

GREENING THE POWER: RENEWABLE ENERGY DEVELOPMENT IN THAILAND

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1. INTRODUCTION

Thailand is at a crossroads on its development path: will it follow the high-carbon growth path, or embark on a green low-carbon growth path? To date, energy intensity in Thailand is higher than in developed countries, and the share of non-fossil fuels in Thailand's power mix is relatively low compared with international standards (Table 1). Energy use per capita in Thailand has grown substantially over four decades, from about 360 kilograms of oil

equivalent in 1971 to 1,790 kg of oil equivalent in 2011. These aspects demonstrate that there is huge potential to improve energy efficiency, reduce energy intensity and increase the share of renewable energy in the country's energy mix. The window of opportunity is closing fast, however, so urgent action is required. Delaying action now would lock the country into a situation in which it will remain highly reliant on fossil fuels into the future.

Table 1: Comparisons of energy-related indicators for Thailand and selected countries

Key energy indicators	Thailand's performance	Performance in selected developed countries
Energy intensity (unit: megajoules (MJ) per US dollar)	17.8	Denmark: 2.8 Sweden: 4.7 Japan: 5.2 United States: 7.2 Republic of Korea: 9.3
Share of non-fossil fuel in power mix (unit: percentage)	8.1%	Sweden: 97.4% Japan: 40.8% Republic of Korea: 38.3% United States: 28.7% Denmark: 22.0%

Source: World Bank and NESDB (2011).

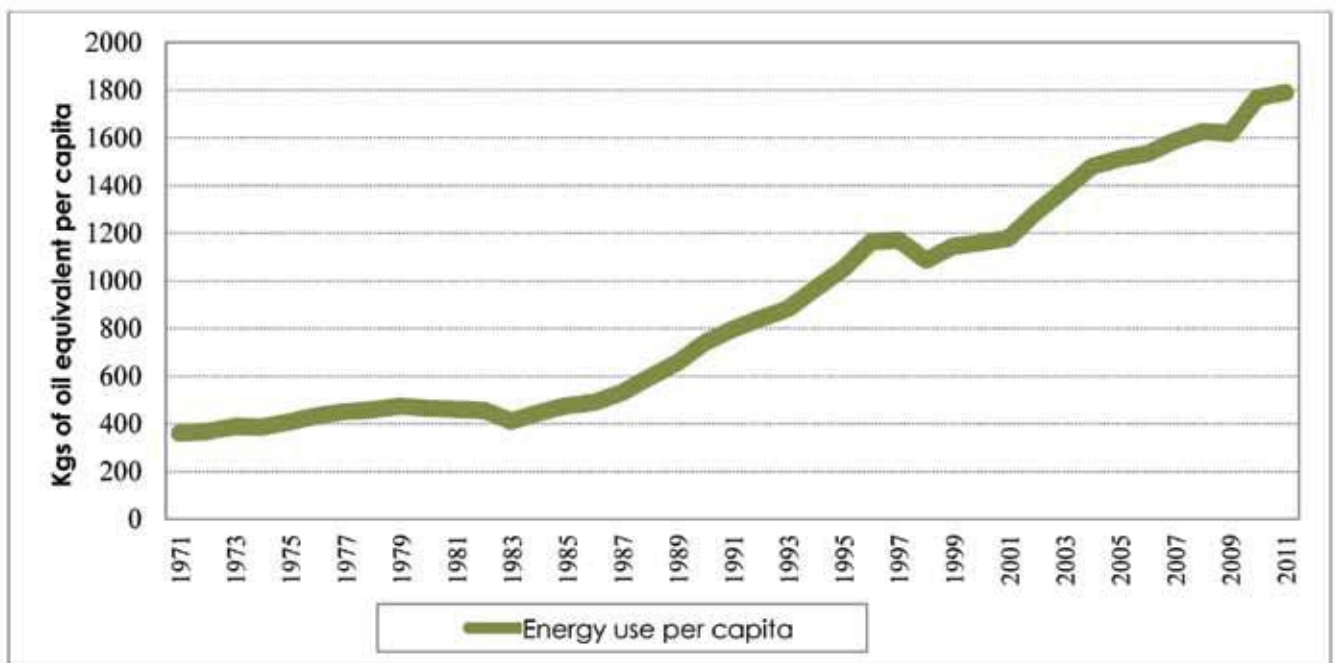
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In an effort to turn this challenge into an opportunity, one of the central themes of the eleventh National Economic and Social Development Plan is to promote Thailand's transition to a low-carbon society that fosters green growth. The overall objective of such a transition is to sustain economic growth without compromising the environment and natural resources. The shift toward a low-carbon society under the eleventh Plan puts emphasis on three areas: sustainable management of natural resources and the environment; achieving food and energy security; and fostering a creative economy and its enabling factors to promote economic structural adjustment.

With regard to the issue of energy security, Thailand has relied heavily on fossil fuels, particularly oil, in its primary energy supply in order to meet its energy needs. At the same time, Thailand

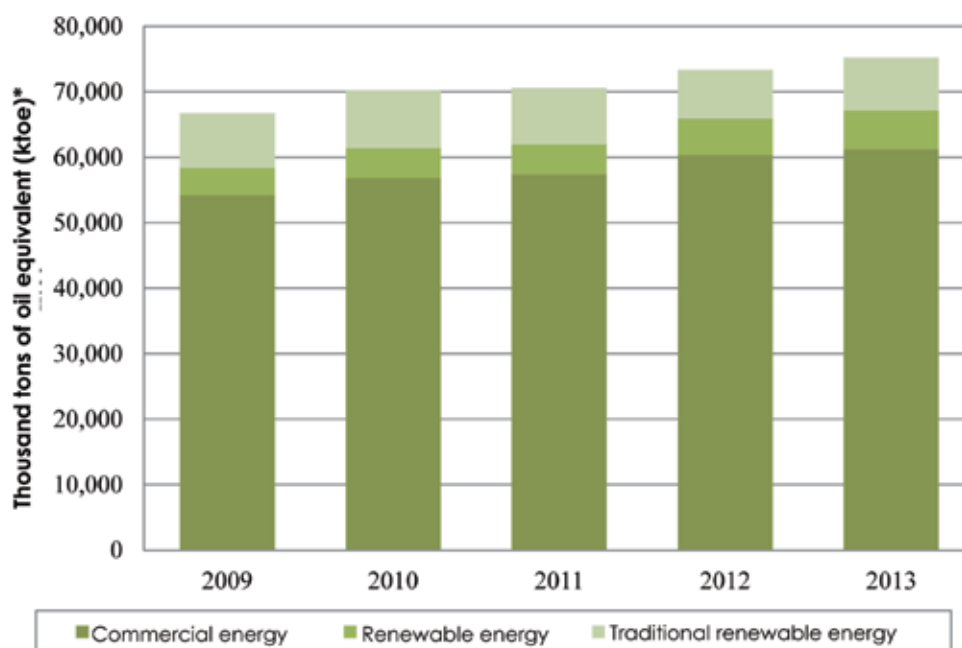
also is highly dependent on energy imports; each year, Thailand imports more than 60 percent of its primary commercial energy needs. Substantial development of renewable energy could help substitute for fossil fuels, such as oil and natural gas, and reduce the country's reliance on energy imports while assisting Thailand to achieve energy security (Figure 2). According to Figure 2, as of 2013, the shares of renewable energy and traditional renewable energy to final energy consumption were 7.9 percent 10.7 percent, respectively. Moreover, development of renewable energy can also help in diversifying the fuel procurement risk for electricity-generation purposes (DEDE, 2012). The focus of this paper is on the promotion of renewable energy in Thailand, one of the national strategies toward achieving low-carbon growth.

Figure 1: Energy use per capita



Source: World Development Indicators, various years.

Figure 2: Final energy consumption by type



* 1 ktoe = 41,868,000 Mj.

Source: Department of Alternative Energy Development and Efficiency, "Thailand Energy Statistics 2013."

During the period 2009-2013, renewable energy consumption in Thailand increased continuously, from 7 percent in 2009 to about 11 percent in 2013 (Table 2). As shown in that table, in the case of Thailand, domestic renewable energy consumption takes three forms, namely electricity, heat and

biofuels. In considering the composition of renewable energy sources in the generation of electricity, biomass has the highest share (77%), followed by biogas (10%), solar (7%), small hydro (2%), wind (2%), and municipal solid waste (MSW) (2%), respectively.

Table 2: Share of renewable energy consumption to final energy consumption

	Quantity (ktoe)				
	2009	2010	2011	2012	2013
Electricity	594	807	988	1,138	1,341
Solar	4.1	5.4	8.1	42.0	92.0
Wind	0.3	0.3	0.4	12.0	26.0
Small hydro	14.6	15.4	18.6	27.0	28.0
Biomass	543.5	739.0	894.8	951.0	1,039.0
Biogas	31.1	46.3	65.7	87.0	131.0
MSW	0.1	0.2	0.4	19.0	25.0
Heat	3,177	3,763	4,529	4,886	5,279
Solar	0.9	1.8	2.0	3.5	4.5
Biomass	2,987.0	3,449.0	4,123.0	4,346.0	4,694.0
Biogas	188.0	311.0	402.0	458.0	495.0
MSW	1.0	1.1	1.7	78.2	85.0
Biofuels	865	875	984	1,270	1,612
Ethanol	340	334	323	430	707
Biodiesel	525	541	661	840	905
Total renewable energy consumption	4,636	5,445	6,501	7,294	8,232
Final energy consumption	66,698	70,248	70,562	73,316	75,214
Share of renewable energy to final energy consumption	7.0	7.8	9.2	9.9	10.9

Source: Department of Alternative Energy Development and Efficiency, "Thailand Alternative Energy Situation 2013."

What are the factors that drive expansion in renewable energy consumption in Thailand? The expansion of renewable energy consumption may be attributed to continue private sector investment in renewable energy projects. As of 2013, investment in renewable energy by the public and private sectors was worth more than 75.8 billion (75,822 million) baht (Figure 3). Among the different types of renewable energy projects, wind energy accounted for the highest share of total investment, followed by solar, biofuels, biomass, biogas, small hydro power and MSW. The authors believe that the government’s policies on renewable energy development have spurred the growth of investment in renewable energy projects.

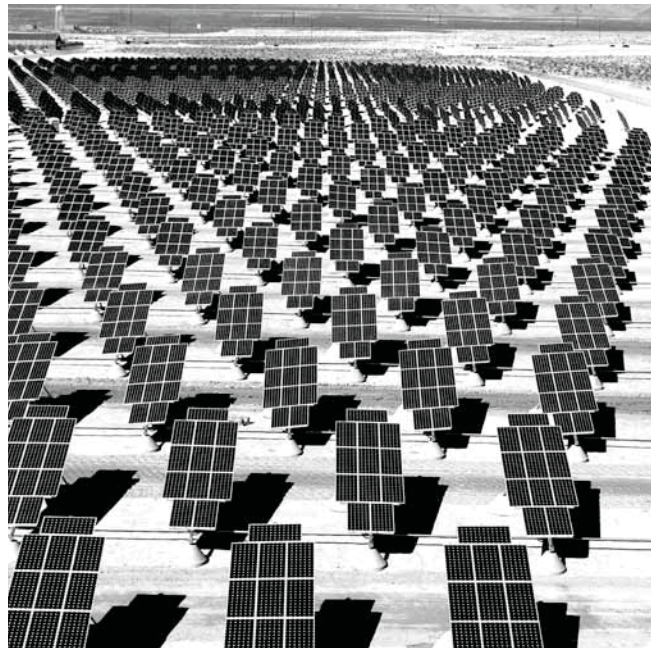
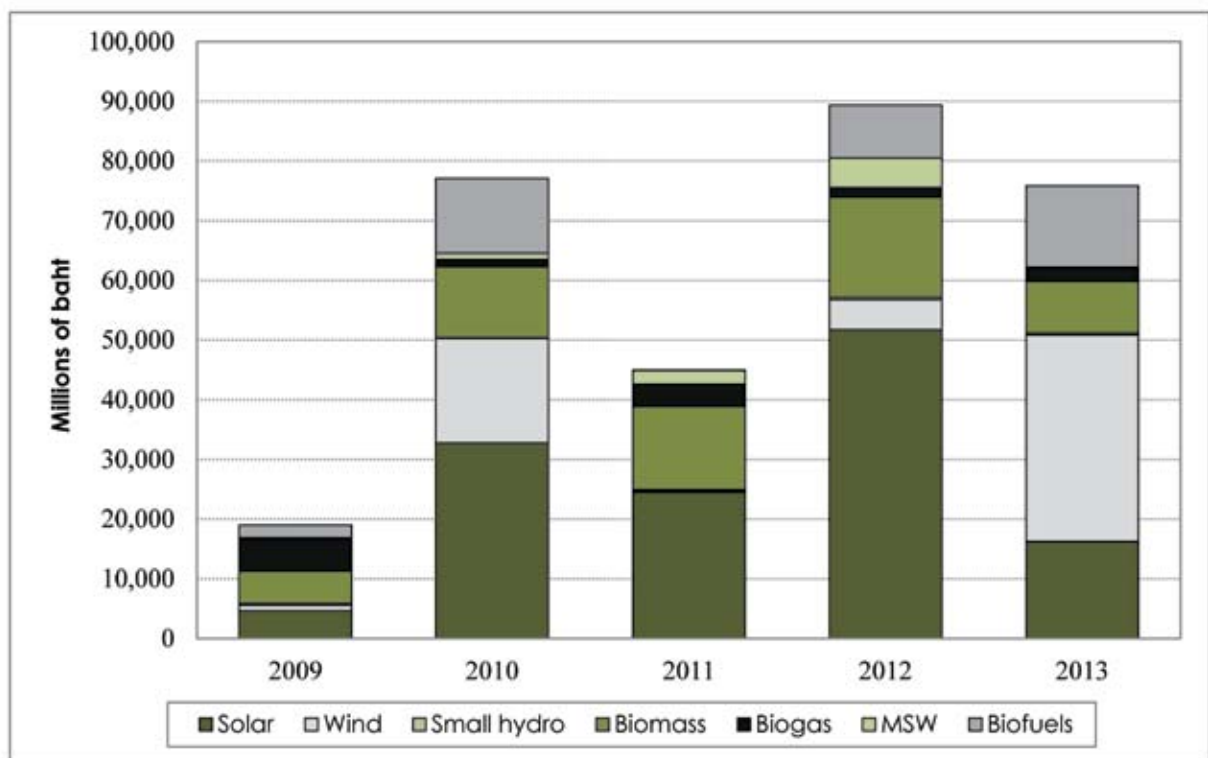


Figure 3: Public and private investment in renewable energy in Thailand



Source: Department of Alternative Energy Development and Efficiency, “Thailand Alternative Energy Situation 2013.”

1. A closer look at plans and policies to promote renewable energy development

Thai government agencies have put into place a number of plans and policies to stimulate the development of renewable energy technology and investment in renewable energy projects. The key plans related to renewable energy comprise the Alternative Energy Development Plan (AEDP) (2012-2021) and the Power Development Plan (PDP) (2010), as well as various renewable energy support mechanisms. The essence of these plans and mechanisms is briefly reviewed before the gaps in the policies are discussed and consideration is given to what steps should be taken to close those gaps.

Under the AEDP, the Thai government set the target to expand the share of renewable energy consumption in total final energy consumption to 25 percent during the period 2012-2021. In order to support the development of renewable energy as a potential substitute for fossil fuels and imported oil, a set of strategies and driving mechanisms were developed by the Ministry of Energy. Examples of these strategies comprise: adjusting the incentive measures to promote private sector investment in renewable energy; amending laws and regulations; improving infrastructure; promoting research and development; capacity-building and knowledge-sharing through public relations programs; and promoting collaboration by local communities nationwide in broadening the production and consumption of renewable energy (DEDE, 2012). Given the uniqueness of each type of renewable energy, separate driving mechanisms are necessary for the promotion of renewable energy. For instance, the driving mechanisms for solar energy include promotion of solar photovoltaic (PV) rooftops, and other small-scale solar energy projects at the household or community levels, while for biomass, the driving mechanisms under the AEDP include adjusting incentive measures, especially for the Distributed Green Generation project, at the community level, as well as providing financial supports to enhance the efficiency of old biomass power plants.



The Thai government developed the PDP to attain energy security and ensure the adequacy and reliability of the power supply. The strategies under this plan comprise: the promotion of power generation from renewable sources; fuel diversification in power generation; and curtailing the use of natural gas in electricity generation. With the government policy targeting a 25 percent increase in the share of renewable energy and alternative energy use over fossil fuels by 2021, the PDP stipulates that renewable energy power projects should be in line with the AEDP.

To promote growth of renewable energy according to the plans outlined above, a number of mechanisms were put in place by different government agencies, namely the Board of Investment, the Department of Alternative Energy Development and Efficiency, and the Energy Policy and Planning Office. The key mechanisms highlighted here include the renewable energy feed-in-tariff (FiT) scheme, revolving and Energy Service Company funds, and incentive measures to encourage investments in the renewable energy sector.

According to Tongsopit and Greacen (2013), the FiT scheme provides additional tariffs for power



generation, using renewable energy sources, from small power producers (SPPs) and very small power producers (VSPPs) to improve the commercial viability of renewable energy projects and provide SPPs and VSPPs with incentives. The duration of payment of these additional tariffs and the FiT rates vary by renewable energy technology. Under the revolving fund, budgets from the Energy Conservation Fund are allocated to investors in the form of loans via commercial banks in order to encourage investment in renewable energy and energy efficiency projects. The Energy Service Company Fund mobilizes funds to co-invest with private developers in renewable energy projects, thereby sharing risks with private developers. The Energy for Environment Foundation and the Energy Conservation Foundation of Thailand are the two fund managers under the Energy Service Company Fund.

With regard to the financial measures to promote renewable energy technology, the Board of Investment grants the privilege of importing machinery duty free and an eight-year corporate income tax holiday to enterprises related to renewable energy, energy conservation and the production of environmentally friendly products. In addition, in-

vestors in the renewable energy business are granted a 50 percent reduction in corporate income tax on net profits for five years after the tax holiday comes to an end, as well as a deduction (not exceeding 25 percent of investment capital) from net profits of the costs associated with facility installation and construction, in addition to a reduction for depreciation. Last but not least, investors in renewable energy projects can apply for investment grants from the Ministry of Energy, the maximum amount of which is about 10-30 percent of a project's value for biogas, 25-100 percent for MSW, and 30 percent for solar hot water, with the maximum cap being 50 million baht per project.

2. Gaps in renewable energy policies

As previously discussed, renewable energy development in Thailand has great potential in substituting for such fossil fuels as oil and natural gas, thereby reducing its dependency on energy imports and helping the country to diversify fuel procurement risks for electricity-generation purposes. Although renewable energy will undoubtedly play an increasingly important role as a result of the continued support granted by the government through its policies, programs and schemes, firms in the renewable energy business in Thailand have flagged some concerns over current renewable energy policies. It is argued in this paper that, to expedite the growth of the renewable energy business in Thailand, policies need to be adjusted and some further actions taken immediately.

The authors begin first by discussing the perceptions of Thai businesses toward the structure of FiT schemes. According to the representatives of firms in the biomass, biogas and MSW businesses, the additional tariffs provided under that scheme have failed to incentivize firms in those categories to expand their investment in renewable energy technology. Given that firms in renewable energy businesses require the use of feedstock and transportation before power can be generated and the price of feedstock and cost of fuel fluctuate over time, by fixing the FiT at a constant rate for the

duration of the scheme, firms are highly exposed as their costs of production could increase substantially. Business representatives have thus urged the government to take action by modifying the FiT scheme, making the additional tariffs become conditional on the technology and type of renewable energy involved. Provided that the additional tariff has a very high impact on firms' planning and decision-making processes, it is important that the government engage the business representatives in the process of designing a revised scheme and assuring the businesses that the government will pursue policy stability.

Second, Thai renewable energy companies have raised some concerns over the availability of skilled personnel, which could be attributed to a shortage of skilled labor and the problem of skill mismatches. Currently, firms in the renewable energy business, the Federation of Thai Industries and some government agencies are pursuing skill-development programs for workers in renewable energy businesses. On the part of employers, skill needs are initially identified; subsequently in-house training courses are designed to upgrade the skills of staff. Rojvithee (2010) also shared this view. The Federation of Thai Industries offers training courses on clean technology. At the local or community level, the non-governmental organization Border Green Energy Team has proactively provided hands-on training on renewable energy technology in ethnic minority areas on both sides of the border with Myanmar. The key objective of the training programs is to demonstrate how these renewable energy technologies, such as solar, micro-hydro, and biogas, are integral in improving the livelihoods of local communities. Despite the existence of these various training and skill-enhancement programs, the business representatives expressed concern about the issue of skill mismatches. To deal with the twin issues of skilled-labor shortages and skill mismatches, renewable energy firms and vocational schools, technical colleges and universities should work together closely by jointly designing the curriculum for such educational institutions to ensure

a constant supply of personnel who are equipped with the skills and knowledge needed for dealing with cutting-edge renewable energy technologies.

Despite the provision of financial support through revolving funds, grants and soft loans via the Energy Service Company Fund, a number of renewable energy business representatives have still encountered difficulties in financing complete renewable energy projects. To raise additional financing, some firms have resorted to obtaining loans from commercial banks; while some have been successful in securing such finance, others have been refused credit. From the point of view of loan officers, financing new and unfamiliar types of renewable energy technology could create considerable uncertainty. It is important therefore that all relevant information about the parameters of renewable energy projects be disseminated to loan officers in order to provide them with helpful guidance and substantially reduce the review and analysis time for assessing renewable energy projects. The loan officers at commercial banks should also keep themselves abreast of new renewable energy technologies so that they would have a clearer understanding of the nature of the renewable energy business.

One important obstacle facing investors in renewable energy projects is the requirement of having to obtain various permits before project development can be authorized. That process takes time as it requires project developers to contact the different government agencies responsible. To overcome this barrier, it is proposed that a one-stop shop be established to facilitate the renewable energy permit application process. Such a one-stop shop could serve as a focal point for investors with an interest in developing and investing in renewable energy projects. The key roles played by such a one-stop shop include provision of necessary information and supports required by developers in navigating through the complicated licensing and permit authorization processes. Based on the United Kingdom's experience, a one-stop shop was set up to overcome some barriers faced in the process

of renewable energy development. That country's Office for Renewable Energy Deployment acts as a one-stop shop and information portal on renewable energy, providing all the necessary information, advice and contacts which individuals and investors would need.¹ In the case of Thailand, the Federation of Thai Industries has made an attempt along this line by offering a one-stop service for renewable energy project developers in order to facilitate their efforts in preparing all the documentation required, such as licenses and permit authorizations.

Last but not least, renewable energy business representatives have some concerns about inadequate transmission lines. Not having the necessary infrastructure for supporting the transmission of the power generated from renewable energy sources could hinder the development of new renewable energy technology and deter investment in renewable energy projects. Remedial action should be taken by the government and its relevant agencies to coordinate with the developers of renewable energy projects and the power producers that want to sell electricity generated from renewable sources to the national grid.

3. What next?

As the Thai economy grows, energy demand will grow along with it. Renewable energy is critical to Thailand in terms of achieving energy independence, energy security, and an environmentally friendly society. Thailand should grasp such an opportunity and make the best use of the country's geographical advantages. Thailand is rich in sources of renewable energy, including sunlight and water, and has some moderate wind spots.² Moreover, as an agricultural country, there are a number of crops, such as cassava and sugarcane, that can be used to generate energy. Municipal solid wastes can also be used to generate electricity. Thailand's success in



promoting renewable energy hinges crucially upon the country having access to appropriate technological expertise, the government providing the right incentives and improving the relative competitiveness of renewable energy in the energy market. It is high time for Thailand to really push forward toward more sustainable energy use in the future. To achieve this lofty goal, it is important that the government play a supporting role by using different policy tools to promote renewable energy development in Thailand.

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¹ See https://energypedia.info/wiki/Permits_-_Wind_Energy.

² See <http://www.nationmultimedia.com/opinion/Time-to-promote-alternative-energy-for-future-secu-30184000.html>.