SECTOR OVERVIEW

A. Electricity in Thailand

1. **Country Context and Overview.** Thailand has a population of nearly 70 million and is one of Southeast Asia’s most developed economies. Thailand’s energy market is one of the largest in the region, behind only Viet Nam and Indonesia in terms of market size by installed capacity. Energy access is nearly universal. A sizeable share of Thailand’s industrial electricity demand comes from its large base of mature industrial blue-chip firms, reflecting the country’s position as one of Southeast Asia’s more energy intensive countries.¹

2. **Regulatory Framework.** 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 as well as 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.

3. **Organizational Structure.** Thailand has adopted a single-buyer model in the power subsector, under which the state-owned utility allows limited private sector participation in electricity generation while maintaining control over system planning, operation, and pricing. Electricity Generating Authority of Thailand (EGAT), a state-owned utility, owns and operates most of the country’s power generation capacity and nearly the entire national transmission network. It is the principal purchaser of electricity and sells almost 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). MEA and PEA distribute power to retail, commercial, and industrial consumers throughout Thailand and own the electricity transmission and distribution networks in the regions where they operate. MEA has the exclusive rights to distribute and sell power to end users in the Bangkok metropolitan area, and PEA has these rights in all other areas. EGAT sells electricity to MEA and PEA at a regulated rate, which is set by the Energy Policy and Planning Office. Figure 1 illustrates the current organizational structure of Thailand’s power system.

4. **Private Sector Participation.** The Government of Thailand allows private sector participation in the renewable electricity generation business through its programs for small and very small power producers. The small power producer (SPP) program allows private developers to build, own, and operate 10–90-megawatt (MW) capacity power projects and enter into power purchase agreements (PPAs) with EGAT. Under the very small power producer (VSPP) program, producers of up to 10 MW may sell power to MEA or PEA. Renewable energy SPPs and VSPPs are eligible for a tariff incentive (adder) in addition to the wholesale electricity price. As of August 2019, 155 SPP projects with total contracted capacity of 9,531 MW were in operation, in addition to 978 VSPP projects with 3,994 MW of capacity.²

5. **Demand.** Demand for electricity in Thailand grew by an average of 3.5% per year during 2009–2019. Total electricity consumption in 2019 was 190,090 gigawatt-hours (GWh), a 1.4%

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rise from 187,375 GWh in 2018. Peak demand in 2019 was 30,120 megawatts (MW)—a 6.3% increase from 28,338 MW in 2018. Peak demand in April 2019 was the highest ever recorded, largely caused by hot summer weather, and declined to 27,747 MW in April 2020. Electricity demand in Thailand has predictable seasonal and daily cycles. Annual peak demand is generally from March to May, during periods of high temperatures. The lowest loads are generally during the coolest months, in December and January. Industry has historically been the largest electricity consumer, followed by business and residences.3

6. **Supply.** As of April 2020, Thailand had installed generation capacity of 46,206 MW (including imports), of which 16,035 MW (35%) was accounted for by EGAT power plants; 14,948 MW (32%) by independent power producers; 9,502 MW (21%) by small producers; and 5,721 MW (12%) by foreign producers of imported power. Power production depends heavily on fossil fuels, with 60% generated from natural gas, and 24% from lignite and coal (Figure 2). Renewable energy sources (including hydro) contribute only 15%, but several factors—e.g., fluctuating prices for fossil fuel, declining supplies of domestic gas, and the government’s promotion of alternative energy—are expected to increase the share of renewable energy. Thailand also expects to increase the use of liquified natural gas (“LNG”) for power generation because of declining domestic gas reserves.

7. **Forecast.** According to Thailand’s Power Development Plan for 2018–2037 (PDP 2018), total installed capacity is expected to reach 77,211 MW by 2037, including 56,431 MW of new capacity, which will help replace the 25,310 MW of capacity that is expected to be retired, in addition to expected growth in demand. Energy demand is forecast to reach 367,458 GWh in 2037, with peak power demand of 53,997 MW. The PDP 2018 projects that by 2037, 53% of

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power will be generated from natural gas, 20% from renewable energy, 9% from imported hydropower, and 12% from coal (including lignite). Energy conservation measures are expected to contribute to a 6% reduction in demand (Table 1).

Table 1: Electricity Production by Fuel Source

<table>
<thead>
<tr>
<th>Fuel Source</th>
<th>May 2020</th>
<th>2037 (forecast)</th>
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</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>60.2%</td>
<td>53%</td>
</tr>
<tr>
<td>Coal (including lignite)</td>
<td>24.2%</td>
<td>12%</td>
</tr>
<tr>
<td>Renewable energy and hydro</td>
<td>14.8%</td>
<td>29%</td>
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<tr>
<td>Import</td>
<td>0.4%</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td>Energy efficiency</td>
<td>0.0%</td>
<td>6%</td>
</tr>
<tr>
<td>Other (oil)</td>
<td>0.4%</td>
<td>&lt;0.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
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8. **Renewable Energy.** Thailand began promoting increased renewable energy development in 2006, when adder payments were introduced for biomass, biogas, waste, wind, and small hydro projects in addition to wholesale tariffs. Thailand has since grown to become the largest renewable energy market in Southeast Asia, with some 8,968 MW of renewable energy capacity (excluding large hydro) as of Feb 2020. Table 2 shows Thailand’s renewable energy capacity as of February 2020. Thailand’s PDP 2018-2037 contains an ambitious target to build an additional 18,176 MW of renewable energy capacity during 2018–2037. This includes a target for an additional 10,000 MW of solar power and nearly 1,500 MW of wind power.

Table 2: Renewable energy capacity by technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Feb 2020 (MW)</th>
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<tbody>
<tr>
<td>Biomass</td>
<td>3,442</td>
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<tr>
<td>Solar</td>
<td>2,982</td>
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<tr>
<td>Large-scale hydro</td>
<td>2,920</td>
</tr>
<tr>
<td>Wind</td>
<td>1,507</td>
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<tr>
<td>Biogas</td>
<td>533</td>
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<tr>
<td>Municipal solid waste</td>
<td>315</td>
</tr>
<tr>
<td>Small hydro</td>
<td>189</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,888</strong></td>
</tr>
</tbody>
</table>

MW = megawatt.


B. **Electric Vehicles in Thailand**

9. **Transport sector air pollution and greenhouse gas emissions.** Transport is typically a significant contributor to greenhouse gas emissions. In Thailand, the sector accounts for about 26% of Thailand’s annual greenhouse gas emissions, and also contributes to poor air quality in major urban centers. Electric vehicles, even if charged from an electricity grid that relies on fossil fuels, can reduce transport sector greenhouse gas emissions, and reduce local air pollution.

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10. **Regulatory Framework.** The electric vehicle industry in Thailand is in the early stages of development. In 2016, Thailand’s Ministry of Energy launched an electric vehicle action plan to support the sector. The plan covers 2016-2036 and includes a target of bringing 1.2 million electric vehicles on the road over this period. In early 2020, the Government of Thailand established the National Electric Vehicle Policy Committee to guide the implementation of the plan. The transition from a conventional automotive industry to an electric vehicle industry is also part of the country’s 20-year National Strategy.

11. **Demand.** In 2019, there were 32,248 new electric vehicles registered in Thailand, bringing the total cumulative number of registered electric vehicles on Thailand’s roads to about 156,038, or nearly 3% of all vehicle registrations. With increasing new registrations on a yearly basis, the cumulative number of registered electric vehicles on Thailand’s roads reached 156,038 vehicles by the end of 2019. Hybrid electric vehicles (HEV) account for nearly all registered electric vehicles in Thailand (about 97%). Battery electric vehicles (BEV) account for a small portion of registered vehicles and the majority of those (about 60%) are electric motorcycles. Barriers to greater uptake of electric vehicles include the still typically higher upfront purchase price, a lack of vehicle choice, and a lack of public charging infrastructure, which can contribute to “range anxiety.”

12. **Supply.** Domestic production and assembly have grown consistently thanks to incentives from the Board of Investment. In March 2020, the Board of Investment approved corporate tax exemption privileges to 22 electric vehicle manufacturing projects, consisting of 5 HEV projects, 6 plug-in hybrid electric vehicles (PHEV) projects, and 11 BEV projects. Five manufacturers with such privileges have begun production for HEVs (Toyota and Honda), PHEVs (Mercedes-Benz and BMW), and BEVs (Fomm). Energy Absolute is in the process of developing a manufacturing facility to produce BEVs within Thailand under their brand name “Mine Mobility.”

13. **Charging Infrastructure.** There were 527 electric vehicle charging stations in Thailand at the end of 2019. As of this time, EA Anywhere (Energy Absolute’s charging subsidiary) was the leading charging station provider with over 70% market share, followed by EGAT and ChargeNow (by BMW), with a combined market share of about 20%.

14. **Target.** The electric vehicle action plan has long-term goals of having 1.2 million electric vehicles on Thailand’s roads and building 690 electric vehicle charging stations nationwide by 2037. For electric vehicle production, the National Electric Vehicle Policy Committee anticipates that Thailand will become a regional hub of electric vehicle production within five years. By 2030, electric vehicle production is targeted to reach 30% of Thailand’s total automobile manufacturing production (or 750,000 electric vehicles per year).

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8 Hybrid electric vehicles combine a smaller battery with an internal combustion engine, and can be grouped into vehicles that can either be plugged in to charge, so called plug-in hybrid electric vehicles (PHEV), or vehicles in which the internal combustion engine and kinetic energy from braking are used to charge the typically much smaller battery (HEV). By comparison, a battery electric vehicle (BEV) relies entirely on the installed battery pack for power and these vehicles do not include any combustion engine.
9 The concern among potential electric vehicle purchasers that vehicle range (in kilometers per full charge) will be insufficient compared to the range of vehicles powered by internal combustion engines.
C. Green and Climate Loans

15. Green loans are innovative financial instruments where the proceeds are used exclusively to finance or refinance, in part or in full, new, or existing green projects with environmental or climate-related benefits. Green loans serve as a vehicle for financing investments in green and climate-smart projects that contribute to the achievement of a low-carbon future under the Paris Agreement on climate change and the 2030 Agenda for Sustainable Development of the United Nations. The Green Loan Principles (GLP) were created in 2018 and are based on, and refer to, the Green Bond Principles administered by the International Capital Market Association.\(^\text{11}\)

16. The GLPs and Climate Bonds Standard and Certification Scheme\(^\text{12}\) can help investors identify market leaders and prioritize financing projects that contribute to efforts to mitigate or adapt to climate change. Climate loans are a type of green loan focused on climate adaptation and mitigation. A certified climate loan must be assessed by a third-party assurance specialist against the relevant sector criteria of the Green Bonds Standard and Certification Scheme. Since the first issuance in 2007, cumulative issuance of green bonds globally is estimated at over $750 billion by 2019.\(^\text{13}\) Green loans, however, are less well known and utilized, and the GLPs were only developed in December 2018. In 2019, global green bond and green loan issuance reached $257.7 billion, of which only 4%, or about $10 billion, was for green loans.\(^\text{14}\) In Southeast Asia, green loans have been issued but none have yet been certified. The majority of green loans issued in the region have been in Singapore’s real estate sector.\(^\text{15}\)

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