	(0.3)
2012	36,447	17,013	27,088	72,336	377	8,517	161,778	8.7
2013	37,657	18,374	30,413	72,536	354	5,007	164,341	1.6
2014	38,993	18,807	31,362	73,782	414	5,327	168,685	2.6
2015	41,286	19,768	33,219	74,773	387	5,401	174,834	3.6

( ) = negative value.

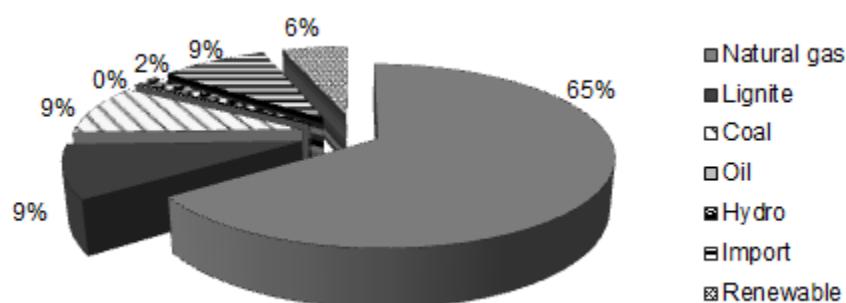
Source: Energy Policy and Planning Office. 2016. *Thailand: Energy Statistics*. Bangkok.

### C. Electricity Supply

7. As of July 2016, Thailand and its suppliers had installed generation capacity of 41,097 MW, of which 16,376 MW (40%) was accounted for by EGAT power plants, 14,949 MW (36%) by independent producers, 5,895 MW (14%) by small producers, and 3,877 MW (10%) by foreign producers of imported power. Five operators manage 80% of Thailand's electricity generation: Gulf JP (14%), Ratchaburi Electricity Generating Holdings (12%), Glow Energy (7%), Electricity Generating Public Company (7%), and EGAT (40%).

8. The national reserve margin fell from a high of 36% in 2001 to 25% in 2015, which is well above the minimum reserve margin of 15% set by the Ministry of Energy. Power production depends heavily on fossil fuels, with 65% generated from natural gas, 9% from lignite, and 9% from coal (Figure 3). Renewable energy sources contribute only 6%, but fluctuating prices for fossil fuel, fuel shortages, and the government's promotion of alternative energy are expected to increase the share of renewable energy going forward.

**Figure 3: Electricity Production by Fuel Source, July 2016**

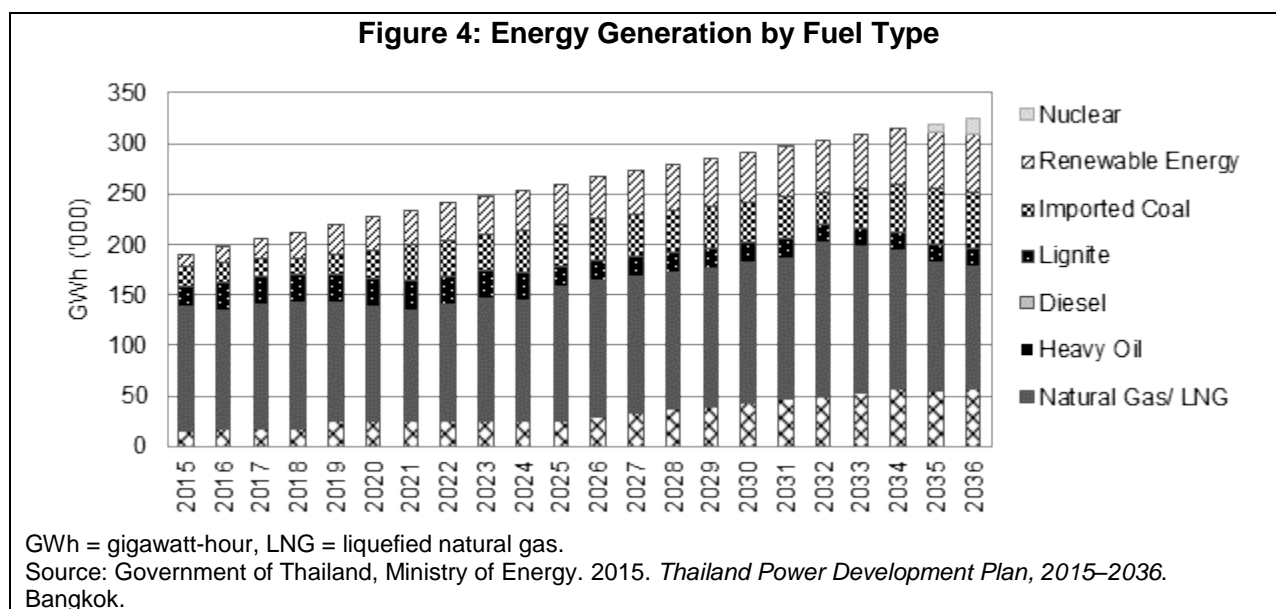


Source: Electricity Generating Authority of Thailand. 2016. *Thailand: Installed Generating Capacity (July 2016)*. Bangkok.

## D. Electricity Supply and Demand Forecast

9. Electric load forecasts are generated to predict future energy demand. This provides the basis for long-term planning to determine which centralized power plants to build and when. According to Thailand's Power Development Plan (PDP), 2015–2036, EGAT is projecting average annual growth of 2.68% in net electricity demand and 2.67% in peak demand during 2015–2036.<sup>1</sup> EGAT forecasts 326,119 GWh in consumption by 2036 and peak generation of 49,655 MW. The PDP, approved by the NEPC in June 2015, projects 6% lower energy demand and 5% lower peak demand than the previous plan. This is based on the expectation of results from the government's PDP to improve energy efficiency in the country. The PDP assumes total installed capacity will be 70,335 MW by 2036, with 57,459 MW of capacity added—more than two times the 24,736 MW of capacity expected to be retired.

10. To mitigate the risk of overdependence on natural gas and sustain national energy security and economic growth, the PDP aims to diversify fuel sources by increasing the use of renewable energy, coal, hydropower, and nuclear power. It projects that by 2036 30%–40% of power will be generated by natural gas, 15%–20% by renewable energy (including hydropower), 20%–25% by clean coal (including lignite), and up to 5% by nuclear power. The PDP estimates that another 15%–20% of electricity will be imported from neighboring countries (Figure 4). Small and very small power producers are expected to generate 22% of the country's total power supply by 2036.



11. The PDP incorporates two energy policy frameworks: (i) the Energy Efficiency Development Plan, 2015–2036,<sup>2</sup> which aims for a 30% reduction in energy intensity by 2036—i.e., 30% less energy consumed for each baht of gross domestic product—and would lower the country's long-term power demand needs; and (ii) the Alternative Energy Development Plan, 2015–2036,<sup>3</sup> which seeks to increase the share of renewable energy and alternative energy used for power generation to 30% by 2036 and build renewable energy power plants rather than

<sup>1</sup> Government of Thailand, Ministry of Energy. 2015. *Thailand Power Development Plan, 2015–2036*. Bangkok.

<sup>2</sup> Government of Thailand, Ministry of Energy. 2015. *Energy Efficiency Development Plan, 2015–2036*. Bangkok.

<sup>3</sup> Government of Thailand, Ministry of Energy. 2015. *Alternative Energy Development Plan, 2015–2036*. Bangkok.

some of the conventional power plants already planned. The Alternative Energy Development Plan, 2015–2036 aims for a total installed capacity of alternative energy of 19,684.4 MW in 2036. This target includes 6,000 MW from solar power alone. To reach this target, the plan calls for the encouragement of private sector participation in the development and use of new technologies. Thailand’s targets for renewable energy power generation under the Alternative Energy Development Plan, 2015–2036 are summarized in Table 2.

**Table 2: Target for Power Generation from Renewable Energy by 2036**

<b>Type</b>	<b>Existing Capacity<sup>a</sup> (MW)</b>	<b>AEDP Target (MW)</b>
Solar	2,023.2	6,000.0
Wind	243.8	3,002.0
Large Hydro	2,906.4	2,906.4
Small Hydro	172.3	376.0
Municipal Solid Waste	140.9	550.0
Biomass	2,805.0	5,570.0
Biogas	402.4	1,280.0
<b>Total</b>	<b>8,694.0</b>	<b>19,684.4</b>

AEDP = Alternative Energy Development Plan, MW = megawatt.

<sup>a</sup> As of July 2016

Source: Government of Thailand, Ministry of Energy. 2015. *Thailand Power Development Plan, 2015–2036*. Bangkok.

## **E. Tariff Structure**

12. The EGAT, MEA, and PEA electricity tariffs are closely regulated by the independent Energy Regulatory Commission. Ultimate approval rests with the NEPC and the cabinet. The tariff structure aims to (i) reflect economic costs and promote the efficient use of electricity, (ii) secure the financial health of these three state-owned power utilities, (iii) reduce subsidies between different categories of consumers, and (iv) adjust electricity tariffs through a mechanism that is flexible and automatic.

13. The tariff is divided into a base tariff and a fuel adjustment charge. The base tariff is a bulk supply tariff, comprising the wholesale tariff that EGAT charges MEA and PEA and the fixed retail tariff that MEA and PEA charge power consumers during each regulatory period. The factors used to calculate the base tariff include forecasts of the demand for electricity; fuel prices; and expenses for power generation, transmission, and distribution. They also take into account capital expenditures by EGAT, MEA, and PEA, as well as a return on invested capital.

14. The fuel adjustment charge is an automatic mechanism. It modifies tariffs to reflect changes in the base-case assumptions that are beyond the control of EGAT, MEA, and PEA—e.g., a higher-than-forecast fuel price increase. The fuel adjustment charge effectively passes unexpected increases and decreases in costs to end users. It is added to base tariffs for the next 4-month period to keep tariffs reasonably stable for consumers. The base component generally remains the same throughout a particular set tariff regulation period, but the fuel adjustment charge is subject to revision every 4 months.