Administrative Restructuring and Renewable Energy: Best Legal Practices in Developing Economies

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Abstract

In the next decade, there will be an unprecedented, extensive investment in electrification in developing nations. Once installed, those generation facilities will remain in place for 40 years or longer. The Kyoto Clean Development Mechanism ("CDM") is primarily encouraging CDM projects outside the electric sector, which raises questions about their longevity of impact on CO_2 reduction. With extensive commitments now to the new Green Climate Fund, more attention to best legal practices for green electrification options becomes more important. Since the power industry is a regulated industry in every country, legislative and regulatory initiatives that incorporate "best practices" for encouraging renewable power have a profound impact on the energy sector of the economy in all countries.

This article focuses on what legal and regulatory structure for small renewable power has been successful in developing countries in Asia, the continent with the greatest electricity demand growth rate in the world. It highlights "best practices" and successful regulatory protocols to monetize the value of incentives that promote smaller renewable power in the Asian electric sector, as well as leveraging the CDM components of the Kyoto Protocol for developing countries internationally. It analyzes several countries' initiatives in detail and compares the regulatory structure, power purchase agreements, and tariff designs for independent renewable power development in these Asian countries. It highlights original program details, subsequent modifications, and key elements of the countries' power sector or renewable power initiatives which make that country an important model or initiative to note. This experience yields lessons applicable to all international political systems for a successful basic legal model for electric infrastructure to contribute to long-term electric sector goals and simultaneously mitigate climate change.

Key Words: Developing countries, Asia, Renewable energy, Best practices, Regulation

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I. Overview

In the next decade, there will be an unprecedented, massive investment in electrification in developing nations. Once installed, those power production facilities will remain in place for at least forty years and in many cases much longer.[1] According to Rajendra Pachauri, United Nations International Panel on Climate Change ("IPCC") Chairman, "What we do in the next two to three years will determine our future."[2]

More than one-third of CO_2 emissions are attributable to the electric power sector.[3] Ninety-eight percent of anthropogenic CO_2 emissions are from combustion of fossil fuels.[4] Fossil fuel generation results in 64 percent of total human-made atmospheric CO_2; the International Energy Agency forecasts that by 2030, world demand for energy will grow by 59 percent and fossil fuel sources will still (as of now) supply 82 percent of the total, while non-carbon renewable energy sources supply only 6 percent of the total.[5] At current rates of energy development, energy-related CO_2 emissions in 2050 would be 250 percent of their current levels under the existent pattern.[6]

The average annual growth rate in primary energy use in developing countries from 1990 to 2001 grew by 3.2 percent per year, compared to industrialized countries where growth over the same period was 1.5 percent annually.[7] The majority of energy and power generation expansion will occur just in Asia over the next decades.[8] The U.S. Department of Energy forecasts that

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1. National Energy Foundation, *Fuel Consumption Statistics, available at* http://www.nefl.org/ea/eastats.html.
2. *See U.N. Chief Seeks more Climate Change Leadership*, New York Times, Nov. 18, 2007.
3. *See* U.S. Energy Information Administration (EIA), *Emission of Greenhouse Gases in the United States 2005* (Feb. 2007), *available at* http://www.eia.doe.gov/oiaf/1605/ggrpt/summary/carbon.html.
4. U.S. Energy Information Administration (EIA), *Emission of Greenhouse Gases in the United States*1998 (1999).
5. International Energy Agency, *World Energy Outlook 2004*, Paris, *available at* www.worldenergyoutlook.org.
6. International Energy Agency, *Energy-Technology Perspectives – Scenarios and Strategies to 2050*, 2006.
7. International Energy Agency, *World Energy Outlook*, 31 (2004).
8. *Id.*

energy demand in developing Asia will double over the next 25 years.[9] Some projections estimate that by 2030, Asia alone will emit 60 percent of the world's carbon emissions.[10]

However**,** there is no Kyoto Protocol requirement that developed economies make any shift to zero-carbon or low-carbon renewable power, and the Clean Development Mechanism ("CDM")[11] under the Protocol is accomplishing only modest renewable energy investment. This article focuses on what has worked in key developing countries of fastest-growing Asia, for innovative promotion of renewable energy applications, under a wide array of political systems and geography.[12]

II. A New Regulatory Infrastructure

In the sections which follow, I detail and compare the legal and regulatory structures adopted for renewable power in several key developing nations in Asia. In doing so, I am comparing experience in a cross-section of developing countries in Asia including those with:

- different forms of government from market economies to centrally planned economies,
- reliance on different primary forms of fuel for generation of electric power,
- different amounts of electrification,
- different kinds of renewable energy potential, including wind and small hydroelectric resources,
- different geographic realities, from island countries with a single island

9. *See* U.S. Energy Information Administration (EIA), *International Energy Outlook.*

10. *See generally* Deborah E. Cooper, *The Kyoto Protocol and China: Global Warming's Sleeping Giant*, 11 Geo. Int'l Envtl. L. Rev. 401, 405 (1999).

11. *See* http://cdm.unfccc.int/index.html.

12. Steven Ferrey, *Small Power Purchase Agreement Application for Renewable Energy Development: Lessons from Five Asian Countries* [hereinafter Ferrey – World Bank], IBRD study, *available at* http://siteresources.worldbank.org/EXTRENENERGYTK/Resources/5138246-1237906527727/5950705-1239137586151/Small0Power0Pu1e0Energy0Development.pdf (2004). The World Bank transferred copyright on all of this material and report back to Steven Ferrey, the sole author, to use for subsequent publication.

to hundreds of islands, as well as mainland countries,
- different resources,
- centralized national electric grids, as well as multiple regional unconnected power grids, and
- federalist individual state power over electric power regulation, to a single federal control over electric power regulation.

There is a select group of Asian countries that initiated innovative measures promoting small renewable power development a decade or more ago, whose experience, both successful and less successful, demonstrates what does and does not work over a period of time for renewable energy development. The developing Asian countries that are profiled and analyzed here include Sri Lanka, two states of India, Thailand, Indonesia, and Vietnam. The countries span Asia in location, size and types of generation, with Thailand, Vietnam, and Indonesia comprising half of the ASEAN-6 nations, with the ASEAN-6 projected to account for more than 80 percent of energy demand growth in Southeast Asia from now to 2030.[13]

This article in this section builds from my earlier work for the World Bank[14] which analyzed original program design on renewable energy programs. Added to this base here, are highlights of subsequent modifications to programs, as well as isolation of distinctive country-by-country contributions to proven and 'best practices' techniques for small renewable power. Section III compares the five countries highlighted here to determine what has and has not worked over time. Section IV concludes with a note on how the new Green Climate Fund and the CDM improve the renewable energy matrix in developing countries.

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13. International Energy Agency, *Deploying Renewables in Southeast Asia: Trends and Prospects*, 7 (2010), *available at* http://www.iea.org/publications/freepublications/publication/Renew_SEAsia.pdf.

14. Steven Ferrey, *Small Power Purchase Agreement Application for Renewable Energy Development: Lessons from Five Asian Countries* , IBRD study (2004), *available at* http://siteresources.worldbank.org/EXTRENENERGYTK/Resources/5138246-1237906527727/5950705-1239137586151/Small0Power0Pu1e0Energy0Development.pdf. The World Bank transferred copyright on all of this material and report back to Steven Ferrey, the sole author, to use for subsequent publication.

A. SRI LANKA

1. What Makes the Sri Lanka SPP Program Distinctive

The Sri Lanka program is considered one of the most successful developing country small power producer (SPP) standardized power purchase agreement (PPA) programs in Asia and in the world. Sri Lanka is an island nation, and implemented this program while undergoing a significant civil war regarding dividing island governance into two separate nations. What is distinctive about the Sri Lanka program is that it successfully employed an avoided cost tariff[15] for the first decade of the program, and more recently successfully switched to a technology-differentiated feed-in tariff (FiT) as a means to diversify its renewable power supply. It provided pre-existing SPPs the option to move to the new FiT or remain on the original avoided cost tariff. This is regarded as one of the best SPP PPA programs over the past 15 years, and has demonstrated use of both an avoided cost tariff and a FiT, in successfully attracting various renewable technologies to make a significant contribution to a country seeking additional generating resources.

2. The Original SPP Program

Sri Lanka introduced a standardized small power PPA in 1997. The government declared a 10 percent target of grid-connected energy produced by non-conventional renewable energy by 2015. Fifteen-year PPAs originally were available for projects up to 10 megawatts (MW) in size. This was altered based on initial program success, so that fifteen-year PPAs are available for projects up to twenty MW in size.[16]

Most successful SPPs in Sri Lanka to date are small hydroelectric projects. As of 2007, the national utility grid in Sri Lanka had 1,800 MW of installed generation, double the amount from a decade earlier. Sri Lanka had more than fifty operating SPP projects supplying more than 100 MW of power.[17] Another 25 SPPs were under construction, plus another approximately 25

15. Avoided cost sets the wholesale power purchase price at the price at which the utility could produce or purchase a similar amount of energy and capacity.

16. Ferrey – World Bank, *supra* note 12, at 56.

17. *Id.*

SPPs were under active development.[18] The term of the PPA is up to twenty years.[19]

3. Subsequent Modifications

In 2003 the program was modified to adopt a controlled solicitation process, with application fees and earnest money deposits from successful PPA recipients. The Sri Lanka program has not utilized a simultaneous solicitation for SPP bids; ad hoc offers were entertained by the state utility. Letters of Intent (LoIs) to successful bidders are now valid for only six months. This prevents award recipients from attempting to prospect for hydroelectric sites for which they have no resources to develop, and once controlling these rights, trying to sell them to other developers.

Thereafter, in 2007, to attract wind and biomass projects, Sri Lanka moved to a feed-in PPA tariff for SPPs differentiated for each renewable technology, so that wind and biomass will receive a higher tariff than small hydro projects.[20] Moving to a technology-differentiated FiT increased the non-hydro SPPs from less than 5 percent of the total MW participating to approximately 50 percent of new project MW.

SPP PPAs signed before the 2007 change are almost exclusively small hydro projects, which were offered the option to amend their long-term PPAs to move to a point in the new FiT tariff rather than stay on avoided cost (now about U.S. $0.10/Kwh), but the existing SPP projects did not elect to amend or move. There are 102 SPPs already in operation, with an additional almost 100 more under development, having signed PPAs but which have not yet completed construction or entered operation, as shown on Table 1. The average size project is approximately 2.5 MW, with biomass and wind projects being larger and solar smaller than the average.

18. *Id.*

19. *Id*.

20. *See* CEB website, http://www.ceb.lk/PVT/PPP%20Home2.htMWww.ceblk.

Table 1: Sri Lanka SPP Renewable Project Development by Type

	Type	Number	Capacity (MW)
Commissioned Projects	Minihydro	92	200.2
	Biomass: agricultural & industrial waste power	2	11.0
	Biomass: Grown (Dendro)	1	0.5
	Solar	4	1.4
	Wind	3	30.0
	Total Commissioned	**102**	**243.1**
Standardized Power Purchase Agreements (SPPA) Signed	Minihydro	74	142.6
	Wind	9	65.0
	Biomass: agricultural & industrial waste	2	4.0
	Biomass: grown (Dendro)	11	61.8
	Total SPPA Signed	**96**	**272.5**

4. Detailed PPA, Tariff and Program Elements

Table 2 sets forth in abbreviated format principal elements of the Sri Lanka SPP program, including a peak-season tariff differentiation and a rolling SPP award process.

Table 2: Primary Elements of the Sri Lanka SPP Program[21]

Process	Open offer
Maximum size	10 MW
Tariff	- Avoided cost for not dispatchable projects de facto capped not to exceed tariff paid to larger IPPs - Differentiated for wet and dry seasons: Wet season: SL Rs. 5.85 per kWh [U.S. $0.06] Dry season: SL Rs. 6.06 per kWh [U.S. $0.062] (2003)
Third-party retail sales	No
Self-wheeling	No
Energy banking	No
Standardized PPA	Yes
PPA term	< 15 years
Subsidy or incentives	SPP and IPP power equipment generally exempt from import tax and enjoy tax holiday if projects are implemented under Board of Investment rules (http://www.boi.lk).

21. Ferrey – World Bank, *supra* note 12, Table 8.

The principal features of the power purchase agreements are given in Table 3.

Table 3: Features of Sri Lanka SPP PPAs[22]

Feature	*Description of SPP feature*
Basic provisions	
1. Parties	The contract is made directly between the state utility, CEB, and the SPP. As a body corporate, CEB waives the sovereign immunity it otherwise could assert against legal action.
2. Milestones	The SPP contract contains negotiable date milestones for (a) achievement of all necessary permits for land acquisition, construction and operation, and (b) achievement of commercial operation. The SPP is responsible for obtaining all permits.
3. Delivery of power	CEB must accept all power at the delivery point as long as operated pursuant to Good Utility Practices and the facility maintains its eligibility for SPP status by selling (not necessarily installing) no more than 10 MW, unless the CEB system is not able to accept power. The contract is only for the transaction in energy, not energy capacity.
4. Output guarantees	The SPP maintains control over the amount of energy sold, with the SPP designated as a "must run" facility, whereby CEB is obligated to take and pay for the energy tendered, unless there is an emergency in the CEB system. There are no consequential damages for which the SPP seller is liable, unless it diverts energy or heat to purposes other than sale of pledged output to CEB. If the facility is capable of generation, it must generate and deliver power to CEB. It may not divert power to other buyers. It may cease to generate only where there is a valid engineering reason for such interruption, and is obligated to provide at least 24 hours notice of interruption when possible.
5. Engineering warranties	Power must be delivered pursuant to IEC standards. The quality of the electric energy output delivered at the termination point is individually defined as to voltage, power rating, power factor, maximum line current and power, and frequency. Delivery voltage is 33 kV plus or minus 10%.
Sale elements	
1. Power quantity commitment	The output capabilities of the SPP are stated in the PPA. The SPP may sell no more than 10 MW of equivalent energy output under the contract. It is not prohibited for the SPP to install greater capacity than is sold to CEB.
2. Metering	CEB owns and maintains the metering equipment. Either CEB or independent third-party calibration is allowed by contract, however, the contract does not specify how the parties choose from among these two alternatives. The meters are required to operate subject to IEC standards. Meters are tested annually and require accuracy within 2%. In the interim period, the SPP can request a test if it believes that the meters are not registering accurately, but regardless of the outcome, the SPP pays for such test.

22. *Id*. Table 17.

Feature	*Description of SPP feature*
	There is established a hierarchy of which set of multiple meters is employed to measure the energy sold during each billing period, cascading to secondary metering sources when the primary metering is not within accuracy parameters, and assuming that the secondary meters are operating accurately. If not accurate at the secondary level of metering, historic data from the prior year is utilized, adjusted by rainfall, stream flow, fuel consumption, heat rate, hours of operation, native self-use, and other factors, to estimate output. If this data is not available, data from the prior six months is used as an average proxy of the amount of output sold.
3. Net metering or exchange	Not contemplated by the contract nor allowed by the program.
Risk allocation	
1. Sovereign risk and financial assurance	By contract, sovereign immunity is waived by CEB, as a body corporate, as a defense to suit.
2. Currency risk	The tariff is paid in local rupees on a kWh-delivered basis. There is no indexation to foreign currencies. Therefore, borrowing in local currencies is necessary to protect against currency fluctuations affecting repayment options.
3. Commercial risk	All commercial risk is absorbed by the SPP. The obligation to attempt to produce and deliver, and for the utility to take and pay for energy, is absolute except for short justifiable interruptions on either side of the transaction. The term may be up to a 15-year term.
4. Regulatory risk and change of law	Although there originally was a change of law clause covering regulatory and tax changes to facilitate a consequent adjustment of the price term, as suggested by the legal consultants, that clause was later not carried forward in the final PPA by the utility. Such risk is now borne by the SPP. The price paid for power is not based on any capacity payment. Only an energy component is paid, and this value fluctuates annually. Thus, there is no long-term certainty for the tariff, which impedes financing.
5. Excuse and force majeure	Force majeure is provided for both acts of God and for more controllable acts. Force majeure is defined in a manner conventional for power sale agreements, including civil disturbance and failure of the sovereign to grant necessary permits. Failure to obtain necessary fossil fuel from a supplier for the SPP, or any other cause out of a party's control, is also deemed to be a force majeure event. The time limit for the maximum duration of a force majeure event is three years. After three years, if not cured, the other innocent party may elect to terminate after an additional notice of 90 days. This is at the most liberal allowance of the range of U.S. small power contracts surveyed by this author. This provides more flexibility to attract small power producers.
Transmission	

Feature	*Description of SPP feature*
1. Transmission and distribution obligations	The SPP must deliver the power at its own cost to the delivery point, which is the line side of the isolator on the CEB grid, and pay for all interconnection and protective costs, as well as all interconnection costs up to the termination point. The title to energy passes at the metering point. CEB must use "best efforts" to take the power or to minimize any disruption given the "must run" status of the SPP. Since CEB is the only entity to whom the SPP may sell power, other than its host or otherwise allowed by license, there is no obligation of the utility to transmit power. Long delays and bottlenecks have been reported by one stakeholder, although it is not clear whether this is a persistent or isolated issue.[23] CEB requires that it build the interconnection or an entity approved by CEB build the line to CEB design standards using materials purchased from CEB.[24]
	Interconnection standards are governed by Interconnection Guideline G. 59/1 of the British Electricity Association. Either the utility can build and bill the SPP for the interconnection upgrades and equipment, or the SPP can construct the interconnection equipment pursuant to utility review and standards, and then dedicate such facilities to the utility. In either event, the SPP incurs the entire cost of the protective equipment. If upgrades, repairs or modifications are later required by the utility, the SPP must implement same at its own expense.
Performance obligations	
1. Operational obligations	The SPP must use its best efforts to deliver power. However, failure to deliver power for short periods, while justifying damages to the purchaser, does not rise to the level of a cause for termination. Provided in this contract are requirements for the SPP annually to forecast the amount of power to be produced and sold, with a minimum one month notice of planned outages, and the right of CEB to have access to and inspect the SPP facility.

23. R. Dias Bandaranaike, Delivered at World Bank International Conference on Accelerating Grid-Based Renewable Energy Power Generation: Grid-Connected Small Hydro Power in Sri Lanka, 7 (Washington, D.C., 2000).

24. *Id.* at 8. In one instance, this author relates the story of a particular instance of CEB delay of four months in providing the design, CEB requiring 100 percent up-front payment by the developer, then failing to supply all of the required materials and refusing to allow the SPP developer to purchaser the missing parts for CEB's supplier, but instead requiring the SPP to wait until CEB next got around to ordering parts. The SPP developer claims it was required to pick up the 1,000 necessary parts from a CEB yard, with no guidance as to where the parts were located in the yard. That author reports that it required 36 person-days for the developer's personnel to locate all of the parts in the CEB yard. There is no indication whether this was an isolated incident.

Feature	*Description of SPP feature*
2. Definitions of breach	Typical commercial definitions are employed. Failure to achieve milestones, failure to pay for 90 days, or bankruptcy of the SPP constitutes a breach. There are no express remedies provided for breach and no explicit penalties in this contract. There are no consequential damages. No deposits or other security are required of the independent producer. Breaches must be cured as soon as possible. A party has 60 days after notice to cure a breach without it constituting a default; or if it requires longer, such cure must be begun within 60 days and the cure accomplished within no more than two years.
3. Termination opportunities	Termination may not be made at the sole election of either party without cause, but may be made 30 days after default, which is defined in the agreement as an uncured breach that ripens into an event of default. Cause for termination includes only uncured default, uncured nonpayment, or uncured force majeure. The project lender gets an opportunity to cure any default. This is an important element for project finance in providing additional loan security to project lenders.
4. Guarantees of payment and performance	The Agreement contains no guarantees of any performance obligations.
5. Assignment and delegation	Other than to subsidiaries for the purposes of financing or to hold the project in a project company, the SPP may not assign or delegate its rights without the prior written consent of CEB, which may not be unreasonably withheld. A succession clause is included which has any successor of either party assume all duties. There is no restriction on assignment by CEB.
6. Dispute resolution	The parties first pledge to attempt to informally settle any dispute among themselves during a period of 30 days. If not settled, and the sum in dispute is less than SL Rs. 1 million, the parties may agree to appoint a single neutral party to resolve the dispute or may ask the government to appoint an expert in the field to resolve the dispute, in either case to resolve the dispute within an additional 60 days. If not then resolved within 90 days, either party may refer the dispute to arbitration under the Arbitration Act No. 11 of 1995.

B. THAILAND

Thailand, with 70 million people, has electricity consumption of approximately 150 billion kWh annually with an annual rate of demand increase of 3.2percent. Thailand serves 99.3 percent of its populated area with electricity, with per capita annual consumption of 2243 Kwh.[25] There is an installed capacity of 31,447 MW,[26] with 66 percent of energy supply sources from

25. World Bank, *World Development Indicators.*

26. *See* http://www.eppo.go.th/info/5electricity_stat.htm.

natural gas, 20% from coal, and five percent from non-hydro renewable energy sources.[27] The Thai electricity mix is approximately 70 percent gas-fired generation, is dependent on foreign supply by importing almost 25 percent of its natural gas supply and over 50 percent of its primary energy supply.

1. What Makes the SPP Program Distinctive

Thailand was one of the first countries in Asia to adopt a small power solicitation program. One key distinction of the Thai electric supply regulatory system is that it is unbundled: EGAT, the national utility, owns approximately 50 percent electric generation capacity and the entire transmission system, while electricity is distributed to consumers by two public distribution companies: Metropolitan Electricity Authority (MEA) in Bangkok and Provincial Electricity Authority (PEA) serving the rest of the country. Thailand has a target of 20 percent renewable power by 2020.

The Thai SPP system employed competitive bidding by new independent renewable energy SPPs as a means to suppress the bid price of renewable power offered for sale and to award subsidy payments. State renewable energy subsidies were provided on a competitive bidding basis that allowed the maximum leverage of renewable SPP resources at the lowest kWh cost to the state. The process operated by an amount of renewable energy subsidy being set aside by the state. Against a maximum subsidy, prospective SPPs bid for the amount of subsidy per kWh that they require to enter a PPA with EGAT, the transmission utility. SPPs were awarded subsidy in the order of the lowest SPP subsidy bid, until the gross subsidy allocation is exhausted. The Thai Energy Policy and Planning Office (EPPO) in the Ministry of Energy administered this program. The maximum subsidy was up to 0.89 U.S. cents/kWh (0.36 Baht/kWh) for the first five years of operation. The average subsidy was been 0.25 Baht/kWh (0.65 U.S. cents/kWh), awarded to 31 projects for 513 MW.[28]

This “adder” to the basic power sale tariff is paid for 10 years for wind and solar projects, or seven years for other renewable energy projects. The cost of

27. As of 2012, the on-grid renewable energy capacity of Thailand was 985.36 MWMW (589.96 MW of renewable VSPP and 395.40 MW of renewable SPP), with 7,558 MW of renewable energy capacity are in the development pipeline (5,547 MW of renewable VSPP and 2,011 MW of renewable SPP).

28. World Bank, *REToolkit Case Study: Small Power producers in Thailand.*

the adder is financed through a pass-through mechanism to all electric power customers.[29] An earlier phase of Thailand's grid-connected renewable energy support includes a net-metering program designed for generation installations exporting no more than one MW in size. In 2009, a bid bond, or security deposit of approximately U.S. $ 6/kW was required.

This was successful in minimizing the cost of such subsidies and employing available subsidy funds to bring forth the maximum number of megawatts of new renewable private power resources. However, such a competitive system requires that there be a controlled competitive solicitation process for SPPs.

With program maturity, that competitive renewable "adder" system has been replaced by a current debate about a FiT system or an RPS system being adopted to provide a more established subsidy level, rather than competitive bidding. Thailand was one of the first Asian countries to implement a feed-in tariff program.[30] Besides the FiT, the Thai government has various low-interest loan options.[31] The major source of low-interest funding comes from the Energy Conservation Promotion Fund (ENCON Fund), which is collected from a tax per liter on all petroleum products sold in Thailand. Large-scale investors in renewable energy projects can receive financial assistance in the form of low-interest loans with an interest rate ceiling of four percent. Smaller investments can receive financial assistance from the ESCO Fund in the form of equity investment,[32] venture capital, equipment leasing, and CDM project development.

2. The Original SPP Program

The SPP regulations allow SPPs to deliver for sale to EGAT up to 60 MW, although up to 90 MW is within the discretion of EGAT to accept on a case-

29. There are two components to the electric rate structure in Thailand: the base tariff (which is adjusted every four years) and an automatic fuel price volatility adjustment tariff, which is adjusted every quarter and is known in Thailand as the "Ft charge". The incremental cost of premium Adder payments to RE generators is passed through directly to rate payers, as a special charge in the Ft charge, which is charged as a line-item on customers' monthly electricity bills.

30. Thailand's FiT program is supported by a renewable energy law.

31. Thailand's policies related to energy, including electric power and renewable energy policies, are drafted and proposed by the Ministry of Energy (MoE).

32. Of up to 50 million Baht or U.S. $1.7 million USD.

by-case basis; it has accepted several of these larger projects. So, the larger EGAT system has accommodated larger SPPs than the other countries in Asia surveyed. The program has not restricted participation to renewable sources.[33] As of the end of 2002, 71 SPPs had been accepted and obligated, with a total capacity of 2,330 MW.[34] Most of this is gas-fueled cogeneration, with some non-firm SPP bagasse, and one small hydro project of about seven MW. [35] Table 4 shows this distribution as of 2002.

In 2002, EGAT paid an average of U.S. $0.054/kWh for firm power, and U.S. $0.0438/kWh for non-firm power. The energy-payments are indexed to the Thai gas price. There is no indexation to foreign currency. For a firm contract, the SPP must supply electricity during the peak months of March–June and September–October. No minimum seasonal capacity is required under the firm PPA. To receive capacity payments, the SPP must supply at least 7,008 hours of power annually. There is no specified minimum amount of capacity that must be supplied during these 7,008 hours for intermittent renewable resources, including wind, solar, and mini-hydro. For baseload waste, generation, biomass, and tree plantations, annual hours of generation must be at least 4,672 and must include operation during the March–June peak season. The monthly capacity factor must not be less than 0.51 for any project receiving a full capacity payment in a given month. Capacity payments are reduced by half if the monthly capacity factor is less than 0.51. Most intermittent renewable projects do not qualify for capacity payments.

3. Subsequent Modifications

In 2001, a Very Small Power Producer (VSPP) program was introduced for

33. Ferrey – World Bank, *supra* note 12. Subsidies were available in the 2001–02 solicitation process for up to five years for renewable projects in the amount of not more than 0.36 baht per kWh (U.S. $0.01 per kWh.). The subsidies are granted under the Energy Conservation Promotion Fund Committee (ENCON), established by the Energy Conservation Promotion Act, B.E. 2535 (1992). Two billion baht (U.S. $50 million) was allocated to such renewable project subsidies, in up to 300 MW of such projects contracted after June 2000. Selected projects were required to be in commercial operation by September 2004 or earlier.

34. *Id.* at 22-23.

35. Firm contracts require the SPP to supply capacity and electricity in March-April, and September-October. Bagasse facilities, employing the dry, fibrous residue remaining after the extraction of juice from the crushed stalks of sugar cane, are seasonal, and cannot satisfy this seasonal capacity requirement.

renewable energy generating facilities with a power export delivery capacity of up to one MW net (later increased to 10 MW). VSPPs are allowed to sell power directly to the distribution companies MEA and PEA at avoided costs, which is the same wholesale power sale price that MEA and PEA pay EGAT for purchased electricity. In 2006, the government introduced a PPA "adder," a feed-in premium tariff paid for 7–10 years (depending on technology of generation) to SPPs and VSPPs for renewable energy, ranging from approximately U.S. $0.08 - $0.21/Kwh.[36]

As of 2012, Thailand had approximately 8,000 megawatts of renewable generation projects in the pipeline seeking renewable adders with approximately 1,000 megawatts connected to the grid. The combined on-grid capacity and the amount of renewable energy in the pipeline amount to 8,543 MW, or about 27 percent of the current installed capacity in Thailand. Contract terms of 20-25 years are the norm for these larger cogeneration projects under firm contracts.

Table 4: Thai SPP program as of 2002

SSP Program	MW
Coal cogeneration	380.0
Fuel oil cogeneration	9.0
Natural gas cogeneration	1,473.0
Total cogeneration	1862.0
Biomass	577.5
Hydro	6.7
Total	**2446.2**

Thailand has reduced and streamlined interconnection requirements for generators with net export[37] under one MW.[38] SPP generators above eight MW must connect to higher voltage (69 kV or 115 kV) lines. The majority

36. This premium "adder" is funded by a small surcharge per kWh paid by all retail electricity consumers in Thailand.

37. Generators in the VSPP program can be larger than 1 MW, but the maximum amount of power they can export to the grid is 1 MW.

38. Generators with capacity above 66 kVA (PEA) or 300 kVA (MEA) must connect at medium voltage levels (24 kV or 33 kV). Generators lower than these capacities can connect at low voltage (230/380 volt).

of IPP projects are natural gas-fired IPP cogeneration projects, which enjoy the firm power sale contracts. The contract is adjusted periodically, for foreign exchange risk for capacity payments and fuel price changes for energy payments. For intermittent renewable projects, the capacity factor must be greater than 0.5, so as not to suffer a reduction in capacity payments.

As of 2013, Thailand has now progressed to where IPP development represents approximately 50 percent of power supply in the country. The Electricity Generating Authority of Thailand owns about 50 percent of generation assets and 100 percent of transmission assets. The other half of the generation assets is developed and owned by private companies, including IPPs, SPPs, and VSPPs.[39] VSPPs and SPPs that utilize solar, wind, biomass, biogas, hydro, and waste energy are eligible to participate in the renewable adder program.[40] As of 2012, more than 260 renewable energy facilities were operational under the SPP and VSPP systems, constituting about one GW of power generation, or twice this amount of capacity including off-grid and utility-owned renewable energy plants. An additional eight GW were in various stages of development.

SPPs and IPPs do not make direct retail sales. SPP PPAs are executed with EGAT, while VSPPs are executed with the national distribution companies, MEA or PEA. Thailand's EPPO makes publicly available model standard form PPAs to be used for SPP and VSPP projects.[41]

There is a significant solar, wind, and biomass potential still available for development in the country. Current policy debate involves eliminating the renewable power adder that has been available. The government has favored moving to an RPS system to subsidize renewable power development. EGAT has favored, instead, moving to a flat feed-in tariff which would not differentiate between different renewable energy technologies.[42] This debate is still proceeding.

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39. VSPPs sell power through the two state-owned distribution systems, the Metropolitan Electricity Authority (MEA) and the Provincial Electricity Authority (PEA).

40. At the end of 2008, a total of 1,075 applications, for 5,147 megawatts of renewable capacity, were filed to receive Adders.

41. The EPPO model PPA, *available at* http://www.eppo.go.th/power/vspp-eng/PPA%20Model%20-VSPP%20Renew%20-10%20MW-eng.pdf.

42. This recent information about Thailand policy and program changes was developed by Professor Ferrey when in Asia in spring 2013 teaching a multi-day master class in PPAs and other legal contracts for the energy sectors of developing countries.

4. Detailed PPA, Tariff and Program Elements

Table 5 sets forth in abbreviated format the primary program design and contract provisions of the Thai SPP program.

Table 5: Primary Elements of the Thai SPP Program[43]

Process	Controlled solicitation
Maximum size	60 MW (90 MW with permission)
Tariff	- Avoided cost to utility - For firm 20-year energy and capacity: Coal: U.S. $0.04 per kWh Gas and Renewables: 2.14 baht per kWh assuming 85% capacity factor [U.S. $0.051 per kWh] (2003 exchange rates)
Third-party retail sales	No (under consideration)
Self-wheeling	No (under consideration)
Energy banking	Only for SPPs < 1 MW
Standardized PPA	Yes. After 2001, because of excess capacity, EGAT purchases 100% of capacity rating of kWh on peak and 65% of capacity rating kWh off-peak. Therefore, project cannot supply and be paid for rated capability during off-peak periods.
PPA term	- Firm: 5–25 years - Non-firm: < 5 years
Subsidy or incentives	- Competitive bidding for five-year renewable subsidy - Up to U.S. $0.009 per kWh based on lowest bids - Eight-year income tax holiday - Equipment exempt from import tax

The principal features of the Thai PPA are displayed in Table 6.

Table 6: Features of Thai SPP PPAs[44]

Feature	*Description of SPP feature*
Basic provisions	
1. Parties	Contracts are made between the SPP and the power purchaser, typically EGAT. Projects of less than 1 MW contract directly with one of two national distribution companies.
2. Milestones	The PPA contains no milestones.

43. Ferrey – World Bank, *supra* note 12, Table 4.

44. Ferrey – World Bank, *supra* note 12, Table 10.

Feature	*Description of SPP feature*
3. Delivery of power	By regulation, power is delivered at the metering point.
4. Output guarantees	Where their duration is five years or less, the contracts are nonfirm without a capacity payment or a firm commitment to deliver power. For a capacity component payment, by regulation, the SPP must make a capacity commitment of at least five years. The capacity obligation requires the SPP to supply electricity during the peak months of March–June and September–October and must supply no fewer than 7,008 hours annually of power, per the regulations, if the power source is wind, solar, or minihydro. The regulations require for waste, biomass, and tree plantations, that annual hours must be at least 4,672 annually and include March–June. By regulation, the monthly capacity factor must not be less than 0.51. Output guarantees are in the form of limits on the time for planned maintenance and in the posting of security for contract performance. A bid bond of 100 baht per kW (U.S. $2.50 per kW) is required of applicants. The security for a bid was 500 baht per kW for some contracts. A performance bond in the amount of 5% of the total receivable capacity payment discounted to present value is required to be posted by selected applicants for the term of the contract. A Letter of Credit is a permissible means to satisfy this requirement. By regulation, all shutdowns for maintenance shall be accomplished during the off-peak months of January, February, July, August, November, and December. Maintenance shut-downs are limited by regulation to 35 days per year.
5. Engineering warranties	By regulation, the SPP must generate electricity in accord with the EGAT Regulations for the Synchronization of Generators to the System. The SPP is responsible legally for any damage to the EGAT system.
Sale elements	
1. Power quantity commitment	Up to 90 MW is some instances, and up to 60 MW in size typically. EGAT recently has been accepting 100% of power output on peak, but only 65% of capacity off-peak, for a weighted average of about 80% of capacity.
2. Metering	Provisions for meter accuracy address the determination of the quantity of power sold, and procedures for redress. The meters are owned by the SPP. Accuracy is required within 2–3%. Meter accuracy in U.S. small power purchase contracts typically is required to be within a range of 0.5%–2.0% of precise accuracy. Metering occurs at the delivery point specified by EGAT. If the SPP's meters are capable of measuring power supplied during peak, off-peak, and partial-peak periods, it receives, by regulation, time-differentiated energy payments. If not, an average energy rate is applied to all power delivered.
3. Net metering or exchange	Not presently allowed. EGAT is taking only 65% of power output capacity during off-peak periods because it is in a temporary surplus situation. Small renewable SPPs below 1 MW contract directly with one of the two national distribution companies rather than EGAT, and for these projects net metering is permitted. No self-wheeling is permitted.
Risk allocation	
1. Sovereign risk and financial assurance	The laws of Thailand govern the interpretation of the contract. There is no sovereign guarantee. In some contracts, the SPP is required to post a bank guarantee against premature termination of the agreement.

Feature	*Description of SPP feature*
2. Currency risk	The financial crisis in 1997 caused a dilemma for some projects who had borrowed in a foreign currency (U.S. $), but were receiving PPA payments in Thai baht. A fundamental restructuring was required, where foreign exchange indexation of capacity payments and adjustment of fuel prices was required. The capacity payments are now adjusted for exchange rate fluctuations in the baht–U.S. dollar exchange, by a formula specified in regulation and geared to changes in the price of the fuel used. Traditionally, the energy payments are adjusted automatically for changes in the baht–U.S. dollar exchange rate, depending on the type of fuel used in the facility. This exchange was linked to changes in the price of Thai gas, Thai oil, or Japanese coal. However, as of 2001, the energy payment is adjusted, but no longer indexed. As of 2001 and thereafter, the energy payment for a firm contract was 1.49 baht per kWh (U.S. $0.034 per kWh), adjusted for changes in the price of Thai gas and not indexed to any foreign currency. In 2001 for an energy-only contract, which by definition is for a duration of five years or less, the energy payment was 1.59 baht per kWh (U.S. $0.036 per kWh), adjusted for changes in the price of Thai gas, without indexation to a foreign currency.
3. Commercial risk	Risk is allocated implicitly to SPP. EGAT needs to take only 65% of rated capacity during off-peak periods and only 80% or more of annual SPP capacity (assuming 100% of peak-period power is taken).
4. Regulatory risk and change of law	If there is a change of law, at the request of the aggrieved party, the parties agree to meet to attempt to resolve the issue. If no resolution is reached, the contract remains in force, and the matter is not considered to constitute a dispute for arbitration.
5. Excuse and force majeure	Force majeure is defined to include acts of government, including seizure of the power plant, and includes otherwise fairly standard provisions of accepted international contract format.
Transmission	
1. Transmission and distribution obligations	The sale transaction occurs at the meter. Transmission on the down side of the meters is the responsibility of EGAT.
2. Interconnection arrangements	By regulation, interconnection costs are the responsibility of the SPP prior to supplying electricity.
Performance obligations	
1. Operational obligations	To the extent that the above capacity performance requirements are not satisfied by the SPP, the SPP is given 18 months to rectify the performance deficiency. If performance is not rectified, the capacity contracted for by EGAT can be unilaterally reduced to reflect actual performance, under regulation. After the midpoint of the contract term, the SPP shall have the election to reduce its contract-committed capacity with advance notice to EGAT. The SPP must be willing to commit to reduce its supply during off-peak periods (21:30–08:00 hours) to 65% of its contracted capacity upon request of EGAT. By regulation, EGAT must take 80% of annual available power. Any amount not purchased during one year is carried forward as a purchase commitment during the subsequent year, by regulation.

Feature	*Description of SPP feature*
2. Definitions of breach	Breach is defined in a conventional manner. The defaulting party has 15 or 90 days to remedy the default, depending on its nature. In some contracts, the SPP is required to post a bank guarantee against premature termination of the agreement.
3. Termination opportunities	If the SPP terminates, the capacity payment is rectified with the actual term of the contract with interest. SPPs eligible for capacity payments must deposit security payments in the amount of 10% of the capacity payments expected during the first five years. This deposit is refunded at the completion or termination of the contract on terms that allow termination by the SPP.
4. Guarantees of payment and performance	There are no outside guarantees of payment. However, late payment carries interest at 2% above the overdraft rate of the Krung Thai Bank Public Company.
5. Assignment or delegation	Assignment is not allowed without permission of the other party, except to subsidiaries or for the purpose of financing. These are standard provisions.
6. Dispute resolution	By regulation, arbitration is allowed to resolve disputes, with appeal to Thai courts. In the contract, arbitration is specified. Two arbitrators, one selected by each party, attempt to arbitrate disputes. They can select an umpire if they cannot agree. The arbitration proceeds under the Thai Ministry of Justice Rules in Bangkok in the Thai language. The parties may substitute by mutual agreement the Rules of the International Chamber of Commerce. A party has a right to redress in the civil courts.

In the discussion of the Sri Lanka SPP program above, the data indicates that a properly designed program PPA and tariff can attract large numbers of successful renewable energy projects on a sustained basis. The Thailand program also demonstrates comparable success, as well as the ability to make independent power developer (IPP) and SPP development a substantial share of total grid power supply.

C. INDIA

While Sri Lanka, profiled above, is not a large country either in land area or population,[45] and Thailand is relatively substantial in population but not huge in land area, we now shift to a different country altogether. India occupies 2.4 percent of the world's land surface area and is home to 17.5 percent of the world's population.[46] With an estimated population of 1.2 billion, India

45. The population of Sri Lanka is approximately 20 million people.

46. Government of India, Census of India, Area and Population.

is the world's second most populated country, trailing only the People's Republic of China.

1. What Makes the SPP Program Distinctive

India is forecast to experience a 10 percent peak power shortage, which gap was partly responsible for the massive grid collapse causing the world's largest blackout in July 2012; during this blackout, renewable plants operating through local community grid systems were not affected.[47] More than a third of India's population has no connection to the central grids.[48]

India has become a major player in renewable generation and private sector power development. India is regarded as one of the top five-rated countries in attractiveness for additional renewable energy development.[49] India is the tenth largest developer of small hydro facilities, the fifth largest developer of wind power, as well as the fifth largest producer of photovoltaic ("PV") systems, in the world. Any generating company may construct and operate a generator without obtaining a license, as long as technical grid standards are observed.[50] Transmission, distribution, and trading of electricity require a government license.[51]

State electric power regulatory commissions are directed by the Act to facilitate the transmission, wheeling, and interconnection of electricity within the state.[52] State electricity boards provide electric power. Each state makes its own determinations about SPP programs, subject to federal incentives and guidance.

India is a federalist form of government, with the political states, at a subnational level of government, exercising direct regulatory control over significant elements of the electric sector of the economy. Federalist forms

47. Ernst & Young, *Renewable Energy Country Attractiveness Indices*, 28-29 (Nov. 2012).

48. *Id.* at 29.

49. *Id.*

50. Electricity Act, No. 36 of 2003, India Code, at 9, § 7 (2003). Certain conditions are imposed on the development of hydroelectric generations to ensure the highest use of water resources for competing uses; *Id.* at 9, § 8.

51. *Id.* at 11, § 12. Conditions may be imposed on the license; *Id.* at 13, § 16.

52. *Id.* at 19, § 30. An appellate tribunal also is established to handle appeals of an order of the regulatory commissions; *Id*. at 53, § 110. State governments are authorized to constitute special courts to expedite trials of those who steal or divert electricity; *Id.* at 68, §153.

of government describe a system in which political sovereignty is constitutionally divided between a central federal authority and constituent states or provinces. Such federalist forms of government are the political system in several countries, such as the United States, Germany, Canada, India, Australia, Brazil, Malaysia, Mexico, Nigeria, and Switzerland.[53]

The Indian PPA schemes provide for wheeling and banking of power, which helps SPP generators. The India Ministry of Non-Conventional Energy Sources (MNES) guideline is a two percent charge for wheeling, although some states, including one of those discussed below, have much higher rates. Such higher rates are designed to limit sales to industrial customers. Industrial rates cross-subsidize low-cost power to agricultural users. Two elements that distinguish what some India states have accomplished with SPP renewable energy programs is that it is one of the few Asian programs (1) which allows power wheeling by SPPs and (2) which has achieved a significant share of wind power development.

Of India's 35 separate territories, the analysis below focuses on the PPA, program, and tariffs details of two of India's largest states, Andhra Pradesh and Tamil Nadu. Each of these states has a population of more than 70 million people, comparable to the population of Thailand or Germany. However, each of these states in central India is surrounded by more than 30 other India states or unions over a large contiguous land area.

2. Detailed PPA, Tariff and Program Elements

a. Andhra Pradesh

A number of India states have SPP programs. The state of Andhra Pradesh is the most advanced in installing wind capacity, with more than 7,000 MW, of which 189 MW are wind capacity in operation. There is no formal standardized contract. Therefore, individual negotiation occurs with the state utility monopoly to determine the contract terms and prices on each independent renewable power project. The utility employed a similar contract in all SPP transactions, thus making a *de facto* standardized PPA contract, while still leaving extensive case-by-case discretion with the utility regarding which contracts to enter.

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53. *See* S. Ferrey, *A Comparison of Renewable Options on Power Supply, Transmission, and Grid Reliability*, 1 KLRI J. of L. & Legis. 93 (2011).

There is no standardized tariff: The state utility makes the determination of the purchase rate it will offer each SPP through individual negotiation, although there is some consistency. Table 7 sets forth in abbreviated format relevant SPP provisions of the SPP program and PPA in Andhra Pradesh, including the significant wheeling fee.

Table 7: Primary Elements of the Andhra Pradesh SPP Program[54]

Process	Open offer
Maximum size	< 20 MW (was < 50 MW)
Tariff	- Above avoided cost to utility not to exceed 90% of industrial retail tariff - Rs. 3.32 per kWh [U.S. $0.0698 per kWh] in 2003
Third-party retail sales	No (previously allowed)
Self-wheeling	Allowed with 28% wheeling fee plus U.S. $0.01 per kWh charge
Energy banking	Allowed with 2% energy banking charge
Standardized PPA	Yes
PPA term	20 years
Subsidy or incentives	- Federal loans with 1- to 3-year repayment moratorium. - 80% of capital cost can be depreciated against taxes in the first year - Grants for PV systems - Equipment exempt from sales tax

Andhra Pradesh has approved the construction of 1,013 MW of nonconventional generation. This is scaled against the potential in Table 8.

Table 8: Andhra Pradesh Renewable Project Status, 2003[55]

Technology SPP	*Capacity (MW)*			
	Projects approved	*Projects complete*	*Projects at finance close*	*Potential capacity*
Wind	283	92	10	745
Biomass	345	81.5	110.7	627
Bagasse cogeneration	210	49.5	75.5	250
Municipal waste	23.6	0	0	40
Industrial waste	36	1.5	4	135
Small hydroelectric	95	69	30.4	1,252

54. Ferrey – World Bank, *supra* note 12, Table 6.

55. *Id*. Table 14.

Representative PPA principal features in Andhra Pradesh are given in Table 9.

Table 9: Features of Andhra Pradesh SPP PPAs[56]

Feature	*Description of SPP feature*
Basic provisions	
1. Parties	The contract is made between the SPP and the utility, APTransco. The agreement is for 20 years.
2. Milestones	Under its financial guarantee agreement with NEDCAP, the SPP is required to achieve financial closure within six months of signing a memorandum of understanding with NEDCAP and is required to begin construction within 15 months of signing a memorandum of understanding with NEDCAP.
3. Delivery of power	Delivery occurs at the interconnection point.
4. Output guarantees	Operation of the project is totally within the control of the SPP. Power must be accepted by APTransco except for system emergency reasons. There is no warranty to deliver any energy or capacity by the SPP.
5. Engineering warranties	Power must be delivered at 50 cycles per second (-5% or +3%).
Sale Elements	
1. Power quantity commitment	No commitment whatsoever, either for energy or capacity, or both, is made by the SPP for power sale.
2. Metering	A pair of bidirectional meters is installed by the utility. Check meters are then installed by the SPP. Meter accuracy is checked twice yearly; meters are calibrated yearly. Where the primary meters do not register accurately, the check meters are utilized for billing purposes. Detailed meter testing is specified.
3. Net metering or exchange	Power can be banked for up to 12 months at a cost of 2% of the energy banked. This is fairly typical of other states in India. Wind produces power during summer months, which is peak period, making energy banking not a primary issue in this state. In 2002, rates were Rs. 3.32 per kWh (2.25 per kWh in 1993–94 rupees, at 5% escalation annually) given in U.S. dollars. This rate is next revised in 2003. This rate is fairly typical of other states, but among the highest. The SPP is entitled to standby and backup power supply at the High Tension tariff. In the past, direct third-party retail sales were allowed, but in 1999 they were suspended indefinitely and the prior arrangements annulled by APERC at the request of APTransco. The APERC issued an order, which prohibited direct third-party sales. Power may be sold only to APTransco at the rates that they prescribe. In other states, such as Karnataka, Madhya Pradesh, Maharashtra, and Rajastan, third-party SPP sales are permitted. Uttar Pradesh, with commission approval,

56. *Id*. at 15.

Feature	*Description of SPP feature*
	allows third-party wheeling without charge for the wheeler, for power sold at the same rate as that for centralized power supply. Other states, such as West Bengal, Tamil Nadu; Gujarat, and Kerala, do not allow third-party sales of private power. Tariffs are under development for third-party, high tension wheeling of power from IPPs to third-party consumers of high-voltage power. APTransco has allowed some wheeling in-kind. APTransco historically charged a 2% fee for wheeling. Other states typically charge 2–5%. Now, APTransco charges a 28.4% in-kind charge for the wheeling, which is the systemwide power line loss factor, plus Rs. 0.50 per kWh (U.S. $0.009 per kWh) paid in cash. At these high rates, SPPs are discouraged from wheeling power and are economically compelled to sell power to the utility.
Risk allocation	
1. Sovereign risk and financial assurance	No provision to protect against this risk is provided.
2. Currency risk	No provision to protect against this risk is provided.
3. Commercial risk	No provision to protect against this risk is provided.
4. Regulatory risk and change of law	No provision to protect against this risk is provided. The SPP remains responsible for any later imposed taxes or levies. Any modification of the agreement can only be made if approved by APERC.
5. Excuse and force majeure	No provision for either force majeure or excuse for failure to deliver is made. Since there is no obligation to deliver, there is no delivery obligation on the SPP.
Transmission	
1. Transmission and distribution obligations	The utility will transmit power to a remote location for the generator. Initially, a 2% wheeling charge was charged. The wheeling charge currently is 28.4%, to reflect what APTransco assesses as systemwide transmission grid losses, irrespective of the distance traveled. This is implemented by requiring the generator to put in 128.4% of the generation they transmit. In addition, the generator is charged a wheeling fee of Rs. 0.5 per kWh. As a practical matter, this has financially eliminated any generator transmission.
2. Interconnection arrangements	Interconnection is designed, installed, owned, and operated by APTransco, the costs for which are reimbursed by the SPP. However, in the case of wind developers, the developer pays Rs. 1 million per MW (U.S. $21,044 per MW). A charge of Rs. 0.10 per kWh (Rs. 0.10 per kWh) (U.S. $0.002 per kWh) is charged to handle reactive power for wind generators.
Performance obligations	
1. Operational obligations	The SPP must operate the project subject to prudent utility practices.
2. Definitions of breach	Breach is not defined in the PPA.

Feature	*Description of SPP feature*
3. Termination opportunities	There are no provisions for termination prior to the term of the PPA.
4. Guarantees of payment and performance	If payment is made on or before the due date, the SPP receives a 1% discount and rebate credit on the next bill. If late, 14% per year interest is added.
5. Assignment or delegation	Assignment of either party must have the prior consent of the other party, which cannot be unreasonably withheld.
6. Dispute resolution	APTransco must discuss with the SPP any disputes on bills.

b. Tamil Nadu

In another India state, Tamil Nadu, the system generates more than 7,000 MW.[57] Tamil Nadu state has a significant fraction of India's wind turbine capacity and a significant percentage of renewable biomass projects. An SPP eligible maximum size limit of 50 MW is imposed. The tariff is higher for biomass projects than for wind. There is no sovereign or currency risk hedge mechanism.

In Tamil Nadu, no formal standardized PPA is employed, although the utility has employed the same PPA format in every situation, thereby creating a *de facto* standardized PPA. Wheeling of power to an affiliated location of the SPP owner and not to a third-party is permitted. The SPP tariff is higher for biomass projects than for wind to reflect the former's non-intermittent, controllable power generation characteristics.[58]

Most of the SPP projects are wind, bagasse,[59] cogeneration, biomass gasification, and PV. Table 10 sets forth in abbreviated format salient elements of the Tamil Nadu SPP program, including its low wheeling charge.

Table 10: Primary Elements of the Tamil Nadu SPP Program[60]

Process	Open offer
Maximum size	< 50 MW

57. Ferrey – World Bank, *supra* note 12, at 49.

58. *Id.* at 53.

59. Bagasse electricity production results from burning the dry, fibrous residue remaining after the extraction of juice from the crushed stalks of sugar cane.

60. Ferrey – World Bank, *supra* note 12, Table 7.

Tariff	- Above avoided cost to utility not to exceed 90% of industrial retail tariff - Wind: Rs. 2.7 per kWh [U.S. $0.057 per kWh] 2003 - Biomass: Rs. 2.88 per kWh [U.S. $0.06 per kWh] 2003
Third-party retail sales	No (previously allowed)
Self-wheeling	Allowed with 2% wheeling charge for up to 25 km transmission; 10% wheeling charge more than 25 km.
Energy banking	Allowed with 2% banking charge
Standardized PPA	Yes, in final development
PPA term	5–15 years
Subsidy or incentives	- 80% of capital cost can be depreciated against taxes in the first year - Grants for PV systems - Equipment exempt from sales tax

The principal features of the agreements are given in Table 11.

Table 11: Features of Tamil Nadu SPP PPAs[61]

Feature	*Description of SPP feature*
Basic provisions	
1. Parties	The contract is made between the SPP and the utility, the Tamil Nadu Electricity Board ("Board"). The agreement is only for surplus power that the SPP may elect to deliver. The particular agreement reviewed ranged between 5 and 15 years. It is subject to periodic renewal or renegotiation.
2. Milestones	None.
3. Delivery of power	Delivery occurs at the interconnection point. At the end of each month, the SPP must forecast to the Board its likely deliveries during the upcoming month.
4. Output guarantees	Operation of the project is totally within the control of the SPP. Power must be accepted by the Board, except for force majeure reasons. There is no warranty to deliver any energy or capacity by the SPP. The term for biomass projects is 15 years, whereas for wind power SPPs there is no term, although the utility reports that it informally will honor these PPAs for 20 years.
5. Engineering warranties	The SPP designs and installs at its own expense its own protective equipment for parallel operation.
Sale elements	

61. *Id.* Table 16.

Feature	*Description of SPP feature*
1. Power quantity commitment	No commitment whatsoever, either for energy or capacity, or both, is made by the SPP for power sale. The utility will only purchase surplus power. In the hours between 11 p.m. and 6 a.m., the utility now requires the SPP (except for bagasse cogeneration which require the steam production) to back down some of the power sold to the grid.
2. Metering	A pair of bidirectional meters is installed, but in this case by the SPP. Check meters are then installed by the SPP. Meter accuracy is checked twice yearly; meters are calibrated yearly. Where the primary meters do not register accurately, the check meters are utilized for billing purposes. Detailed meter testing is specified.
3. Net metering or exchange	Energy banking is allowed for a 5% in-kind energy charge. The SPP is entitled to standby and backup power supply at the high-tension tariff. The SPP is allowed to wheel power over the Board's grid to its affiliated entities. When a wind project is developed, for example, a special project company can be created to be owned in shares by several companies, each of which wheels power from the wind turbine, sited to maximize wind capture, to its factory or load center. Within 25 km of it generation source, 2% is deducted for line losses; at more than 25 km, the wheeling charge is 10%. Other than this arrangement, there are no direct third-party sales currently, although it was briefly allowed in the past. Power may be sold only to the Board at the rates that they prescribe. An earlier provision to allow third-party sales was discontinued.
Risk allocation	
1. Sovereign risk and financial assurance	No provision to protect against this risk is provided.
2. Currency risk	No provision to protect against this risk is provided. In the model PPA that is circulating, the Board would provide a letter of credit from a commercial bank in favor of the SPP to serve as a surety for one month's expected power payments from the Board.
3. Commercial risk	No provision to protect against this risk is provided. Developers are required to have control of the site and a purchase order for equipment prior to signing the PPA with the utility.
4. Regulatory risk and change of law	No provision to protect against this risk is provided. A major problem is that the PPAs allow the utility to alter its terms or the SPP tariff at any time during the term of the contract. This is a major impediment, and SPP developers report that they execute these PPAs under protest.
5. Excuse and force majeure	A relatively weak force majeure provision that includes rebellion, riot, and natural disaster, is included. In the model PPA that has circulated, the force majeure provision is somewhat stronger, including work stoppages, fire, and loss of license.
Transmission	
1. Transmission and distribution obligations	Power can be wheeled to affiliates, as discussed above.

Feature	*Description of SPP feature*
2. Interconnection arrangements	There is no standardized interconnection agreement. Interconnection arrangements vary. Interconnection at lower voltages is designed, installed, owned, and operated by the SPP at its own cost. For higher-voltage interconnections, the SPP is required to deposit the cost of the work with the Board, which performs the work. For bagasse-fueled cogeneration, the Board bears the costs itself and performs the work. For a wind project, an interconnection charge of Rs. 15.75 lakhs per MW of installed capacity is paid by the SPP for the interconnection.[62]
Performance obligations	
1. Operational obligations	The utility reserves the right not to take power when not needed, and in the PPA the SPP agrees to back down generation during off-peak periods. Any excess above the amount of energy requested by the Board is not paid for by the Board. It does this now by requiring SPPs to back down sold power output at daily off-peak evening times.
2. Definitions of breach	Breach is not defined in the PPA.
3. Termination opportunities	Termination is allowed by the Board if any technical condition of the Board is not followed.
4. Guarantees of payment and performance	None.
5. Assignment and delegation	No contractual limitations.
6. Dispute resolution	Disputes as to power quantity or payment that arise are referred to the government Chief Electrical Inspectorate to resolve. In the model PPA circulated, arbitration is mandatory under the Arbitration and Conciliation Act of 1996. The arbitrator's decision is final and enforceable by the courts under the laws of India. In the model PPA, all consequential and special damages are waived.

D. INDONESIA

Indonesia's 240 million inhabitants are spread across more than 6,000 islands of the more than 17,000 islands comprising the country, with 80 percent of the population living on Java, Bali, and Sumatra.[63] Java, is the most populous island in the world, substantially exceeding the population of Japan or Britain; four of these Indonesia islands are among the most populous

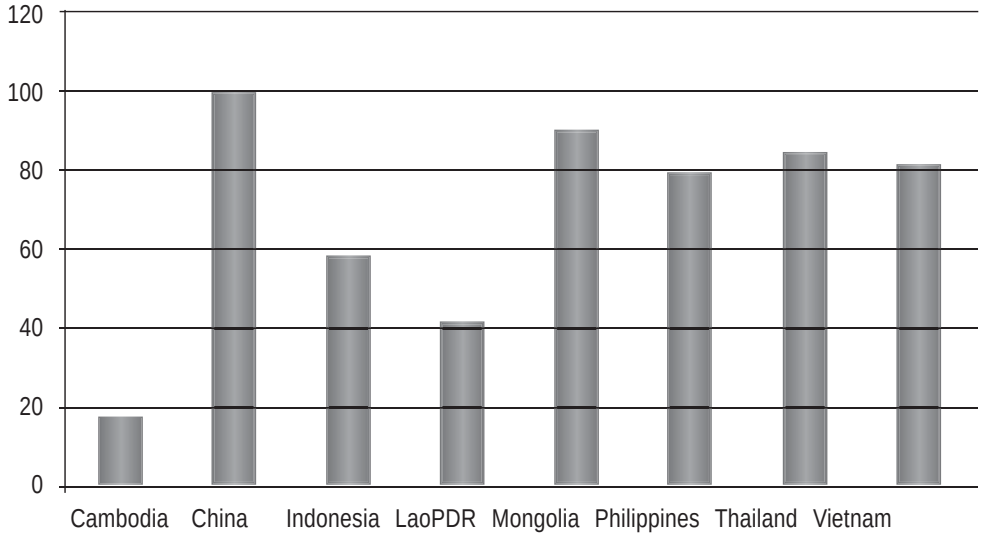
62. One lakh is 100,000 Rupees, such that 15.75 lakhs is Rs. 1,575,000 ($33,500) per megawatt [$33 per kW].

63. U.S. International Trade Administration, *Renewable energy market assessment report: Indonesia*, Washington, D.C. (2010).

islands in the world.[64] Such a dispersed island country spread over so many islands and kilometers creates unique electric sector challenges, including challenges of independent generation. Indonesia has 34 provinces within the federal government structure. Indonesia has 600 mini-grids operated outside the Java-Bali grid by Perusahaan Listrik Negara (PLN), the state-affiliated national electric utility for Indonesia, where PLN maintains and operates 4,700 diesel generators comprising 44 percent of outer region generation capacity.[65] Thirty-five percent of the population, or 90 million people, lives off the electric grid, without access to it. Forecasts suggest that electricity demand will increase from 135 TWh in 2010 to 194 TWh in 2014, with a seven to nine percent annual demand increase continuing thereafter.[66] Indonesia currently ranks third in the world, after the U.S. and China, as one of the highest emitters of greenhouse gases.

Notwithstanding this, the average Indonesia energy consumer only pays a retail tariff of U.S. $0.086/kWh. To fill the gap between PLN's costs and price of electricity sold, the Government of Indonesia (GOI) provides PLN with an annual subsidy; in 2010 it totaled U.S. $5.5 billion. One-third of the Indonesia population does not have access to electricity, as shown in Figure 1.

Figure 1: Electricity Access in Asia countries and Indonesia Islands[67]



64. *See* World's Most Populous Islands, http://www.worldislandinfo.com/POPULATV2.htm. These include Java, Sumatra, Borneo/Kalimantan, and Sulawesi.

65. U.S. AID, *Indonesia Energy Sector Assessment*, executive Summary (Nov. 22, 2008).

66. Anderson, A. J., Watson, T., & Shannon, C., *Electricity in Indonesia - Investment and taxation guide*, Jakarta, Indonesia: PwC Indonesia (2011).

67. Indonesia Energy Sector Assessment, *supra* note 65, Table 7.

Major Islands	Population (million)	Electrification Ratio (percent)	Population w/o Access (million)
Java	128.7	74%	33.6
Bali	3.4	86%	0.5
Sumatra	45.4	57%	19.4
Kalimantan	11.9	59%	4.9
Sulawesi	15.6	61%	6.1
Nusa Tenggara	8.2	33%	5.5
Maluku	2.1	54%	1.0
Papua	2.3	22%	1.8
TOTAL	217.7	(average) 67%	72.7

1. What Makes the SPP Program Distinctive

To meet underserved demand as well as its 6.2 percent economic growth and 91 percent electrification targets for 2019, the Government of Indonesia (GoI) will need to increase installed capacity to approximately 81 GW.[68] This will require an investment of U.S. $66 billion. Indonesia will need to add approximately 5 GW of new generating capacity per year for the next 10 years in order to keep up with demand. The vast majority of existing capacity is fossil-fuel based, and future plans call for continued development of coal-based generation. In late 2008, the GoI began a second 10,000 MW Fast-Track Program which included a goal of 4,000 MW of geothermal capacity.[69]

Indonesia contains 40% of the world's geothermal resources, which total 27 GW of potential capacity spread across more than 250 geothermal fields.[70] Of this total, approximately 10 GW are thought to be economically

68. *Id.*

69. PLN, *Going through the 2008 World Financial Crisis, available at* https://esmap.org/sites/esmap.org/files/Indonesia%20Perusahaan%20Listrik%20Negara%20Going%20Through%20the%202008%20Global%20Financial%20Crisis.pdf ; Asmarini, W., *House of Representatives concerned on PLN*, Indonesia Finance Today, May 18, 2011. In the implementation of PLN's 10,000 MW fast-track program, 10,000 MW of new coal-fired power plants to be built that did not comply with NOX standards which required less than 750 ppm emissions; Indonesia Energy Sector Assessment, *supra* note 65.

70. West Japan Engineering Consultants Inc., Prepared for the Japan International Cooperation Agency (JICA) and the Republic of Indonesia: Study on fiscal and non-fiscal incentives to accelerate private sector geothermal energy development in the Republic of Indonesia (Final Report Summary), Ministry of Finance (2009).

viable to exploit,[71] yet only 10 percent, or 1,052 MW, have been developed to date.[72] What is distinctive about the original Indonesia SPP renewable energy program was that it was one of the most sophisticated and nuanced such programs in the world, prioritizing among four different classes of eligible power generation technologies, employing competitive bidding to select projects for participation, utilizing incentives rather than penalties to enforce provisions of the program, and employing different PPAs and tariffs for the primary Java-Bali grid and for the other seven grids. This employed sophisticated tools to get significant value for the government. The next section examines this program.

2. The Original SPP Program

Prior to its more recent movements for small power support, Indonesia had one of the first SPP programs in Asia. The Indonesian program began its development in 1993, and rolled out in 1996. It came to involve a standardized PPA and tariff. The SPP program was designed to supply up to one-third of national new power supply capacity additions from small, renewable sources, organized into four tiers of priority for project of up to 30 MW in size on the primary island, and half that size on smaller island grids. Because Indonesia comprises several separate and not interconnected island grid systems and isolated diesel systems, this program design was nuanced and disaggregated to address avoided cost and power requirements on a regional basis.

The standardized PPA in its original design contemplated either a firm or non-firm power sale. The tariff was based on 100 percent of PLN's avoided costs, but differentiated by each of 7 island regions. The original protocol included both non-firm PPAs receiving an energy charge, and firm PPAs receiving energy and capacity charges. Firm contracts included escalation provisions to hold constant the Rupiah-U.S. $ exchange rate for five years to protect capacity payments for foreign debt service obligations.

The incentives for firm power delivery were embodied in the tariff, with indexation of capacity payments for foreign exchange risk, on the theory

71. Climate Investment Funds, *Clean technology fund investment plan for Indonesia*, Washington, D.C., World Bank (2010).

72. U.S. International Trade Administration, *Renewable Energy Market Assessment Report: Indonesia*, Washington, D.C. (2010). Duties, taxes, and other fees are applicable to new renewable energy.

that most of the value added (cost) of generating capacity would be foreign-manufactured turbines and generator sets (this program included cogeneration utilizing fossil fuels as a lower priority generation source). Therefore, conventional industrial cogeneration, as well as renewable resources, was eligible for this program. This provided an innovative approach to structuring the performance obligation, whereby sanctions without a legal basis were imposed for performance failure of the SPP.

The 1997 Asian financial crisis suspended the chances for program implementation of the original 1995 program in Indonesia, just as this SPP program was rolling out. It was cancelled in late 1998.[73]

Renewable resources were afforded a preference in the award criteria. There were four tiers of priority, with renewable energy at the top, fossil-fired cogeneration in the middle tiers, and conventional non-cogeneration fossil fuels at the lowest tier. In other words, each region under regulation would award entitlements to sell SPP power to PLN from completed applications first from the top-tier renewable resources, proceeding down the hierarchy until the resources solicitation was filled with available resources. The award process fills up the queue first with renewable resources, and then proceeds to accept additional small power resources in lower tiers.

The size of projects accepted on Java-Bali ranged from 1.5-30 MW in size. In the five other island grid regions that actually made award selections (as opposed to the total that were supposed to make award selections), the size selected ranged from 1.5-15 MW in size. The data above reveal that although all biomass, most geothermal, and more than half of the hydroelectric project applications were accepted, all of the cogeneration and conventional power generation applications were rejected. Of those projects selected and awarded contracts, totaling 280 MW, and those 802 MW of applications rejected, the winners and losers were from the sources shown in Table 12.

73. Four of the strongest commercial banks in Indonesia had expressed interest in participating in the Project. The value of the Rupiah plummeted from Rp 2,341/U.S. $ in September 1996 to Rp 17,000/U.S. $ by January 1998.

Table 12: Indonesia SPP Awards by Type of Energy[74]

Source	Award winners (MW)	Award rejections (MW)	Total (MW)
Hydro	165.5	288.2	453.7
Geothermal	45.5	10	55.5
Biomass	69.5	0	69.5
Conventional fuel	0	500.7	500.7

Two lasting lessons of the original 1995 Indonesia renewable energy SPP program design are (a) that disaggregated PPA provisions and tariffs can be designed to address different regional grids and requirements, and (b) that PPA and tariff incentives can be designed to provide profound financial incentives for SPP delivery of power at peak times. This latter element allows the PPA to avoid typically stringent sanctions and penalties for failure to perform on-peak: Market incentives are substituted for the traditional "command-and-control" legal sanctions.

3. Subsequent Modifications

Despite the inability to proceed with the original program, beginning in 2002, the PSK Tersebar[75] scheme was allowed for small projects of less than one MW for PPA terms of only one year, and a parallel *Prisai Sakti Mataram* (PSM) Tersebar program exists for projects of 1-10 MW, which were eligible to receive 10-year PPAs. PLN was required to purchase electricity at prices reflecting tariff formulas that used the nationwide uniform tariff, more recently changed to reflect local costs Benchmark PSK/PSM tariff were set at either 60 percent or 80 percent of the retail tariff, by voltage.[76] The tariff in these PPAs provided 80 percent of PLN average production costs in the particular Willayah or region. These tariffs are much lower than were calculated under the original program.

A new electricity law was enacted in 2009 replacing the prior 1985 statute. MEMR issued a new regulation on Electricity Pricing for Indonesian Geo-

74. Ferrey – World Bank, *supra* note 12, Table 11.

75. This is translated as diffuse or spread, http://www.eudict.com/?lang=engind&word=afloat,%20diffuse,%20spread.

76. Indonesia Energy Sector Assessment, *supra* note 65.

thermal Projects, which requires PLN to purchase electricity produced by independent, privately-owned geothermal power projects pursuant to prices established under PPAs awarded based on competitive tender.[77] For projects awarded a license after 16 February 2011, the tariff is fixed at the price proposed in the bid, subject to a cap of U.S. $0.097/kWh, at the point of power transmission.[78]

Current law permits a standardized PPA and PLN is required under law to provide a standardized PPA. The elements of standardization are not specified in the law,[79] and there is not a standardized PPA that is in routine use. PLN has published its version of a standard form geothermal PPA.

In the past two years, there is a program for small solar, hydroelectric, and biomass renewable energy projects which pays a feed-in tariff for power production from these projects. As in the original 1995 program, there are separate feed-in tariff levels depending on in which island system the SPP is located. There is a base FiT rate for SPP output in the primary grid of Java-Bali. This base FiT tariff is multiplied by 120 percent for projects located on island grids in Sumatra and Sulawesi; multiplied by 130 percent for SPP projects located in island grids in the islands of Kalimantan, and Malucca; and multiplied by 150 percent for eligible SPP projects located in island grids on the island of Papua New Guinea, Timur, and Nusa Tenggara.

The rate for these technologies is Rp. 656 for minihydro and biomass projects. For solar projects, it is a higher FiT rate of approximately U.S. $0.25/Kwh. This revived SPP program resembles the original 1990s program in many regards. The PPA is still a consolidated 28 pages in length, including appendices. Since recently adopted in the past two years, PLN has already received more than 300 SPP applications to participate. As of March 2013, there were already installed 39.7 MW of small hydroelectric SPP projects.

The FiT tariff of U.S. $0.097/Kwh for geothermal projects, after 2012, is allowed to increase for certain smaller geothermal projects, based on successful geothermal project developer bids. The rates vary from U.S. $0.10/kWh to almost $ 0.20/kWh depending upon the region where the resource is located. Unlike the existing policy for hydro, biomass, and landfill gas projects, the tariffs are awarded in U.S. dollars. Geothermal is slated to contribute the

77. Indonesia Law 27/2003.

78. Indonesia MEMR Regulation 02/2011, art. 2.3-4.

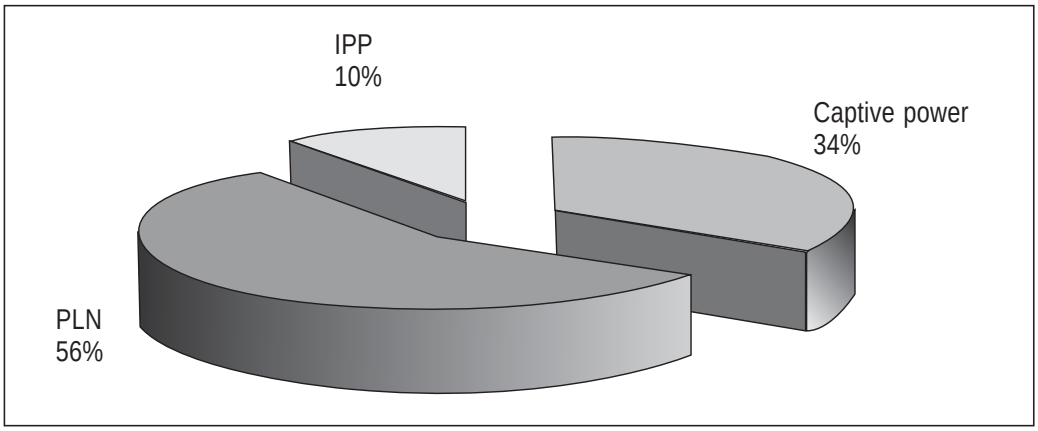
79. Indonesia MEMR Regulation 02/2011, art. 2.5.

bulk of new generation, supporting the target of 17 percent renewables by 2025. Indonesia's 1,200 MW of geothermal generation is the third largest in the world.

So the original SPP concept has been revived in form and substance and incorporated in Indonesia. The Indonesia PLN system is now approximately 50,000 MW grid-connected, or about five times its size in 1994 when it began planning a renewable PPA system. Approximately 20 percent of the system is supplied by IPP projects. Rather than an avoided cost tariff, there is now a FiT tariff. There is still differentiation in SPP tariff structure by island grid location.

The state-owned utility, PLN, owns 86 percent of all generating capacity exclusive of captive power that is not grid connected, and controls the transmission and distribution system.[80] See Figure 3. The remaining 14 percent of generating assets, exclusive of captive power, is owned by Independent Power Producers (IPPs),which sell electricity to PLN via 15-30 year PPAs.[81] Over 80 percent of the current capacity of 29,500 MW comes from fossil fuels with oil-fired plants accounting for 62 percent of the total. This reliance on oil-fired generation has helped push the cost of production from U.S. $0.06/kWh in 2004 to a range of U.S. $0.117-$0.141/kWh in recent years.[82] Only two-thirds of total power generation is grid-connected. See Figure 2.

Figure 2: Power Supply in Indonesia[83]



80. *Id.*

81. *Id.*

82. Clean technology fund investment plan for Indonesia, *supra* note 71; *Geothermal Clean Energy Investment Project: Project Information Document (PID) Appraisal stage* (Report No.: AB5963); House of Representatives concerned on PLN, *supra* note 68.

83. Indonesia Energy Sector Assessment, *supra* note 65, Figure A5.

4. Detailed PPA, Tariff and Program Elements

It is the original program, because of its sophisticated market design, on which we devote detail. Table 13 sets forth in abbreviated format the regulatory system and contract characteristics of the original Indonesian SPP system, including its tariff differentiation for peak-period power delivery.

Table 13: Primary Elements of the Original Indonesia SPP Program[84]

<table>
<tr><td>Process</td><td>Controlled solicitation (Renewables and renewable cogeneration given highest priority.)</td></tr>
<tr><td>Maximum size</td><td>30 MW on Java-Bali; 15 MW on seven other island systems</td></tr>
<tr><td>Tariff</td><td>- Avoided cost for each island system.
- For firm renewable energy and capacity:
<table><tr><td rowspan="2">Location</td><td colspan="3">U.S. $ per kWh (1995)</td></tr><tr><td>On-peak</td><td>Off-peak</td><td>Weighted average</td></tr><tr><td>Java-Bali</td><td>$0.155</td><td>$0.04</td><td>$0.059</td></tr><tr><td>Other islands</td><td>$0.17</td><td>$0.05</td><td>$0.07</td></tr></table>- The dramatic devaluation of the rupiah since these tariffs were calculated caused withdrawal of the tariff during the Asian financial crisis. Because of the drastic devaluation of the rupiah, the above 1995 prices are not expressed in rupiahs.
- Ninety-five percent (of year one) floor under renewable SPP energy price in future years (not inflation adjusted), whereas energy price can increase with marginal system fuel prices year to year; capacity price adjusted by the U.S. dollar–to–rupiah exchange rate for five years.</td></tr>
<tr><td>Third-party retail sales</td><td>No</td></tr>
<tr><td>Self-wheeling</td><td>Allowed with permission</td></tr>
<tr><td>Energy banking</td><td>No</td></tr>
<tr><td>Standardized PPA</td><td>Yes</td></tr>
<tr><td>PPA term</td><td>- Firm: 5–20 years
- Non-firm: < 5 years</td></tr>
<tr><td>Subsidy or incentives</td><td>- Steeply incentivized on-peak tariff
- Exemption from import duties and certain income taxes
- Postponement of the value added tax and sales tax on luxury goods</td></tr>
</table>

The principal features of the original PPA agreements are given in Table 14.

84. Ferrey – World Bank, *supra* note 12, Table 5.

Table 14: Features of Indonesia SPP PPA before Later Modifications[85]

Feature	*Description of SPP feature*
Basic provisions	
1. Parties	The contract is made directly between the state utility and the SPP.
2. Milestones	The SPP has a period of two years after receiving its necessary permits to achieve commercial operation.
3. Delivery of power	The utility must accept all delivered power as long as operated pursuant to Good Utility Practices, unless the system is not able to accept power.
4. Output guarantees	The SPP pledges to commit to deliver a set amount of peak and off-peak capacity in a firm contract. Nonfirm contracts are also available. If the facility is capable of generation, it must generate and deliver power to PLN. It may not divert power to other buyers.
5. Engineering warranties	Power must be delivered at 50 Hz within 5% of nominal voltage.
Sale elements	
1. Power quantity commitment	In nonfirm contracts, there is no commitment of capacity, and energy is sold from time to time. In a firm contract for a period of years, the SPP is obligated to sell a dedicated quantity of dedicated capacity.
2. Metering	PLN owns the metering equipment. Telemetering is required. Independent third-party calibration is required. Meters are tested annually and require accuracy within 1%. There is established a hierarchy of which set of multiple meters is employed to measure the energy and capacity sold during each billing period, cascading to secondary metering sources when the primary metering is not within accuracy parameters.
3. Net metering or exchange	Not contemplated by the contract.
Risk allocation	
1. Sovereign risk and financial assurance	By contract, sovereign immunity is waived as a defense to suit. Otherwise, there is no limitation of sovereign risk.
2. Currency risk	As discussed below, there is indexation to the U.S. dollar currency exchange rate for capacity payments for the first several years. This allows repayment of the capital costs borrowed in foreign currency or to purchase foreign-produced generating equipment.
3. Commercial risk	The contract is set up so that the utility contracts for an entitlement of power, defined as a set amount of capacity plus its associated electric energy. The obligation to attempt to produce and deliver, and for the utility to take and pay for, that entitlement is absolute except for short justifiable interruptions on either side of the agreement.

85. Ferrey – World Bank, *supra* note 12, Table 12.

Feature	*Description of SPP feature*
4. Regulatory risk and change of law	Although there originally was a change of legal clause covering regulatory and tax changes to allow adjustment of the price term, that clause was later removed by the utility in alterations to the PPA designed by the consultant and previously accepted by all stakeholders.
5. Excuse and force majeure	Force majeure also is provided for both acts of God and other acts. The time limit for the maximum duration of a force majeure event is three years. This is at the most liberal extreme of the U.S. small power contracts surveyed. This provides more flexibility to attract small power producers. Force majeure is defined in a manner conventional for power sale agreements, including civil disturbance and failure of the sovereign to grant necessary permits. Failure to obtain necessary fossil fuel for the SPP or any other cause out of a party's control is also deemed to be a force majeure event. After 180 days, if not cured, the other party may elect to terminate after an additional notice of 90 days.
Transmission	
1. Transmission and distribution obligations	The SPP must deliver the power at its own cost to the delivery point, and pay for all interconnection and system protective costs. Since PLN is the only entity to whom the SPP may sell power, other than its host or otherwise allowed by license, there is no obligation of the utility to transmit power.
2. Interconnection arrangements	Two options are provided for interconnection at the election of the SPP. Either the utility can build and bill the SPP for the interconnection upgrades and equipment, or the SPP can construct the interconnection equipment pursuant to utility review and standards, and then dedicate such facilities to the utility. The latter option was the one implemented by the utility. If upgrades, repairs, or modifications are later required by the utility, the SPP must implement the same at its own expense.
Performance obligations	
1. Operational obligations	The SPP must use its best efforts to deliver power. However, failure to deliver power for short periods, while justifying damages to the purchaser, does not rise to the level of a cause for termination. However, the tariff is structured to impose significant loss of revenue to the SPP if it does not deliver capacity on peak. Provided in this contract are the following protections of PLN: • Seller forecasts of power to be produced and sold. • Seller information about SPP outages. • PLN ability not to take power when necessary. • SPP's operation in a manner consistent with PLN standards, codes, and Good Utility Practice. • PLN ownership of metering equipment. • PLN rights to facility access and inspection. • Advance notice to PLN of interruptions in sale. • Indemnification of PLN when the independent producer owns the interconnection facilities.

Feature	*Description of SPP feature*
2. Definitions of breach	There are no express remedies provided for breach and no explicit penalties in this contract. Although a failure to supply capacity has significant economic consequences for the seller. Moreover, no deposits or other security are required of the independent producer. There are no rights for PLN to take over the small power facility in the event that power is not provided. Typical commercial definitions are employed. Breaches must be cured as soon as possible. A party has 45 days after notice to cure a breach, or if it requires longer, such cure must be begun within 45 days and the cure accomplished within no more than two years. Failure to pay within 90 days is a breach.
3. Termination opportunities	Termination may not be made at the sole election of either party without cause. Cause for termination includes only uncured default, uncured nonpayment, or uncured force majeure.
4. Guarantees of payment and performance	The Agreement contains no guarantees of any performance obligations.
5. Assignment or delegation	Other than to subsidiaries for purposes of financing, the SPP may not assign or delegate its rights without the prior written consent of PLN, which may not be unreasonably withheld. A succession clause is included which has any successor to PLN assume its duties and rights regarding the contract.
6. Dispute resolution	The purpose of the dispute resolution provision is to keep the matter out of the Indonesian court system. The parties first pledge to attempt to informally settle any dispute among themselves during a period of 60 days. If not settled, the dispute is referred to the director general of the subministry of electricity. If not then resolved within 90 days, either party may refer the dispute to the Indonesian National Board of Arbitration, which will make a final determination.

F. VIETNAM

Vietnam has abundant fossil fuel resources. It has large off-shore natural gas resources. Crude oil production is estimated potentially to reach 25-30 million tons/annum and natural gas production could rise to 15-30 billion cubic meters/annum. Vietnam has significant coal reserves in its northern provinces, which produce coal for export beyond domestic coal requirements. Coal extraction is estimated to be able to reach 15-20 million tons of coal annually by 2020.

Its electric demand is expected to continue growing at a faster pace than GDP from 2010 to 2030, rising between 15 percent and 18 percent per year.[86]

86. *See* Nhan T. Nguyen et al., *Improving the Clean Development Mechanism Post 2012* (2010).

Over the last decade, demand for electricity increased by 14.9 percent per year for 1996-2000, 15.3 percent for 2001-2005, and 14.1 percent for 2006-2007. Between 1996 and 2007, the demand for electricity increased by more than 14 percent each year. It is predicted to grow at about twice the growth rate of the GDP, by 15 percent in a low-growth scenario and 18 percent in a high-growth scenario over 2010-2030.[87]

1. What Makes the SPP Program Distinctive

What makes the current Vietnam NSPPA program distinctive is the use of market and other incentives to attract small renewable power producers to one of the most centrally planned and managed economies in the world. That alone is significant. Vietnam has significant potential for the implementation of renewable energy development.[88] Vietnam is endowed with an abundance of natural resources and geophysical conditions that can be leveraged to generate significant amounts of renewable energy, including hydropower, wind, geothermal, sun, biogas and biomass,[89] and various forms of waste-derived energy.[90]

During 2010-2030, CO_2 emissions in the power sector are expected to quickly increase to approximately 352 million tons of CO_2 in 2030, which is several times the 45.9 million tons of carbon emissions emitted by the energy sector in the year 2000.[91] The potential for total sustainable renewable generation in Vietnam is significant. Seventy-five percent of Vietnam is mountainous or hilly. Vietnam has more than 2,200 rivers and streams of longer than ten km each, which could yield an estimated 8.0-10.0 TWh of power generation potential from a total installed generating capacity of 18,000-20,000 MW.[92]

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87. *Id.*

88. Germany Trade & Invest, *CDM Market Brief: Vietnam Case Study* (2009).

89. This is principally residues from sugar, rice, agriculture, and wood.

90. This is principally waste from landfills, animal farms, and tapioca starch.

91. N. Nguyen et al., *The Clean Development Mechanism in Vietnam* (2010); Climate Focus, *Renewable Energy Small Power Producers in Vietnam: Finance Consultancy*, for Vietnam Ministry of Industry and Trade (2008)*;* Institute of Energy, *Strategies for Promotion of Energy Efficient and Cleaner Technologies in the Power Sector* (2005).

92. Econ. Consulting Ass'n &Robert Vernstrom Ass'n, *EVN Tariffs: Interim Report* 42 (Sept. 2003).

In addition to hydro resources, Vietnam features 3,440 km of windy coast for wind turbine development, over 300 sub-terrain hot-stream sources ranging from 30 °C to 148 °C which can be developed for geothermal power generating, abundant sunshine and agriculture residues for energy use. Geothermal power capacity is estimated at 200 MW and perhaps as high as 400 MW; biomass cogeneration is estimated at 300 MW; wood and agricultural residues for the electric sector are estimated at 50 million tons/annum.[93]

During the rainy season in Vietnam, which runs from mid-June until mid-November, hydroelectric generation constitutes more than 60 percent of system generation and a lesser percentage in the dry season.[94] Small hydropower, biomass (in Vietnam utilizing bagasse and rice husk waste materials), and geothermal resources are cost-effective in Vietnam compared to conventional fossil fuel resources.

There is a central transmission grid running the length of the country. This transmission spine supports operation of a national power grid throughout the country, reaching all 64 provinces, 96 percent of the districts within the provinces, 78 percent of the communes, and 69 percent of the households.[95]

2. The Original SPP Program

In 2000 a consultant drafted a PPA for possible adoption. The draft SPP PPA was accompanied by a tariff design utilizing a "deemed energy" concept to pay the SPP for capacity in a manner unrelated to actual energy sale. With a two-part tariff involving deemed energy, the power buyer would pay under the capacity portion of the tariff even when the utility does not need or take RESPP power. Its features are displayed in Table 15. As set forth below, Vietnam did not proceed with this recommendation to utilize a split two-part tariff and the originally designed PPA incorporating it. The renewable energy program also did not proceed at this time.

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93. Ministry of Industry, *Master Plan Study on Electric Power Development in Vietnam, Summary Report*, 14 (Sept. 2001) (updated October 2002 & 2003).

94. *Id.*

95. *Id.* This does not mean than 69 percent of households actually subscribe as customers and consume electricity, rather that 69 percent of households have physical access to electricity.

3. Subsequent Modifications

This design of PPA was never implemented. The original consultant tasks were terminated in 2002, and the author was asked to take over tasks. The new consultants designed a new, non-negotiable standardized small power program (NSSPP) PPA and tariff as part of a Non-Negotiable Standardized Small Power Purchase Agreement (NSSPPA). The new tariff was not a split tariff, did not incorporate "deemed" energy value, and was based on avoided cost principles. In addition, the new consultants suggested a series of regulatory reforms to make renewable energy information more transparent and to make the renewable power market more accessible to new entrants.

Related to this, the Vietnam electricity market has been in the gradual process of some deregulation since 2005.[96] Under the government's current energy roadmap, the electricity sector will be opened in phases and fully to retail/household sales after 2022. Until then, the government sets the retail electricity price at a subsidized level of less than six cents/Kwh (U.S. $/kWh equivalent). The power sector is controlled and administered by the state utility, Electricity de Vietnam ("EVN").

Consultant reports for the Ministry of Industry and Trade[97] highlight the complex approval process to form a company allowed to conduct business or successfully complete a small power project in Vietnam in comparison to other countries. Vietnam is distinct from other countries surveyed above, because of many of the complex regulatory and economic factors identified in the Ferrey and Vernstrom Report in 2005.[98] Consultant reports in 2005 and 2006[99] identified the institutional impediments and needs for a viable SPP market in Vietnam.

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96. Professor Ferrey in 2004-2005 advised the Vietnam Ministry of Industry and Trade ("MOIT") on electric sector restructuring.

97. Nguyen Tuan Minh, *Legal Assistance to Ministry of Industry on Legal Issues Relating to RESPP Development in Vietnam* (July 2006); Steven Ferrey & Robert Vernstrom, *RESPP Planning and Preparation*, Final Report prepared for Vietnam Ministry of Industry (2006).

98. Steven Ferrey & Robert Vernstrom, *RESPP Planning and Preparation*, Final Report prepared for Vietnam Ministry of Industry (2005).

99. Id; Nguyen Tuan Minh, *supra* note 97.

4. Detailed PPA, Tariff, and Program Elements

It is important to focus, in the case of Vietnam, on program details of what was not acceptable renewable energy program design for this centrally planned and administered economy. The split "deemed" tariff was a primary point of contention. Table 15 sets forth details of the original rejected PPA and tariff.

Table 15: Features of Not Implemented Year 2000 Vietnam draft SPP PPA[100]

Feature	*Description of SPP feature*
Basic provisions	
1. Parties	The contract is made directly between the SPP and the state utility, EVN. As structured, no lender rights are expressly recognized, as they are in the Indonesian PPA. Parties are allowed to sign the contract in two different languages simultaneously. No matter how proficient the translation, there will be significant differences and nuances that can change the interpretation. Ideally, there should be a single executed PPA for each project: The parties should execute only one contract, in either Vietnamese or English, typically at the election of the SPP so that it can utilize the language that facilitates project debt financing.
2. Milestones	A milestone for commercial operation is contained in the PPA, but its length of time is not specified. It is individually negotiated.
3. Delivery of power	EVN must purchase all power supplied by the SPP. No delivery requirement is imposed if there is a forced outage. EVN has indicated that it is willing to purchase all excess power if it has operational control over the SPP. This interface and control will need to be carefully structured during final negotiations on a standardized PPA.
4. Output guarantees	The PPA allows the utility purchaser not to accept or pay for power where SPP facility maintenance is inadequate, but it does not affect the quality of the energy. This allows the purchaser not to pay for deemed energy output, and could mask Transmission and distribution (T&D) problems. This could discourage lenders not to participate in this program.
5. Engineering warranties	The SPP must be operated pursuant to Prudent Utility Practices, which are conventionally defined, in a manner similar to the commonly employed concept of "Good Utility Practices."
Sale elements	

100. Ferrey – World Bank, *supra* note 12, Table 19.

Feature	*Description of SPP feature*
1. Power quantity commitment	The agreement does not require the SPP to use best efforts to produce power (capacity) or EVN to accommodate and take power. There is no typical reciprocal obligation for the buy-sell transaction, where EVN must take, the SPP must produce and deliver. EVN can refuse to take power for any system-related reason. Otherwise, if it refused to take power, it must pay for deemed energy output.
2. Metering	The meters are maintained by EVN at the SPP's expense. The meters are calibrated at least every 12 months, with +/- 2% accuracy required. Secondary meters, installed at the expense of the SPP, are used to register quantity if the primary meters are not accurate; and if the secondary meters are not operable, estimation is done without any specific legal references for this estimation. So, this places the SPP at a disadvantage. There is no time limit on subsequent adjustment. There is a requirement that if one party thinks there is meter inaccuracy, the meters must be tested. The metering provision requires that both parties "shall" be present to break meter seals.
3. Net metering or exchange	There is no provision for net metering and no direct sale at retail is allowed the SPP.
Risk allocation	
1. Sovereign risk and financial assurance	Nationalization or expropriation of the SPP assets by the government is deemed an event of default by EVN. However, the remedy for such is not clearly specified and could be difficult to enforce in any Vietnamese tribunal. After notice of default, the defaulting party has 60 days, plus an extension of another 30 days, to cure the default before it terminates the agreement.
2. Currency risk	SPPs would be paid in Vietnam dong, so there would be no protection for currency fluctuations. The dong is subject to a fixed exchange and has been relatively stable.
3. Commercial risk	Commercial risk under the contract is borne by the SPP. The types of insurance required of the SPP are specified by contract without specifying the amount of coverage, any requirement to name the buyer as an additional insured, or any other requirements.
4. Regulatory risk and change of law	There is no provision on this risk.
5. Excuse and force majeure	"Force majeure" is defined as any third-party or extraneous action that interrupts performance. This would include failures of supplies, fuel, or T&D capacity. "Forced outages" are defined only to include investigations, repairs, and replacement. Force majeure does not include failure to comply with EVN interconnection or grid standards or failure of a supplier to perform. Under the draft PPA, if something is wrong with the T&D system or repairs are necessary, then EVN pays for power it does not receive and gains no revenue because it cannot resell. However, if there is a force majeure event affecting EVN, there is no payment for this phantom energy. However, there is not a clear delineation between these two kinds of events in the draft PPA.

Feature	*Description of SPP feature*
6. Resource Risk	For hydro projects, there is resource risk from draught and upstream appropriation of stream flow. This contract, employing a two-part tariff, allocates the energy payment risk of the PPA to the SPP owner, and allocates the capacity payment risk to the buyer of capacity.
Transmission	
1. Transmission and distribution obligations	Since there is no ability to wheel retail power or to make third-party sales, wheeling obligations of the utility to not arise. At the interconnection delivery point, the power becomes the property of EVN.
2. Interconnection arrangements	Interconnection is designed and constructed by EVN. These costs are billed to the SPP. SPPs are concerned about a lack of standardized interconnection procedure.
Tariff issues	
1. Type of tariff	There was no standardized SPP tariff. The SPP power purchase price was to be negotiated on a case-by-case basis by EVN. EVN negotiates this tariff to attempt to not lose money on its retail resale of IPP and SPP power. Therefore, it subtracts from the average retail tariff its average transmission and distribution charges, yielding a residual value for the maximum SPP price. This methodology (a) utilizes average system cost concepts and (b) is limited by state-set retail tariffs for a system that does not earn sufficient revenues to cover its fully loaded costs. By contrast, the avoided cost concept of SPP program design is predicated on marginal costs.
2. Capacity obligations	The consultant in year 2000 recommended a dry and wet season tariff, with a U.S. $0.013 per kWh "minimum supply bonus" for SPPs that commit and deliver at least 70% of their capacity in a given month. There also is a deemed energy concept, that obligates the purchaser to pay for energy when the buyer elects not to take energy for non-emergency reasons. This is similar to a "take or pay" provision. Minor problems with EVN acceptance can result in payment for output that cannot be taken. The adaptability of this concept to small renewable projects is not yet demonstrated in Vietnam.
3. Fuel price hedging	There is no fuel price hedging with an avoided cost-based tariff.
4. Update mechanism	There was no update mechanism. Update and escalation provisions could allow more flexibility for EVN to pay a higher cost for SPP power over time.
5. Tariff penalties for nonperformance	Other than the "minimum supply bonus" mentioned above, the tariff itself does not contain internal incentives to encourage the SPP to deliver power on peak. The final tariff proposal did not load capacity payments into the delivered energy price. The PPA implied that the project is dispatchable; however, this contract did not otherwise provide dispatch control to EVN. For small renewable projects, dispatch is not an ordinary operating paradigm. However, if EVN elects not to take power without a scheduled repair or force majeure event, it must pay for deemed energy.
Performance obligations	

Feature	*Description of SPP feature*
1. Operational obligations	The agreement does not require the SPP to use best efforts to produce power (or commit capacity), or EVN to accommodate and take power. There typically would be a reciprocal obligation—EVN must take, the SPP must produce and deliver. Where there are no penalties for nondelivery imposed on the SPP, there typically would be more flexibility for EVN acceptance. EVN can refuse to take power for any system-related reason. Otherwise, if it refused to take power, it must pay for deemed energy output.
2. Definitions of breach	Default occurs if permits cannot be obtained by the SPP. This failure, or an improper assignment or failure to carry insurance, could result in a default whether or not it would be deemed a material breach otherwise. Typically, only for material breaches are damages (but not default and cancellation) the appropriate remedy. Cancellation is not a particularly effective remedy for the SPP under certain default scenarios because there is no allowed net metering or other retail or wholesale power sale opportunity.
4. Guarantees of payment and performance	There are no sovereign or other guarantees of performance by the utility. In a socialist economy, both the seller and purchaser of power are state entities.
5. Assignment and delegation	Any assignment requires the prior written consent of the other party, which shall not be unreasonably withheld. Without consent the SPP can assign to an affiliate or for the purposes of financing the facility.
6. Dispute resolution	If a dispute ensues, the parties shall try to settle the dispute informally for 30 days. If not resolved, the dispute is submitted to arbitration. The place of arbitration and the rules under which resolution is pursued are left blank for the parties to complete. Either party has the ability to cut off the other party's court rights by making a unilateral referral to the arbitrator.

III. COMPARISONS AND CONCLUSIONS

A. Lessons

These five Asian nations and six states offer different forms of government and have different predominant fuel sources in their generation base (hydro, coal, gas, oil). They share key similarities:

- All were in need of long-term increases in power generation capacity (although Thailand has a short-term current surplus).
- All have the potential of small-scale renewable energy options.
- Each country is being approached by private developers who seek to develop renewable SPP projects.
- Each system employs either deliberately or *de facto* a standardized PPA.

They have achieved and can achieve in just a few years a substantial contribution of new renewable small power projects to the national energy supply. Table 16 displays key comparative elements of program design and implementation regarding primary generation source for projects, size limitations, whether there were premiums for renewable power, and year begun in five of the programs surveyed.

Table 16: Comparative Asian Renewable Power Program Overview[101]

Country Program	Year Begun	Maximum Size (MW)	Premium for Renewable Energy	Primary Fuel Used	Eligible PPA Solicitation
Thailand	1992	60 or <90	Yes, competitive bid	Gas	Controlled period
Indonesia (original program)	1993	<30 Java <15 other island grids	No	Renewable energy	Controlled Period
Sri Lanka	1998	<10	No	Hydro	Open offer
India: Andhra Pradesh	1995	<20 Prior <50	Yes, in tariff	Wind	Open offer
India: Tamil Nadu	1995	<50	No	Wind	Open offer

While much has been written about renewable energy and the World Bank has archived 250 key renewable energy assessments and documents regarding developing countries in a "toolkit,"[102] only two of these files document "best practices" in developing countries, and only one of these addresses program, PPA and tariff "best practices."[103] The conclusion in the 2004 assessment of "best practices" based on the first decade of experience, remains significantly true over time. What's past is prologue.[104]

The key legal document to facilitate private sector PPAs is a fair

101. Ferrey – World Bank, *supra* note 12, Table 1.

102. *See* http://en.openei.org/wiki/World_Bank_Renewable_Energy_Toolkit.

103. Bernie Tenenbaum, *Regulatory of Grid and Off-Grid Electrification: Three Observations and Six Principles*, World Bank (2004) (contrasting 'light' regulation with 'heavy' regulation), *available at* http://siteresources.worldbank.org/EXTRENENERGYTK/Resources/5138246-1237906527727/Regulation_of_Grid_and_Off-Grid_Electrification.pdf; Ferrey – World Bank, *supra* note 12.

104. William Shakespeare, The Tempest (1610).

and neutral power purchase agreement which obligates the utility to purchase independently produced renewable power. Table 17 displays salient comparative elements of legal design of the power purchase agreement and contractual entitlement in five of the Asian programs surveyed. A "firm" sale requires the power seller to commit to sell a set quantity or capacity of power to the purchasing utility; a "non-firm" sale allows the seller to vary the quantity of power it elects to sell at any time. Each of these regulatory embellishments benefits the independent small power seller. Key provisions of the legal structure and the standardized power purchase agreements (PPAs) in each of these countries are evaluated and critiqued in Table 17, as to

- Basic structure
- The elements of power sale and metering
- Allocation of various risk parameters among the parties to the PPA
- Interconnection and transmission provisions
- Tariff and price design for the power sale transaction
- Parameters of SPP operation and breadth of obligation
- Dispute resolution

Table 17: Comparative PPA Elements[105]

Country Program	Standard PPA?	Maximum years	Third-party sales	Self-service wheeling	Net meter-banking
Thailand	Yes	20-25 firm 5 nonfirm	No, under consideration	No, under consideration	Yes, if <1 MW
Indonesia	Yes	20 firm 5 nonfirm	No	Yes	No
Sri Lanka	Yes	15	No	No	No
India: Andhra Pradesh	Not formally, but a de facto standardized form	20	No, previously allowed	Yes, but very expensive	Yes
India: Tamil Nadu	In development	5-15	No, previously allowed	Yes	Yes

105. Ferrey – World Bank, *supra* note 12, Table 2.

To provide some detail regarding the terminology used in the table above, third- party sales allow the renewable power generator to sell at retail to power consumers directly, bypassing the wholesale sale to the state utility. This provides alternative options to secure a revenue stream to such a project. Self-service wheeling allows use of the utility transmission system to put power into the power grid at, for example, the wind generation site and withdraw an equivalent amount of power at one's factory or business at a distant location from the generation. This essentially allows a virtual geographic "bridge" between a power generation source and the owner's point of consumption of that power. Net metering is the ability to sell surplus self-generated power to the utility grid, receiving a credit or turning one's retail consumption meter in reverse to reflect such sale back to the utility.[106]

Note also that the avoided cost concept and a standardized PPA are generally utilized in many programs, with some diversifying to employ a FiT. An SPP program can be initiated and sustained either by an open offer to execute PPAs, or by an ordered and time-limited solicitation process.

The single state buyer of power in most of the electric sectors can more robustly and efficiently promote renewable SPPs, either by (a) a program for purchase of all SPP power at its full value (at least avoided cost) to the wholesale system, or (b) the introduction of some combination of third-party retail sales, net metering–energy banking, or third-party wheeling.

Note the differing policies in different programs on direct retail third-party sales, self-wheeling, and net metering or energy banking.[107] Table 18 displays comparative elements of the PPA tariff in these same countries. The tariff sets the price that the country's utility agrees in the PPA to purchase wholesale power produced under the SPP independent energy programs. "Avoided cost" was previously defined.[108]

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106. *See* S. Ferrey, *Nothing But Net: Renewable Energy and the Environment, MidAmerican Legal Fictions, and Supremacy Doctrine*, 14 Duke Envtl. L. & Pol'y. Forum 1, 52-65 (2003).

107. Ferrey-World Bank, *supra* note 12, at 14. For a discussion of these topics, *see* S. Ferrey, *The Law of Independent Power*, §§ 10:1, 4:26-4:27. (Thomson/Reuters/West Publ., 2013 ed., Vol. I).

108. *See* Ferrey – World Bank, *supra* note 12, at 56; 18 C.F.R. 292.101(6); *see also* The Law of Independent Power, *supra* note 107, §§7:1-7:5.

Table 18: Comparative Tariff Elements[109]

Country program	Avoided cost basis	Indexed to foreign currency	Periodically adjusted	Design elements
Thailand	Yes, energy and capacity payment for firm contracts only	No	Yes	Utility purchases 65% of off-peak power
Indonesia (Original design)	Yes, both energy and capacity	Yes	Yes, for changes in avoided capacity cost	Steep on-peak incentives; differentiated for each island grid
Sri Lanka	Originally yes, energy only; nondispatchable units received less than full avoided energy cost; later switch to feed-in tariff	Not directly, but price linked to dollar-denominated imported oil price	Yes, and included foreign fuel component	Originally, avoided cost calculated annually, based on three-year moving average imported oil price
Andhra Pradesh	Yes, not to exceed 90% of retail tariff	No	Yes	Reset every three years
Tamil Nadu	Exceeds avoided cost	No	Yes	Higher tariff for biomass than wind

Note that both an "avoided cost" tariff concept and a standardized power purchase agreement were utilized initially in most successful SPP and renewable energy programs in developing nations. Feed-in tariffs can attract even more vigorous renewable energy participation, but have proven costly for several countries. Even where developing nations feature different forms of governance and have different predominant fuel sources in their power generation bases (hydro, coal, gas, or oil), there are common principles that are present for successful small renewable energy programs. Several important lessons for future design of legal infrastructure of successful renewable programs are revealed from the experience to date[110]:

- **Transparent Regulatory Process.** A transparent regulatory process is required to build investor, developer, and lender confidence.
- **Standardized PPA.** All programs employ either *de jure* or *de facto* standardized PPAs; all afford some form of long-term firm contract commitment.

109. Ferrey – World Bank, *supra* note 12, Table 3.

110. *Id.* at 11-13.

- **Legal Dispute Resolution Mechanism.** A legal framework for structured project development that features an acceptable mechanism for fair and prompt resolution of disputes between buyer and seller of power is necessary.
- **Allocation of Legal Risks.** A variety of commercial, sovereign, currency, and regulatory risks are implicitly or expressly allocated in the power sector.[111] The Thai program reduces the future SPP payment for capacity where the SPP does not deliver. Tamil Nadu facilitates SPP power wheeling.
- **Interconnection Requirements.** Utilities must interconnect the utility grid with renewable energy SPP projects subject to a straightforward procedure to accomplish this without significant transaction costs or interconnection risk.
- **Legal Milestones and Bid Security.** To eliminate the speculative risk of slow or non-development, the Thai program requires a bid security deposit of 500 baht per kW (U.S. $12 per kW) of capacity pledged in the PPA.[112] This puts at risk "earnest money" of the developer to proceed expeditiously. Sri Lanka, beginning in 2003, placed a new six-month limit on the validity of Letters of Intent granted to renewable project developers and required bid security bonds of SL Rs. 2,000 per kW (U.S. $20 per kW)[113] to prevent developers from hoarding sites.
- **Tariff Principles.** The state utility has a monopsony on the purchase of wholesale power in most of the electric sectors of developing nations of the world. They are the only entity to whom independently produced power can be sold. To yield a fair rate for this sale, the power purchasing utility and transmission provider (also typically the same utility) must be subject to objective PPA and tariff principles to set a tariff at least at avoided cost. A feed-in tariff also is used in some programs today.
- **Renewable Set-Aside.** The program in Thailand allocated government entitlements and subsidies in order of the most preferred renewable energy projects, favoring the lowest requested subsidy for renewable projects. It later adopted an "adder." A variant of this in 29 U.S. states employ a

111. For a discussion of these topics, see The Law of Independent Power, *supra* note 107, § 3:10.

112. Ferrey-World Bank, *supra* note 12, at 12, 16, 24.

113. Ferrey-World Bank, *supra* note 12, at 53, 58.

renewable portfolio standard to subsidize a minimum percentage of renewable energy power incorporated in the supply portfolio of each retail seller of power.[114]

- **Third-Party Sales.** None of these Asian SPP programs currently allow direct third-party retail sales of power by the SPP (except in limited industrial estate areas). However, other states in India do allow direct retail sales, and other programs are considering this embellishment.[115]
- **Net Metering and Energy Banking.** Energy banking is allowed in 80 percent of the states in the U.S. in the form of "net metering."[116] Several of the Asian countries adopted energy banking variants, and in 2009, Sri Lanka adopted net metering.

Table 19 highlights the successful legal contours of programs which have been implemented in developing nations in fast-growing Asia. This table sets forth whether renewable projects come into the program through either a controlled bid/solicitation or through an open enrollment process, both of which have proved successful in different countries. Table 18 documents whether security deposits, project milestones, or neither is utilized to prevent projects in the program from stalling. It is indicated whether a standardized long-term power purchase agreement is utilized to protect the renewable energy producer.

Elements of the tariff for the sale of power are highlighted, including whether it is based on accepted avoided cost or other principles; whether the power seller is paid for sale of electrical capacity as well as energy supplied; and how that capacity payment is adjusted downward if there is a failure to supply by the power seller. It is also indicated whether or not the power buyer, the utility, has the ability to dispatch the generating unit or tell it when it can operate on the system to sell power. Finally, the embellishments of power wheeling, energy banking, and net metering, each of which provides additional options to the power seller, are indicated in Table 19 .

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114. *See* S. Ferrey, *Renewable Orphans: Adopting Legal Renewable Standards at the State Level*, Electricity J. 52, 54 (Mar. 2006).

115. Ferrey-World Bank, *supra* note 12, at 14.

116. S. Ferrey, *Nothing But Net*, 14 Duke Envtl. L. & Pol'y J. 1, 15, 54-55 (2003).

Table 19: PPA Successful Management Design and Practices[117]

Successful design and management practice features	Thailand	Indonesia	Sri Lanka	India: Andhra Pradesh	India: Tamil Nadu
PPA size <0.5% of system capacity	Yes	Yes	Yes	Yes	Yes
Open offer if need capacity	n.a.[118]	No, but very large solicitation	Yes	Yes	Yes
Controlled solicitation if surplus capacity	Yes	n.a.	n.a.	n.a.	n.a.
Milestones on development time afforded SPP	n.a.	Yes	Yes	Yes, if NEDCAP financial guarantees	n.a.
Bid security deposit by SPP	U.S. $12 per kW	n.a.	U.S. $20 per Kw	n.a.	n.a.
How renewable technologies are encouraged	Competitive award subsidy	Hierarchy of renewable SPP preference; floor price on renewable power	Floor price on renewable power	Tariff differentiated for base load power and intermittent renewable SPPs	None
Competitive solicitation	Yes	Yes	No	No	No
Standardized PPA	Yes	Yes	Yes	Yes	No, under development
Long-term firm PPAs	Yes	Yes	Yes	Yes	Yes
Avoided cost based tariff	Yes	Yes originally	Yes originally; later FiT	FiT not to exceed 90% of industrial retail tariff	FiT not to exceed 90% of industrial retail tariff
Capacity payment for long-term power	Yes	Yes	No	No	No
Allocation of performance risk between seller and buyer	Alteration of capacity payment; utility can refuse delivery	Neutral; originally mutual best efforts	Neutral; mutual best efforts	Nonfirm, but utility must accept all power	Nonfirm, but utility can refuse delivery

117. Ferrey – World Bank, *supra* note 12, Table 9.

118. n.a means not applicable.

Successful design and management practice features	Thailand	Indonesia	Sri Lanka	India: Andhra Pradesh	India: Tamil Nadu
Capacity payment adjustment if seller does not deliver power	Yes	No, capacity payments in peak rate	n.a.	n.a.	n.a.
SPP unit dispatchable	Yes, if firm capacity PPA; 80% minimum annual output purchase obligation	No, as PPA originally conceived; after PPA later changed dispatchable without limitations	No	No	No
Wheeling, net metering, or energy banking	Limited energy banking	Wheeling	n.a.	Energy banking, wheeling	Energy banking, wheeling

B. Embellishments for Renewable Power in Developing Nations

There is now an additional international incentive for small renewable power programs. A few developed countries have committed to the largest sustained international transfer of wealth in history: A commitment of an additional U.S. $100 billion/year of foreign aid continuing indefinitely in perpetuity for the explicit purpose of dealing with global warming risk.[119] There were GHG reduction pledges made by developed countries at the 1997 Kyoto Protocol,[120] at the 2007 Bali COP,[121] at the 2009 Copenhagen COP,[122] and at the 2010 Cancun COP[123] and a fast-start pledge.[124] The United Nations Climate Change Conference in Copenhagen set a goal of mobilizing U.S. $100

119. U.N. Secretary-General's High-Level Advisory Group on Climate Change on Financing, Report, 2 (Nov. 5, 2010).

120. *See* http://unfccc.int/kyoto_protocol/items/2830.php.

121. *See* http://www.guardian.co.uk/environment/2007/nov/30/bali.climatechange; http://www.guardian.co.uk/environment/2007/dec/15/bali.climatechange4; http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3.

122. *See* http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf#page=4.

123. *See* http://www.huffingtonpost.com/2010/12/08/cop-16-un-conference-dee_n_794094.html; http://www.guardian.co.uk/environment/2007/dec/15/bali.climatechange4.

124. *See* http://pdf.wri.org/climate_finance_pledges_2010-10-27.pdf.

billion per year by 2020 to support mitigation and adaptation activities in developing countries, plus U.S. $30 billion in "fast start" finance during 2010-2012. Korea is the recently selected host of the Green Climate Fund.

In the interim, the CDM allows projects that reduce greenhouse gases in developing nations to earn Certified Emission Reductions (CERs) for each ton of CO_2-equivalent of GHG reduced.[125] Those CERs are then traded or sold to owners of activities in Annex I developed countries, which increase that country's carbon emission cap allocated in the Protocol. CDM CERs are required to be "additional" to baseline project emissions, which involve the establishment of an individual emissions baseline, taking account of sector reform initiatives, barriers to expansion, and sector expansion plans.[126] Credits generate value for a maximum of seven years with two renewals (21 total years), or a maximum of 10 years with no renewal.[127]

CDM projects may only be pursued by registration of the credit through Annex 1 countries.[128] The first CDM project was registered on 16 February 2005; by 2013, the CDM had approved 5,000 offset projects, with another several thousand awaiting approval.[129] While the CDM remains the only established institutional instrument allowing an active role for the developing world in carbon mitigation credit activities to enhance renewable energy project financing. To date, world-wide, renewable energy projects account for less than one-third of CDM CERs; methane capture and flaring projects producing no electricity, mostly located at large landfills, coal mines, and CAFOs, account for 19 percent of CERs. Most of the CERs are from industrial emissions mitigation. Over 80 percent of registered CDM projects are currently being carried out in Asia, which opens huge potential for renewable energy projects.[130]

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125. *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change art 12, Dec. 10, 1997, 37 I.L.M. 22 (1998).

126. *Id*. at art 3, 5, 7.

127. *Id*. at art 12.

128. *Id*; Marrakech Accords.

129. United Nations Framework Convention on Climate Change, *CDM Insights*, *available at* http://cdm.unfccc.int/Statistics/Public/CDMinsights/index.html.

130. United Nations Framework Convention on Climate Change, *CDM in numbers*, *available at* http://cdm.unfccc.int/Statistics/index.html; Nguyen, N. T., Ha-Duong, M., Greiner, S., & Mehling, M., *Improving the Clean Development Mechanism post-2012: A developing country perspective* (2010).

However, the new Green Climate Fund may fundamentally alter renewable power economics and programs in developing countries. Because power sector investments are long-term and overseen by public sector regulators, and developing countries have goals to extend power supply to all consumers, renewable power respresents the "fail-safe" climate change mitigation investment. It should be a principle focus of the Green Climate Fund. Even now, there are FiT "adder" programs proposed for at least one of the Asian countries profiled in Section II, where an additional tariff payment for specific renewable energy projects would be funded by donors rather than the power purchasing utility and its ratepayers and secured through international carbon markets.[131] This improves both the financial and legal security of a participating project. With unprecedented future subsidy commitments from developed nations, when one analyzes these innovative regulatory initiatives for renewable power in the above-surveyed developing nations, there is a model of proven practices for how to best structure a low-carbon high-development growth curve for the fundamental electric infrastructure of developing nations.

131. Information is available through author, but is kept confidential until this new program develops.

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