THAILAND

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GENERAL

1. What is the nature and importance of renewable energy in your country?

Renewable energy plays an increasingly significant role in the energy generation market in Thailand. The renewable energy sector started in 1989 when the Thai government introduced a policy encouraging the Electricity General Authority of Thailand ("**EGAT**") to purchase electricity from small power producers using waste by-products generated by the agricultural sector to produce electricity for sale to EGAT.

Since then, the Thai government has continually focused on the development of renewable energy production and in January 2018, the total capacity generating from renewable energy accounts for approximately 15.79% of the total energy production nationwide.

In 2015, the Ministry of Energy published the Alternative Energy Development Plan ("**AEDP 2015**") setting out targets for renewable energy production during the period 2015-2036. Significantly, AEDP 2015 sets out the target of renewable energy making up 30% of the total energy production by 2036.

The table demonstrates the renewable energy generation targets by the type of renewable energy for 2036.[1]

Type of Energy		Target by 2036
Electricity	**Ktoe**	**5,588.24**
	MW	**19,684.40**
1. MSW	**MW**	500.00
2. Industrial Waste	**MW**	50.00
3. Biomass	**MW**	5,570.00
4. Biogas (WW/SW)	**MW**	600.00
5. Small Hydro	**MW**	376.00
6. Biogas (Energy Crop)	**MW**	680.00
7. Wind	**MW**	3,002.00
8. Solar	**MW**	6,000.00
9. Large Hydro	**MW**	2,906.40
Heat	**Ktoe**	**25,088.00**
1. MSW	**Ktoe**	495.00
2. Biomass	**Ktoe**	22,100.00
3. Biogas	**Ktoe**	1,283.00
4. Solar	**Ktoe**	1,200.00
5. Alternative Renewable Energy	**Ktoe**	10.00
HeatBiofuel	**Ktoe**	**8,712.43**
1. Bio-Diesel	Million L/d	14.00
2. Ethanol	Million L/d	11.30
3. Pyrolsis Oil	Million L/d	0.53
4. Compress Bio-methane Gas	Tons/d	4,800.00
5. Alternative Fuel	**Ktoe**	10.00
RE consumption (ktoe)		**39,388.67**
Final Energy Consumption (ktoe)		**131,000.000**
Share of RE in Final Energy Consumption (%)		**30**

[1] Source: AEDP 2015/ Department of Renewable Energy Development and Energy Efficiency.

In addition, according to this framework, the Thai Government has planned to enhance the energy production capacity capability by implementing tax incentives and supporting electricity trade using competitive bidding measures.

2. What is the definition and coverage of renewable energy under the relevant legislation?

Under the National Energy Policy Act 1992, renewable energy covers energy obtained from wood, firewood, husk, bagasse, biomass, hydropower, solar, geothermal, wind and waves.

Waste-to-energy does not expressly come within this definition but the Thai government has nevertheless included waste-to-energy in its renewables policy.

REGULATION

3. How is the renewable energy sector regulated? What are the principal laws and regulations?

The production of electricity from renewable energy sources is regulated by the Energy Industry Act 2007 ("**Act**"). The Act sets out a primary framework that requires energy production to be licensed, regardless of whether the electricity is sold to a third party or used by the producer. Industry specific licences such as the energy production license are issued by the Energy Regulatory Commission ("**ERC**").

However, it is not a straightforward process to obtain all necessary energy production licenses under the Act, as the licensing process requires an applicant to comply with regulations of other acts that are not specifically related to the energy sector, such as the factory regulations under the Factory Act 1992, the building control restrictions under the Building Control Act 1979 and the provincial town planning regulations which vary from province to province.

In addition to the Act, the regulations concerning the environment must be taken into account as a part of licensing process that the developer has to comply with the EIA (Environmental Impact Assessment) or EHIA (Environmental Health Impact Assessment) pursuant to the Enhancement of Environmental Quality and Preservation Act 1992 which will depend on the type of fuel. A project can be exempted from the EIA/EHIA requirement if its capacity is less than 10 MW, but the project will be required to implement a plan in compliance with the Code of Practice regulated by the ERC.

Public hearings are frequently required to canvas the views and concerns of local populations in the vicinity of a proposed project, and failure to strictly observe the public hearing process can result in a project being cancelled even if all other licenses and approvals have been obtained and construction has commenced.

In addition, the Energy Development and Promotion Act 1992 and its subordinated regulations also require the energy producer to obtain a controlled energy production license, if its capacity is more than 200 kVA.

4. What are the principal regulatory bodies in the renewable energy sector?

The main regulatory authority in Thailand's energy sector is the Energy Regulatory Commission.

The ERC is empowered under the Act to regulate energy production and operation in compliance with the government's policies and the Act.

The ERC plays an important part in the licensing process as they provide a single point of application for all licenses required for a

renewable energy project. This means the developer can submit applications with the ERC, and the ERC will cooperate and determine with other authorities including the local authority relating to the controlled building, the Department of Industrial Works for the factory license and the Department of Alternative Energy Development and Efficiency for the controlled energy production license.

However, the EIA or EHIA must be filed by the developer directly with and will be determined by the Office for Natural Resources and Environmental Policy and Planning.

5. What are the main permits/licenses required for renewable energy projects?

It is important to note that Thailand does not have a concept of a "single electricity permit" to cover all matters relating to the development and operation of a renewable energy project. The project developer will be required to obtain various permits/licenses under the Act and relevant regulations.

Energy Production License

The energy production license is the main license under the Act. The developer is required to obtain this license, whether the production is with or without remuneration. The Act provides for the exemption of certain projects from the requirement to obtain an energy production license in accordance with the subordinated decrees.

In 2009, a decree relating to the exemption of the energy production license was published, exempting the production of electricity from projects less than 1,000 KVA from the requirement to obtain an energy production license.

In 2010, further clarification was announced to exempt electricity production from in-plant utility with off-grid systems from the requirement to obtain the license as well.

Renewable energy projects of less than 1,000 KVA are nevertheless obliged to inform the ERC of its project.

Controlled Energy License

A controlled energy license is required if the capacity of the project is more than 200 KVA.

Factory License

In general, any power plant with a capacity exceeding 5 horsepower (approximately 3.7 kW) is required to obtain a factory license.

In recent years, the Thai government has supported the renewable energy sector and this direction has resulted in the amendment of the Factory Act to enable some renewable energy sources to be exempted from the licensing requirement – for example, a solar rooftop with a capacity of less than 1 MW and wind farms.

Construction Permit

In case a project is located in a controlled building area, a construction permit is required.

6. Is there a category of "license-exempt generation"? If so, does it cover some types of renewable energy based generation?

There is no concept of license exempt generation and arguably only low-capacity projects below 3.7 kW could be said to be truly "license exempt".

Thailand instead offers "**license-light generation**" by removing some but not all of the licensing requirements for certain types of renewable energy projects, such as solar rooftop projects of less than 1 MW or wind

farms, which are not required to obtain factory licences, and captive off-grid power plants, which are not required to obtain energy production licenses.

7. Has there been any reform related to renewable energy regulations since 2017? Do you expect any reform/change in the near future?

Currently, the Thai Government is in the process of revising the AEDP 2015 and we expect the new AEDP will be published in 2019. The expectation is that the new AEDP will reflect an enhanced government focus and support on the establishment of renewable energy projects in every province in Thailand.

Once this policy has been implemented, we expect to see new regulations to support the ease of the licensing process relating to renewable energy.

INCENTIVES

8. Are tax advantages available to renewable energy generation companies?

Yes. Thailand's Board of Investment ("**BOI**") grants tax incentives to developers of renewable energy projects in Thailand that generate electricity from renewable sources (including waste).

Depending on the type of renewable energy, the renewable energy project company can receive an exemption from corporate income tax for 8 years with no maximum limit, and an exemption from import duties on the importation of machinery.

However, BOI incentives do not apply to the project automatically and BOI approval must be applied for before commencing the project - they cannot be obtained retrospectively for an existing project. The developer will be required to submit an application with the BOI and the entire process will take approximately 3-4 months to complete.

9. Is there a purchase guarantee given by the relevant legislation for the electricity generated by renewable energy companies?

The Thai renewable energy framework does not provide a Government guarantee for payment of energy produced by renewable energy projects.

There is no legislative guarantee that all electricity produced by renewable energy projects will be purchased by government off-takers, however in practice the relevant government off-taker has purchased all electricity produced up to the installed capacity of the project as specified in the PPA for the project.

Thailand's stated owned electricity distributors, being the Provincial Electricity Authority ("**PEA**"), the Metropolitan Electricity Authority ("**MEA**") and the Electricity Generating Authority of Thailand ("**EGAT**") offer power purchase agreements ("**PPAs**") to renewable energy producers. EGAT offers PPAs for projects above 10MW, while the PEA and MEA offer PPAs for projects below 10MW, with the MEA focusing on projects in Bangkok and immediately surrounding provinces, and the PEA focusing on projects throughout the rest of Thailand.

The payment track records of EGAT, the PEA and the MEA for renewable PPAs are strong, and the absence of a government guarantee is not perceived by local lenders to raise any bankability issues in a project finance context.

In 2015, Thailand has shifted from Adder-Rates to Feed-in Tariffs ("**FiT**") for utility scale renewable energy producers.

While some existing projects operate on Adder-Rate PPAs, PPAs issued in the future will be on a FiT basis.

10. Is there a minimum price guarantee given by the relevant legislation for the electricity generated by renewable energy companies?

Pursuant to the FiT scheme issued by the ERC in 2015, the below chart demonstrates the FiT Rates applicable for renewable energy producers.

Capacity (MW)	FiT (Baht/kWhr)			Duration (Years)	FiT Premium (Baht/kWhr)	
	FiT_F	FiT v. 2560	FiT(1)		Bio-fuel projects (first 8 years)	Project in Southern Border Province (2) (project lifetime)
1. **Waste** (integrated waste management)						
Installed Capacity ≤ 1 Megawatt	3.13	3.21	6.34	20	0.70	0.50
Installed Capacity **>** 1-3 Megawatt	2.61	3.21	5.82	20	0.70	0.50
Installed Capacity **>** 3 Megawatt	2.39	2.63	5.08	20	0.70	0.50
2. **Waste** (land fill)	5.60	-	5.60	10	-	0.50
3. **Biomass**						
Installed Capacity ≤ 1 Megawatt	3.13	2.21	5.34	20	0.50	0.50
Installed Capacity **>** 1-3 Megawatt	2.61	2.21	4.82	20	0.40	0.50
Installed Capacity **>** 3 Megawatt	2.39	1.85	4.24	20	0.30	0.50
4. **Biogas** (waste water/ waste material))	3.76	-	3.76	20	0.50	0.50
5. **Biogas** (energy plants)	2.79	2.55	5.34	20	0.50	0.50
6. **Hydro**						
Installed Capacity ≤ 200 kW	4.90	-	4.90	20	-	0.50
7. **Wind**	6.06	-	6.06	20	-	0.50

11. Has the Paris Agreement under the United Nations Framework Convention on Climate Change been ratified? If yes, what are the undertakings of your Country in the NDC (national determined contributions) submitted for the first five-year period?

Thailand ratified the Paris Agreement on 21 September 2016.

Prior to the ratification of the Paris Agreement in 2016, Thailand's Office of Natural Resources and Environmental Policy and Planning submitted the first of Thailand's Intended Nationally Determined Contribution ("**INDC**") to the United Nations Framework Convention on Climate Change ("**UNFCCC**") in supporting its commitment to comply with the Paris Agreement.

The INDC plan is to include a 20% reduction in greenhouse gas emissions from the projected business-as-usual level by 2030. The Thai government has further confirmed that the reduction in greenhouse gas emissions can be improved to 25%, subject to adequate and enhanced access to technology developments and transfers, financial resources and a support from the UNFCCC.

12. Is there a carbon market or carbon credits mechanism in your jurisdiction?

On 28 August 2002, Thailand ratified the Kyoto protocol, which entered in to force on 16 February 2005.

Under the Kyoto protocol, Thailand voluntarily committed itself to adopting measures to reduce greenhouse gas emissions by joining the Clean Development Mechanism ("**CDM**") and the Thailand Greenhouse Gas Management Organization (a public organization regulated by the Thai Government) was established in 2007 as a designated national authority to oversee CDM projects.

The organization has aFlso developed its own project verification scheme called the Thailand Voluntary Emission Reduction Program in order to support the voluntary carbon market in Thailand. Carbon credits obtained from a verified project can be sold by way of commercial trading.

However, the Thai government does not purchase any carbon credits and therefore such trading cannot be accounted for in the carbon reduction targets under the Kyoto protocol.

13. Do the renewable energy based power plants have priority for connection to the grid?

There is no specific law which gives renewable projects priority connection to the grid, although in recent renewable PPA rounds, the need for projects has been identified on a province by province basis, with specific reference to grid interconnection points that would be made available to project developers.

Despite the issuance of AEDP 2015 which supports energy generated from renewable energy sources, PPAs between the renewable energy utility scale with the government electricity distributor have been slowed in recent years due to a large number of renewable energy projects which are now in the process of construction and development and are required to meet the scheduled commercial operation date.

14. Is there an incentive for domestic (local) manufacturing of equipment or materials used in the construction of renewable energy based power plants?

There is no specific framework which provides incentives to developers to use locally produced materials, however the BOI does reserve the right to deny import duty exemption for items which are manufactured in Thailand, and developers relying on BOI approval for import duty exemption should carefully consider the scope of import duty exemption available for their projects.

Indirect incentives are potentially available in that the BOI also has the ability to provide tax incentives to manufactures of equipment and materials used in the renewable energy sector, resulting in lower production costs for locally produced equipment and materials.

15. What are the other incentives available to renewable energy generation companies?

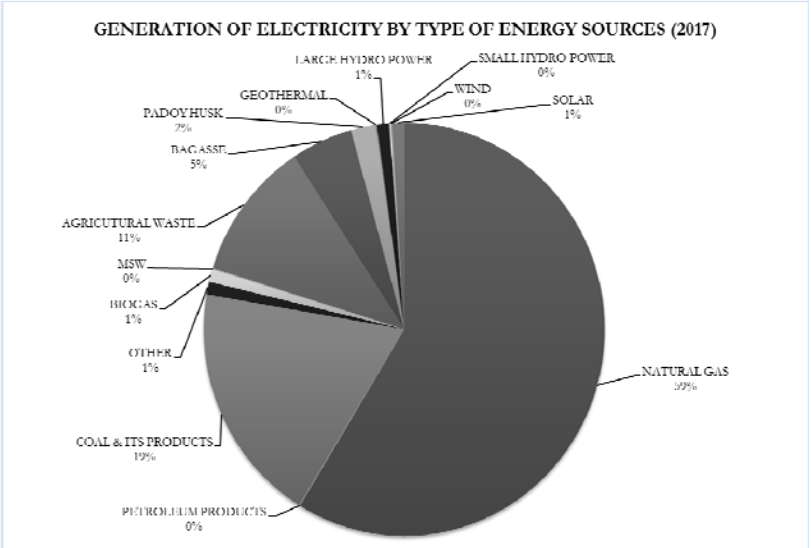
Under the BOI scheme, a renewable energy generation company being majority foreign owned is able to enjoy incentives other than tax incentives including permission to own land and being able to bring in foreign workers and expatriate employees to work in Thailand.

STATISTICS

16. What is the percentage of electricity generated based on each type of renewable energy source in the total generation of electricity at country scale?

Unit: ktoe

TYPE	2560 2017	% 2017
COAL & ITS PRODUCTS	8,53	19,50%
PETROLEUM PRODUCTS	64	0,15%
NATURAL GAS	25,964	59,36%
SOLAR	387	0,88%
WIND	95	0,22%
SMALL HYDROPOWER	43	0,10%
LARGE HYDROPOWER	369	0,84%
GEOTHERMAL	0	0,00%
PADDY HUSK	702	1,61%
BAGASSE	2,394	5,47%
AGRICULTURAL WASTE	4,595	10,51%
MSW	36	0,08%
BIOGAS	260	0,59%
OTHER	298	0,68%
Total	43,737	100,00%



Source: Energy Balance of Thailand 2017
Note: 1) Small hydropower including hydro power plants ≤ 12 MW & hydro power plant using the water downstream.
2) Large hydropower including hydro power plant > 12 MW & hydro power plant (Lamtakhong Dam).
3) other including black liquor and residual gas.

OTHER

17. Is there anything else you wish to add?

Thailand's approach to renewable energy is becoming progressively more sophisticated, both financially, and in terms of grid stability. Thailand's first renewable PPAs were issued without competition and without requiring bid bonds. More recent PPA rounds have required bidders to provide performance bonds, and future rounds of PPA offerings are likely to be based on competitive bidding (based on the FiT bidders being willing to accept). One of Thailand's most recent renewable PPA rounds was for a semi-firm model PPA, which required developers to use a hybrid approach (utilising more than one source of renewable energy) to guarantee a minimum base load at all times, and the use of renewable energy to provide a more predictable base load can be expected to continue.

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