Journal of Infrastructure, Policy and Development 2024, 8(1), 2620.
https://doi.org/10.24294/jipd.v8i1.2620

Article

Regulatory challenge of the license and permission for energy industry operation on renewable energy growth in Thailand

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CITATION

Aggarwal S, Usapein P. (2024). Regulatory challenge of the license and permission for energy industry operation on renewable energy growth in Thailand. Journal of Infrastructure, Policy and Development. 8(1): 2620. https://doi.org/10.24294/jipd.v8i1.2620

ARTICLE INFO

Received: 20 August 2023
Accepted: 25 September 2023
Available online: 13 December 2023

Abstract: This research explores the implementation of streamlined licensing frameworks and consolidated procedures for promoting renewable energy generation worldwide. An in-depth analysis of the challenges faced by renewable energy developers and the corresponding solutions was identified through a series of industry interviews. The study aims to shed light on the key barriers encountered during project development and implementation, as well as the strategies employed to overcome these obstacles. By conducting interviews with professionals from the renewable energy sector, the research uncovers a range of common challenges, including complex permitting processes, regulatory uncertainties, grid integration issues, and financial barriers. These challenges often lead to project delays, increased costs, and limited investment opportunities, thereby hindering the growth of renewable energy generation. However, the interviews also reveal various solutions and best practices employed by industry stakeholders to address these challenges effectively. These solutions encompass the implementation of streamlined licensing procedures, such as single licenses and one-stop services, to simplify and expedite the permitting process. Additionally, the development of clear and stable regulatory frameworks, collaboration between public and private entities, and improved grid infrastructure were identified as key strategies to overcome regulatory and grid integration challenges. The research findings highlight the importance of collaborative efforts between policymakers, industry players, and other relevant stakeholders to create an enabling environment for renewable energy development. By incorporating the identified solutions and best practices, policymakers can streamline regulatory processes, foster public-private partnerships, and enhance grid infrastructure, thus catalyzing the growth of renewable energy projects.

Keywords: single license; renewable energy; government regulatory

1. Introduction

Since the energy industry is important to the social structure, economy, and environment of the country, it is well known that energies are considered necessary for the daily lives of people, to the point that they may be called basic utilities. The government, therefore, has a duty to provide, along with a global society that is more alert and interested in environmental issues. At the most recent COP27 meeting in Sharm El-Sheikh, Egypt, some significant proposals about climate action were made during the just concluded COP27. Expectations were greater, though, and certain crucial decisions were either postponed or altered to appease all parties, undermining the significance of environmental protection and climate action—the whole reason the meeting was organized (Arora and Arora, 2023). Thailand is one of the countries most affected by climate change, ranking 9th out of 170 countries around the world, which led to the proposal of a master plan to move forward on the issue of clean energy and

reduce greenhouse gas emissions in the United Nations General Assembly (Eckstein et al., 2021).

Thailand pledged at COP26 to achieve carbon neutrality by 2050 and net zero carbon dioxide by 2065 (Diewvilai and Audomvongseree, 2022). It means that, after the year 2030, the amount of greenhouse gas (GHG) emissions per unit of Gross Domestic Product (GDP) must fall by 6% each year, which is a challenge and a race against time. To reduce GHG emissions, switching from fossil fuels to renewables is an important option. Thailand has integrated five master plans in 2015. They were the Petroleum Management Plan, the Energy Efficiency Plan (EEP2015), the Alternative Energy Development Plan (AEDP), the Natural Gas Supply Plan, and the Power Development Plan (PDP) 2015 (Kusumadewi et al., 2017). The PDP2015 spans the years 2015 to 2036, and economy, ecology, and energy security are its main concerns. According to the National Economic and Social Development Board, the average annual growth rate of the GDP was roughly 3.94 percent. Effects from EEP2015 were incorporated into PDP2015. In 2036, the EEP2015 is projected to save 8672 GWh of energy. The AEDP2015 will also promote renewable energy sources like biomass, biogas, wind, and solar electricity (Chunark et al., 2017). Moreover, the Thai government intends to have 690 charging stations and 1.2 million electric vehicles by 2036 (Wattana and Wattana, 2022).

In 2007, the Energy Regulatory Commission (ERC) was established. ERC is in charge of regulating electricity tariffs, issuing licenses for energy industry operation in the Electricity Supply Industry (ESI) and energy network system business, issuing regulations for power procurement, customer service standards, and quality, including measures to protect energy consumers from adverse effects resulting from energy industry operation, and issuing levies for the Power Development Fund (ERC, 2011).

Regulation acts as a contemporary and effective interface between the public interest, consumer interests, those who provide regulated services under monopolistic conditions, and those who use the monopolistic infrastructure (Vasconcelos, 2005). When a regulation was put into practice, gaps were frequently discovered. Numerous earlier studies investigated regulatory gaps, which implies that improving and developing regulations is necessary to facilitate the development of modern electricity production innovation. For example, an improvement in standardizing testing for maritime renewable energy was investigated by Noble et al. (2021). They stated that the main themes were the progression of development from concept to commercialization, including testing in environments with more complex environmental conditions, accurately modeling and quantifying the power generated, including grid integration, and modeling and testing of novel moorings and foundation solutions. (Cassar et al., 2021) conducted a regulatory gap analysis on liquefied natural gas for ship fuel. Stritof and Krajcar (2011) analyzed the gaps between the Croatian model and the quality-dependent approach for regulating power distribution. In addition, there is also the study of regulatory gaps related to electricity production. Aggarwal and Usapein (2022) investigated the gap analysis of the license and permission for renewable energy industry operations in Thailand. They concluded that the ERC's regulation of the licensing and trading mechanisms for renewable electricity is overly bureaucratic and raises administrative barriers. To tackle the many difficulties associated with an energy transition, simultaneous collaboration between

the public and commercial sectors is necessary. This collaboration should also be supported by the knowledge of many societal stakeholders.

To relieve the problem, therefore, the objective of this study is to 1) study and analyze relevant provisions relating to the regulation of renewable energy in power generation business and the license application system in the Energy Industry Act B.E. 2550; and 2) provide policy recommendations for the process development in a single license of electricity generation from renewable energy in Thailand. The result will demonstrate the problems and obstacles related to laws and regulations, as well as government policies that will support the principles that will make the renewable energy industry progress and reduce barriers to obtaining a license. Moreover, it will meet the needs of using new technologies or new services that operators can clearly use in their business operations faster, as well as helping to attract foreign investors and capital and help reduce costs for operators at the same time.

2. ERC permitting overview

Thailand has divided the energy industry license system according to fuel type, for example, type of oil business operation, type of power generation business, and natural gas business. Each type of business will have different regulators. The types of energy industry licenses can be divided into five categories (ERC, 2014): (1) Electricity Generation License; (2) Electricity Transmission System License; (3) Electricity Distribution System License; (4) Electricity Supply License; and (5) Electricity System Control License. The term of all types of licenses is limited to 25 years from the date of issuance. Applying for the energy industry license has important criteria for consideration as follows (ERC, 2023):

1) The applicant must be financially ready with a contract from a clear source of financial support.
2) The applicant is ready in terms of ownership of the land, with ownership or possessory rights of land corresponding to the power purchase point.
3) The applicants are ready for fuel as the type of fuel that complies with the proposal for selling electricity by showing sufficient evidence of the procurement of fuel for the business operation.
4) The applicant has the technology readiness in accordance with the type of fuel according to the proposed power sale proposal, and the installed capacity does not exceed the specification in the contract.
5) There is already a power purchase agreement that is binding.
6) Environmental and community impact assessments must have a public hearing process and environmental reports according to the type and nature of the business operation.
7) Compliance with other relevant laws such as town planning laws, environmental laws, and laws under section 48 of the Energy Industry Act.
8) Other conditions according to the announcement of the purchase of electricity.

An analysis of interviews on the impact of licenses and permissions on renewable energy growth in Thailand reveals several key findings. While the process of obtaining a license for renewable energy production is relatively straightforward, there are disparities in promotion efforts between businesses and households. Historically, the

licensing process posed obstacles, particularly in selling electricity to the government sector, resulting in slower development compared to neighboring countries.

However, the surplus of electricity production has diminished the government's interest in increasing renewable energy generation, leading experts to believe that the licensing process is no longer a significant obstacle. Challenges persist in obtaining licenses for large production capacities due to the involvement of multiple regulatory agencies, necessitating applicants to navigate through various agencies themselves.

3. Methodology

3.1. Questionnaire formulation

The questionnaire was created in the form of a semi-structured interview, which was examined by experts to determine the suitability of the questions as well as questions about the appropriateness of the government's current renewable energy management policy. Index of item congruence (IOC) was applied to examine the content validity (Nantee and Sureeyatanapas, 2021). **Table 1** presents the interview questions in this study.

Table 1. The interview questionnaire in this study.

Objectives	Questions for the interview
Obstacles, problems affecting the development of energy production from renewable energy in Thailand	1. What do you think about the current circumstances of electricity generation? Should the government promote or motivate people to use more renewable energy? How?
	2. In Thailand, can the electricity production license from renewable energy be used at full efficiency in all areas?
	3. What do you think about the law? Or rules for applying for an electricity generation license from renewable energy?
	4. How do you see the advantages and disadvantages of the process of applying for electricity production from renewable energy?
	5. Do you think that the license request process is an important obstacle to the development of national energy in the country? Why?
	6. Do you think that requesting an energy business license is appropriate? For the current electricity situation? Is it complicated?
	7. What do you think about the sale of electric power obtained from renewable energy into the grid system? And the grid systems of the EPRC and the PEA are ready to support electricity production from renewable energy?
	8. Do you think that EGAT should improve the system or that EGAT should prepare power supply from electricity production from renewable energy?
	9. What do you think about the problem or obstacle to requesting a license to produce electricity? Please explain.
	10. What is the factor that stimulates the production of electricity from renewable energy?
Cost/Law/Law/Management of Energy Business License	1. Do you know the cost of installing alternative energy production systems? And do you agree that the government should give an incentive to install the renewable electric power generation system? How?
	2. Do you think that the default license fee is appropriate or not? Please explain.
	3. If the government allows entrepreneurs to bring the license fee to deduct corporate tax, do you think it is appropriate? Please explain.
	4. Do you think the government should support the device to encourage people to use more renewable energy? Please explain.
	5. Do you think the law and rules regarding the operating of the renewable energy business are appropriate? Please explain.
	6. Do you think that the government should set the renewable energy purchased from the people at a higher rate than the private sector? Please explain.
	7. What do you think are the factors that the government should consider and give importance to the law and regulations to stimulating the use of more alternative energy? Please explain.
	8. Do you think that the supervision agency should improve the laws and regulations related to the license to support the renewable energy business? Please explain.
	9. Do you think that the business supervision agency should have a private representative to participate or not? Please explain.

Table 1. (*Continued*).

Objectives	Questions for the interview
System restrictions/research and development of energy business supervision	1. What are your opinions about the management of the electric transmission system from the renewable energy perspective of the government? Please explain.
	2. From the answer above, how do you recommend? Please explain.
	3. Do you agree that the government or the Ministry of Energy should establish a budget to study and develop at least 10 percent of the energy business in the annual budget? Please explain.
Policy and measures for editing/ policy suggestions on the application of the license to increase the potential of renewable energy in the future	1. What laws should be added to promote the potential of renewable energy production in the future? Please explain.
	2. What do you think the government's policy should be to improve to increase the potential of renewable energy in the future? Please explain.
	3. If you are able to suggest to the government policies and measures regarding the request for a government license for the renewable energy business, how do you want to suggest them? Please explain.
	4. How do you think the government should solve the problem of an anti-replacement power plant setting? Please explain?

3.2. Sample groups

In the framework of qualitative research, the study used purposive selection procedures backed by the convenience sample method to choose 11 participants from a range of demographics for in-depth interviews (Guarte and Barrios, 2006). The sample group comes from various stakeholders who have a part in the system, including government agencies that regulate, the private sector, which operates in the production and distribution of electricity, academics, and the public who are interested and want to apply for an energy industry license, or people who are affected by the process of obtaining an energy industry license using the purposive sampling technique. The sample sizes for each group of stakeholders are shown in **Table 2**. It is crucial to remember that the choice of sample size in qualitative research depends on a number of context-specific criteria, including the scientific paradigm, the size of the study, and the nature of the subject. Even with a single sample or case, qualitative investigations addressing novel topics or findings that have the potential to be extremely significant can be worthy of publishing (Boddy, 2016; Reeder, 2023).

Table 2. The interview questionnaire in this study.

Stakeholders	Amount
State enterprise	3 people
Energy Regulatory Commission (ERC)	1 people
Academic/Consultant	5 people
Private companies involved in power generation business and renewable energy growth in Thailand	2 people

3.3. Results analysis and policy recommendations

The results of the questionnaire were collected and analyzed in order to identify the barriers to the adoption of a single-license system in the country. The variables that could drive the development of the single license licensing system in Thailand were concluded. Finally, policy recommendations were presented for future improvements to the licensing system. **Figure 1** illustrates the overview of the methodology in this study.

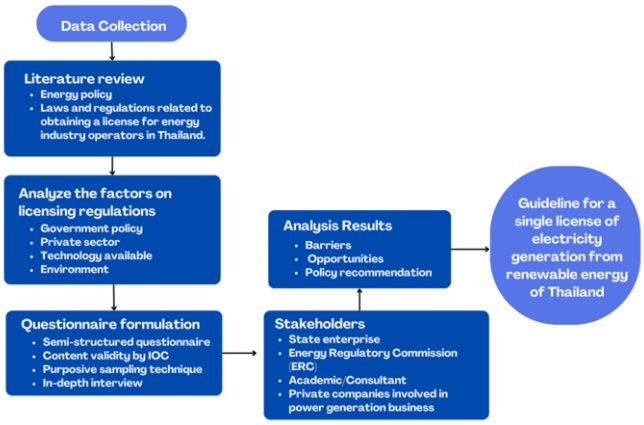

Figure 1. Overview of the methodology in this study.

4. Results

4.1. Barriers to permitting

The interviews conducted with members of the Energy Regulatory Commission (ERC) and scholars highlighted several key points regarding the licensing process for renewable energy. Here is a summary of the results:

1) Need for government support: ERC committee members emphasized the importance of government incentives and support to promote the use of renewable energy. They suggested that the government should provide financial assistance and tax deductions to encourage investment in renewable energy businesses.
2) Inefficiencies in the licensing process: The current licensing process for renewable energy generation was deemed inefficient and complex. It requires consideration of various factors, such as the type of renewable energy and specific geographical areas. Lack of clear energy policies and national energy plans further complicates the process.
3) One-stop service: To address the challenges, there was a consensus among scholars and ERC members that a centralized one-stop service should be established. This would streamline the licensing process, eliminate redundancies, and facilitate efficient coordination between regulatory agencies.
4) Unified laws and regulations: Scholars stressed the need for comprehensive and unified laws and regulations specifically tailored to the renewable energy sector. The current fragmented regulations create confusion and hinder business operations. Consolidating these laws into a single act would provide clarity and simplify the licensing process.
5) Expansion of exemptions: To encourage the adoption of renewable energy, it was suggested that the electricity generation ceiling, which does not require a license, should be raised. This would incentivize more individuals and businesses to invest in renewable energy.
6) Safety standards: Scholars highlighted the importance of establishing safety standards for renewable energy devices, such as wind turbines. By ensuring proper installation and adherence to safety protocols, risks can be minimized, and confidence in renewable energy can be strengthened.

7) Licensing fees: The appropriateness of licensing fees was a topic of discussion. While some members believed that the fees should reflect the actual costs, others felt that it would be more suitable to adjust them to consider inflation and the capital-intensive nature of renewable energy projects.
8) Tax deductions: There was a difference of opinion regarding the deduction of license fees from corporate taxes. While some members supported it as an incentive to encourage renewable energy adoption, others considered it inappropriate, arguing that costs should be treated uniformly across all businesses.

4.2. Opportunities

While the licensing process for renewable energy electricity generation has improved compared to the past, challenges still remain, such as lengthy license acquisition periods, a lack of centralization, and the involvement of multiple regulators, which cause delays and inconveniences for applicants. The need for improvement in these areas is highlighted to streamline the process and enhance efficiency, in which researcher can summarize into the following topics:

Topic 1: Simplifying the licensing process. Several experts mentioned that the process of obtaining a license for renewable energy production has become simpler compared to the past. However, there are still issues with the time it takes to obtain a license, lack of centralization, and the involvement of multiple regulatory agencies. Suggestions were made to reduce the complexity, streamline the process, and establish a one-stop service for license applications.

Topic 2: Government incentives for renewable energy. Experts emphasized the need for the government to increase incentives to encourage the use of renewable energy, particularly in the household sector. Currently, the focus is mainly on promoting renewable energy in the business sector, and there is a lack of support for households. Suggestions were made to expand incentives, promote household solar installations, and coordinate efforts among government agencies.

Topic 3: Advantages and disadvantages of the licensing process. The advantages of the licensing process include a centralized database, increased transparency, shorter consideration timeframes, and reduced overlap. Disadvantages include uncertainties in the selection method for auction winners, delays due to multiple agencies' involvement, and the need for improved one-stop services.

Topic 4: Selling electricity to the grid. Experts agreed on allowing the sale of electricity produced from renewable energy to the grid. It was suggested to have different regulations for large-scale production capacity (10 MW or more) and small-scale production, as connecting devices to the grid may be challenging for households. There was also a recommendation for better supporting systems such as peer-to-peer sales and implementing controls to manage market prices and maintain the overall energy system.

Topic 5: Supporting renewable energy in the household sector. The government was advised to provide more support and incentives for renewable energy installations in the household sector. Suggestions included offering installment plans for system installations, promoting domestic equipment over imports, and focusing on safety standards and certified shops for equipment purchases.

Topic 6: Regulatory challenges and simplification. Experts highlighted that laws and regulations for renewable energy businesses need to be updated and simplified. While the business sector has seen improvements, the household sector still faces complexities in the licensing process. Recommendations were made to make the process more accessible and reduce the burden on applicants by centralizing the procedures.

Topic 7: Setting prices for renewable energy. Opinions varied regarding the government's role in setting prices for renewable energy purchases. Some experts suggested setting higher purchase prices for the public sector to incentivize installations, but with careful consideration to avoid excessive installations. Others believed in leaving it to market mechanisms while initially providing a higher price to motivate adoption.

Topic 8: Revising policies and plans for renewable energy. Experts emphasized the need to revise the Power Development Plan (PDP) and other policies to enhance the potential of renewable energy. Clear specifications for desired energy sources, roles of relevant agencies, regulations for purchasing electricity, and stability of prices were recommended.

Topic 9: Improving transmission and distribution systems. Recommendations were made to manage the transmission and distribution systems to accommodate the increasing household production of renewable energy. Issues such as adjusting systems for different types of renewable energy and implementing mechanisms that consider actual costs and not just financial potential were mentioned. Proper planning and policies were emphasized to avoid wasteful investments and ensure alignment between energy needs and actions.

Topic 10: Enhancing transparency and stakeholder participation. Experts emphasized the importance of transparency in energy regulatory affairs and involving stakeholders from various sectors in decision-making processes. Suggestions included incorporating public hearings, providing access to information, and building credibility through disclosure. It was recommended to consider other support systems beyond committee composition to increase credibility and access to information.

4.3. Policy recommendations

The process of obtaining a license for energy industry operations was considered simple, with the requirement of ready documents for submission. However, considerations were made to maintain the balance of the demand-supply system and evaluate support for distribution systems in specific areas. The government was advised to increase incentives for households to adopt renewable energy, as the current focus is primarily on private companies. While the process of obtaining a license for renewable energy is efficient, it lacks centralization, particularly in promoting renewable energy in households. Laws and regulations for obtaining licenses align well with technological trends in the business sector, but complications arise in household installations, and the absence of centralized regulatory agencies burdens applicants. The advantages of the process include a unified database for renewable energy, transparency, shorter consideration time frames, and reduced overlaps. Disadvantages involve uncertainties in auction selection methods and delays caused

by multiple agencies involvement. Recommendations include increasing incentives for household adoption, establishing centralized regulatory agencies, addressing uncertainties in auction processes, and implementing a streamlined, one-stop service for licensing procedures. Research suggestions based on the interviews can be concluded as follows:

The process of obtaining a license: The creation of a centralized database for renewable energy throughout the country, increased transparency and clarity in the licensing process, a shorter time frame for license consideration, and a reduction in overlapping procedures

Challenges in obtaining licenses for household renewable energy production: The complicated installation process leads to low attention from individuals, a lack of centralized regulatory agencies for obtaining licenses, and a burden on applicants due to the involvement of multiple regulatory agencies.

Suggestions for improving the licensing process: Simplification of the license application process and reduction of processing time; implementation of a digital platform to support license applications; establishment of a one-stop service for license applications with clear policy and measures regarding the licensing process for renewable energy industries.

Government incentives for renewable energy: Increase incentives for households to adopt renewable energy, particularly solar power; provide financial support and promotions for household renewable energy installations; encourage the use of domestic equipment rather than imported ones; and consider offering installment plans to make renewable energy more affordable.

Role of regulators and coordination: Representation of all sectors in regulatory bodies, the importance of public hearings and access to information for transparency, coordinated efforts among government agencies and regulators, and certification and standards for safety control in renewable energy production and distribution.

Pricing and market mechanisms: Setting competitive market prices to encourage renewable energy production, adjusting prices according to the market situation and energy supply, avoiding excessively high prices to prevent unnecessary installations, and considering cost-effectiveness and price stability when purchasing electricity from the public.

Integration of renewable energy into the grid: Addressing transmission system limitations in supporting renewable energy production, planning for improved transmission and distribution systems in line with increased household production, cost considerations, and fairness in supporting households with batteries for storing excess power, balancing the overall energy system, and preventing market price fluctuations.

Revision of laws and regulations: Reviewing and amending laws and regulations to support the renewable energy industry, enhancing ease of operation and reducing complexity in obtaining licenses, increasing the production ceiling for renewable energy projects, and involving academics and the public sector in law revisions.

Budget allocation and research: Consideration of using a portion of the budget for research and development in energy regulatory affairs, determining the appropriate percentage for R&D activities assessment of the need for a separate budget for

research and development, utilizing existing budgets from other government agencies and the private sector for research and development.

Revision of the Power Development Plan (PDP): Clear specification of the government's desired energy sources and types; improved regulations for purchasing electricity from the government, especially in P2P transactions. setting standards for safety control and price stability in promoting renewable energy, ensuring a thorough and stable electricity supply for renewable energy integration.

Public acceptance and community engagement: Understanding and addressing resistance from local communities to renewable power plants, providing knowledge and information to the public regarding the benefits and drawbacks of renewable energy projects, encouraging public participation, and gathering opinions through public hearings promoting understanding and engagement through education and awareness programs.

5. Discussion

A single license can address several challenges and streamline the process of obtaining licenses for electricity generation from renewable energy sources. With the adoption of this technology, researchers expect that it can solve some of the problems identified in the interviews:

Simplification and efficiency: Currently, the licensing process involves multiple regulatory agencies, which can be time-consuming and burdensome for applicants. With a single license, all necessary approvals and permits would be consolidated into one document, reducing complexity and streamlining the process, as shown in **Figure 2**. This simplification would save time and effort for both applicants and regulatory agencies.

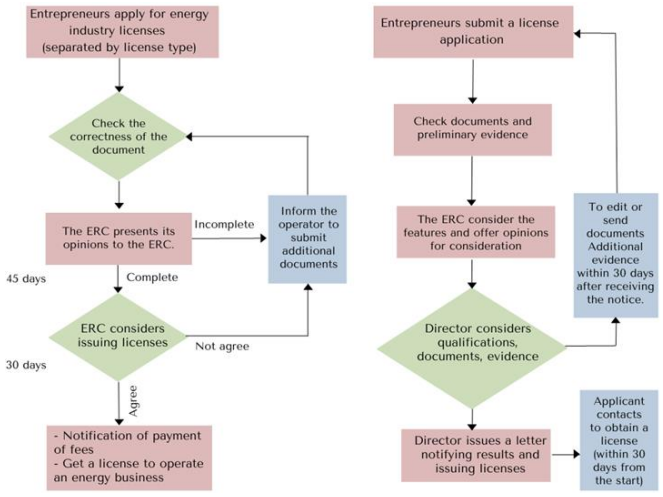

Figure 2. Diagram of license and permission (traditional and single license).

Clarity and transparency: The involvement of multiple agencies in the licensing process can lead to overlapping procedures and confusion. A single license would provide greater clarity regarding the requirements and procedures for obtaining permission to generate renewable energy. It would ensure consistency in decision-

making and promote transparency, allowing applicants to understand the exact criteria they need to meet.

Time and cost savings: Currently, delays in renewable energy auctions and the involvement of multiple agencies can lead to longer processing times and increased costs. A one-stop service would centralize the licensing process, enabling applicants to submit all necessary documents and applications to a single authority. This would eliminate the need for applicants to navigate through various agencies, reduce bureaucracy, and expedite the license approval process. Consequently, it would save time and minimize costs for both applicants and the government.

Enhanced coordination: A one-stop service would facilitate better coordination among regulatory agencies involved in the licensing process. It would create a centralized authority responsible for managing and overseeing the entire process, ensuring effective communication and collaboration among different stakeholders. This coordinated approach would help avoid delays, resolve conflicts, and streamline decision-making.

Improved access to information: A one-stop service could provide a dedicated digital platform or information center where applicants can access all the necessary guidelines, forms, and updates related to the licensing process. This centralized repository of information would enhance transparency and make it easier for applicants to understand the requirements, submit applications, and track the progress of their licenses.

6. Conclusion

Improvements to the licensing process are suggested by the interviewees. These include expanding renewable energy coverage to encompass all types of renewable sources, promoting the use of various renewable energy options, enhancing coordination among regulatory agencies, and raising the exemption ceilings for licenses to accommodate technological advancements and increased power generation capacity. Additionally, the government should increase incentives for households to adopt renewable energy and establish centralized regulatory agencies to streamline the licensing process.

Regarding the sale of electricity generated from renewable energy, experts advocate for separate approaches based on production capacity. Larger-scale production facilities (10 MW or more) can connect to the existing Electricity Generating Authority of Thailand (EGAT) system, while limitations exist for small-scale production, particularly in certain areas and households, due to concerns about infrastructure support and increased costs. Suggestions are made for better supporting systems such as peer-to-peer (P2P) sales and implementing control mechanisms for direct household sales to the grid to ensure market price regulation and maintain the stability of the overall energy system. The government is preparing to supply electricity from renewable energy sources and has guidelines for battery installation based on the Power Development Plan (PDP). However, limited support has been provided to the household sector. Recommendations include expanding support for renewable energy in households and preparing batteries to support the sale of

electricity to the government during overload situations and address electricity shortages, emphasizing effective demand-supply management.

Author contributions: Conceptualization, SA and PU; methodology, SA and PU; validation, PU; formal analysis, SA; investigation, SA and PU; resources, PU; data collection, SA; writing—original draft preparation, SA; writing—review and editing, PU; visualization, PU; supervision, PU. All authors have read and agreed to the published version of the manuscript.

Acknowledgments: The authors are grateful to the Rattanakosin College for Sustainable Energy and Environment (RCSEE), Rajamangala University of Technology Rattanakosin for their support of this research.

Conflict of interest: The authors declare no conflict of interest.

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