



CHANDLER MHM

THAILAND'S ENERGY TRANSITION

2023 OUTLOOK



Thailand's Energy Transition

2023 Outlook

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INTRODUCTION

We are currently in the midst of a global energy transition; fossil fuels are being replaced by renewable and carbon-free fuels as the world's primary sources of energy. The major driver of the energy transition has been the arrival of global climate change, caused primarily by human activity since the industrial revolution. There is a growing consensus that urgent action is needed in order to stave off the most pernicious effects of climate change. Coupled with this consensus has been a dramatic decrease in costs for some of the technologies needed to facilitate the energy transition, such as solar photovoltaic (PV) panels, wind turbines and lithium-ion batteries. With so-called "climate tech" options now being cost competitive with fossil fuel-based competitors, the economic case for supporting the energy transition is clear. The energy transition will continue to attract public and private capital across various sectors, as savvy investors seize new and emerging opportunities.

Countries around the world are at various stages of transitioning in this new energy landscape. Thailand can fairly be said to be in the early stages of its transition, though the country is already taking concrete steps to move towards decarbonization. Fossil fuels continue to account for roughly 70% of electricity generation, though this percentage is falling. There are few electric vehicles ("EVs") driving on Thai roads at the moment, though the government has ambitious plans to become a global leader in the sector. Carbon pricing and hydrogen production are on the government's radar, both of which should further facilitate decarbonization.

This report will provide a brief overview of some of the key legal and policy-related developments impacting Thailand's energy transition. It is not comprehensive, as the energy transition is broader and deeper than a report of this format would allow. As 2023 approaches, we have aimed to provide a snapshot of the current efforts being undertaken in Thailand to support the drive to decarbonize the economy.

Should you have any questions or wish to discuss the contents of this report in greater detail, please contact the individuals appearing on the final page.

CHANDLER MHM LIMITED
December 2022

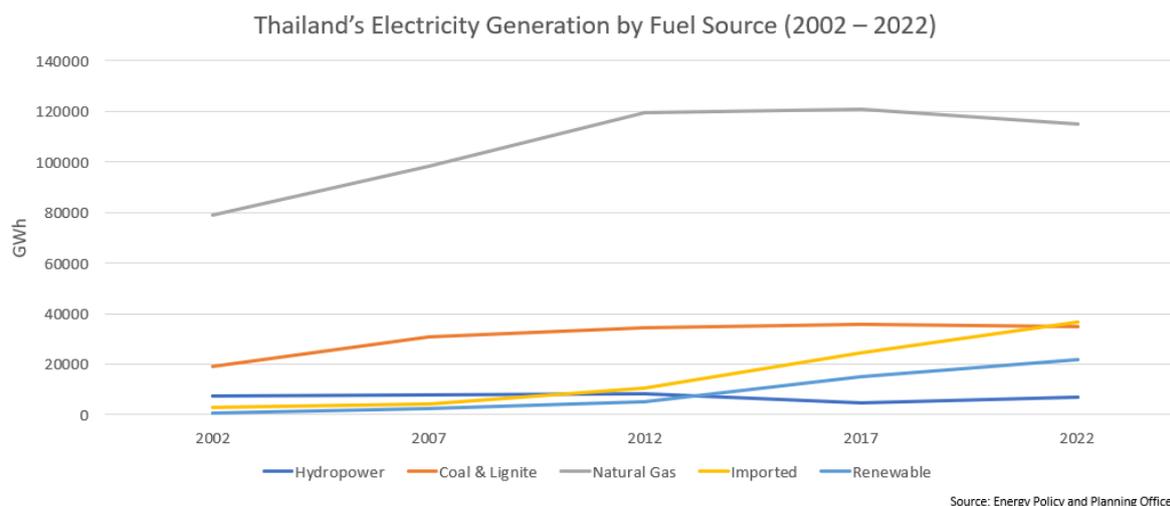
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MARKET OVERVIEW

Around the world, there are major transformations currently taking place in all segments of the energy sector. Thailand is no exception in this regard. Awareness of the impact of anthropogenic climate change has reached a critical mass amongst individuals and companies, who are now pressuring policymakers to take action to accelerate the energy transition.

Thailand continues to rely heavily on fossil fuels, though the role of renewables (including imported hydropower) occupies an increasingly expanding segment of Thailand's energy mix.



Electricity generation

As of July 2022, Thailand's installed grid capacity was approximately 48.57 GW.¹ This does not include very small power producers ("VSPPs"), which are defined as power projects with an installed capacity not exceeding 10 MW. This generating capacity is also exclusive of so-called "behind the meter" distributed generation, such as power supplied from natural gas fired cogeneration plants on industrial estates or rooftop solar installations.

As of the date of this report, peak demand for electricity in 2022 has been 32,255 MW.²

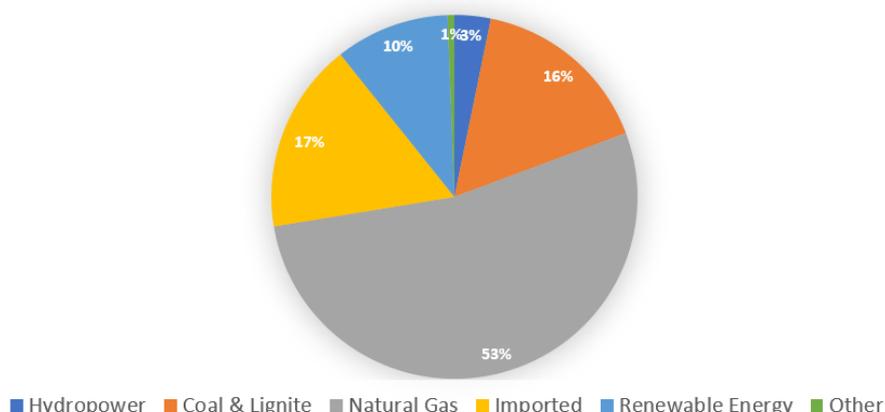
Although it appears that the Thai grid has significant excess capacity, it should be noted that the most recent version of the Power Development Plan ("PDP") contemplates the retirement and decommissioning of 25,310 MW of existing installed capacity by 2037. The energy transition and economic development generally will likely entail that Thailand's electricity consumption will continue to grow in the coming years, meaning additional capacity will need to be added to the grid. Indeed, the PDP currently envisions a further 56,431 MW of new installed capacity being built by 2037.³

¹ Energy Policy and Planning Office, Ministry of Energy. Electricity statistics (<http://www.eppo.go.th/index.php/en/en-energystatistics/electricity-statistic>).

² Ibid.

³ International Trade Administration, Department of Commerce (United States of America). Thailand – Country Commercial Guide, Energy, 15 August 2021 (<https://www.trade.gov/country-commercial-guides/thailand-energy>).

2022 – Generation by Fuel



Source: Energy Policy and Planning Office

Petroleum

Thailand is a net importer of both crude and refined oil products. Natural gas is sourced both domestically and through imports, which arrive through pipelines from Myanmar and as liquefied natural gas (“LNG”).

With domestic gas supplies being depleted and limited opportunities for new investment in the upstream sector, LNG will likely play an important role in supplying Thailand’s energy needs in the coming decades.

In 2021, 3,204 million standard cubic feet per day (“MMSCFD”) of natural gas was produced domestically, and a total of 1,521

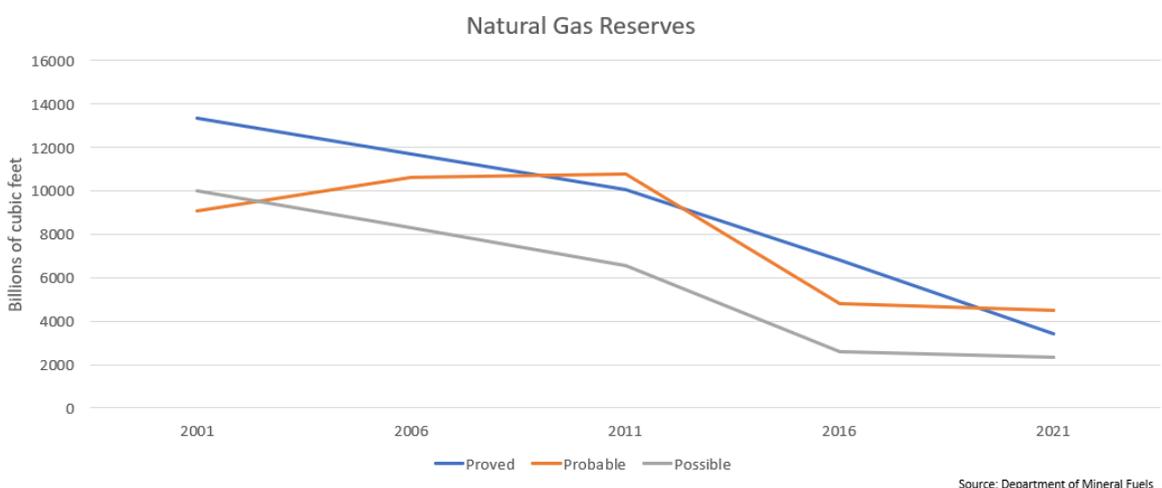
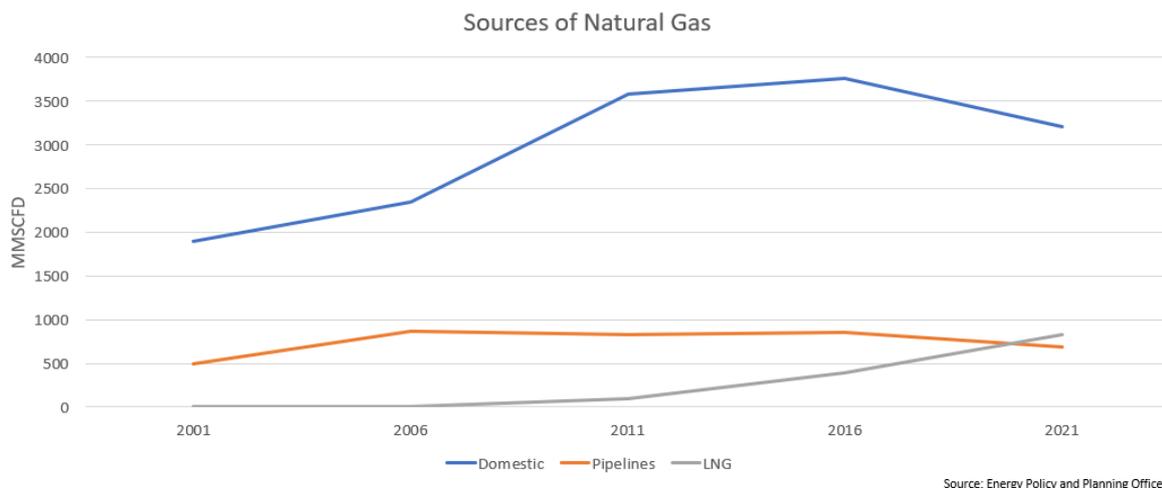
MMSCFD was imported.⁴ LNG imports have been steadily increasing since the receiving terminal at Map Ta Put industrial port in Rayong began operations in 2011; in 2021, 829 MMSCFD of LNG was imported.⁵ As Thailand’s domestic reserves of proven, probable, and possible natural gas are being depleted, LNG will continue to play an important role in satisfying Thai demand for natural gas.

In 2021, Thailand imported 846.6 million barrels of oil equivalent per day (“MBOEPD”) of crude oil, alongside 1,163.1 MBOEPD of refined oil products. By comparison, only 100.7 MBOEPD of crude oil was produced domestically for local refining. Meanwhile, the Thai economy consumed a total of 852.7 MBOEPD of refined oil products.⁶

⁴ Supra note 1.

⁵ Ibid.

⁶ Department of Mineral Fuels, Ministry of Energy. Annual Report, 2021, at page 48.



In September 2022, the Department of Mineral Fuels (“DMF”), Ministry of Energy accepted bids for a new round of offshore exploration and production blocks. Presumably, the purpose of this bid round is to secure greater amounts of indigenous gas in order to promote energy security. However, since it is likely to take at least 5 - 10 years for these new gas blocks to begin producing in significant quantities, the new bid round is likely to do little in the short- to mid-term to help stabilize energy costs.

Policy and planning

The Ministry of Energy and its various departments and agencies are in charge of setting overall energy policy in Thailand. The main planning activities are carried out by the Energy Policy and Planning Office (“EPPO”), whose policies and plans are

considered and approved by the National Energy Policy Council (“NEPC”). Until recently, Thailand’s primary integrated policy document was the Thailand Integrated Energy Blueprint, or “TIEB” for short. Within the TIEB were specific policies and plans relating to each sub-sector, including the Oil Plan, the Gas Plan, the Alternative Energy Development Plan, the Energy Efficiency Development Plan, and the PDP. These plans are intended to be complementary and provide the overall direction of the Thai government’s plans within the energy sector.

Going forward, Thailand will reportedly be changing the name of its overarching policy and planning document in the energy sector to the “National Energy Plan” (“NEP”). The sub-sector planning documents will reportedly remain unchanged under the

NEP.⁷ Historically, the PDP has been the main policy document related to electricity generation, transmission, and distribution. It has been updated every 3 - 4 years, with the current PDP having been adopted in early 2019, with retroactive effect to 2018.

It seems likely that the PDP will be updated in 2023. The updates to the PDP will likely reflect the changing global and domestic landscape, which has been altered significantly since 2019. Of particular note are Thailand's increased efforts to decarbonize its economy, including adopting more ambitious Nationally Determined Contributions under the Paris Agreement. Furthermore, a significant drop-off in domestic natural gas production, coupled with the war in Ukraine driving up global prices of LNG, will force policymakers to consider the long-term wisdom of reliance on natural gas as a major energy source.

⁷ <https://www.trade.gov/country-commercial-guides/thailand-energy>.



ELECTRICITY GENERATION

Overview

The power sector will play an increasingly important role in facilitating Thailand's energy transition. With continued economic development and increasing electrification of transportation and other sectors, much of the activity in Thailand's energy transition will be taking place on the grid.

There are a number of trends that will impact the power sector in the coming years, including:

- increased reliance on LNG, as domestic gas reserves continue to be depleted;
- more greenfield renewable energy projects;
- additional power trading with neighbouring countries;
- market liberalization; and
- distributed power generation.

These trends are not always mutually complementary, and adjustments in policy and major changes to the legal and regulatory framework are inevitable in the coming decades.

Natural gas outlook

Natural gas remains the primary fuel used in Thailand's power sector, accounting for

more than 53% of generation in 2022. Given the number of existing gas fired power plants, as well as large industrial users who rely on natural gas as a feedstock for manufacturing, it seems likely that natural gas will continue to play an important role in Thailand's energy mix for the foreseeable future.

However, with domestic gas production declining and limited opportunities to build more pipelines to purchase gas from neighbouring countries, Thailand will need to rely more heavily on LNG imports, i.e. natural gas that has been cooled and transformed into liquid form. LNG already plays a vital role in Thailand's energy market, as it is seen by some as having a role to play as a bridge fuel in facilitating the energy transition. Natural gas is the most carbon-efficient fossil fuel, emitting 40 percent less carbon dioxide than coal and 30 percent less than oil.

2022 was a challenging year for all LNG purchasers around the world. The war in Ukraine has impacted the LNG market, driving up costs and threatening to severely limit fuel supplies. Russia, a key natural gas exporter, reduced supplies to Europe by almost 80 percent. The increased demand is reflected in the price of US exports of LNG.

The war in Ukraine has impacted Thailand as well, as it arrived at a moment when domestic gas production in the Gulf of Thailand has decreased dramatically, thus resulting in increasing reliance on LNG

imports. Given the predominant role that natural gas plays in power generation in Thailand, the cost of electricity for Thai consumers is expected to climb significantly in 2023.

The Ministry of Energy plans to promote the use of LNG by improving laws that impede full competition, creating a prospective assessment system, modernizing supervision, and developing infrastructure to facilitate its decentralized use. These initiatives will be included in the NEP.

Based on the proposed policies that will be included in the NEP, there are many potential opportunities for LNG players, including but not limited to the following:

- LNG berthing and regasification facilities;
- the importation and sale of LNG;
- gas pipelines and gas systems;
- onshore LNG transportation; and
- gas trading on the secondary market.

Despite the current headwinds facing the LNG market, the long-term trends in Thailand suggest that LNG will play an

increasingly important role in meeting the country’s energy needs.

New round of renewable energy bidding

In September 2022, the Energy Regulatory Commission (“**ERC**”) released the Regulation for Procurement of Renewable Energy under Feed-in Tariff (FiT) Scheme for the Period of 2022 to 2030 (the “**2022 RE Regulation**”).

This round of procurement will be in the form of: (i) non-firm purchases for power generated from biogas (from wastewater and solid waste), wind and ground-mounted solar power generated by greenfield small power producers (SPPs) and very small power producers (VSPPs); and (ii) partial-firm purchases for power generated from ground-mounted solar with battery energy storage systems (BESS) generated by greenfield SPPs.

The current PDP envisions over 5 GW of additional renewable energy capacity coming online by 2030, and sets out target procurement quotas and scheduled commercial operations for these energy sources as follows:

Renewables	Proposed electricity to be sold (MW) for each year of scheduled commercial operation dates (SCODs)							
	2024	2025	2026	2027	2028	2029	2030	Total
Biogas (from wastewater/solid waste)			75	75	75	70	40	335
Wind		250	250	250	250	250	250	1,500
Ground-mounted solar with BESS	100	100	100	100	200	200	200	1,000
Ground-mounted solar	190	290	258	440	490	310	390	2,368

Of particular note are the 2022 RE Regulation’s restrictions on foreign ownership and management; foreign ownership in project companies has been capped at 49%, and the majority of project companies’ boards of directors must be Thai nationals.

Renewable energy certificates (“**RECs**”) or carbon credits will belong to the Electricity

Generating Authority of Thailand (“**EGAT**”), the Provincial Electricity Authority (“**PEA**”), or the Metropolitan Electricity Authority (“**MEA**”) (as offtakers), or the relevant government sector in exchange for subsidies granted by the government sector in the form of the FiT. Based on the ERC’s press release and the 2022 RE Regulation, the announcement of the selected bidders will occur in mid-2023, with the first set of

power purchase agreements to be executed shortly thereafter.

Cross-border purchases and grid-interconnection with neighbouring countries

Cross-border power purchase agreements have gained significant attention in South and Southeast Asia as a means of addressing energy security and insufficient power generation resources.

Though historically ASEAN governments have focused on increasing energy capacity by reliance on fossil-fuel power plants, an increased desire to avoid overbuilding capacity, coupled with a pivot towards green energy, has led to governments supporting cross-border energy trading throughout the region. Connecting grids and the cross-border trading of electricity also makes sense for certain countries (e.g., Singapore) which do not have enough free space or available resources to operate renewable power plants, such as solar, wind, or hydropower, within their territories.

Recently, Laos has experimented with cross-border power trading through grid interconnection by investing heavily in hydropower projects. Accordingly, it has adopted the moniker of 'the battery of Southeast Asia'. Ninety-five percent (95%) of its power exports come to Thailand. Governmental authorities from Thailand and Laos signed a MOU in March 2022 whereby Thailand agreed to increase its purchases of electricity from Laos. In 2022, imported electricity (mainly from Laos) replaced coal and lignite as the second largest source of power consumed in Thailand, accounting for approximately 17% of the country's total. Going forward, it seems likely that Thailand will continue to rely on electricity generated from hydropower projects in Laos to meet its baseload generating needs.

Cross-border trading has many challenges, many of which Laos and Thailand have already experienced. Cross-border grid interconnection requires technical

standardization and grid code synchronization to ensure technically feasible, reliable, safe, and economical power exchanges among the participating countries. Moreover, developers must deal with different government regulations and commercial regimes, such as transit fees and energy pricing, and more technical issues such as regional barriers, load profiles, and load factors of different countries.

While there are benefits to connecting grids and exporting of green energy to support the energy transition, greater collaboration throughout Asia would require significant political effort from the various ministers and governmental authorities in the relevant countries.



Trend towards distributed generation

Over the past five years, solar electricity developers ("***Developers***") have been busy installing photovoltaic ("***PV***") panels on the rooftops of private commercial and industrial ("***C&I***") customers. For C&I businesses, this has been an easy sell: installing solar equipment on site is often financed by the Developers, rooftop solar generally reduces overall electricity costs, and the glare caused by the sun shimmering off PV panels that sit atop a building show the occupant's green bona fides.

Developers have sought premier projects as they expand their portfolios in Thailand. This generally includes a relatively new factory or store, in a suitable physical location, with a creditworthy occupant. There are a significant number of

Developers active in the rooftop solar sector, and most financing for development costs has been sourced from shareholder equity contributions or corporate lending.

There is no standard template Power Purchase Agreement (“*PPA*”) that is commonly used in Thailand's rooftop solar industry. As such, we see various form agreements being used in the market. Some of the areas of concern when examining rooftop solar PPAs are likely to include the following issues:

- ***Revenue certainty and demand risk.***

The C&I customer's anticipated use of electricity from rooftop solar will be the primary factor used in assessing prospective financial returns. The pricing formula, as well as incentives to make use of rooftop solar electricity in priority to other sources, must be considered.

- ***Consequences of termination.***

The likelihood of early termination, and the Developer's rights must be properly understood. Although the Developer will retain ownership of the solar installations during the term of the PPA, the Developer's ability to make use of the installations will be limited upon termination of the PPA. A mechanism that permits the transfer of the equipment to the C&I customer is essential.

- ***Force majeure and unforeseen risks.***

A project's commercial viability will depend on projected electricity demand over a 20-25 year period. The PPA must consider the consequences of unforeseeable events or circumstances which affect the rights and normal business operations of the parties over this long term. Clear drafting is essential; in the wake of the Covid-19 pandemic, a spotlight has been shone on the importance of robust force majeure clauses. Although force majeure clauses drafted since 2020 can reliably be expected to mention “pandemic or epidemic” as a listed event constituting force majeure, it is important not to over-learn the lessons from past crises and to think further about the next

round of unforeseeable events. With the global climate rapidly changing, these are surely forthcoming.

Thailand does not presently have a state-mandated carbon trading market. However, voluntary carbon offset schemes such as the International Renewable Energy Certificate Standard (“*I-REC*”) are gaining in notoriety. Essentially, the I-REC scheme allows generators of renewable electricity to register their generation and sell certificates to consumers on the open market, enabling consumers to meet other clean energy objectives. Carbon credits have emerged as a secondary source of revenue for Developers, who are generally better situated than their customers to maximize the benefits of engaging in carbon trading schemes.

Thailand's rooftop solar industry is still young, and there remain numerous opportunities for Developers to seize. In addition to C&I customers, residential consumers and small retailers present another great opportunity for Developers in the country. At the moment, access to credit and the relatively small size of projects are drawbacks; these issues can be overcome with proper policy tailoring. As the Thai government has shown a desire to promote renewable energy, it is likely that initiatives will be drawn up to enable greater market penetration.

TPA Codes

The electricity market in Thailand is described as an enhanced single buyer model. Based on this structure, EGAT purchases all electricity generated by private power producers, other than: (i) power generated by VSPPs where the installed capacity of the power plant is not exceeding 10 MW which can be sold to either the MEA or the PEA; and (ii) private direct sales from small-scale facilities (e.g., rooftop solar, as mentioned above) or by industrial users.

Under the enhanced single buyer model, EGAT holds a monopoly on high-voltage transmission and the wholesale electricity

market. Similarly, the MEA and the PEA hold monopolies in managing the distribution grids, as well as being the primary retail sellers of power. While this market structure has been effective in recent decades in coordinating investments to ensure Thailand's electricity supply is sufficient to meet its economic growth objectives, its inherent lack of competition has become a barrier to rapid deployment of renewable energy projects. In order to liberalize the electricity market, therefore, private electricity generators will need the ability to access both the transmission and distribution grids in order to sell power to customers at a distance.

As a measure to enhance competitiveness in the power industry, on 3 May 2022 the ERC issued the Notification Re: Criteria and Guidelines on Preparation of the Third-Party Access Code for the Electricity Network Systems (the "**ERC Notification**"). This ERC Notification discusses third-party access codes (the "**TPA Codes**") relating to electricity network systems which encompass the electricity transmission systems and the electricity distribution systems.

The ERC Notification requires designated electricity transmission system licensees and electricity distribution system licensees to issue TPA Codes prepared in accordance with the Third-Party Access Framework Guidelines attached to the ERC Notification (the "**TPA Code Guidelines**"). Once the TPA Codes are adopted and the ERC's further regulation of usage and utilisation of the electricity network systems is implemented, the issuers of the TPA Codes generally would have to allow third parties, who have requested to utilise or connect to the issuers' electricity network systems and have been allocated with the availability capacity of electricity network systems, to utilise or connect to the issuers' electricity network systems. Under the ERC Notification, third parties are specified as private power business operators or licensees under the Energy Industry Act, B.E. 2550 (2007) other than the issuers themselves. The issuers would be entitled to service fees, which

would be subject to further supervision by the ERC.

The initial designated issuers of the TPA Codes are EGAT, the MEA, and the PEA. The ERC is authorised to designate additional electricity transmission system licensees and electricity distribution system licensees as TPA Code issuers under the ERC Notification.

Pursuant to the draft TPA Code Guidelines, the services that EGAT, the MEA, and/or the PEA (as TPA Code issuers) will provide will be on a use-it-or-lose-it basis; that is, any capacity not used by a user within the specified time and conditions can be allocated by the issuers to other users or applicants. Furthermore, the TPA Code issuers would be required to propose service fees and penalty rates to the ERC for approval, and the service fee rates must also be compliant with the Electricity Tariff Regulatory Framework and international prudent cost practice. In addition, the TPA Codes must integrate steps and restrictions which help to ensure that the issuers' affiliates will not receive preferential treatment to other players with respect to their applications to utilise or connect to the electricity network systems. The issuers will also have to ensure that they do not favour their respective affiliates over third parties in terms of the allocation of available transfer capacity and access to information regarding the same.

The enactment of TPA Codes to provide greater access to private electricity generators should increase competition in Thailand's power markets and, ultimately, lower retail electricity costs. A key issue to watch going forward will be wheeling charges imposed by the TPA Code issuers, since this will be a driving factor in determining the economic viability of private electricity trading.

The primary beneficiaries of a liberalized market would be consumers, who should be able to benefit from lower power prices. Another key motivator will be the ability to procure electricity entirely or mainly from renewable sources. As many companies

have adopted commitments to achieve net zero carbon emissions by a specified date, allowing the purchase of power that has been generated entirely from renewable sources will facilitate the achievement of these commitments and provide opportunities for renewable energy developers.

Competition law

The ERC is the primary government agency responsible for monitoring and regulating competition in the power sector. At the moment, the merger control regime in the power sector is limited in scope and in need of updates to account for the increase in private investment brought on by the energy transition. In 2023, it seems likely that the status quo on competition law in the power sector will be upended.

In October 2022, the ERC launched a public hearing on new merger control rules for energy businesses. There are currently five draft notifications and regulations being considered; the key takeaways from each are set out below.

The ERC Notification Re: Rules, Procedures, and Conditions on Transfer of Energy Licenses

The draft notification would replace an existing notification from 2009. The draft notification adds a clear definition of what constitutes a 'transfer of license', which currently is limited to an action where an energy licensee transfers all or part of its rights under an energy license to another person, where the transfer is neither (i) a mere change of an energy licensee's name, nor (ii) a merger as prescribed by the ERC. As with the existing notification, under the draft notification a transferor would have to submit an application for approval of the transfer of its license, while the transferee must be demonstrably qualified to be an energy licensee in accordance with its contemplated energy business. The vetting process by the ERC will be changed from a single step process (i.e., where the transfer is either approved or not approved) to a two-

step process, whereby if an application is considered likely to fall short of achieving certain criteria, the transferor would be required to submit an impact assessment report for an additional round of consideration.

The ERC Regulation Re: Rules and Procedures for Merger and Cross-Shareholding in Energy Businesses

Under this draft regulation, "mergers" would conceptually cover entire business transfers, amalgamations, and the acquisition of assets, shares, or managerial control of another energy licensee. The revised definition would also capture mergers by persons with power of control, parent companies, subsidiaries, and affiliates of energy licensees. Mergers with an asset value or annual revenues not exceeding certain thresholds will be required to submit a clarification report pre-merger in lieu of obtaining the ERC's pre-merger approval. Under the draft regulation, an energy licensee wishing to implement a cross-shareholding structure will need to file a request for approval to the ERC. Cross-shareholding captures shareholding in another energy licensee, major shareholders, subsidiaries, affiliates, or parent companies of an energy licensee itself or another energy licensee, which may result in control in another energy licensee, either by direct or indirect shareholding.

The ERC Regulation Re: Definition of Market and Scope of Relevant Energy Market

This draft notification would authorise the ERC to set out definitions of 'market' and 'scope of a relevant energy market' by using criteria prescribed in the notification.

The ERC Regulation Re: Rules on Dominant Player

Based on the draft notification, two energy licensees with a relationship in terms of policies or power of command are considered the same licensee. Considerations on being a dominant market

player are specified in the draft notification. A licensee considered to be a significant market dominant player would be subject to specific measures imposed by the ERC, unless they are lawfully the only licensee in the relevant market.

The ERC Regulation Re: Rules and Measures Relating to Monopoly, Reduction of Competition, and Restriction of Competition

A monopoly, a reduction, or restriction of competition under this draft notification would cover actions taken singly by an energy licensee or operator, or jointly with a third party, regardless of whether that third party is another energy licensee.

Taken together, these five draft notifications and regulations will greatly increase the role of the ERC. Once adopted, independent power producers will need to assess whether their current structures comply with new requirements relating to

competition. Going forward, it seems apparent that the ERC intends to play a more active role in scrutinizing M&A transactions in the power sector.

Final thoughts

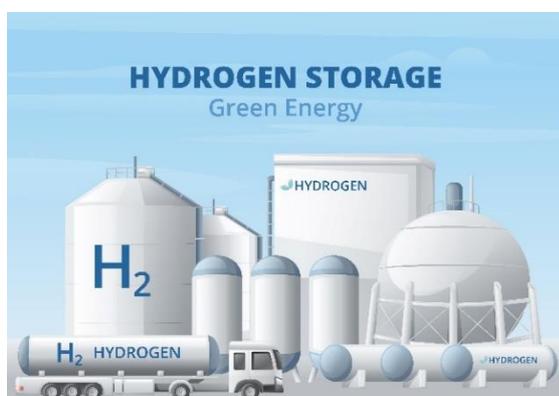
Over the past decade, the power sector in Thailand has become far more dynamic, with new technologies and business structures disrupting incumbents. This appears set to continue, with further disruption on the horizon brought on by greater market liberalization. These developments will be accompanied by a more hands-on role for the ERC and grid operators, meaning more regulations and greater legal complexity are on the horizon. Well-tailored laws and regulations can be a great facilitator to the energy transition, as they enhance predictability and promote investor confidence.

HYDROGEN

Introduction

As the energy sector continues to transition from fossil fuel-based energy to lower carbon alternatives, one of the disruptors gaining attention globally is hydrogen. Hydrogen has multiple potential applications, including in ground-transportation vehicles, generating electricity, heating and cooling, shipping and aviation fuels, ammonia production, and steel manufacturing.

Pure hydrogen is a transparent gas in ambient conditions and does not exist in its natural state in great abundance. As such, hydrogen must be produced by separating hydrogen atoms from molecules in which they exist naturally; primarily, methane and water. Hydrogen production comes in a variety of processes, commonly referred to with a colour scheme used by the industry to differentiate the various methods of production.



Grey hydrogen is produced by refining natural gas, through steam reformation, and separating methane into carbon and hydrogen. As a byproduct, it creates carbon dioxide.

Blue hydrogen is produced in a similar manner as grey hydrogen; however, carbon dioxide emissions are reduced by carbon capture, utilisation, and storage (CCUS) technology.

Green hydrogen is produced through electrolysis with inputs of water and renewable electricity, such as wind or solar. The electrolysis process separates water into hydrogen and oxygen as a byproduct. As a result, green hydrogen is a zero-carbon source.

Pink hydrogen is produced in a similar manner as green hydrogen, with the

exception that the electricity input comes from nuclear power.

Turquoise hydrogen is produced with natural gas as a feedstock through methane pyrolysis, whereby the methane is heated to very high temperatures resulting in gaseous hydrogen and carbon in a solid state known as carbon black. Carbon black is currently used as an industrial feedstock in various applications such as paint pigments, tire manufacturing, etc. Similar to blue hydrogen, turquoise hydrogen produces low quantities of carbon.

The majority of hydrogen production in the global market, including in Thailand, is currently fossil-fuels based⁸. However, the development of green hydrogen is growing fast as many nations aim for net zero emissions targets by 2050.

Hydrogen in Thailand's energy framework

Under the Alternative Energy Development Plan ("**AEDP**"), one of Thailand's five master plans for energy development, hydrogen is included as part of the "alternative fuels" category with an overall target of 10 kilotons of oil equivalent (KTOE) of energy being produced in total by 2036. The AEDP does not set out what proportion of this target will be contributed by hydrogen.

⁸ <https://www.iea.org/reports/hydrogen>.

Guidelines for the development of hydrogen production are currently being devised under the direction of EPPPO. In 2023, we expect to see policies promoting the commercial use of hydrogen and a strategic plan of hydrogen utilization, as well as a trial sandbox in the Eastern Economic Corridor (“EEC”).

Current legal framework

On the regulatory side, the ERC has included hydrogen within the definition of “renewable energy” to be purchased by the PEA or MEA (for VSPP projects) and EGAT (for SPP projects), pursuant to the ERC Notification re purchase of power from SPP operators of renewable energy by Feed-in Tariff (B.E. 2560) and the ERC Notification re purchase of power from VSPP operators of renewable energy (B.E. 2561).

As the hydrogen industry is in early phases of development, general regulations would apply to hydrogen projects similarly to other power projects. This would include licensing requirements under the Building Control Act and the Factory Act. In hydrogen projects where electrolyzers are co-located with wind or solar farms, an electricity generation license under the Energy Industry Act would also be required. However, hydrogen does not currently fall within the definition of “fuel” and is not currently subject to the Fuel Oil Control Act or the Fuel Oil Trading Act.

Hydrogen-specific regulations may develop in stages; in the short-term, regulators may focus on safety standards for hydrogen production. In the mid-term, storage, pipeline, and transportation standards of hydrogen may be developed, and the commercial use of hydrogen may be supported in the long-term, e.g., hydrogen fuel cells, hydrogen-driven vehicles, and networks of hydrogen fuel stations. Recently, the Board of Investment (“BOI”) announced that from 3 January 2023, the manufacturing of hydrogen-fuel vehicles

and hydrogen production from renewable energy will be added to industry categories eligible for BOI privileges, which include exemptions on import duties and VAT for machinery, as well as a corporate income tax holiday for a specified number of years.⁹

Pilot hydrogen project in Thailand and potential for hydrogen in Thailand

EGAT has initiated Southeast Asia's first wind hydrogen hybrid project in Lam Takhong, Nakhon Ratchasima province, where green hydrogen will be produced during off peak hours by electrolysis. Green hydrogen is produced with local wind resources and fed to EGAT's storage facility located on-site. During off-peak hours, the hydrogen charges fuel cells which power the nearby EGAT learning center. When there is sufficient electricity generated from the wind turbines for hydrogen production, the excess electricity generated from the wind turbines is fed into the grid. Although this is only a pilot project, it demonstrates recognition by EGAT that hydrogen production will play an increasingly important role in facilitating Thailand's energy transition.

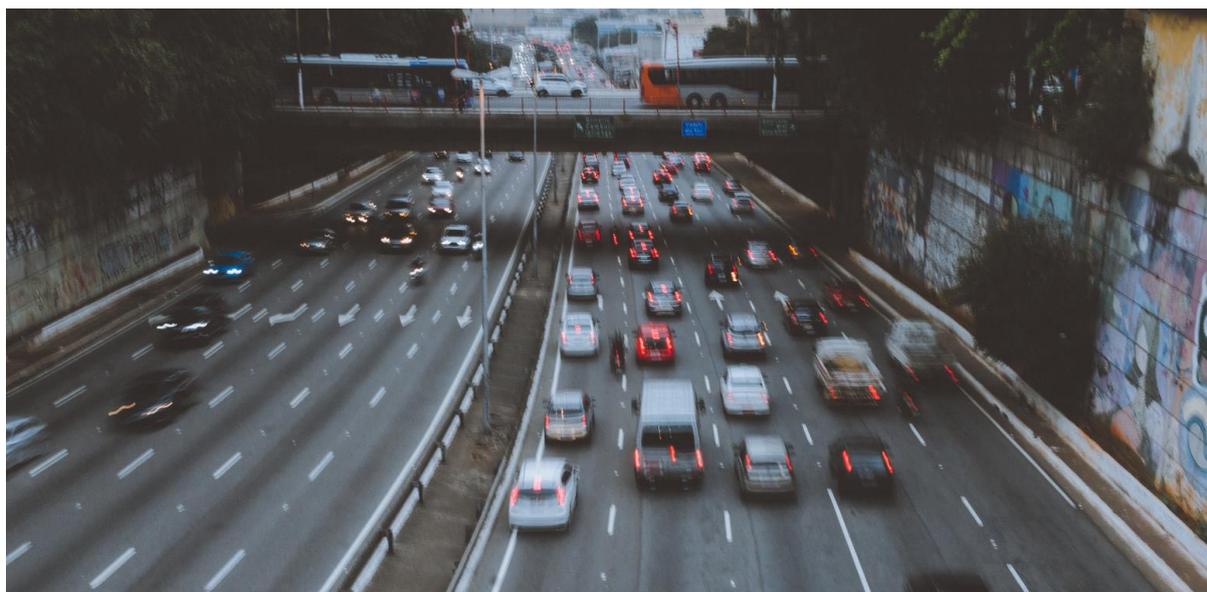
A number of developers of electrolysis technology and actors in the hydrogen industry generally suggest that Thailand has great potential for the hydrogen industry. Attractive locations in Thailand for hydrogen production are those with stable capacity for solar energy (most of Thailand, with the highest solar intensity in the central and the northeast regions), wind energy (high wind speed in mountainous areas in Chiang Mai, mountainous areas in the west, and coastal areas in southern Thailand, Rayong, and Chonburi) and water inputs (e.g., central Thailand).

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https://www.boi.go.th/index.php?page=press_releases_detail&topic_id=133211.

Final thoughts

At the moment, the main challenges confronting the hydrogen industry are high production costs, limited current uses, and the lack of a clear regulatory framework. However, there are positive signals as the technology for hydrogen production is improving, thus allowing for cost reductions and further expansion. Thailand has the potential to be a leader in the emerging hydrogen economy, particularly in the mid-to long-term, whilst regulators begin to recognize and support this growing industry. Thailand's hydrogen regulatory framework may become clearer in the future and must be closely monitored, as this will be key to encouraging and supporting future hydrogen projects.



TRANSPORTATION

Overview

Millions of cars roam the streets in Bangkok and other big cities in Thailand every day. Needless to say, transportation is a sector that uses high volumes of fossil fuel and is a major emitter of carbon dioxide (CO₂) into the atmosphere.

In order to respond to demands to decarbonize the economy, the Thai government, like many other governments around the world, has resolved to implement policies focused on sustainable mobility, involving various transportation modes. The government's priorities include the use of zero-emission vehicles, the development of an efficient, environmentally friendly interconnected urban transportation system (e.g., electric ferries now plying the Chao Phraya River, an electric monorail and electric buses in operation, and electric tuk-tuks accessible by mobile apps), the promotion of a circular economic manufacturing system, and the building of infrastructure to enable the use of these systems. Furthermore, growing environmental consciousness, surging gas prices, and reduced battery costs are driving interest in electric vehicles ("EVs") in Thailand.

At COP26, the Thai government pledged to reach carbon neutrality by 2050 and to reduce greenhouse gas emissions to net-zero by 2065. Among the many initiatives to realize these carbon-neutral and net-zero goals is the government's commitment to support investment in EVs, which will also help reinforce the country's comprehensive strategy to create sustainability and inclusiveness in its economy, society, and environment through the much-touted "**BCG**" (bio-circular-green) model.

Policy developments

Despite being in the early stages of transitioning to EVs, Thailand has been moving forward at a fast pace, propelled by the government's various policies, regulations, and incentives, as well as consumer demand. Putting plans into actions, the Office of the Prime Minister – in collaboration with the Ministry of Industry, the Ministry of Energy, and the Ministry of Transport, among others – established the National Electric Vehicle Policy Committee (the "**EV Committee**") in 2020, which is chaired by Deputy Prime Minister, to set directives and to oversee the integration and developments of EVs towards zero-emission mobility.

The EV Committee has since issued a bold road map setting both short-term and long-term goals for EV developments that cover

public and private means of transportation (i.e., buses, trucks, tuk-tuks, boats, cars, and motorcycles). Among these goals is the much-promoted "30@30" policy, which sets a target of zero-emission vehicles (ZEVs) constituting at least 30% of total local vehicle production by 2030. The EV Committee later decided to increase the target to 50%, following the rapid growth of EVs abroad, especially in Europe. The Thai government's ambition is to have every EV sold in the country manufactured domestically by 2035, and increase the total number of EVs to 2.5 million by 2040.

Besides the goal to shift from traditional internal combustion engine ("**ICE**") vehicles to ZEVs, the government's strategy focuses, in tandem, on accelerating the rollout of EV charging points and related infrastructure, power grid management, and the manufacturing of EV parts, batteries, and storage, all within the same timeframe. Thailand's ambitions of being an EV hub of Asia are also supported by the government's policy to designate the next-generation automotive sector (covering the entire automotive industry value chain and the production of batteries, driving systems, etc.) as one of the targeted industries with numerous investment privileges in the EEC.

Regulatory framework and incentives

To achieve these lofty ambitions, the Thai government has sought to provide a clear set of policies which address major concerns in order to increase investor confidence. The government's policies demonstrate its intention to align with the global shift to EVs by major car manufacturers. Within Southeast Asia, Thailand has consistently

ranked first in terms of total auto production output, and 11th in the 2019 global rankings. In an attempt to preserve its leading reputation in the automotive sector, the government's related policies are aimed at incentivizing the widespread use of EVs in Thailand by providing exemptions or reductions on import duties and excise taxes, as well as subsidies to increase domestic demand for EVs and to attract investment in the EV sector. Specifically, this includes the local manufacturing of completely knocked down ("**CKD**") vehicles in Thailand. The government has also adopted various policies to encourage the mainstream use of EVs, such as a one-year 80 per cent cut on the annual vehicle registration tax for all fully-electric EVs that are registered within the eligible period, improvements to EV registration procedures, and measures to control insurance premiums for EVs.

Tax authorities' incentive packages

Following the resolution of the EV Committee¹⁰ to launch an "EV Tax Incentive Package", as endorsed by the Cabinet,¹¹ the Ministry of Finance and Excise Department has recently issued notifications to implement the EV Incentive Package (for the years 2022-2025), with the aim of stimulating battery electric vehicle ("**BEV**") demands by equalizing the price of BEVs and ICE vehicles.

Only certain types of BEVs are eligible for incentives under this scheme, i.e., passenger cars, pick-up trucks, and motorcycles. These types of BEVs must be imported completely built up ("**CBU**") in 2022 – 2023 or CKD between 2022 – 2025¹².

¹⁰ Resolutions 3/2564 and 1/2565.

¹¹ Cabinet resolution dated 15 February 2022.

¹² Whilst import of EV parts for locally manufacture was included in the tax incentive

packages approved by the Cabinet, there has still been no regulation or notification on EV part tax incentives issued by the Excise Department to date.

Incentives	Types of eligible BEVs		
	Passenger cars with less than 10 seats	CKD Pick-up trucks with an SRP ¹³ up to THB 2 million with battery capacity of at least 30 kWh	CBU and CKD motorcycles with SRP of up to THB 150,000
Reduced/Exempted import duty until 31 December 2023	<p>For CBU cars with an SRP of up to THB 2 million with a battery capacity of at least 10 kWh</p> <ul style="list-style-type: none"> - Exempted: imported under FTA¹⁴ with outstanding duty rate up to 40% - Reduced by 40%: imported under FTA with outstanding duty rate over 40% - Reduced to 40%: not imported under FTA <p>For CBU cars with an SRP above THB 2 million and up to THB 7 million with battery capacity of at least 30 kWh</p> <ul style="list-style-type: none"> - Exempted: imported under FTA with outstanding duty rate up to 20% - Reduced by 20%: imported under FTA with outstanding duty rate over 20% - Reduced to 60%: not imported under FTA 	N/A	N/A
Reduced excise tax	2%	0%	0% - 5% depending on voltage
Subsidy package	<ul style="list-style-type: none"> - THB 70,000 per unit for those with a battery capacity between 10-30 kWh - THB 150,000 per unit for those with a battery capacity of at least 30 kWh 	THB 150,000 per unit	THB 18,000 per unit

When these incentives are approved, business operators will be required to sign a memorandum of understanding (MOU) with respect to the approved incentives with the Excise Department. Within 30 days of the execution of the MOU, the business operator must also provide a letter of guarantee issued by a commercial bank registered under Thai law with guaranteed coverage until 30 June 2026. The guaranteed amount

will vary depending on the registered capital of the business operator. Moreover, the business operator will be subject to the following subsequent requirements for imports of CBU BEVs:

- **Excise Department's Certificate:** to enjoy the incentives relating to import duties, the promoted business operator is required to show the certificate issued by

¹³ SRP means the suggested retail price, and the business operator needs to inform this SRP and any changes to the Director-General of the Excise Department, according to the law on excise tax.

¹⁴ Free trade agreement.

the Excise Department regarding its eligibility for tax incentives to the customs officer.

- **Matching ratio for local manufacturing:** the promoted business operator is required to domestically manufacture BEVs, so that the volume reaches the volume of CBUs imported in 2022 - 2023 at a 1:1 ratio by 31 December 2024, or 1:1.5 ratio if extended to 31 December 2025. Any promoted business operators failing to meet the required domestic manufacturing BEV ratios must return the full amount of incentives received under the MOU together with interest at the rate of 7.5 per cent per year to the Excise Department, and may be subject to fines and surcharges on the excise tax amounts that should have been paid by the promoted business operators if the incentives had not been granted.
- **Source of batteries:** from 1 January 2026 onwards, promoted business operators must use batteries or battery parts produced in Thailand in the manufacturing of BEVs.
- **Minor change prohibition:** throughout the promoted period, minor changes to the BEVs imported or manufactured under this program are prohibited unless approved by the EV Committee.

Board of Investment promotions

To accommodate manufacturers, the government currently offers supporting incentives through the following channels for both Thai and non-Thai businesses. In short, consistent with the government's policy to accelerate growth of the domestic market for EVs and help to quickly expand related infrastructure, the BOI has revised its incentives and conditions for investment in the EV supply chain, which is expected to increase following the government's support of incentives for locally manufactured EVs, i.e.:

- **EVs and part manufacturing:** cars, motorcycles, tuk tuks, buses, trucks and

parts (e.g., batteries, battery management systems (BMS), drive control units (DCU), traction motors, inverters, onboard chargers, DC/DC converters, high voltage harnesses, and fraction motors).

- **Charging stations:** with at least 40 chargers per station – 25% of which must be (DC type) quick charging, though these requirements were recently relaxed (see below).
- **BEV platform:** must include an energy storage system, charging module, and front and rear axle module.

The corporate income tax exemption ranges from 3 – 8 years, depending on the type of activities and size of the project. However, the general non-tax incentives are available throughout the project period (e.g., to receive permits to own land, to bring in skilled expats, and to remit money abroad in foreign currency).

A recent policy change by the BOI is to add to the five-year corporate income tax holiday available for investments in charging stations with at least 40 chargers, 25% of which are the DC type. The revised measures now allow smaller charging stations to be eligible for tax benefits. The BOI has also abolished two requirements, namely the condition barring investors to receive additional benefits from other agencies, and the requirement for ISO certification, to respond to the fact that some chargers could be installed in other establishments such as hotels and condominiums, and not necessarily at dedicated charging stations. Investors are now only required to adhere to the relevant safety regulations and to submit either a plan to implement an EV Smart



Charging System or to connect to an EV Charging Network Operator Platform.

Challenges and conclusion

Whilst Thailand is keen to play a key part in becoming a hub for EV production, a number of challenges face manufacturers. Transforming from an ICE vehicle manufacturing hub to one focused primarily on EV manufacturing is not an easy task. Some of the challenges will include the following:

- Insufficient EV infrastructure development is one barrier to Thailand developing a holistic EV manufacturing industry, since existing supply chains are tailored towards manufacturing parts and bodies for ICE vehicles.
- There is a lack of public and home charging stations throughout Thailand, with only 1,447 public and private charging points¹⁵ compared to around 30,000 gas stations.
- Many Thai consumers are concerned about EV performance, specifically with respect to reliability, battery lifespan, range, engine power, and charging time. Moreover, high purchase costs, battery costs, and resale value are also barriers for Thailand's EV industry.

Against this backdrop, Thailand will need to ensure the continuation of financial investment in the EV sector through investment incentives, tax and customs benefits, and the development of an ecosystem to support EV manufacturers. We anticipate that the incentive schemes will be attractive to new EV players as well as to existing domestic manufacturers who have potential and are committed to transforming their operations within the new ecosystem. The Thai government will need to ensure its incentives contemplate ongoing support for training of the Thai workforce in the automotive industry.

Even with available funding to support the EV manufacturing industry, much more work is needed on EV charging infrastructure to support the mass adoption of the use of EVs, especially in rural areas. Concurrently, a key factor to drive consumer demand will be whether charging infrastructure is conveniently located, as well as range and price parity with ICE vehicles. Planning for increasing electricity usage will also be essential, as the PDP must take the adoption of EVs into consideration when determining power supply sufficiency.

Despite these challenges, Thailand's goal to be a base in Asia for cleaner vehicles is possible with the right implementation and incentivization to propel growth in the EV industry. There are several factors that will support Thailand's ambitions to be an EV production hub; the country has a well-developed logistics network and the necessary supporting infrastructure to support the EV industry. The introduction of the latest incentive packages shows that the Thai government is eager to position the country as a regional EV production hub. Thailand now stands in a good position to drive the future of the EV industry. While the journey will take time, significant steps have already been made.

¹⁵ Information as of 4 March 2022.



INDUSTRY

Introduction

Heavy industry is one of the pillars of Thailand's economy, accounting for more than one-third of GDP in recent years.¹⁶ Many of the goods manufactured in Thailand, including cement, steel and petrochemicals, account for significant greenhouse gas emissions globally. Further, as highlighted in previous chapters, natural gas, coal, and lignite account for approximately 70% of the fuel used to generate the electricity in Thailand's grid.

Carbon pricing has been introduced in jurisdictions around the world in order to facilitate the transition to lower-carbon economies. Thailand does not currently have a national carbon price, but it remains exposed to carbon pricing mechanisms implemented around the world. The EU's Carbon Border Adjustment Mechanism ("**CBAM**"), which forms a part of the European Green Deal, will impose requirements on Thai industries to expedite their decarbonization objectives.

Thailand's commitments at a glance

On an international level, Thailand is currently a party to the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, and the Paris Agreement. Regionally, Thailand has endorsed the ASEAN Plan of Action for Energy Cooperation (APAEC) Phase I 2016-2020 and Phase II: 2021-2025, among other initiatives.

Thailand pledged in its nationally determined contributions ("**NDCs**") under the Paris Agreement to cut its emissions by 20 to 25 percent from projected business-as-usual levels by 2030 in economy-wide sectors. Following the UNFCCC's Conference of the Parties (COP 26), the Thai prime minister further pledged to achieve carbon neutrality by 2050 and net zero emissions by 2065, which has been reflected in Thailand's NDC Roadmap on Mitigation 2021-2030. Under this plan, the Thai government has outlined its intention to reduce greenhouse

¹⁶ CIA Factbook: <https://www.cia.gov/the-world-factbook/countries/thailand/#economy>.

gases through overt support for the energy transition.

Impact of the CBAM

Thailand's position toward decarbonization is impacted by actions taken by foreign governments. For example, the EU's European Green Deal, which provides guidelines toward carbon neutrality, will have an impact on Thai industries going forward. The European Green Deal includes the CBAM, which has been designed to levy a price on carbon before goods are imported into the EU.

The CBAM is seen as complementary to the EU's carbon-pricing system, an emissions trading system ("**ETS**"), which prices carbon emissions within the EU. In order to deter manufacturers from avoiding the imposition of carbon prices by shifting production abroad, the CBAM will levy a carbon price on emissions generated outside the EU when goods are imported. As a result, Thai manufacturers who aim to export certain goods to the EU will be required to obtain and submit a CBAM Declaration to certify the amount of embedded emissions in those goods. In this regard, an EU importer would request a CBAM Certificate from the Thai exporter, which will be evidence for determining the carbon price that would have been paid to produce goods in the EU.

The CBAM would initially apply to imports in five emission-intensive sectors deemed at greater risk of carbon leakage: cement, iron and steel, aluminum, fertilizers, and electricity. The CBAM charge would cover imports of these goods, unless a country is participating in an ETS or a linked mechanism.

To date, Thailand has not yet implemented a reporting mechanism for measuring embedded emissions; however, the Carbon Footprint System managed by the Thailand Greenhouse Gas Management Organization (Public Organization) ("**TGO**") has been implemented. Please see further details on Thailand's Carbon Footprint System in the upcoming Environment chapter.

For goods manufactured in Thailand to comply with the CBAM, the TGO aims to develop an "Embedded Emissions System", focusing on how to evaluate the amount of direct and indirect greenhouse gas emissions from the manufacturing processes. The TGO's mechanism would allow Thai exporters to obtain CBAM Certificates and pay carbon prices in Thailand rather than overseas. Additionally, the TGO has established a Voluntary Emission Reduction Program ("**T-VER**"), which allows organizations to offset their carbon footprint voluntarily. The T-VER issues Voluntary Emissions Reduction credits to qualifying projects. In this regard, the TGO also foresees the possibility that Thailand may negotiate an agreement with the EU to allow Thai companies to use carbon credits from the T-VER project in lieu of paying a separate carbon price or obtaining a CBAM Certificate. To that end, the TGO aims to raise some of its certification standards to comply with requirements under CBAM.

Thailand's current status and progress toward zero emissions

In October 2022, the Ministry of Industry reported in a press conference that it will drive the "Net Zero Emissions" policy by continuing to implement seven standards to reduce the emission of greenhouse gases. These standards were announced by the Thai Industrial Standards Institute ("**TISI**") in 2019 as the National Inspection and Certification Standard, or Standard of Organizational Management System Prescribed by the International Organization for Standardization ("**ISO**"). The standards include regulations and guidelines on quantifying and reporting greenhouse gas emissions, the evaluation of products' carbon footprint, etc.

The Ministry of Industry is encouraging the Thai industrial and services sectors to implement these standards to reduce their environmental impacts and lower greenhouse gas emissions. According to the Ministry of Industry's statistics, its standards were implemented by over 200

Thai business operators between December 2019 to August 2022, resulting in the

reduction of 50 million tons of carbon dioxide emissions.¹⁷

The amount of greenhouse gas reductions monitored and assessed from the country's measures during 2020 - 2021¹⁸

Year 2020		Year 2021		Year 2022	Summary of 3 years operation (2020 – 2022)		
Target	Operating Result	Target	Operating Results at the End of the Fiscal Year	Target	Overall Target	Overall Operating Result as of 31 August 2021	Overall Operating Results at the End of the Fiscal Year (Estimate)
51.00 MtCO ₂ eq	57.84 MtCO ₂ eq	53.00 MtCO ₂ eq	64.20 MtCO ₂ eq	55 MtCO ₂ eq (From TGO's operation plan)	Thailand has expressed its intention to reduce the country's greenhouse gas emissions over two targeted periods: <ul style="list-style-type: none"> • Before 2020 (NAMA: 7 – 20%): target for greenhouse gas reduction from energy sector and logistics sector of not less than 24 MtCO₂eq • During 2021 – 2030 (NDC: 20 – 25%): target for greenhouse gas reduction from all sectors (Economy – Wide) of not less than 111 MtCO₂eq 		

Remark: The monitoring assessment of greenhouse gas reduction is calculated annually (i.e., there are no cumulative statistics)

Further, several government authorities and regulatory agencies have issued regulations to support the reduction of carbon emissions. For example, the Securities and Exchange Commission has recognized the issuance of green bonds, which require the issuer to meet certain international standards (e.g., ASEAN Green Bond Standards (ASEAN GBS), or the International Capital Market Association Green Bond Principles), and the Revenue Department has implemented a regulation on the exemption of income tax of companies or juristic persons that participate in the T-VER.

Summary

Both public and private sectors in Thailand are beginning to take greenhouse gas emissions seriously and are proactively taking steps with the aim of achieving Thailand's carbon neutrality target. The TGO will likely be taking a leading role in driving Thailand to meet its international commitments in reducing greenhouse gas emissions, including supporting Thai businesses with their endeavours to comply with the CBAM. Although there is still much work to be done, there is reason for optimism that Thai industries will be well positioned to navigate the global energy transition.

¹⁷<https://www.thaigov.go.th/news/contents/details/60746>.

¹⁸Public Organization Evaluation Form for Fiscal Year 2022 of Thailand Greenhouse Gas

Management Organization, submitted to Office of the Public Sector Development Commission.

ENVIRONMENT

Introduction

Thailand has been actively focusing on environmental safeguards through both the prevention of environmental degradation and the promotion of environmental quality enhancements. The Thai government continues to introduce and implement various approaches, including enacting new legislation, amending existing laws to be more stringent, adopting a model which promotes environmental quality, and introducing new incentives which are attractive to investors to drive the country towards a low-carbon society.

The Cabinet has endorsed the National Plan for Economic and Social Development (2023–2027) (the “**National Plan**”) as a master plan to develop the country’s overarching economic and social policies. In line with international goals for environmental sustainability, the National Plan replicates the environmental development aspects of the UN Sustainable Development Goals. The National Plan also aims to lower greenhouse gas emissions and transform Thailand’s economy into a circular economy within a low-carbon green society.

In addition, the Thai government has been creating a more concrete plan for climate change mitigation by setting out a national agenda where climate change has been incorporated at the highest policy level under the National Strategy (2018–2037) and Climate Change Master Plan (2015–2050) to guarantee the continuity of low-carbon development.

Environmental **legislative** **framework**

To ensure that environmental protection will be continuously integrated into the national agenda, the Constitution of Thailand, B.E. 2560 (2017) prescribes the state’s responsibility to conserve, manage, and utilize natural resources, the



environment, and biodiversity in a balanced and sustainable manner, while also affirming and recognizing the right of citizens and local communities’ participation in resource management. The Constitution also ensures that any project or activity which may have a severe impact on the environment, health, sanitation, and quality of life may not be carried out unless the impact on environmental quality and health of the people in the surrounding community has first been studied and evaluated.

Thailand does not have a unified environmental code, but environmental related law provisions appear in many pieces of legislation covering different aspects of environmental conservation, including the Town Planning Act, B.E. 2562 (2019), the Factory Act, B.E. 2535 (1992), the Hazardous Substances Act, B.E. 2535 (1992), the Building Control Act, B.E. 2522 (1979) (as amended), the Minerals Act, B.E. 2560 (2017), and the Public Health Act, B.E. 2535 (1992), among others.

The Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 (1992) (as amended) (the “**Environment Act**”) serves as the first comprehensive environmental legislation established in line with common environmental principles. The Environment Act prescribes fundamental environmental

quality standards, including the quality of water, air, noise, vibration, and soil, among others, to enhance and conserve environmental quality. These standards apply to any businesses causing an impact on the environment and society. The concepts of environmental impact assessments have also been incorporated in the Environment Act. The preparation of environmental impact assessment reports, namely the Initial Environmental Examination, Environmental Impact Assessment, and Environmental Health Impact Assessment, are crucial tools to evaluate the possible impacts on the environment, society, and health of the affected populations and communities incurred from project developments. The result of the impact assessment also serves as a key decision-making element for the relevant authorities on whether to permit the development of the project. A new draft environmental bill is currently being proposed in order to address recent developments in environmental degradation and pollution. If passed, the new bill will mark a significant change to current environmental regulations by including, among other penalties, heavier fines and other forms of monetary compensation and fees for offenders who damage and pollute the environment.

In addition to the substantive laws imposed on today's businesses, Thailand has recently extended its focus to cover procedural laws—court proceedings for environmental-related cases, ensuring environmental justice and preservation of the environment. The proposed bill on procedures for environmental-related court claims will transform the procedural rules which were traditionally applied (i.e., the Criminal Procedure Code and the Civil Procedure Code). If the bill is enacted, it will establish a more flexible and efficient mechanism for the court and affected persons, which will improve the effectiveness of environmental litigation and allow for compensation for actual damages incurred by litigants.

More stringent climate change legislative framework

In the past few years, the Thai government has actively pursued international cooperation initiatives, especially those relating to climate change. As one of the top 10 countries most vulnerable to climate risk, the nation is now facing multiple extreme environmental hazards where the consequences are tangible; the risks associated with climate change are no longer simply theoretical.

As a party to the Paris Agreement, Thailand has set its NDSs to reduce carbon emissions by 20 to 25 percent from its business-as-usual levels by 2030. Internally, Thailand has created a Long-Term Low Greenhouse Gas Emission Development Strategy ("**LT-LEDS**") as a national framework for climate change mitigation. This includes introducing sectoral action plans in four sectors (i.e., energy, transportation, industrial processes and product uses, and waste management), adopting the bio-circular-green economy model, placing a target for electric vehicle deployment, promoting incentive measures on carbon reduction, and drafting a climate change bill and new environmental bill, among others. Details of some of these frameworks are outlined below.

During the recent United Nations Climate Change Conference of the Parties (COP 27) which was held in Egypt in 2022, Thailand introduced a revised LT-LEDS and increased its NDCs to reduce greenhouse gas ("**GHG**") emissions to 30% of the projected business-as-usual levels by 2030 and to 40%, subject to adequate and enhanced access to technology development and transfer, financial resources, and capacity building support. The Thai government will now focus on economic growth with a balance of environmental responsiveness, with plans to accelerate the reduction of GHG emissions in all sectors, including increasing the use of renewable energy in electricity generation, promoting the commercial use of carbon capture technology, and expanding the country's green areas to enhance and maintain its carbon sink, among others.



Thailand is also in the process of establishing guidelines and mechanisms to manage the transfer of carbon credits between member countries under the Paris Agreement. Further, Thailand continued its pledge to tackle climate change by setting a goal for carbon neutrality by 2050 and net-zero greenhouse gas emissions by 2065.

Draft Climate Change Bill

Driven by its commitments under the Paris Agreement, the Thai government is attempting to steer the nation toward a net-zero emission future by introducing its first legislation specifically targeting climate change: the Climate Change Bill.

The Climate Change Bill will outline a regulatory framework for Thailand's climate change response and stipulate policies and measures to tackle GHG emissions, including reducing emissions at the source, increasing carbon sinks, and other initiatives that bolster the reduction of GHG from entering the atmosphere. These objectives will lead to extensive planning at the policy, sectoral, and project levels, and impose reporting and disclosure obligations on the public sector and certain operations in the private sector. The Climate Change Bill will also ensure the rights of citizens to be informed by the state, to express climate change mitigation solutions, and to be supported for climate change-related activities. As such, the state will take a role in assessing the risks and impacts of climate change, sponsoring the

study of new technologies, and adopting policies that account for climate change.

Carbon footprint

Thailand's attempts to drive the nation towards carbon neutrality and net-zero GHG emissions have led to various tools being developed and deployed by the government to create low-carbon development and growth. Different government entities and public organizations, mainly the TGO, have been advancing efforts through various policies and mechanisms. For example, the TGO has developed the carbon footprint and labelling framework as voluntary mechanisms for business operators aiming to measure and disclose GHG emissions. This, in turn, compels the operators to set emissions reduction targets and properly manage same within their organizations and production processes.

The voluntary carbon footprint projects currently promoted by the TGO include:

Carbon Footprint for Organization ("CFO")

CFO is described as a tool for measuring and reporting GHG emissions and removals occurring from an organization's activities and quantifying the GHG emissions in terms of carbon dioxide equivalent (CO₂eq). The quantification is categorized into direct emissions, indirect emissions from energy usage, and other indirect emissions. The present CFO projects cover both the public and private sectors.

Carbon Footprint for Products ("CFP")

CFP is introduced as a tool to calculate the quantity of GHG emissions produced through the life cycle of a product, including material acquisition, production process, distribution, usage or consumption, and waste management, showing the results in the form of CO₂eq. Products conducting CFP may also be eligible for a carbon footprint reduction label if they meet the criteria set by the TGO.

Carbon Footprint for Circular Economy Products (“CE-CEP”)

In line with the adoption of the bio-circular-green model, CE-CEP has been developed to certify the carbon footprint assessment for circular economy products. The GHG emissions quantification will be conducted on finished products, components, packaging, and circulated materials, to provide consumers with the confidence that there is an assessment of GHG emissions on the components of final products in accordance with the guidelines approved by the TGO.

Once an organization or product fits the relevant requirements, it will receive a certificate and carbon label certification mark from the TGO.

As carbon footprint projects can be used to evaluate the current GHG emissions contributed by each business and product, operators may utilize this information to further develop emissions management and reduction, or seek off-setting opportunities. By implementing these projects, transparency and environmental awareness can also contribute to the environmental, social, and governance (ESG) policies of the companies who implement them.

Potential carbon tax

While the risk of long-term climate change is acknowledged by the Thai government, the real challenge is devising appropriate policies to shape the direction of the country towards a greener path and increase resilience against climate change impacts. The government has been mainly offering carrots by utilizing its tax policies to incentivize (i.e., tax reduction and tax exemption) behavior aimed at encouraging business operators to reduce carbon emissions and develop green technologies. As for the government's sticks, currently, Thailand has only adopted implicit taxes that apply to certain carbon-emitting activities, such as excise duties on oil and oil products, electrical appliances, motorcycles, and automobiles. However, the government is

now considering the implementation of explicit carbon pricing to discourage carbon-intensive activities.

Generally, there are broadly two forms of carbon pricing deployed around the world—emission trading systems (ETS) and carbon taxes. ETS (or cap-and-trade) in Thailand are voluntary in nature, meaning that the government has never set a limit on emissions, nor issued emission permits within such a limit.

The Thai government is now considering moving towards a carbon tax, which would be a direct tax levied on activities and products against an amount of emissions. Imposing a carbon tax, i.e., setting a definite price on carbon, could make the use of fossil fuels more expensive and therefore encourage a transition to alternative energy, reduced consumption, and increased energy efficiency. The tax levied could also be used towards subsidizing environmental restoration and other means of emission mitigation.

While carbon pricing may allow the private sector to be creative with which technologies to adopt and permit the market to decide how best to lower emissions, it may also increase the cost of providing goods and services for suppliers and consumers. Therefore, there may still be a long and challenging road ahead for the government before the actual implementation of carbon pricing can take place in Thailand. Nevertheless, exporters of carbon-intensive products will still have to take into consideration regulations at the destination markets, as carbon border adjustment mechanisms may be imposed where prices of traded products will be adjusted to include the costs of emissions.

Final thoughts

Looking ahead, climate change will become a more pressing issue at both the policy and regulatory levels. To bring emissions in line with overarching global warming temperature targets, cooperation from both the public and private sectors will be

required. We anticipate that regulators will continue to bolster current legislation related to environmental protection given the increasing public awareness of the deleterious impacts of pollution. Although the GHG emissions reduction mechanisms are currently voluntary in nature, this may be a steppingstone for further changes in the environmental regulatory landscape. Given the global pressure for businesses to reduce their carbon footprints, any upcoming climate change-related obligations are likely

to be more onerous. This could lead to the private sector becoming subject to mandatory GHG emissions mitigation requirements in the near future. Against this backdrop, if business operators would like to stay ahead of the curve, they will need to start considering the implementation of greener business plans and the development of proper data collection and reporting mechanisms to mitigate potential risks.

LOOKING AHEAD

Attempting to predict the future is never easy. Due to the speed at which the energy transition is progressing, having a clear view of what the Thai economy will look like in 2030 is a particularly challenging proposition. That said, there are a few projections which in the mid-term seem highly likely:

- **Increased reliance on LNG.** Production in Thailand's largest gas fields will continue to fall off over the coming decades, while it is unlikely that pipeline gas can be increased significantly beyond its current levels. Accordingly, the only way for Thailand's natural gas needs to be met will be through LNG imports. This will likely result in additional receiving infrastructure being developed.
- **Additional deployment of greenfield renewable energy projects.** According to the International Energy Agency, the Thai grid has the capacity to take on greater amounts of variable renewable energy, such as derived wind and solar.¹⁹ In particular, solar projects, especially if co-located with energy storage, will likely be deployed significantly in the next decade. Development of biomass, biogas, and waste-to-energy projects are all also likely to increase.
- **Development of an EV ecosystem.** Government incentives and falling prices will likely give rise to wide adoption of EVs amongst Thai consumers. This will likely be facilitated by the development and improvement of charging infrastructure throughout the country. However, the current government objective of having EVs represent 40% of automobiles on the road appears ambitious at this stage, though its targets for motorcycles may be more feasible. Of course, the process of EV adoption may be accelerated if a carbon pricing mechanism is introduced.

There are many areas that are not covered in this report which also have the potential to undergo step-changes. For example, agriculture (particularly fertilizers), steel and cement manufacturing, aviation, and long-haul shipping are all areas likely to be impacted by the energy transition in Thailand; we will continue to monitor developments to the legal landscape in these sectors as well.

Regardless of the direction it takes, one point seems certain: the energy transition will give rise to countless investment opportunities to explore.

¹⁹ https://iea.blob.core.windows.net/assets/c41cd30d-5f69-4b12-9502-3e7caaca294e/Partner_Country_Series_Thailand_Grid_Renewable_Integration_Assessment.pdf.

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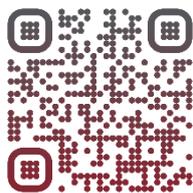


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