Legal Issues of Renewable Energy in the Asia Region

Recent Development in a Post-Fukushima and Post-Kyoto Protocol Era

Edited by

Anton Ming-Zhi Gao
Chien Te Fan

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List of Editors and Contributors

Dr. Chien-Te Fan, Professor and Director in the Institute of Law for Science and Technology at the National Tsing Hua University (Taiwan). He specializes in energy and environmental law, areas of biotechnology, ethic related issues and competition law. He is also an experienced scholar involving in UNFCCC negotiation process since 2001 in Marrakesh. Moreover, as a speaker, he was also invited to join the side event several timesheld in the COPs.

Dr. Anton Ming-Zhi Gao, Assistant Professor in the Institute of Law for Science and Technology at the National Tsing Hua University (Taiwan). Main activities are concentrated in the areas of energy law and policy, European environmental law, renewable energy, feed in tariff, strategic environmental assessment, etc.

Dr. Madjedi Hasan, Director of PT Pranata Energi Nusantara Consulting, an energy development and specific engineering process consultant. He is also a fellow charter arbitrator in Indonesia National Arbitration Institute. He holds Master of Petroleum Engineering degree, and Master and Doctor in Business Law, and has more than 50 years of experiences in Indonesia's petroleum and geothermal power projects.

Shi Jingli, Professor of Energy Research Institute and CNREC, graduated from Tsinghua University and North China Institute of Electric Power with bachelor and master degrees, and since 1995, she has engaged in the economic assessment and policy research in the field of renewable energy, especially electricity pricing policy and involved in drafting a number of important national policy documents.

Yuan Jingting, China National Renewable Energy Center researcher of CNREC, graduated from Tsinghua University of Management Science and Engineering with master. She has engaged in wind power policy research and RE policy research.

Dr. Popi Konidari is the Head of the Climate Change Policy Unit of the Energy Policy and Development Centre (KEPA) of the National and Kapodistrian University of Athens. She has an MSc in environmental physics and an MSc in electronic automatisms. She is currently working as a senior researcher at KEPA on climate change policy

issues (emission trading schemes, evaluation criteria for climate change policy instruments, policy interactions, AMS method, development of mitigation/adaptation policy portfolios, Kyoto mechanisms). She is the scientific secretariat of the bi-lingual scientific journal 'Euro- Asian Journal of Sustainable Energy Policy Development Policy'.

Dr. Taehwa Lee, a Research Professor of the Institute for Legal Studies at Yonsei University. She received her Ph.D. in Urban Affairs and Public Policy from University of Delaware, USA. Her research interests are environmental & energy policy and political economy of Climate Change regime in relation to global trade and investment regimes.

Dr. Ken'ichi Matsumoto is an Assistant Professor at the School of Environmental Science, The University of Shiga Prefecture. He received his Ph.D. in Policy Studies from Kwansei Gakuin University in 2007. He specializes in environmental/energy policy and economics.

Dr. Kanako Morita is a Project Assistant Professor at Graduate School of Media and Governance, Keio University. She received her Ph.D. in Value and Decision Science from Tokyo Institute of Technology in 2010. She specializes in environmental policy and governance, including environmental financing.

Dr. Deok-Young Park is a Professor of International Economic Law at Yonsei University. He finished Ph.D coursework in Edinburgh University and received his Ph.D. in law from Yonsei University. He specializes in International Dispute Settlement, Trade and Environment and Trade Related Intellectual Properties.

Darryl Smith, Independent consultant in the electricity and telecommunications industries in Australia. He holds a degree in Electrical Engineering and has spent 12 years with a state-owned generation company in both field operations and head office functions. He has also assisted a private company to enter the Smart Grid market.

Nucharee Nuchkoom Smith is a Doctoral student, School of Law, at the University of Western Sydney, Australia specializing in International Trade Law. She holds Masters Degrees from Universities in both Thailand and Australia. She was previously a Legal Officer to the House of Representatives Standing Committee of Foreign Affairs of the Thai Parliament.

Dr. Robert Smith holds a Ph.D. in Civil Engineering and is currently a Team Leader for an Asian Development Bank funded asset management advisory project for Karnataka Public Works, Ports and Inland Water Transport Department India in India. He specializes in the field of infrastructure asset management and financial sustainability of asset management practices.

Manuel Solis is a Teaching Fellow at the Law School, University of Adelaide. He specializes in energy, climate change, environment and sustainable development law. He has extensive work experience on institutional capacity, regulatory and policy framework development projects involving government, business, non-government

organizations, and multilateral and bilateral development agencies such as the UNDP, World Bank and the Australian Agency for International Development, among others.

Antonius Wahjosoedibjo, President Director of PT Pranata Energi Nusantara Consulting. He is a graduate electrical engineer and has spent almost 40 years of his career with Chevron's affiliated companies in Indonesia and the United States. He is a member of the Board of Advisors and/or the Board of Experts of the Indonesian Electrical Power Society (MKI), the Indonesian Renewable Energy Society (METI), the Indonesian Geothermal Association (API), and the Indonesian Power Engineers Association (IATKI).

Dr. Tao Ye, Researcher of ERI and CNREC, graduated from Department of Automation of Northwestern Polytechnical University with Ph.D. in 2009. He has engaged in renewable energy modeling research and involved in research of RE Power Quota System of China.

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Preface

Technology innovation and industrial revolution bring more convenient life and better life quality for the human society as a whole. However, Water Can Overturn the Boat as Well as Float It. Technology also leads to additional negative effects on human society, such as world war, environmental pollution, climate change, etc. The dominant approach in tackling the challenges resulted from technologies remains relying on technological solutions. We can find the application of this approach in dealing with environmental challenges, energy crisis, and climate change challenges, etc. For instance, even though the renewable electricity technology, such as hydropower, has been developed quite early, the recent prosperity of renewable electricity is highly related to the challenges of energy crisis in 1970s and the concerns of climate change since the discussion of United Nations Framework Convention on Climate Change (UNFCCC) in 1990s. How to use the law as a tool to facilitate the deployment the *renewable electricity* (RE) technology and possibly save the planet inspire the motivation of this book project.

Just like the problem in deployment of most novel technology, RE technology is relatively expensive and less cost-effective, compared to other traditional energy technology. The different forms of subsidies are usually provided to facility the RE technology from laboratory research and development (R&D), to demonstration and/or large-scale market application. According to study of the International Energy Agency (IEA)'s recommendation, multi-types of market deployment policy instrument are available to RE, including: bidding system, tax credit, obligation, tradable certificate, capital grants, government purchase, net metering, etc.[1] These subsidy scheme has played a role in contributing to the prosperity of RE in most of the countries since the 1970s.

Three 'key' market deployment schemes can also be identified from the experience in decades, they include: feed in tariff (FIT), tendering scheme, and RPS (renewable portfolio standard or Renewable obligation (RO)). The related literature

1. IEA renewable scheme http://s3.amazonaws.com/zanran_storage/www.iea.org/ContentPages/9895294.pdf at p. 85.

and research on policy, legal design and practical implementation, and the effectiveness of these three regimes has been widely studied and discussed in the western world.[2] Yet, relatively few 'legal' literature focuses on the development in Asia region, which also provide the rationale for this book.

Asian countries are definitely late comers in terms of RE technology, policy and legal regimes. Thus, similar to borrowing civil code, constitutional law, and criminal code from the western world to improve their existing traditional legal regime, in order to develop appropriate legal regime to promote RE, each country also tries to borrow the successful story of the western world in developing RE, such as: the successful FIT model from Germany, RPS model from the US. Therefore, to see how the RE legal regime in Asian region was affected by that of the western world, the idea of this book is to use the detailed design of FIT, RPS, tendering scheme, created by several important international level projects or database[3] as a parameter, and see how the main RE promotion regime in each country transforms these detailed design into their own RE legal regime. This book can be seen as a 'voluntary' research by extending European wide Res Legal in the jurisdiction of Asian region. Hopefully, it could contribute to further conversation or a EU-Asia forum between these two important RE regions.

The most recent influential factor to global RE policy and law is definitely the Fukushima accident of March 2011. This Fukushima issue has influenced the European RE policy and law, such as Germany, not to mention its huge impact on the Japan's neighbouring countries and itself. With a response to the energy or climate change policy after Fukushima accident, RE legal regime are also subject to likely reform. Two directions of reform can be identified: on the one hand, there is a group of countries, such as china and Thailand, seeking to modify their existing scheme by *fine-tuning* existing RE promotion scheme to reflect the need of post-Fukushima or climate change issues (Part II of this book). On the other hand, a group of countries adopting aggressive approach by changing track to other RE promotion scheme, such as: Japan and South Korea. (Part I of this book) After investigating into the detailed of country RE regime, this book will provide a cross-country-analysis on the RE legal regime in East Asia and Black Sea and Caspian Sea regions (Part III of this book).

After such an deep investigation into the RE legal regime and its implementation and the latest data on RE development, the preliminary finding is that even though most of the countries would 'formally' declare and emphasize the effects of successful RE promotion model of western society on their RE policy and legal regime, the 'substantial' legal context and detailed RE legal regime could tell another story. This 'promotion scheme' gap also impedes the development of RE in their jurisdiction. For

2. *See e.g.*, Toby Couture et al., A Policymaker's Guide to Feed-in Tariff Policy Design, available at: http://www.energy.eu/publications/A_Policymakers_Guide_to_Feed-in_Tariffs_NREL.pdf; Clarisse Fräss-Ehrfeld, Renewable Energy Sources: A Chance to Combat Climate Change (2009); Miguel Mendonça et al., eds, Feed-in Tariffs: Accelerating the Deployment of Renewable Energy (2007); Res-Legal, Legal Sources on Renewable Energy, http://www.res-legal.eu/.
3. Res-Legal http://www.res-legal.eu/; IEA/IRENA, Renewable Energy Database. http://www.iea.org/policiesandmeasures/renewableenergy/.

instance, both the FIT in South Korea, China and Taiwan declares to be affected and inspired by the Germany FIT model. Yet, in terms of detailed design of cost-recovery issues, these countries either bizarrely introduced the idea of polluter-pays principle (comparing to the use-pays principle of Germany) or not fully passing all of the RE cost on the final consumers (comparing to the fully passing all of the cost of Germany model). Also, in terms of grid connection rules, most of Asian countries do not integrate the very comprehensive grid connection rules and expansion rules or favorable grid connection cost sharing scheme of Germany model. This kind of non-fully transposition of Germany model due to taking too much the political compromise or unknown of the essence of Germany Model may cast shadow on the further RE deployment.

What is the main reason behind this? It may be related to the dilemma between two different RE promotion directions. In Germany and many western countries, the RE policy and law focus on both the development of local RE *industry* and *real deployment*. The assumption is these two directions can complete each other. However, in most of Asian and manufacturing sector based countries, such as: Japan, South Korea, Taiwan, China, Thailand, etc., they are facing a dilemma in striking an appropriate balance between these two directions. Perhaps the real application may benefit the RE industry, but it may also have a potential impact on the electricity price and quality and reliability and hamper the existing manufacturing industry or energy intensive industry. Thus, there is always a critical debate between the supporter of the creation of new green jobs and preservation of existing and already-available grey jobs! Furthermore, for the less industrialized and developing countries, like Philippine and Indonesia, the lack of domestic RE industry may worsen their willingness in promoting RE's real deployment. Perhaps, there is similarity in selling *democracy* and RE *promotion scheme* from western world or international organizations, such as: IRENA. Certain Asian countries may be too poor to afford such luxury products of *democracy* and RE *technology*. However, the editors have to admit that there is also a situation of chicken first or egg first issue here!

Will this situation change in the near future? The Fukushima accident sent a *mix* message! For certain countries, particularly for those geologically located closer to the accident site and relatively richer countries, such as Japan, South Korea and Taiwan, the RE policy and legal regime become more active in promoting real deployment of RE. Yet, For other countries, particularly for those geologically located more far away from the accident site and relatively poor countries, like Indonesia and Philippines, the future of RE is blight. In general, it remains to be seen whether the further climate change talk and the worsening situation in Fukushima site would give some impetus to the political willingness or public supports to further RE development in the Asian region.

Finally, the publication of this book has to acknowledge the multi-funding support from National Science Council, National Tsing Hua University and Ministry of Education (NSC 102-3113-P-007-002-; NSC101-2410-H-007-024-MY2; Excellent Centre Project of NTHU and Ministry of Education: A Study on Low-carbon Policy, Economics, Law at a Post-Kyoto New Situation: Focus on Carbon Market and the Legal Roadmap for Low Carbon Technology Development.) Also, the draft of the articles have been presented and discussed in the International Joint Conference on Changing

Energy Law and Policy in Asia Region on 17–18 October 2013 at the venue of 9F, TSMC Building, the campus of National Tsing Hua University, Taiwan. The conference funding is provided by Center for Energy and Environmental Research, Research Center for Humanities and Social Science, Bioethics and Law Center, and Office of Research and Development of NTHU, and National Science council. The efforts of working team are very much appreciated as well. Hopefully, in the short term, the conference can become an important annual energy law research and publication platform in the Asian region; in the long term, this conference can be expanded to become an Euro-Asia energy law forum.

Anton Ming-Zhi GAO
Chien Te, FAN
At 8F., TSMC Building, Institute of Law for Science & Technology,
National Tsing Hua University, Taiwan

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CHAPTER 6

FIT and Its Implementation in Thailand: Legal Measures, Implementation, Challenges, and Solutions

Robert Brian Smith, Nucharee Nuchkoom Smith & Darryl Robert Smith

§6.01 INTRODUCTION

[A] Overview[1]

Thailand operates a large scale integrated power system. It has a well-developed electricity network and a high per capita energy demand in comparison with its South East Asian neighbors. Malaysia is the only neighbor with a higher degree of electrification and per capita demand.[2] According to the latest World Bank data available (2010), Thailand has a population of around 68 million with 99.3% having access to electricity consuming 2,243 kWh per capita per annum.[3] The electricity consumption in 2010 was 149.32 billion kWh[4] with total energy consumption being 117.43 Mtoe.[5,6]

1. One of the main challenges is preparing this paper has been the dearth of available literature in either Thai or English. Government websites provide limited information and that which is available is often a PowerPoint presentation given by senior staff at an international symposium. It is the hope of the authors that this paper assists the reader in better understanding the significant advances being made by the Kingdom of Thailand in the utilization of renewable energy and reduction of greenhouse emissions.
2. Lutz Weischer, Pioneering Renewable Energy Options: Thailand takes up the Challenge, in Inside Stories on Climate Compatible Development, Climate & Development Knowledge Network, May 2013, 1.
3. World Bank, World Development Indicators, World Database, http:/databank.worldbank.org/ (accessed 21 Jun. 2013).
4. Sopitsuda Tongsopit & Chris Greacen, Thailand's Renewable Energy Policy: FiTs and Opportunities for International Support, (Berkeley: University of California, Berkeley Renewable and Appropriate Energy Laboratory, 31 May 2012), www.palangthai.org/docs/ThailandFiTtongsopit&greacen.pdf (accessed 1 May 2013).

Thailand proclaimed the Energy Conservation and Promotion Act in 1992. Electricity in Thailand has been a regulated energy source since 1993.[7] As a result Thailand has, over the years, initiated a number of energy conservation measures including measures for energy conservation in buildings[8] and factories.[9]

The Thailand electricity sector operates under an 'Enhanced Single Buyer' model.[10] The state-owned Electricity Generating Authority of Thailand (EGAT) operates under its own Act[11] and is the own/operator of around 48% of electric generation capacity, with the remaining capacity generally supplied by private operators.[12] Transmission and distribution are split and operated by different government utilities.

EGAT operates the high voltage transmission network whilst the distribution network is operated by the Metropolitan Electricity Authority (MEA) in the Bangkok market and by the Provincial Electricity Authority (PEA) in the provinces, with the Bangkok market constituting 30% of the total market.[13]

In addition to the generation capacity of EGAT of about 48%, Independent Power Producers (IPP) supply around 38% of the power requirements, Small Power Producers (SPP) produce 7%, with imports supplying around 7%; imported power is mainly produced at hydroelectric plants in Laos, with some power also purchased from Malaysia.[14]

Weischer has identified a number of challenges facing the Thai power sector, namely:

- Thailand is dependent on natural gas for over 70% of its electricity generation and imports almost 25% of its natural gas supply.
- Whilst there is disagreement over future electricity demand predictions, there is general agreement that additional capacity will be required in coming years.
- Thailand recognizes that it needs to reduce pollution and greenhouse gas emissions and has set an objective of being a low carbon society.
- As the power sector was responsible for 42% of greenhouse gas emissions in 2011, it will have to make a significant contribution to the reduction effort.[15]

It should be noted that the levels of greenhouse gas emissions as reported would have been much far higher if coal was used as the predominant fuel source with its higher greenhouse gas emissions.

5. International Energy Agency, World Energy Statistics, 2012, 56, http://www.iea.org/publications/freepublications/publication/kwes.pdf (accessed 29 Jun. 2013).
6. Tonne of oil equivalent (toe) is the International Energy Agency/OECD unit of energy and is the amount of energy released by burning one tonne of oil.
7. The Royal Decree on Regulated Energy, BE 2536 (1993).
8. The Royal Decree on Designated Building, BE 2538 (1993).
9. The Royal Decree on Designated Factory, BE 2540 (1995).
10. Tongsopit & Greacen, *supra* n. 4, at 2.
11. Electricity Generating Authority of Thailand Act, BE 2511 (2006).
12. Pallapa Ruangrong, Energy and Regulatory Overview of Thailand, PowerPoint Presentation to Asia Pacific Energy Regulators' Forum (APER), 1 Aug. 2012, Washington D.C, USA.
13. *Ibid*.
14. *Ibid*.
15. Weischer, *supra* n. 2, at 1-4.

As a result, Thailand decided to develop a series of Development Plans culminating in the 10-year Alternative Energy Development Plan (2012–2021), which set a target of 25% of total energy consumption by 2021 to be provided by renewable energy, with 10% of electricity consumption being met by renewable energy.[16]

Unlike other markets where renewable energy is being promoted primarily on energy security grounds, Thailand's growth is commercially motivated and is driven by financial incentives and supporting policies.[17] In other words, Thailand sees a commercial advantage in producing green energy from alternative energy sources. Not only does it reduce reliance on potentially costly imports, it fosters economic growth by development of new industries and the production of renewable energy sources from agricultural products.

Of the six most developed ASEAN countries, Thailand is seen as having the highest renewable energy targets, the highest level of financial incentives as well as the highest level of non-financial incentives.[18] However, Thailand, like Malaysia, is perceived to have medium importance issues/risks associated with the administrative/regulatory environment; market related issues, technical and infrastructure issues; and finally in the area of socio-cultural issues.[19]

The energy industry in Thailand operates under a mix of legislative and administrative requirements. It is primarily governed by the Energy Industry Act BE 2550 (2007).

[B] Energy Industry Act BE 2550 (2007)

The Energy Industry Act BE 2550 (2007) was enacted to apply to the operation of the energy industry throughout the Kingdom (section 4) and its application is restricted to electricity and natural gas (section 5).[20]

The objectives of the Act as set out in section 7 include procuring sufficient energy to adequately meet the demand in a sustainable manner; promoting competition in the energy industry; promoting economical, efficient and worthwhile use of energy whilst considering the environmental impacts, and increasing the economic competitive edge of the country; encouraging increased participation of the local communities and developing education programs to promote energy conservation; and promoting the use of renewable energy.[21]

16. DEDE AEDP 2012-2021 presented on DEDE Website, http://www.dede.go.th/dede/images/stories/aedp25.pdf in Thai version. English by Dr. Renu Cheokul (April 2012) (Accessed 1 May 2013).
17. Ipsos Business Consulting, Meeting the Energy Challenge in South East Asia: A Paper on Renewable Energy, July 2012. http://w3.ipsos.com/businessconsulting/insights/whitepaper/docs/A_Paper_on_Renewable_Energy_in_South_East_Asia_July_2012.pdf (accessed 26 Jun. 2013).
18. Samantha Ölz and Milou Beerepoot, Deploying Renewable in South East Asia: Trends and Potentials. (Paris: International Energy Agency, 2010), 136.
19. *Ibid*, 137.
20. Energy Industry Act 2550 (2007) (Unofficial Translation), www.eppo.go.th/admin/cab/law/energy_industry_act-2007.pdf, (accessed 23 Jun. 2013).
21. *Ibid*.

The definition of the term 'renewable energy' refers to section 4 of the National Energy Policy Council Act BE 2535 (1992) and includes 'energy obtained from wood, firewood, paddy husk, bagasse, biomass, hydropower, solar power, geothermal power, wind power, and waves and tides' whilst non-renewable energy includes 'energy obtained from coal, oil shale, tar sands, crude oil, oil, natural gas, and nuclear power'.[22]

Under the Energy Act, the role of the government, as set out in section 8, is to establish fundamental policy guidelines on the energy industry. The role of the government is to procure sufficient energy to adequately meet the demand in a sustainable manner; promoting competition in the energy industry; promoting economical, efficient, and worthwhile use of energy whilst considering the environmental impacts, and increasing the economic competitive edge of the country; encouraging increased participation of the local communities and developing education programs to promote energy conservation.[23]

It might be noted that whilst renewable energy is included in section 7, it is not included in section 8. In addition, following a failed attempt at power industry privatization, this section states:

> The government will be responsible for electricity network system operation, electricity system operation and hydropower plants – with the Electricity Generating Authority of Thailand being the operator of the electricity transmission system, the Metropolitan Electricity Authority and the Provincial Electricity Authority being the operators of the electricity distribution systems – including retention of appropriate reasonable proportion of electricity generation capacity of state-owned electricity industry.[24]

Moreover, the Act sets out the authority and duties of the Minister of Energy in relation to his administration. The powers and duties of the Minister as set out in section 9 include:

- proposing to the Cabinet policy on energy industry structure;
- proposing to the National Energy Policy Council (NEPC), policies on energy procurement and diversification of fuel sources to ensure efficiency and security of electricity industry;
- considering the power development plan, the investment plan of electricity industry, the natural gas procurement plan and the energy network system expansion plan, for submission to the Cabinet for approval; and
- proposing the NEPC policy on the level of contributions to the Power Development Fund and on the utilization of those funds.[25]

22. National Energy Policy Council Act BE 2535 (1992) (Authorized Official Translation), http://www.thailawforum.com/database1/national-energy-act.html, (accessed 24 Jun. 2013).
23. Energy Industry Act 2550, *supra* n. 20.
24. *Ibid.*, s. 8 (5).
25. *Ibid.*, s. 9.

Because of the critical role of energy to the nation's economy an Energy Regulatory Commission (ERC) is established under Division 2 of the Act. The Commission's authorities and duties include:

- regulating energy industry operation;
- imposing measures to ensure security and reliability of electricity system;
- providing opinions on the power development plan, the investment plan of the electricity industry, the natural gas procurement plan, and the energy network system expansion plan for submission to the Minister;
- issuing regulations and announcements and supervising customer service standards and quality;
- issuing regulations or announcements on criteria, method and conditions of the contributions given to the Power Development Fund and the utilization of those funds;
- promote and support study and research on energy industry operation;
- promoting energy awareness;
- promoting economical and efficient use of energy, renewable energy and energy that has minimal impact on environment, with due consideration of efficiency of electricity industry operation and balance of natural resources.[26]

It is the ERC, then, which has prime responsibility for implementing renewable energy policies in the electricity and natural gas industries.

The ERC is then subject to a number of regulations as described in Commentaries of Laws related to Energy Industry, ERC, Volume 1.[27]

This is the legislative framework under which the Feed-in Tariff Scheme operates.

Thailand currently operates an Adder Program and is in the process of moving to a (FIT) Feed-in Tariff Scheme.[28]

§6.02 FEED-IN TARIFF SCHEME

[A] The Detailed Design of the Feed-In Tariff Scheme

[1] Technology Eligibility

The renewal energy program is administered by the three government electricity utilities (EGAT, MEA, PEA) that purchase electricity generated from renewal energy from:

26. *Ibid.*, s. 9.
27. *Ibid.*, Division 2.
28. Tongsopit & Greacen, *supra* n. 4, at 3.

- SPP for generators sized greater than 10 MW and less than 90 MW and operating under the SPP regulations.[29]
- Very Small Power Producers (VSPP) for generators sized less than or equal to 10 MW and operating under the VSPP regulations.[30]

It is considered that the classification should be based on 'registered' capacity and not generating capacity. This, for instance, allows a wind station rated at 60 kW to be registered as 50 kW, on the basis that it is limited to generating 50 kW. But since the fans are bigger, it would potentially generate a better dollar return for the operator given the different tariffs for SPP and VSPP producers. This also allows excess generation capacity to be used by the operator for its own needs. In addition there appears to be no impediment under the Act for an operator to store excess energy and feed it back into the grid later to meet its supply obligations at the FiT rate.

The types of renewable energy eligible for inclusion in the schemes are biomass, biogas from all sources; waste both municipal solid waste (MSW) and non-toxic industrial waste; wind; hydro (mini- and micro-hydro); and solar.[31]

In addition, VSPPs are able to produce power using photovoltaics, sea or ocean waves, and geothermal energy.[32]

On 28 June 2010, the NEPC resolved not to accept any further solar energy projects until there was a review of policy and guidelines (section 13.3).[33] At the same meeting, the Commission agreed in principle to a proposal to introduce a Feed-in Tariff for solar projects that are installed on residential and commercial buildings (section 12.2).[34] The argument being that it will foster energy efficiency by promoting the installation of solar energy on residential and commercial roofs as it reduces the power loss in the system because it is produced and used at the point of installation and does not require a lot of space.[35] At the time of writing this paper in July 2013, the applications for solar projects were still on hold, with the details of the FiT for solar projects on residential and commercial buildings still not released.

29. Regulations for the Purchase of Power from Small Producers (1998) revised August 2001, http://cdm.unfccc.int/Projects/DB/DNV-CUK1174895235.33/ReviewInitialComments/Y1IBB4M1S9LY4C9M8ZAM318OS7N3QK (accessed 27 Jun. 2013).
30. Regulations for the Purchase of Power from Very Small Power Producers (for the Generation Using Renewable Energy) (Unofficial Translation), http://www.eppo.go.th/power/vspp-eng/Regulations%20-VSPP%20Renew-10%20MW-eng.pdf (accessed 24 Jun. 2013).
31. Pallapa Ruangrong, Thailand's Power Tariff Structure, PowerPoint Presentation to Regional Energy Regulatory Associations of Emerging Markets, Roundtable Discussion III: Affordability and Customer Issues, 8–9 Apr. 2013, Istanbul. Turkey.
32. Regulations for the Purchase of Power from Very Small Power, *supra* n. 30.
33. Resolution of the National Energy Policy Council. 2/2553 (No. 131.) on Monday, 28 June, 2553 (in Thai), http://www.eppo.go.th/nepc/kpc/kpc-131.htm (accessed 25 Jun. 2013).
34. *Ibid*.
35. *Ibid*.

On 8 February 2013 the NEPC approved the use of biogas from energy crops under the Community Enterprise green energy plants in the form of an Adder for projects that can produce up to 1 MW of power at a rate equivalent to USD 0.15 per unit for a period of 20 years; the plan being to encourage farmers grouped together as communities or cooperatives to grow energy crops.[36]

Provided all environmental clearances are obtained, there appears to be no impediment to the establishment of Community Enterprise green energy plants that provide local power that is used locally and is not purchased by the power utility.

[2] FiT Duration

The period of support from the FiT commences on the Commercial Operation Date (COD) and is 7 years for biomass, biogas, waste, and hydro; and 10 years for wind and solar.[37]

As noted above, biogas from energy crops under the Community Enterprise Green Energy plants are supported for a period of 20 years.[38]

[3] Tariff

[a] Tariff Schedule

The rate for feed-in tariffs in Thailand since 2007 is paid on top of the utilities' avoided costs and is called a Premium Feed-in Tariff or Adder.[39] In 2010, the government approved a plan to switch from a premium-price FiT payment to a fixed-price FiT.[40] Studies to determine the rates for each type of renewable energy are still being considered at the time of this paper. The current Adder rates are shown in Table 6.1. Contracts are in Thai baht and have been converted here for comparison purposes.

36. Resolution of the National Energy Policy Council. No. 1/2556 (No. 144.) (in Thai) http://www.eppo.go.th/nepc/kpc/kpc-144.htm (accessed 25 Jun. 2013).
37. Tongsopit & Greacen, *supra* note 4 at 8, and Ruangrong, *supra* n. 31.
38. Resolution of the National Energy Policy Council. No. 1/2556 *supra* n. 36.
39. Fixed Feed-in Tariff is the determination of a purchase rate for electricity generated from renewable energy sources at a certain constant level which is independent from the fluctuation of market price for electricity throughout the support duration. With a Premium Feed-in-Tariff. a premium or Adder is an additional rate on top of the market price for electricity. Therefore, the purchase price for electricity generated from renewable energy sources will fluctuate in line with the market price.
40. Pallapa Ruangrong, Thailand's Power Tariff Structure, PowerPoint Presentation to Regional Energy Regulatory Associations of Emerging Markets, Roundtable Discussion III: Affordability and Customer Issues, 8–9 Apr. 2013, Istanbul. Turkey.

Table 6.1 Thailand's Adder Rates (Exchange Rate USD 1 = THB 30)[41]

Type of Renewable Energy	*Former Adder 2009 ($/kWh)*	*Adder as of 2010 ($/kWh)*	*Additional for Diesel Substitution ($/kWh)*	*Additional for RE Generators in the Three Most Southern Provinces (S/kWh)*
Biomass				
Installed Capacity ≤ 1 MW	0.017	0.017	0.033	0.033
Installed Capacity > 1 MW	0.010	0.010	0.033	0.033
Biogas (All Sources)				
Installed Capacity ≤ 1 MW	0.017	0.017	0.033	0.033
Installed Capacity > 1 MW	0.010	0.010	0.033	0.033
Waste (MSW and Non-toxic Industrial Waste)				
Fertilizer/Landfill	0.083	0.083	0.033	0.033
Thermal Process	0.117	0.117	0.033	0.033
Wind				
Installed Capacity ≤ 50 kW	0.150	0.150	0.050	0.050
Installed Capacity > 50 kW	0.117	0.117	0.050	0.050
Hydro (Mini/Micro Hydro)				
50 kW < Installed Capacity < 200 kW	0.027	0.027	0.033	0.033
Installed Capacity ≤ 50 kW	0.050	0.050	0.033	0.033
Solar				
	0.267	0.267	0.217	0.050

The 2009 tariff was set by a Cabinet resolution of 24 March 2009 and was valid from that date.[42] As will be seen later in this paper, the tariff for solar energy generators was reduced in 2010. This was due to the reduction on capital costs due to delay in approved suppliers entering the supply chain as the prices of solar cells were falling significantly. Energy suppliers determined that their windfall profit would be greater the longer they waited.[43] Suppliers delaying generation projects had an improved financial outcome at a negative environmental outcome. The revised rate applied to projects that had not been accepted by the power utilities by that date. The 2010 rates

41. *Ibid*.
42. *Ibid*.
43. Energy Policy and Planning Office Annual Report BE 2554 (2010), 130.

apply at the date of this paper in July 2013. This outcome provides a very obvious example of the need for a regression pricing mechanism as is, indeed, proposed for Thailand.

Biogas from energy crops under the Community Enterprise Green Energy Plants in the form of Feed-in Tariff for projects that have the power to sell up to 1 MW is supported at a rate of USD 0.15 per unit for a period of 20 years.[44] It should be noted that this is saleable capacity. Additional generation capacity could be installed and not exported to the grid due to self-use or other consumption.

As was seen in Table 6.1, the current FiT is dependent on both energy type and location. An additional tariff is paid for power generation from the three southern provinces.

[b] Tariff Degression Mechanism

On 28 June 2010, the NEPC ordered a review of the renewable energy support program.[45] A Feed-in Tariff is proposed to replace the Adder, but as of July 2013 details are not available.

The only degression mechanism that has been used is the one-off decision to reduce the Adder for solar energy in 2010.

[c] Tariff Progression Mechanism

There is no tariff progression mechanism in place, although there is a recognition that the current Adder rates for some forms of renewable energy are inadequate to encourage development of that sector due to uncommercial pay back periods.

[4] Capacity Cap

[a] Soft Cap

The monthly capacity factor for a SPP must not be less than 0.51 but no more than 1.0 times the agreed Contract amount (MW), except when otherwise requested by the utility. The utility may, however, require the SPP to be able to generate and supply power in accordance with power utility's requirement (but not exceeding the quantity indicated in the contract).

The amount of net power each VSPP dispatches into the distribution system must not exceed 10 MW at any time. The Distribution Utility will, however, consider the

44. Resolution of the National Energy Policy Council. No. 1/2556 *supra* n. 36.
45. Wattanapong Kiatrat, Financial Mechanism for Renewable Energy PowerPoint Presentation to Seminar of Financial Schemes for Renewable Energy Projects, 27 Nov. 2012, Landmark Hotel Bangkok.

capability and security of the distribution system in determining the level of net power acceptable on a case-by-case basis.[46]

[b] Hard Cap

At the moment the cap is controlled by a 'Cap and Deadline' mechanism.[47] The first phase of the Adder program had a deadline at the end of 2008. When the scheme was revised in March 2009, no deadline was imposed but the NEPC imposed a broad guideline that new project approval would be subject to acceptable cumulative effects on pass-through costs to consumers.[48] Unfortunately, there is no guidance as to when the pass-through cost becomes unacceptable with the utility companies being aware of this eventual ceiling but having no guidance as to when they must stop accepting further applications.[49] This results in the utilities using their own discretion in accepting or rejecting applications.[50]

[5] Loading Hours (Resources Quality Cap)

[a] Small Power Producers

SPPs are required to meet the conditions set out in the SPP Regulations.[51]

SPPs must generate and supply electricity to the Power Utility during the system peak months of March, April, May, June, September and October, and the total hours of electricity production supplied to the utility must be no less than 7,008 hours per year.[52]

For SPPs using waste or residues from agricultural processes or from industrial productions, processes or products derived from these processes, garbage and dendro-thermal sources (such as tree plantations), the annual hours must be not less than 4,672 hours per year.[53] Generation and sales must include the period of March, April, May, and June.[54]

As noted above utility may require the SPP to be able to generate and supply power in accordance with the utilities requirement (but not exceeding the quantity indicated in the contract).[55]

46. Regulations for the Purchase of Power from Very Small Power Producers, *supra* n. 30.
47. Tongsopit & Greacen, *supra* n. 4, at 8.
48. *Ibid*.
49. *Ibid*.
50. *Ibid*.
51. Regulations for the Purchase of Power from Small Producers, *supra* n. 25.
52. *Ibid*.
53. *Ibid*.
54. *Ibid*.
55. *Ibid*.

The quality of electricity generated must be in accordance with the Regulations for the Synchronization of Generators to the System of the particular power utility to ensure the security of the electricity network.[56]

Shut-down for planned maintenance is only allowed to take place during the off-peak months of the system which include the months of January, February, July, August, November, and December and must not exceed 840 hours or 35 days in a 12-month cycle.[57]

In the case of an emergency, the total shut-down time for maintenance during the peak demand period (18.30–21.30 hours) of the peak months should not exceed 30 hours for a 12-month cycle.[58]

These regulations are designed to ensure that planned outages are minimized, and that the forced outage rate is as low as possible.

[b] Very Small Power Producers

Very Small Power Producers are required to meet the conditions set out in the VSPP Regulations.[59]

Unlike in the case of SPP, there is no requirement to supply a minimum amount of power nor is there a requirement to provide power at peak times.

The quality of electricity generated must be in accordance with the Regulations for the Synchronization of Generators to the System of the particular power utility.[60]

[6] Cost Sharing and Recovery

SPPs are responsible for the cost of system interconnection, which includes the costs of the transmission and distribution system of the SPPs and the Public Utility, the meters, the protective devices, and other expenses arising from undertaking purchasing electricity from the SPPs and are also responsible for cost of equipment inspections.[61] They are also required to install protective devices to prevent damage to the system as prescribed in the Regulations Governing Synchronization of Generators and each party is responsible for damage caused by faulty electrical devices or other causes that arise from its own system.[62] The conditions for VSPPs are similar.[63]

56. *Ibid*.
57. *Ibid*.
58. *Ibid*.
59. Regulations for the Purchase of Power from Very Small Power Producers, *supra* n. 30.
60. Distribution Utilities' Regulations for Synchronization of Generators with Net Output under 10 MW to the Distribution Utility System, http://www.eppo.go.th/power/vspp-eng/VSPP%20Synchronization%2010%20MW-eng.pdf (accessed 28 Jun. 2013).
61. Regulations for the Purchase of Power from Small Producers, *supra* n. 29, s. G.
62. *Ibid*., s. N.
63. Regulations for the Purchase of Power from Very Small Power Producers, *supra* n. 30, s. G.

In addition, there are a number of financial incentives available for renewable energy projects. These include a Revolving Fund that provides a loan at a maximum interest rate of 4% for a period of up to seven years and the Energy Conservation Promotion Fund (ESCO), which provides venture capital.[64] Finally Thailand's Board of Investment (BOI) provides tax incentives for renewable energy.[65] These include a tax holiday of up to eight years, exemption or reduction of import duties on solar equipment, and corporate income tax reduction.[66]

[7] Grid Connection, Usage, and Expansion Rules

Initially, the VSPP program utilities were required to grant projects permission to interconnect to the power network if they met basic safety and power quality standards, provided there was sufficient substation capacity.[67] This all changed in 2010 when more rigorous requirements were implemented.

Prior to the EGAT, the PEA and the MEA entering into a power purchase agreement, the Managing Committee on Power Generation from Renewable Energy Promotion, established by NEPC, has nominated the criteria that must be assessed prior to making a decision on power purchase.[68] The project must have a connecting point which can be easily identified and be well equipped with a certain Scheduled Commercial Operation Date (SCOD). The transmission and/or distribution system must be able to support the electricity purchase according to the SCOD. The project must be technically approved by EGAT and have an appropriate and clear operating plan. [This power is granted to EGAT under section 18, Chapter 2 of the EGAT Act BE 2511]. If biogas or garbage is to be used, the fuel source must be identified. Tyres and other forms of polluting garbage are not to be used. If wind energy is to be used, there must be a declaration that the proponent has rights to use the land.[69]

Once these initial criteria are met another five criteria must be met before a power purchase contract can be signed.[70] The project must have received a confirmation for power purchase from the relevant Electricity Authority and must be technically approved by EGAT. The project must have gone through an examination to ensure its readiness in relation to legal possession of the required land, obtained access to the required capital, possession of the required technology and possess or being in the process of requiring all licenses required by law. The proponent must agree to take responsibility for any system development costs.

64. Kuravat[illegible]*ra* n. 45.
65. *Ibid*.
66. *Ibid*.
67. Tongsopit & Greacen, *supra* n. 4 at 14.
68. Energy Policy and Planning Office Annual Report BE 2554 (2010),125.
69. *Ibid*.
70. *Ibid*.

Finally, the project must have an Environmental Impact Assessment report as required by law and receive approval from the authorized government agency.[71] This is particularity pertinent in Thailand where there are a number of cases of forced resettlements where villages claim that they were not consulted before they were ordered to move. In September 2003, Government officials ordered the residents of four small mountain villages in Lampung Province to move.[72] Villagers claim they were not consulted before the decision to move them was made and were told only that its purpose was to improve their 'development' and when a number of them protested, officials are reported to have told them that they would be punished if they did not move, and if they did, they were reportedly promised comparable land upon resettlement, as well as citizenship cards.[73]

In January 2011, the three power authorities were instructed to issue a notification prohibiting a change in or amendment to Power Purchase Agreements with renewable energy projects applying for a change in the quantity of the power energy offered for sale, relocation of the power plant, or a change in the production technology.[74] EGAT issued such notification dated 14 March 2011.[75]

[B] The Results of the FiT Implementation

As can be seen in Table 6.2, the quantity of electricity offered by private power producers in areas such as solar energy and biomass far exceeded the target in the 15-year Renewable Energy Development Plan (REDP). The actual volume of electricity distributed into the grid was far below the agreed volume in the Power Purchase Agreements.

This is particularly in the case of solar energy, where projects were clearly delayed to take advantage of the marked drop in the price of solar panels.

Kuravat has identified a number of difficulties with the current scheme operating in Thailand and the rationale behind the proposed Feed-in Tariff regime:

- The current Adder is dependent on the global energy pricing; the Feed-in Tariff is not.
- The Adder poses a potential long-term risk to both the developer and the end user; with a revised Feed-in Tariff the risk to all parties is less.

71. *Ibid.*, 126.
72. Asia Pacific Forum of National Human Rights Institutions / Brookings Institution – SAIS Project on Internal Displacement National Human Rights Commissions and Internally Displaced Persons Project Visit of a Three Member Team to Thailand, 9–13 Aug. 2004, http://www.oknation.net/blog/print.php?id=169463 (accessed 29 Jun. 2013).
73. *Ibid.*
74. Chandler & Thong-EK, Wind Energy Development in Thailand, 22 Mar. 2011, http://www.ctlo.com/mediacenter/2011-03-29-MemoreWindEnergyDevelopmentinThailand_(330445_3).pdf (accessed 28 Jun. 2013).
75. *Ibid.*

- The Adder is an up-front subsidy to the developer by providing faster payback whilst imposing an extra burden on the consumer.
- The Adder with its up-front subsidies may promote inefficient technologies whilst the Feed-in Tariff promotes the use of high energy efficient technology.
- The Feed-in Tariff leads to less uncertainty as to the amount of renewable energy that will be available to assist in power development planning.[76]

The significance of K[illegible]avat's analysis is shown by the vast difference between what was offered in the P[illegible]r Purchase Agreements and that which was actually produced. This makes reliable energy planning almost impossible. The potential solar energy producers were no doubt waiting to enhance their windfall profits by building their infrastructure as late as possible to take advantage of the continuing decline in the price of solar panels whilst the Adder rate remained unchanged.

76. K[illegible]avat, *supra* n. 45.

Table 6.2 Purchased Electricity from Renewable Energy in November 2011 Compared with Target Volume in the REDP[77]

Fuel Type	*Target Volume REDP (MW)*	*With Actual Transmission to the Grid*		*With PPA Already Signed (Waiting for COD)*		*With Acceptance to Purchase (Pending PPA Signing)*		*Under Consideration for Purchase*	
		Number of Projects	*Volume Offered (MW)*	*Number of Projects*	*Volume Offered (MW*	*Number of Projects*	*Volume Offered (MW*	*Number of Projects*	*Volume Offered (MW*
Solar Energy	500	85	65.14	438	2.048.33	65	368.41	183	1,116.85
Biogas	120	70	106.93	33	60.28	26	41.92	47	76.00
Biomass	3,700	84	704.72	220	1,564.15	50	406.69	36	264.43
Municipal Solid Waste (MSW)	160	12	37.33	21	108.67	6	7.28	8	78.45
Hydro Energy	324	6	13.28	5	6.10	2	0.305	1	0.03
Wind Energy	800	3	0.38	17	308.28	24	356.25	17	488.49
Total	5,604	260	027.78	734	4,095.81	173	1,180.85	292	2,024.25

77. After Energy Policy and Planning Office Annual Report BE 2554 (2010), 130.

§6.03 RECENT DISCUSSION OVER FIT AT A POST-FUKUSHIMA AND POST-KYOTO PROTOCOL ERA

[A] Evaluation

As previously noted, Thailand is a net energy importer. The data from 2011 showing that more than 60% of primary commercial energy demand is derived from imports with oil imports a[illegible]unning at 80% and increasing as domestic production is incapable of increasing to m[illegible]et demand. Around 70% of power generation is dependent on natural gas.

Thailand reacted quickly to the Fukushima Daiichi Nuclear Power Plant disaster as they sensed that this disaster lessened public acceptance and trust in the Thailand's nuclear power project development. On 3 May 2011, Cabinet endorsed a recommendation by the Ministry of Energy to defer SCOD of the first unit of Thailand's first nuclear power project 2020–2023 to allow for detailed review of the Project.[78] The review is to consider safety measures, legislation framework for development and operation of nuclear projects, stakeholder opinion and future involvement in the process as well as development of additional supporting plans and resulted in preparation and expeditious acceptance of the Power Development Plan 2010 Revision 2.[79]

The Power Development Plan also took cognizance of the government policy that is targeting on increasing the share of renewable energy and alternative energy uses by 25% instead of fossil fuels within the next 10 years, by initiating new projects of renewable energy development.[80] At the end of 2030, total capacity of renewable energy is to proposed to be 20,546.3 MW (or 29% of total generating capacity in the power system) consisting of domestic renewable energy of 13,688 MW and renewable energy from neighboring countries of 6,858 MW.[81]

Whilst these figures provide generating capacity they do not reflect the actual supply of power to the network as they are dependent on availability as some sources provide power continuously whilst others like solar power have restricted availability (e.g., about 1,000 hours per year). When calculated on the basis of kWh the anticipated power consumption in 2030 is expected to be 300,380 kWh with renewable energy providing 19,732 kWh (6.57%), hydro providing 6.941 kWh (2.31%) and nuclear 16,046 kWh (5.34%).[82] The proposed sources of renewable energy are solar power, wind power, hydro power (both domestic and from neighboring countries), biomass, biogas, and MSW.[83]

78. Ministry of Energy, Energy Policy and Planning Office, *Summary of Thailand Power Development Plan 2012 – 2030.* (PDP2010 Revision 3), 2012, 1, http://www.eppo.go.th/power/PDP2010-r3/PDP2010-Rev3-Cab19Jun2012-E.pdf accessed 19 Jun. 2013.
79. *Ibid*.
80. *Ibid*.
81. *Ibid*.
82. Ruangrong, *supra* n. 12.
83. Ministry of Energy, *supra* n. 78, at 1.

In 2010 the NEPC established the Managing Committee on Power Generation from Renewable Energy Promotion.[84] This has resulted in more stringent policies and has centralized all decisions regarding SPP and VSPP renewable energy projects under the Managing Committee, which has also taken on responsibility for policy design (the purview of the Energy Planning and Policy Office (EPPO)) regulation (the purview of the ERC).[85] Clearly, this is an issue that must be addressed, so that duplication of effort is avoided, and a clear and transparent approval process is established.

Weischer has identified a number of factors to explain why Thailand was able to take up the challenge of renewable energy:

- First, the renewable energy policies were aligned with broader political considerations beyond environmental considerations. In essence they encouraged private participation in the sector yet were small enough not to seem to be threatening the government owned utilities.
- Civil society played a crucial role in the design of the VSPP and the Adder. As there was very limited expertise within the Thai electricity sector, civil society organizations such as Palang Thai[86] brought in overseas exerts on renewable energy and regulatory frameworks that have worked in other countries.
- Thai programs started small and grew over time, essentially providing pilot schemes that showed both regulators and the wider community that the program would work.[87]

The Alternative Energy Development Plan 2012–2021 has also acknowledged the impact of global warming due to greenhouse gases.[88] Although Thailand has not agreed to enforcement, at the moment the Plan acknowledges that Thailand should conduct the renewable energy development and promotion as a measure to reduce the release of greenhouse gases as 'this would be an initial point to step into the Low Carbon Society and be exemplary for the world society to cite Thailand as the country with strong intent in using renewable energy'.[89]

[B] Challenges

The Alternative Energy Development Plan 2012–2021 has identified new energy resource types for power generation. There are, however, a number of challenges that must be met.[90]

The target for geothermal energy is planned to increase from 350 kW to 1 MW over the period. The identified issues include the lack of domestic geothermal sources with high heating value and the reliance on overseas technologies. They have also

84. Tongsopit & Greacen, *supra* n. 4 at 14.
85. *Ibid*.
86. www.palangthai.org/.
87. Weischer, *supra* n. 2 at 4–5.
88. DEDE AEDP 2012-2021 *supra* n. 16.
89. *Ibid*.
90. *Ibid*.

identified the need for community education on the production of electricity using geothermal energy.[91] This recommendation is no doubt partly due to the poor history of consultation with affected communities and their subsequent resettlement in northern Thailand, as outlined earlier. Northern Thailand is the potential source of geothermal energy.

The proposed roadmap involves the development of a map of potential geothermal sources and the identification of appropriate technologies.[92] The preferred option is to adopt technology that utilizes geothermal energy at the prevailing lower temperatures likely to be encountered in Thailand. Following initial studies, it is proposed to evaluate the cost effectiveness of the technology for the geothermal source and its geography. In addition, they propose to assess the impacts on community, environment, and public health from energy production before proceeding.

Another energy target is power generation from wave and tidal current that is not utilized at present but has a target of 2 MW.[93] The major impediment is the lack of data and an assessment on wave and tidal energy potentials. The proposed roadmap requires an acceleration of studies to assess the potential tidal and wave energy sources and appropriate technologies for power generation. The primary sites identified in the Plan are Sarasin Bridge at Phuket on the western coast of peninsular Thailand and the island areas surrounding areas of Koh Samui on the east of the peninsular east. Once the site has been identified it is necessary to undertake a capably assessment of the development potential and readiness preparation to develop a pilot project.

Whether or not Thailand can reach this target is questionable. Worldwide, only tidal barrages, exploiting tidal rise and fall, are a mature technology, and can face environmental controversy; tidal/ocean currents and wave power are still at the demonstration stage whilst temperature and salinity gradient technologies remain at the research and development stage.[94]

One of the sites identified in the plan, namely Sarasin Bridge is known by the authors, and any project at this site will have significant environmental and social impacts, particularly on the fishing industry and potentially on fragile mangrove areas. The other locations are near tourist islands and if not carefully managed could also have significant impacts.

Finally, the plan includes the use of hydrogen energy and energy storage system.[95] The Plan has identified a number of major problems and barriers including both a low priority given to domestic research and development and a lack continuous of budget support. As a result, energy development will be dependent on overseas technology. There is no current measure to provide incentives in the development and utilization of hydrogen as either an energy source or as an energy storage system. The roadmap includes studying appropriate raw material sources of hydrogen production in Thailand; research and development technologies for domestic production, storage,

91. *Ibid*.
92. *Ibid*.
93. *Ibid*.
94. International Energy Agency, Renewable Energy Medium-Term Market Report 2012, 149.
95. *Ibid*.

and related devices; research and development of high efficiency low cost hydrogen energy processes; and research and development of technologies for the use of hydrogen application in energy storage systems.

There is also a need to ensure that there is a balanced renewable energy portfolio so as to achieve the positive development impacts in terms of job creation and avoided imports.[96]

A number of administrative challenges have still to be overcome. Renewable Energy planning needs to be integrated into the overall energy planning process. At the moment there are a number of plans such as the Power Development Plan 2010–2030 and the Alternative Energy Development Plan 2012–2021. There also appears to be duplication in the activities between the various agencies within the Ministry of Energy. At the moment many of the processes within these agencies lack transparency.

There is also a need for Thailand to find a way to manage the costs of its incentives without making what was formerly a simple support scheme unpredictable.[97]

[C] Solutions

The World Economic Forum has undertaken a recent study of the energy industry in Thailand and recommended A New Energy Architecture.[98] The first recommendation was that there is a need to build in flexibility to the 10-year Alternative Energy Development Plan to take account of the rapid changes that are taking place in the renewable energy sector.[99] They considered that Small Power Providers (SPPs) and Very Small Power Providers (VSPPs), should be more closely regulated and alternative financing support mechanisms such as the reverse auction Feed-in Tariff as used in India, should be considered for new energy technologies.[100]

Interconnection to the grid must be smooth as grid integration of a large share of intermittent renewable energy sources calls for: a sound policy and regulatory framework that provides interconnection standards and financial incentives to the grid companies; coordinated generation-transmission planning; and technology solutions such as smart grids, energy storage, pump storage and grid-friendly wind turbines with better power factor control and grid fault management capability to reduce disturbances to the grid.[101]

As Thailand has committed to building nuclear power, the report recommends that there should be a focus on capacity-building to lay the foundations of the nuclear sector with a focus on all areas of the nuclear energy supply chain.[102]

96. Weischer, *supra* n. 2, at 7.
97. *Ibid.*, 4–5.
98. World Economic Forum New Energy Architecture: Thailand, October 2012, http://www.weforum.org/reports/new-energy-architecture-thailand (accessed 30 Jun. 2013).
99. *Ibid*. 34.
100. *Ibid*. 36.
101. *Ibid*. 38.
102. *Ibid*. 44.

Finally, the report recommends the need to foster understanding about energy issues targets have to be translated into a language that consumers understand.[103] Demonstrate and [illegible] model change through pilot programs that bring local benefits.[104]

It is clear th[illegible] well as the essentially technical solutions as recommended by the World Economic Forum Report, there is also a need for regulatory and administrative reform. Whilst the Ministry of Energy is the regulatory authority, there are a number of subordinate authorities that are involved in developing policy. This has led to fragmentation and the issue of development plans such as Power Development Plans and Alternative Energy Plans that do not appear to be completely coordinated. When unforeseen issues arise, additional administrative hurdles are introduced.[105] On the face of it, this is not necessarily an unreasonable response. The problem is that the approval process has become somewhat opaque, and the integrity of the process can be jeopardized.

After nearly three years, the detail of the new Feed-in Tariff regime has still not been released. Detailed information on the scheme should be made more readily available, and the information that is should include full technical papers and not just PowerPoint presentations, of which there are plenty.

As much of the current technology is imported Thailand requires a comprehensive program of institutional strengthening to develop the local renewable energy industries as well as the staff to operate both current and future facilities.

§6.04 CONCLUSION

Thailand has a rapidly developing renewable energy sector supported by Government policy which sees renewable energy as salable commodity.

It is not sufficient to have a vision. It must be supported by a transparent and efficient regulatory and administrative framework as well as have innovative financial mechanisms. Initial issues with the large initial response for the offer to the supply of solar energy followed by the slow response to actually build and operate the generating facilities have led to increase administrative imposts and a slow response to develop streamlines approval processes and release of details of the new Feed-in Tariff mechanism.

103. *Ibid.*, 58.
104. *Ibid.*, 60.
105. Tongsopit & Greacen, *supra* n. 4.

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