Thai Legal Studies (2021) Vol. 1 | 133–149
https://doi.org/10.54157/tls.246133

Rights to Own and Operate a Hydro-Floating Solar Project in Thailand

Piti Eiamchamroonlarp[*]

Abstract

This paper finds that the current electricity regulatory regime, established by the Energy Industry Act B.E. 2550 (2007), together with the current electricity industry structure—the enhanced single buyer model—serves as a favorable legal basis for a state electricity enterprise, especially the Electricity Generating Authority of Thailand (EGAT), to own and operate a hydro-floating solar project in Thailand. However, it argues that, despite their ability to obtain the relevant licenses under the Energy Industry Act B.E. 2550 (2007) as well as enter into power purchase agreements with state electricity enterprises or private customers, the rights of private hydro-floating solar project operators to own and operate a hydro-floating solar project on the surface of public water resources are undermined by uncertainty pertaining to the possessory right over the water surface of public water resources, as well as unfair or discriminatory practices concerning electricity network access.

Keywords: Hydro-floating solar project — Public water resources — Electricity license

[*] LLB (Thammasat University); Barrister at Law (Thailand); LLM (Thammasat University); LLM (University of Aberdeen); PhD (University of Aberdeen); Lecturer, Faculty of Law, Chulalongkorn University, piti.e@chula.ac.th.

I. INTRODUCTION

Uninterrupted energy supply at a reasonable and affordable price—or energy security[1]—is a crucial factor behind the growth of a country and the well-being of its people. In Thailand, traditional energy projects—for example natural gas production and a coal mine, along with its coal-fired power plant—have played a vital role in ensuring energy security. Acknowledging energy as a key factor behind greenhouse gas emissions, the Thai government has stimulated investment in renewable energy industries[2] as a means toward achieving "energy sustainability," a concept which requires the reconciliation of disparate interests—the provision of adequate, reliable, and affordable energy, and conformity to social and environmental requirements.[3] Converting sunlight, a renewable resource, into electricity using solar photovoltaic systems (PV) has been accepted as a form of sustainable development, as the operation of PV systems can contribute to the security of the electricity supply, while causing minimal pollution during their lifetime.[4]

Rather than occupying land, PV systems can be installed on the surface of water. The first commercial floating PV system, with a generation capacity of 175 kWp, was installed in California in 2008.[5] Medium-to-large floating PV systems with a generation capacity of larger than 1MWp began to emerge in 2013.[6] Under the Power Development Plan 2018, hydro-floating solar technology is expected to contribute to security of electricity supply.[7] The Thai government approved a proposal submitted by the Ministry of Energy requesting the Electricity Generating Authority of Thailand (EGAT) to implement a large-scale 45-MW hydro-floating solar project.[8] The project will be located on the water surface of Sirindhorn Dam, and will operate in conjunction with the existing 36-MW hydroelectric power plant owned by EGAT.[9]

From a technical perspective, a hydro-floating solar project involves the installation of photovoltaic solar panels above open-air waterways and water bodies—

---

[1] Ang Beng Wah, Lawrence Wai-Choong Wong and Ng Tsan Sheng, "Energy Security: Definitions, Dimensions and Indexes" (2015) 42 Renewable and Sustainable Energy Reviews 1077, 1077–78.

[2] Office of Natural Resources and Environmental Policy and Planning, Thailand's Intended Nationally Determined Contribution (INDC) *UNFCCC* (October 2015) <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Thailand%20First/Thailand_INDC.pdf>.

[3] Evangelos Grigoroudis, Vassilis S. Kouikoglou, Yannis A. Phillis, and Fotis D. Kanellos, "Energy Sustainability: A Definition and Assessment Model" (2019) Operational Research 1, 2.

[4] Serafeim Michas and others, "Identifying Research Priorities for the Further Development and Deployment of Solar Photovoltaics" (2019) 38(3) International Journal of Sustainable Development 276, 276.

[5] Rocio Gonzalez Sanchez and others, "Assessment of Floating Solar Photovoltaic Potential in Existing Hydropower Reservoirs in Africa" (2021) 169 Renewable Energy 687, 688.

[6] "Where Sun Meets Water: Floating Solar Market Report" *World Bank* (2018) 2 <https://olc.worldbank.org/system/files/131291-WP-REVISED-P161277-PUBLIC.pdf>.

[7] Energy Policy and Planning Office, "Power Development Plan 2018" *Ministry of Energy* (April 2019) 14 <http://www.eppo.go.th/images/POLICY/PDF/PDP2018.pdf>.

[8] "Summary of the Cabinet Resolution on the 29th of October 2019" *Royal Thai Government* (October 2019) <https://www.thaigov.go.th/news/contents/details/24140>.

[9] ibid.

typically artificial basins, dams, or lakes.[10] Similarly to a land-based photovoltaic project, floating photovoltaic solar panels are responsible for generating direct current (DC) electricity.[11] The generated DC electricity is gathered by combiner boxes and converted to alternating current (AC) by inverters.[12] This physical characteristic of a hydro floating solar project means that an electricity operator needs to obtain the right to possess or use a water surface for installation and operation of photovoltaic solar panels. Therefore, it is necessary to address and analyze the legal questions that arise as to the existence of the right of an electricity operator, whether state-owned or privately-owned, to possess or use a water surface for the commercial operation of floating PV systems under the Thai legal system.

This paper finds that the current electricity regulatory regime established by the Energy Industry Act 2007, together with the current electricity industry structure—the enhanced single buyer model—serves as a favorable legal basis for state electricity enterprises, especially EGAT, to own and operate a hydro-floating solar project in Thailand. However, it argues that private hydro-floating solar project operators' rights to own and operate a hydro-floating solar project on the surface of public water resources are undermined by the uncertainty of their right to use public water resources under the Water Resources Act B.E. 2561 (2018). In addition, a private hydro-floating solar project operator's right of access to electricity networks, as guaranteed by the Energy Industry Act 2007, can be undermined by the fact that electricity network owners may become competitors of private hydro-floating solar project operators in the electricity generation market.

The paper begins by discussing rights of electricity operators, whether state-owned or private enterprises, to own and operate a hydro-floating solar project in Thailand. The second part analyses how the existing laws, especially the Water Resources Act B.E. 2561 (2018) and the Energy Industry Act B.E. 2550 (2007), can positively contribute to the installation and commercial use of floating PV systems in Thailand. The third part presents the practical challenges of gaining the right to use public water resources under the Water Resources Act B.E. 2561 (2018), as well as the difficulties in exercising a right of third-party access to electricity networks under the Energy Industry Act B.E. 2550 (2007).

---

[10] Eden Cohen and Ryan Hogan, "Made in the Shade: Promoting Solar over Water Projects" (2018) 54(1) Idaho Law Review 101, 118; Nallapaneni Manoj Kumar, Jayanna Kanchikere, and P. Mallikarjun, "Floatovolatics: Towards Improved Energy Efficiency, Land and Water Management" (2018) 9(7) International Journal of Civil Engineering and Technology 1089, 1090.

[11] World Bank (n 6) 1.

[12] ibid.

II. RIGHTS TO OWN AND OPERATE A HYDRO-FLOATING SOLAR PROJECT

Historically speaking, it was a commonly accepted view that electricity could be supplied most efficiently by vertically integrated monopolies.[13] In this monopolistic situation, electricity operators could either be state-owned or privately-owned.[14] Reflecting the state-owned model, the Thai electricity industry has been dominated by three state-owned electricity enterprises, namely the Electricity Generating Authority of Thailand (EGAT),[15] Metropolitan Electricity Authority (MEA),[16] and Provincial Electricity Authority (PEA).[17] Prior to 2007, EGAT, without obtaining any license from a regulator, was vested with public power to generate, acquire, transmit or distribute electric energy to the MEA, the PEA or other electricity authority.[18] Under the Declaration of the Revolution Council No. 58, private operators were prohibited from carrying out electricity operational activities, unless they obtained a license from or entered into a concessionary agreement with a competent Minister.[19]

In 1992, in order to promote private participation in the electricity generation market, the cabinet approved the plan by EGAT to purchase electricity from private producers, such as small power producers (SPP)[20] and independent power producers (IPP).[21] Renewable power producers, being categorized as very small power producers (VSPP), were allowed to sell their electricity to MEA and PEA in 2006 at a subsidized price.[22] In addition to this market reform, the Energy Regulatory Commission (ERC) was established as an independent power regulator in 2007.[23] It is vested with public power to regulate electricity and natural gas operation[24] activities through a licensing

---

[13] Peter Choynowski, "Restructuring and Regulatory Reform in the Power Sector: Review of Experience and Issues" *Asian Development Bank* (May 2004) 2 <https://www.adb.org/sites/default/files/publication/28187/wp052.pdf>.

[14] Paul L. Joskow, "Lessons Learned From Electricity Market Liberalization" (2008) 29 The Energy Journal, Special Issue: The Future of Electricity: Papers in Honor of David Newbery 9, 10.

[15] Electricity Generating Authority of Thailand Act B.E. 2511 (1968) s 6.

[16] Metropolitan Electricity Authority Act B.E. 2501 (1958) s 6.

[17] Provincial Electricity Authority Act B.E. 2503 (1960) s 6.

[18] Electricity Generating Authority of Thailand Act B.E. 2511 (1968) s 6(1).

[19] Declaration of the Revolution Council No. 58 B.E. 2515 (1972) cls 3 and 4.

[20] "Power Purchasing from the Private Producer" *Energy Policy and Planning Office* (2011) <http://www.eppo.go.th/images/Power/pdf/buy.pdf>.

[21] ibid.

[22] "Resolution of the Energy Policy and Planning Committee in the Meeting No.3/2006" *Energy Policy and Planning Office* (September 2006) <http://www.eppo.go.th/index.php/th/eppo-intranet/item/1741-nepc-thaksin106#s5>.

[23] Energy Industry Act B.E. 2550 (2007) s 10.

[24] The ERC only regulates the following natural gas operation: the natural gas transmission through pipelines via a natural gas transmission system, natural gas storage and transformation of natural gas from liquid to gas, natural gas procurement and wholesale, or natural gas retail via a natural gas distribution system, exclusive of the natural gas industry operation in the transportation sector. Natural gas exploration and production are activities that need legal authorization from the Minister of Energy under the Petroleum Act B.E. 2514 (1971).

system, tariff regulation, setting of safety standards, and energy network regulation under the Energy Industry Act B.E. 2550 (2007).[25] Replacing the Declaration of the Revolution Council No. 58 in the part concerning electricity operation,[26] the Energy Industry Act B.E. 2550 (2007) requires that electricity operation—namely production, procurement, transmission or distribution of electricity, or the control of a power system[27], including any of those carried out by EGAT, MEA, and PEA—are subject to supervision of the ERC.

A. Operating Rights: Licensable Activities Under the Energy Industry Act 2007

Generating and supplying electricity from floating photovoltaic solar panels are licensable activities under the Energy Industry Act B.E. 2550 (2007). A person desiring to generate electricity, whether or not for remuneration, shall obtain a power generation license from the ERC; however, if the generation capacity is lower than 1,000 Kilovolt-Amps (kVA), the power producer is exempted from obtaining the license. At the same time, a person who does not hold a power generation license, and who desires to supply electricity to the consumer, can apply for an electricity supply license from the ERC. As with the exemption from obtaining a license for generation activity, electricity supply having a supply capacity lower than 1,000 Kilovolt-Amps (kVA) is exempted from the necessity to obtain an electricity supply license.[28] In the case that an operator is exempted from obtaining the license, the operator is required to notify the ERC Office of the details of its operation.[29]

In granting an electricity license, the ERC, in addition to compliance with the Energy Industry Act 2007, is required to comply with other applicable legislations including the Enhancement and Conservation of National Environment Quality Act B.E. 2535 (1992). Under the Enhancement and Conservation of National Environment Quality Act, if the proposed electricity activity is an activity which is subject to the environment impact assessment (EIA), for example a thermal power plant with a generation capacity exceeding 10 MW,[30] the ERC shall not grant an electricity license

---

[25] Energy Industry Act B.E. 2550 (2007), Division 3.

[26] Clause 6 of the Declaration of the Revolution Council No. 58 B.E. 2515 (1972) provides that where a specific law on businesses specified in order No. 3 or order No. 5 exists, that law shall apply.

[27] Energy Industry Act B.E. 2550 (2007) s 5.

[28] Energy Regulatory Commission Notification re: Types and Term of a License B.E. 2551 (2008), cl 5(1); Royal Decree re: Types, Size, and Characteristic of Energy Businesses that are Exempted from Obtaining Energy License B.E. 2552 (2009) ss 3(1) and 3(3); Energy Regulatory Commission Notification re: Types and Term of a License B.E. 2551 (2008) cl 5(4).

[29] Energy Regulatory Commission Notification re: Notification Requirement for the Exempted Activities B.E. 2552 (2009) cls 3 and 4.

[30] Notification of Ministry of Natural Resources and Environment re: Prescribing Projects, Businesses, Operations that are Required to Conduct an Environmental Impact Assessment and Criteria, Procedures, and Conditions in Conducting an Environmental Impact Assessment 2019, Annex 4 No. 18.

unless they are notified of the approval of the environmental expert committee.[31] However, a hydro-floating solar project is not deemed a project, business, or operation which is subject to EIA requirements under the Enhancement and Conservation of National Environment Quality Act B.E. 2535 (1992). In relation to environmental impact mitigation, a person desiring to obtain an electricity generation license for a hydro-floating solar system is required through the "Notification of the ERC re: Preventive Measures and Environmental Monitoring for an Electricity Generation Licensee who generates electricity from Floating Photovoltaic Solar Panels 2019" to comply with the Code of Practice (COP) attached to that Notification.[32]

In addition to licensing requirements for electricity activities per se, the ERC, acting as a one-stop-service agency, is vested with the power to grant permission for establishing a new factory under the law on factories, the law on building control, the law on town and country planning, and the law on energy development and promotion.[33] Under the amended Factory Act B.E. 2535 (1992), a "factory" is defined as:

> buildings, premises, or vehicles using machines with total power from 50 horsepower or equivalent of 50 horsepower or more or which employ 50 workers or more with or without machinery to engage in factory operation in accordance with the type or kind of factory as prescribed in the Ministerial Regulations.[34]

Additionally, a detailed description of factories under the Factory Act B.E. 2535 (1992) can be found in the Ministerial Regulations promulgated under the aforementioned Factory Act. The Ministerial Regulations prescribe that solar power generation, except for solar rooftop systems with a generation capacity not exceeding 1,000 KV, shall be deemed a factory under Category 3.[35] A person desiring to operate a Category 3 factory shall obtain a factory license from the licensor.[36] Therefore, an operator of floating PV systems is required to obtain a factory license from the ERC prior to operation.

In relation to the Building Control Act B.E. 2522 (1979), any person who wishes to construct, modify, or move a building must be licensed by a local competent official, or inform a local competent official.[37] A "building" is defined as: "a town house, house, home, hall, shop, raft, warehouse, office and other construction which people may live in or utilize . . ."[38]

---

[31] Enhancement and Conservation of National Environment Quality Act 1992, s 50 para 2.

[32] Notification of the ERC re: Preventive Measures and Environmental Monitoring for an Electricity Generation Licensee Who Generates Electricity from Floating Photovoltaic Solar Panels 2019, cl 4.

[33] Energy Industry Act B.E. 2550 (2007) s 48 para 1.

[34] Factory Act (No.2) B.E. 2562 (2019) s 3 (amending Section 4 of the Factory Act B.E. 2535 (1992)).

[35] Ministerial Regulations re: Types Kinds and Size of Factories B.E. 2563 (2020) No.88 of the Annex.

[36] Factory Act B.E. 2535 (1992) s 12 para 1.

[37] Building Control Act B.E. 2522 (1979) s 21.

[38] ibid s 4.

A hydro-floating solar system is not a town house, house, home, hall, shop, raft, warehouse, office or any other construction in which people may live; however, it is a construction which can be utilized by an electricity operator to generate electricity. Hence, a person desiring to install, modify, or remove floating PV systems is required by the Building Control Act B.E. 2522 (1979) to obtain a building construction, modification, or removal license from the licensor. Therefore, an operator of floating PV systems is required to obtain the aforementioned licenses from the ERC.

Under the Energy Development and Promotion Act B.E. 2535 (1992), no one shall be allowed to produce or expand the production of controlled energy, unless a controlled energy production license is granted by the Department of Energy Development and Promotion.[39] Under the Ministerial Regulations, a regulated energy activity includes the generation of electricity exceeding 200 kVA. If it appears that a hydro-floating solar system generates electricity over 200 kVA, the generation of energy becomes a regulated activity under the Energy Development and Promotion Act B.E. 2535 (1992). In this case, a person desiring to generate electricity of over 200 kVA from floating PV systems is required to obtain a controlled energy production license from the ERC.

B. Ensuring the Financial Viability of a Power Project: A Power Purchase Agreement

To generate income and ensure financial viability—which can be referred to as a situation when a power company can earn sufficient revenue, e.g. from selling electricity, to cover the cost of service[40]of a power project—a power producer needs to sell the generated electricity to a buyer. Electricity transmission and distribution can be done through electricity networks such as the transmission system[41] or distribution system,[42] which are natural monopolies.[43]

State operators like EGAT, MEA and PEA own and operate electricity networks. Their rights to supply electricity through electricity networks are recognized by the Electricity Generating Authority of Thailand Act B.E. 2511 (1968), the Metropolitan

---

[39] Energy Development and Promotion Act B.E. 2535 (1992) s 25.

[40] Joern Huenteler and others, "Cost Recovery and Financial Viability of the Power Sector in Developing Countries" *World Bank* (January 2020) 5 <http://documents1.worldbank.org/curated/en/970281580414567801/pdf/Cost-Recovery-and-Financial-Viability-of-the-Power-Sector-in-Developing-Countries-Insights-from-15-Case-Studies.pdf>.

[41] Section 5 of the Energy Industry Act B.E. 2550 (2007) provides that "electricity transmission system" means a system that transmits electricity from a power generation system to a power distribution system, and shall mean to include the power system operator controlling that given power transmission system.

[42] Section 5 of the Energy Industry Act B.E. 2550 (2007) provides that a system that transmits electricity from a power transmission system or a power generation system to power consumers who are not licensees, and shall mean to include the power system operator controlling that given power distribution system.

[43] Kim Talus, *Introduction to EU Energy Law* (Oxford University Press 2016) 24.

Electricity Authority Act B.E. 2501 (1958), and the Provincial Electricity Authority Act B.E. 2503 (1960). Under the Electricity Generating Authority of Thailand Act B.E. 2511 (1968), EGAT is vested with the "statutory authority and power" to generate and supply electricity to MEA and PEA through its electricity networks. As a result, when EGAT generates electricity from floating photovoltaic solar panels, it will be able to gain income from the supply to MEA and PEA.

However, under a single buyer model, the right of a private power producer to sell and generate income for a project depends on the decisions of state agencies. The term "single buyer" can be referred to as a situation where the government authorizes private operators to construct a power plant to generate electricity and sell it to the national power company through a long-term power purchase agreement.[44] Reflecting the essence of the single buyer model, the power to decide over the right to sell electricity generated from renewable resources in Thailand is vested in the state. From the outset of a power purchasing procedure, the ERC has the authority and the duty to prescribe the regulations and criteria for electricity procurement and the issuance of request proposals for the purchase of power, as well as monitor the selection procedures in order to ensure fairness for all stakeholders.[45]

For example, under the Notification of the ERC re: Electricity Procurement from the Land-Based Solar System for State Agencies and Agricultural Cooperatives B.E. 2560 (2017), the ERC allows state agencies and agricultural cooperatives to submit their electricity vending proposal to the ERC.[46] Once the proposal is accepted by the ERC, the project owner shall submit their intention to be party to a 5-MW power purchase agreement with the MEA or the PEA.[47] The power purchase agreement shall last for 25 years.[48] Prior to the commercial operation date (COD), the project owner shall present all required licenses to the MEA or the PEA.[49] The price of electricity shall be calculated in accordance with the subsidy rate announced by the ERC.[50] As with the land-based solar system procurement announcement, the ERC can exercise its power under the Energy Industry Act B.E. 2550 (2007) to prescribe the regulations and criteria of electricity procurement for the electricity generated by hydro-floating system operators.

---

[44] Laszlo Lovei, "The Single-Buyer Model: A Dangerous Path toward Competitive Electricity Markets" *World Bank* (2000) 1 <https://openknowledge.worldbank.org/handle/10986/11409>.

[45] Energy Industry Act B.E. 2550 (2007) s 11(4).

[46] Notification of Energy Regulatory Commission re: Electricity Procurement from the Land-Based Solar System for State Agencies and Agricultural Cooperatives B.E. 2560 (2017) cl 7.

[47] ibid cls 9 and 10.

[48] ibid cl 11.

[49] ibid cl 13.

[50] ibid cl 15.

C. A Case Study: EGAT's Hydro-Floating Solar Hybrid Project

The previous sub-sections reveal the capability of the Electricity Industry Act B.E. 2550 (2007) and other relevant laws to support the implementation of a hydro-floating solar project in Thailand. In practice, this capability has been tested by the hydro-floating solar hybrid project initiated by EGAT. In January 2020, EGAT and B.Grimm, a privately-owned power company, announced that they had signed an engineering, procurement, and construction (EPC) contract with Energy China Consortium to build a hydro-floating solar hybrid project at Sirindhorn Dam.[51] The solar panels selected for this 45 MW project are crystalline double glass modules, which are suitable for installation in a high humidity environment, e.g. on water surfaces.[52] The eco-friendly high-density polyethylene (HDPE) plastic floating platform, which is not dangerous to aquatic animals, will cover a surface area of over 720,000 square meters.[53]

The implementation of the above-mentioned EGAT project partially reveals the capability of the Thai legal system to permit the future implementation of hydro-floating solar projects in Thailand. With regard to the operating rights, as discussed in section 1 of this article, EGAT can apply for a power generation license from the ERC and conduct an EIA in accordance with the announced COP. As regards the right to sell electricity, unlike a private power producer, who needs to wait for the renewable purchasing round, EGAT is vested with the statutory power to supply electricity to MEA and PEA.

However, a question arises concerning EGAT's right to use or possess the water surface for the project. It is necessary first of all to identify legal status of the right to use or possess the water surface of public water resources as well as determine the state agency that is vested with the power to manage Sirindhorn Dam. Being a multi-purpose dam, Sirindhorn Dam was jointly constructed in 1968 by the National Energy Office—which was subsequently changed to Department of Alternative Energy Development and Efficiency—and the Royal Irrigation Department. The Dam can be used e.g. for power generation, irrigation, disaster reduction, fishery, transportation, and tourism purposes.

---

[51] "EGAT kicks off the World's Largest Hydro-Floating Solar Hybrid Project" *EGAT* (January 2020) <https://www.egat.co.th/en/news-announcement/news-release/egat-kicks-off-the-world-s-largest-hydro-floating solar-hybrid-project>.

[52] ibid.

[53] ibid.

III. OPPORTUNITIES FOR A PRIVATE HYDRO-FLOATING OPERATOR

Emphasized by EGAT's hydro-floating solar hybrid project, Part II of this article reveals possibility of the development of hydro-floating systems in Thailand. EGAT is able to obtain a generation license and supply the generated electricity to MEA and PEA. However, it was also argued that the current electricity regulatory framework, as established under the Energy Industry Act B.E. 2550 (2007), poses challenges to a private operator. Firstly, there is a practical difficulty for a private operator in obtaining an electricity generation license due to the inability to demonstrate the right to use or possess public water resources. Secondly, under the single buyer model, even if an electricity generation license is obtained, a private operator is still unable to sell the electricity generated from a hydro-floating system, unless the ERC announces an electricity procurement round for hydro-floating projects, and a power purchase agreement with a state electricity enterprise is entered into.

A. Rights to Use And Possess the Water Surface of Public Water Resources: The Water Resources Act B.E. 2561 (2018)

In applying for an electricity generation license, an operator of a hydro-floating solar project must have the qualifications prescribed by the ERC. Among several qualifications, a licensee, whether a natural person or a juristic person, must demonstrate that they have ownership, a possessory right, or a right to use the area that will be used for the operation.[54]

According to the Electricity Generating Authority of Thailand Act B.E. 2511 (1968), EGAT is vested with the power to construct the impounding dam, diversion dam, storage dam, reservoir or other things which are accessories of the dam or reservoir thereof for the production of electric energy.[55] Sirindhorn Dam, where the 45-MW floating PV systems are expected to be installed and used for generating electricity from sunlight, has been under the control of EGAT for electricity generation since 1972. Despite the absence of a water resources law, EGAT has the power to manage and monitor the operation of Sirindhorn Dam for electricity generation, including the installation of floating PV systems. Hence, EGAT can demonstrate its possession over the water surface of the Dam, and can obtain a generation license from the ERC. However, a private operator desiring to install floating PV systems does not have the same privileges as EGAT regarding the water surface of the Dam. Its access to and right to use public water resources depend on the applicable water resources law.

---

[54] Energy Regulatory Commission Regulation re: Energy License Application and License Granting B.E. 2551 (2008) cls 4(1)(g) and 4(2)(d).

[55] Electricity Generating Authority of Thailand Act B.E. 2511 (1968) s 9(4).

The Water Resources Act B.E. 2561 (2018) is a primary legislation governing the usage or utilization of public water resources in Thailand. Limiting a person's right to water use, the law postulates that public water resources are publicly owned. A person has the right to use or keep water to the extent necessary for the benefit of his activities or his land, without causing grievance or damage to other persons who may use such water.[56] "Public Water Resources" is defined as:

> water in a water source which is publicly used or reserved for common use by the public or, by nature, capable of common use by the public and shall include rivers, canals, waterways, swamps, underground water sources, lakes, internal waters, territorial seas, wetlands, other natural water sources, water sources built or developed by the State for common use by the public, international water sources located in the territory of Thailand and capable of use by the public, irrigation waterways under the law on irrigation and groundwater under the law on groundwater.[57]

Apart from the definition of public water resources, the Water Resources Act B.E. 2561 (2018) defines "water use" as:

> a pursuit of activities in relation to public water resources for the purpose of consumption, ecosystem conservation, customs, public disaster mitigation, agriculture, industry, commerce, tourism, communication, waterworks or energy generation or for any other purpose, whether it may result in a change in the quantity of water or not.[58]

From the above definitions, if a private hydro-floating solar system operator desires to install floating photovoltaic solar panels on the water surface of a natural water source or an irrigation waterway, it shall be deemed an activity to be carried out in a public water resource. Even if such activity may not result in a change in the quantity of water, it is still deemed water use.

The Water Resources Act B.E. 2561 (2018) explicitly makes a reference to the use of public water resources to generate electricity. The use of public water resources for electricity generation falls under Type 2 water use, as stipulated in the Water Resources Act B.E. 2561 (2018).[59] A person seeking to use public water resources for electricity generation, whether a state-owned enterprise like EGAT or a private power producer, is required by the Water Resources Act B.E. 2561 (2018) to obtain a water use license from the Director General of the Irrigation Department, Director General of the Department of Water Resources or the Director General of the Department of Groundwater Resources (depending on the location of the water resources) with the approval of the drainage basin committee responsible for the area in which the water

---

[56] Water Resources Act B.E. 2561 (2018) s 7.

[57] ibid s 4.

[58] ibid.

[59] ibid s 41.

resources are located.[60] In granting a license, Thai authorities must take the balance of water in public water resources into consideration.[61]

Once a private hydro-floating system operator has obtained a Type 2 water use license, it can present this license to the ERC to demonstrate its right to use or possess a water surface (of public water resources) in the process of obtaining an electricity license. From this finding, it can be said that the Water Resources Act B.E. 2561 (2018) can contribute to the development of hydro-floating solar projects, especially when it comes to a right to use the water surface of public water resources.

B. The Right to Sell Electricity: A Private Power Purchase Agreement

As discussed in sub-section II.B., the right of a private operator to commercially sell its electricity depends on the decisions of state agencies, especially an electricity procurement round of the ERC. A legal question then arises as to whether a private operator can ensure the financial viability of its hydro-floating solar project through a private power purchase agreement that is directly entered into with a customer who is not a state electricity enterprise regardless of the procurement round to be announced by the ERC.

First of all, it must be noted that a hydro-floating system operator, as discussed in sub-section II.A., can apply for a supply license from the ERC or be exempted from obtaining a supply license if the supply capacity is lower than 1,000 Kilovolt-Amps (kVA). However, due to the technical nature of the electricity industry, electricity that is generated from hydro-floating photovoltaic solar panels must be delivered through the electricity network, for example a transmission system or a distribution system. This private operator may choose to construct its own electricity distribution network and obtain an electricity distribution system license from the ERC.[62] In the case that it does not wish to invest in the grid construction and, importantly, wishes to utilize the existing electricity networks that are owned by EGAT, MEA, and PEA, the Energy Industry Act 2007 recognizes this as third-party access (TPA).[63]

Under the electricity TPA regime, EGAT, MEA, and PEA, as licensees that own and operate electricity networks, shall allow other licensees or energy business operators to use or connect to their energy network systems, in accordance with the regulations prescribed and announced by an owner of the electricity network.[64] It must be noted that EGAT, MEA, and PEA are required to operate their electricity networks in a fair manner and shall refrain from unjust discrimination.[65] Unfair or

[60] ibid s 43.

[61] ibid s 46.

[62] Energy Regulatory Commission Notification re: Types and Term of a License B.E. 2551 (2008) cl 5(3).

[63] Energy Industry Act 2007, ch 3 pt 4.

[64] ibid s 81 para 1.

[65] ibid s 80.

discriminatory electricity network operation practice by EGAT, MEA, and PEA will be dealt with and is subject to the regulatory power of the ERC.[66]

The electricity TPA regime, as established by the Energy Industry Act B.E. 2550 (2007), reveals that a private hydro-floating system operator may enter into a transmission or distribution service agreement with EGAT, MEA, or PEA to transmit or distribute its electricity to the buyer under a private power purchase agreement. This private power purchase agreement will allow the producer to directly collect electricity charges from the customer, while using the electricity network owned by EGAT, MEA, or PEA. The producer will be responsible for paying service fees related to transmission or distribution—for example, transmission or distribution charges, connection charges, imbalance charges, and ancillary charges under a transmission or distribution service agreement.[67]

IV. POTENTIAL CHALLENGES

The opportunities for a private operator to own and operate a hydro-floating solar project addressed in Part III.A. can be counter-argued on the grounds of uncertainty potentially arising from the interpretation of the Water Resources Act B.E. 2561 (2018), especially in relation to the definition of water use. On the other hand, the TPA regime can be criticized on the grounds of difficulty in the practical implementation of the regime, as well as an unlevelled playing field for private and public operators.

A. Definition of "Water Use" Under the Water Resources Act B.E. 2561 (2018) and Possessory Right

Unlike EGAT, which is vested with public power to construct and utilize dams for electricity generation including installation of hydro-floating systems over Sirindhorn, a private electricity operator needs to obtain legal authorization from the applicable water regulators, and faces difficulties potentially arising from the interpretation of the Water Resources Act B.E. 2561 (2018). When granted a Type 2 water use license, a licensee only gains the right to use water, not the right to use or possess a water surface. Under the Civil and Commercial Code of Thailand, a person acquires possessory right by holding a property with the intention of holding it for himself.[68] However, a Type-2 water use licensee may only use water resources to support

[66] ibid s 82–84.

[67] Please see for example, "Sacramento Municipal Utility District's Rate Policy and Procedures Manual re: Distribution Wheeling Service" *Sacramento Municipal Utility District* <https://www.smud.org/-/media/Documents/Going-Green/PDFs/Distribution-Wheeling-Service-Policies-and-Procedures.ashx>; "The Distribution Connection and Use of System Agreement" *Distribution Connection and Use of System Agreement* (December 2020) <https://www.dcusa.co.uk/dcusa-document/>.

[68] Civil and Commercial Code, s 1367.

electricity generation without holding the water resources or the water surface with the intention of holding it for himself.

The use of public water resources for a cooling system or a power plant is clearly different from using the water surface for a hydro-floating solar system. This is because a cooling system or a hydroelectricity project actually uses the water in the production process (which may not result in a change in the quantity of water); however, a hydro-floating solar system operator only possesses the water surface without actual usage or consumption of public water resources. Hence, despite the application of the Water Resources Act B.E. 2561 (2018) and its reference to the use of public water resources for power generation, it has remained unclear if a hydro-floating solar system operator can rely on this law to obtain a property right to occupy the water surface of public water resources.

One way forward is to provide the details of Type 2 water use in the Ministerial Regulation, as the Water Resources Act B.E. 2561 (2018) provides that "the nature and descriptions of the water use of each type under (1), (2) and (3) shall be as prescribed in the Ministerial Regulation issued by the Prime Minister with the approval of the NWRC."[69] The Prime Minister and the NWRC can use this opportunity to clarify the definition and characteristics of water use for electricity generation, by including the use of a water surface for a hydro-floating solar project in the Ministerial Regulation.

One could claim that the term "water use," as defined by Section 4 of the Water Resources Act B.E. 2561 (2018) is broad in its definition, for the reason that it begins by describing water use as "a pursuit of activities in relation to public water resources." Literally speaking, it does not only limit water use to an activity that relies upon consumption of public water resources. Installation of a hydro-floating solar system over the water surface of a public water resource should be deemed "an activity in relation to public water resources (for the purpose of electricity generation)." Hence, the Prime Minister, with the approval of the NWRC, is vested with the administrative power to postulate a detail of water use that includes a possessory right over the water surface for a hydro-floating system.

However, it can be counter-argued that it is beyond the power of the Prime Minister, in exercising his power under the Water Resources Act B.E. 2561 (2018), to promulgate a ministerial regulation that authorizes the use of a water surface. This is because the ministerial regulation can only provide details on "the use of public water resources." Since a hydro-floating project only needs a possessory right over the water surface, it is therefore not within the power of the Prime Minister to include this possessory right in the licensing regime under the Water Resources Act B.E. 2561 (2018). Promulgation of a by-law that goes beyond the scope of authority conferred on the delegate, or which is in conflict with the Water Resources Act B.E. 2561 (2018), can be deemed an unlawful administrative act and is subject to a review by the administrative court.[70] It should be noted that EGAT can avoid the aforementioned

[69] Water Resources Act B.E. 2561 (2018) s 41 para 2.

[70] Act on Establishment of Administrative Courts and Administrative Court Procedure, B.E. 2542 (1999) s 9(1).

potential legal uncertainty by relying on its statutory power to utilize the dam under its control for electricity generation, including installation of floating PV systems, without the need to obtain a water use license under the Water Resources Act B.E. 2561.

Even if the Ministerial Regulation promulgated by the Prime Minister included a possessory right over a water surface for a hydro-floating system, a challenge could arise from a financial perspective. In the case that a hydro-floating system operator relies on a loan from a lender which is granted on a project finance basis, the lender will carefully assess repayment ability according to the revenue flow of the project.[71] This assessment can be referred to as a "bankability assessment." Among several bankability factors, including power purchasing commitment and the price of electricity, the lender will assess the property rights of the project owner.[72] For a hydro-floating project that is planned to be installed over public water resources in Thailand, uncertainty arising from the interpretation of "water use" will undermine the bankability of the project.

B. The Electricity TPA Regime Without Unbundling

In more liberalized electricity markets, electricity operators that own and operate electricity networks shall be separated from those carrying out generation and supply activities. For example, the EU Directive 2019/944 recognizes that "without the effective separation of networks from activities of generation and supply (effective unbundling), there is an inherent risk of discrimination not only in the operation of the network but also in the incentives for vertically integrated undertakings to invest adequately in their networks."[73]

It further states that where the distribution system operator is part of a vertically integrated undertaking, it shall be independent at least as regards its legal form, organization and decision-making, from other activities not relating to distribution.[74]

Unlike the legal requirement of the EU Directive 2019/944, the electricity TPA regime under the Energy Industry Act B.E. 2550 (2007) only imposes a duty upon EGAT, MEA, and PEA to refrain from acting unfairly or discriminatorily when operating their electricity networks. Under this regulatory framework, a situation could arise where a private hydro-floating electricity producer would need to compete against a state electricity enterprise that is also a hydro-floating electricity producer and, simultaneously, the owner and operator of electricity networks. Consequently,

---

[71] Jeffrey Delmon, *Public-Private Partnership Projects in Infrastructure: An Essential Guide for Policy Makers* (Cambridge University Press 2011) 73.

[72] ibid 76.

[73] European Parliament and the Council 2019/944 of 5 June 2019 on Common Rules for the Internal Market for Electricity and Amending Directive 2012/27/EU [2019] OJ L158/125, Recital (67).

[74] ibid art 35 para 1.

there is a chance that a hydro-floating operator that decides to enter into a private power purchase agreement could be unfairly treated by the electricity network operator, as the latter would be its competitor in the electricity generation market.

V. CONCLUSION

Part II of the article reveals the capability of the Energy Industry Act 2007 to serve as a regulatory basis for the operation of a hydro-floating solar project in Thailand. Under the Energy Industry Act B.E. 2550 (2007), if not carrying out electricity operation activities that are exempt from licensing requirements, a hydro-floating operator, whether a state electricity enterprise or a private operator, can obtain the right to generate electricity from floating PV systems and to supply the generated electricity by obtaining the applicable licenses from the ERC. In addition, the ERC, acting as a one-stop-service agency, is vested with the administrative power to issue other relevant licenses—for example, an electricity generation license, a factory license, or a license for regulated energy activities. To ensure the income and financial viability of a hydro-floating project, a private operator can enter into a power purchase agreement with state-owned electricity enterprises in accordance with the power purchasing rules promulgated by the ERC.

EGAT's hydro-floating solar hybrid project serves as a good example that preliminarily reveals the readiness of the current electricity regulatory regime to support and regulate the implementation of a hydro-floating solar project in Thailand, especially when an operator is a state-owned enterprise like EGAT. Regardless of the interpretation of the right to use public water resources under the Water Resources Act B.E. 2561 (2018), EGAT can rely on its statutory power under the Electricity Generating Authority of Thailand Act B.E. 2511 (1968) to use the water surface of a dam under its control (such as Sirindhorn Dam) for the installation of floating PV systems. Therefore, a state-owned operator like EGAT is capable of demonstrating a right to use the area that will be used for the installation and operation of floating PV systems when applying for an electricity generation license from the ERC.

However, this article argues that, despite the ability to obtain the relevant licenses, the current regulatory regime poses challenges to a private operator desiring to install a floating PV on the water surface of a public water resource. Unlike EGAT, a private hydro-floating system operator needs legal authorization from the applicable water regulators, and inevitably faces difficulties that could potentially arise from the interpretation of the Water Resources Act B.E. 2561 (2018), especially concerning the right to use or possess the surface of public water resources. Even if a Type 2 water use license has been obtained by a private operator, it may be argued that the obtained right does not include the right to use the water surface for installation of floating PV systems. In addition, this uncertainty may undermine the bankability of a private hydro-floating project to be developed by a private operator in Thailand.

In relation to the financial viability of the project, it can be said that revenue flow for a hydro floating solar project can rely on a power purchase agreement that the operator enters into with a state electricity enterprise like EGAT, MEA, or PEA, or alternatively, a private power purchase agreement that enables the private operator to directly collect the tariff from the consumer while transmitting or distributing the electricity through electricity networks owned by EGAT, MEA, or PEA. However, this paper argues that the TPA regime, without effective separation of the generation and supply activities and network activities, may make it difficult for a private operator to escape from unfair or discriminatory practice by the network operator. This is particularly likely to be the case when the network operator is also a hydro-floating electricity producer, thus being a competitor of the network user in the electricity generation market.

[Date of submission: 05 February 2021; Revision: 03 June 2021; Acceptance: 11 October 2021]