Resetting International Law Linkages: COP 20 Mechanisms and Protcols

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Abstract:
The article reviews the experiences of programs to promote renewable energy in Southeast Asian countries and proposes some learned lessons that can be useful in the context of COP 20 to promote renewable energy.

The article analyzes the rates and mechanisms of promotion used in countries such as India, Indonesia and Vietnam, that are led by the World Bank. These mechanisms are used as a legal basis that proposes successful tested alternatives and its usefulness is that renewable energies can be implemented within the current legal structure of international environmental law.

In conclusion, it is the correct timing for the COP 20 to secure funds and international legal mechanisms that promote sustainable energy infrastructure.

Keywords:
Environmental Law – Green economy – Climate change – COP 20 – Certified Emission Reductions (CERs) – Clean Development Mechanism (CDM) – Greenhouse gas (GHG)

Content:

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1. Setting the stage: the global challenge, the CDM opportunity

1.1 The CO2 Imperative and Energy

Within a century, if all nations of the world do not limit their greenhouse gas («GHG») emissions, «the average global temperature will climb anywhere from 1.4° to 5.8° Celsius» (or 2.5° to 10° Fahrenheit).[1] To accomplish such a GHG limitation, will require a dramatic reduction of emissions over the next generation, and to «near zero by 2100».[2] This will only be possible if we «can demonstrate that a modern society can function without reliance on technologies that release carbon dioxide (...)».[3] An official with the Intergovernmental Panel on Climate Change (IPCC) concluded that developed nations will need to slash CO_2 emissions almost entirely by 80 to 90 percent by 2050 to hold GHGs to 450 ppm in the atmosphere.[4] Complicating this, CO_2 lingers in the atmosphere for decades,[5] perhaps even hundreds of years,[6] thus causing concentrations of GHGs which cause the warming to be maintained for generations after the actual emissions.

Global CO_2 emissions are rising at the rate of approximately 10% per year.[7] The thirty richest nations in the world (members of the Organization for Economic Cooperation and Development, or «OECD») produce a slight majority of the world CO_2 emissions, estimated at about twenty-five gigatons (Gt) annually.[8] The crossover point is projected to be no later than 2020, when OECD countries and developing countries each are projected to emit roughly comparable annual amounts of CO_2 into the atmosphere. By 2030, the position of developed and developing nations will have reversed, with developing countries providing the dominant share of CO_2 emissions, and the developing country share increasing proportionally more than that of developed countries over time into the foreseeable future.[9]

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.[10] Even if all developed countries could achieve a Herculean reduction of eighty percent of their GHGs by 2050, this would not achieve Kyoto Protocol goals without simultaneous vigorous participation by developing countries.[11] If not simultaneously addressed, the annual increase in GHG emissions from India, China, Brazil, Indonesia, or any one of several dozen fast-growing developing nations, will cumulatively swamp all of the collective GHG reductions achieved by developed nations complying with the requirements of the Kyoto Protocol.[12]

1 Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [IPCC], Climate Change 2007: Impacts, Adaptation and Vulnerability45tbl.3.1(Martin Parry et al. eds., (2007)).The IPCC 4th Assessment Report calculates temperature increases in a range of increasing 2.4-6.4 degrees C. This would yield a 0.26–0.59 meter rise in sea levels during the 21st century. *Id.*

2 *See,* Michael MacCracken, *Prospects for Future Climate Change and the Reasons for Early Action*, 58 J. Air & Waste Mant.Ass'n., 735, 735 (2008); *see also* Tony Blair, The Climate Group, «Breaking the Climate Deadlock: A Global Deal for our Low-Carbon Future 9 (2008).

3 *Id.*

4 Steven Ferrey, *The Failure of International Global Warming Regulation to Promote Needed Renewable Energy*, 37 B.C. Envtl.Aff.L. Rev. 67, 72 (2010) (citing Rick Mitchell, *IPCC Official Says Industrialized Nations Must Cut Emissions up to 95 Percent*, 39 Env't Rep. (BNA) 1917 (2008)).

5 Nat. Acad. of Sci. et al., Understanding and Responding to Climate Change 16 (2006).

6 See Susan Soloman, 106 P.Nat.Acad.Sci. 1704 (2009)(Instead of lasting 100 years, CO2 warming impact could last 1,000 years or more).

7 *See* Ray Purdy, *The Legal Implications of Carbon Capture and Storage under the Sea*,7 Sustainable Dev.L.&Pol'y 22, 23, tbl.1 (2006).

8 *Id.* at 23, tbl.1. OECD and developing countries collectively contribute more than 90% of all CO2 emissions and are projected to continue this percentage over time.

9 *Id.*

10 International Energy Agency, «World Energy Outlook, 2004,» at 31.

11 Mohamed T. El-Ashry, *An Overview of this Issue: Framework for a Post-Kyoto Climate Change Agreement*, 8 Am. U. Sustainable Dev.L. & Pol'y 2 (2008).

12 The Kyoto Protocol, did not achieve its target of reducing GHG emission to 7% below composite 1990 levels by its 2012 target. Between 1990-2004, the 41 Kyoto Protocol Annex 1 developed nations, excluding the countries with «economies in transition» (the former Soviet economies), increased GHG annual emissions by 12.1%. U.N. Framework Convention on Climate Change, *National greenhouse gas inventory data for the period 1990–2004 and status of reporting*, Oct. 19, 2006, U.N. Doc. FCCC/SBI/2005/18, *available at* unfccc.int/resource/docs/sbi/eng/26.pdf. These developed countries were responsible for 18.6 billion tons of GHGs emitted annually. *Id.* One hundred twenty-two developing nations reported 11.7 billion tons of GHG emissions in 2004. U.N. Framework Convention on Climate Change, *Sixth Compilation and Synthesis of National Communications from Parties Not Included in Annex 1 to the Convention*, Oct. 25, 2005, U.N. Doc. FCCC/SBI/2005/18/Add.2. Therefore, approximately 40% of GHGs are from developing countries. This may actually understate the percentage because only 122 of about 160 developing nations are included in this U.N. report database, and there may be data gaps and underreporting in some of the 122 countries that do report. Assuming that the Kyoto targets are achieved by 2020, a world reduction in carbon is only achieved if the developing nations of the world do not base their increasing electrification on carbon-based fuels. If the 41 «developed» Annex 1 nations potentially regulated by the Kyoto Protocol were to reduce their emissions by 20% from current levels, they would approximately achieve their Kyoto Protocol targets. Since these Annex 1 countries currently emit no more than 60% of world carbon, this would constitute an approximately 12% reduction in world carbon emissions. However, if the non-Annex 1 developing nations, currently representing about 40% of world carbon emissions, increase their electricity demand (and other GHGs) by the forecast 4% annually between 2007 and 2020 (2004 World Energy Assessment, at 31), that is a cumulative compounded increase of about 60% of power use from that more than 40% base share. U.N. Dev. Programme, World Energy Assessment: Overview 2004, at 31, U.N. Sales No. E.04.III.B.6 (2004). If those developing nations utilize predominately fossil fuels for this power sector expansion (and transportation fuels, etc.), that is an increase of 24% in carbon emissions in developing

The United States Energy Information Administration (EIA) forecasts a fifty percent worldwide increase of carbon emissions between 2005 and 2030 as the most likely forecast scenario.[13] The International Energy Agency forecasts a twenty-five to ninety percent increase over the same period.[14] The International Energy Agency concluded that absent a major policy change, CO_2 emissions could increase 130 percent by 2050.[15] Most of the projected increase will occur in developing countries, whose emissions are projected to grow five times as fast as emissions from industrialized countries over the next twenty-five years.[16]

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.[17] More than one-third of CO_2 emissions are attributable to the electric power sector.[18] Ninety-eight percent of anthropogenic CO_2 emissions are from combustion of fossil fuels.[19] Fossil fuel generation results in percent of total human-made atmospheric CO_2.

The International Energy Agency forecast that by 2030, world demand for energy will grow by 59 percent and fossil fuel sources will still (as they do now now) supply approximately 82 percent of the total, while non-carbon renewable energy sources supply only 6 percent of the total.[20] At current rates of energy development, energy-related CO_2 emissions in 2050 would be approximately 250 percent of their current levels under the existent pattern.[21] World countries are on a vector of increasing power use linked to increasing GHG emissions. As a world-wide linkage, it will require innovations in international law to accomplish necessary changes to reduce GHG emissions.

1.2 The international regulatory mechanism

The April 2008 Bangkok talks following the 2007 United Nations Climate Change conference in Bali, concluded that a post-2012 international carbon scheme should look much like the pre-2012 Kyoto Protocol regime, including trading of allowances and the creation of additional credits or «offsets» through the existing Kyoto Joint Implementation (JI) and the Clean Development Mechanism («CDM»).[22] The CDM allows projects which reduce greenhouses gases in developing nations to earn Certified Emission Reduction credits (CERs) for each ton of CO_2-equivalent GHG reduced.[23] Those CERs are then traded or sold to those industries regulated in Annex I developed countries which increases those countries' GHG emission cap allocated by the Protocol.[24] Credits generate value for a maximum of seven years with two allowed periods of renewals (twenty-one total years), or a maximum of ten years with no renewal.[25] CDM projects may only be pursued by registration of the credit through Annex 1 countries.[26] 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.[27]

nations. Thus, the carbon increase in developing nations could completely negate by a factor of two the carbon reductions that the Kyoto Protocol seeks to achieve in Annex 1 developed countries. The use of fossil fuels for power generation in developing countries often employs older combustion technologies that do not utilize the most effective emission control technologies. Moreover, it is important to note that the Kyoto Protocol is *not* achieving its targets in the Annex 1 countries which demonstrated a composite 12% increase since 1990, so these assumptions of success in the developed countries may be optimistic.

13 Energy Info. Admin., U.S. Dept. of Energy, DOE/EIA-0484(2008),International Energy Outlook(Sept. 2008), *available at* http://www.eia.doe.gov/oiaf/archive/ieo08/pdf/0484(2008).pdf.

14 U.N. International Panel on Climate Change, Fourth Assessment Report: Climate Change2007(Rajendra K. Pachauri et al. eds., 2007).

15 *Energy Estimates Show Rise in CO2 Emissions, Offer Mitigation Options*, Inside EPA's Clean Energy Rep. (June 26, 2008), http://cleanenergyreport.com/2008062699158/Carbon-Control-Daily-News/News/energy-estimates-show-rise-in-co2-emissions-offer-mitigation-options/menu-id-202.html.

16 Energy Info. Admin., U.S. Dept. of Energy, DOE/EIA-0484(2008), International Energy Outlook at 89 (Sept. 2008), *available at* http://www.eia.doe.gov/oiaf/archive/ieo08/pdf/0484(2008).pdf.

17 National Energy Foundation, «*Fuel Consumption Statistics*,»available at http://www.nefl.org/ea/eastats.html.

18 *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.

19 U.S. Dept. of Energy, EIA, Emission of Greenhouse Gases in the United States, 1998 (1999).

20 International Energy Agency, «*World Energy Outlook 2004*,» available at www.worldenergyoutlook.org.

21 International Energy Agency, «Energy-Technology Perspectives – Scenarios and Strategies to 2050,» 2006.

22 Eric J. Lyman, *«Progress» of Bangkok Talks Shows Much Still to be Done for 2009 Global Agreement*, 39 Env't Rep. (BNA) 704 (2008). For discussion of Joint Implementation (JI), *see Joint Implementation*, U.N. Framework Convention on Climate Change, For discussion of CDM, s*ee, The Clean Development Mechanism*, U.N. Framework Convention on Climate Change, http://cdm.unfccc.int/index.html; http://unfccc.int/kyoto_protocol/mechanisms/joint_implementation/items/1674.php.

23 Kyoto Protocol to the U.N. Framework Convention on Climate Change, Dec. 11, 1997, 2303 U.N.T.S. 148 (1998) [hereinafter «Kyoto Protocol»] art. 12(3)(a); United Nations Framework Convention on Climate Change, Conference of the Parties, Marrakesh, Morocco, Oct. 29-Nov. 10, 2001, *Report of the Conference of the parties on its Seventh Session—Part Two: Action Taken by the Conference of the Parties (Volume II)*, dec. 19/CP.7, U.N. Doc. FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter «Marrakesh Accords»], at dec. 17/CP.7, annex, para. 1(b).

24 Kyoto Protocol, art. 12(3)(b). Two and one half percent of ERUs (European emission allowances) and CERs may be carried over to the second phase of Protocol implementation after 2012. Marrakesh Accords, dec. 19/CP.7, annex, para. 15(a)-(b).

25 See, Kyoto Protocol, 37 I.L.M. 22 (1998), art. 12.

26 Kyoto Protocol, Article 12; and Marrakech Accords.

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

However, there is no Kyoto Protocol requirement that developed economies make any shift to zero-carbon or low-carbon renewable power, and the CDM[28] is accomplishing only modest renewable energy investment. Most of the CERs are from industrial emissions mitigation. 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.[29]

2. The key sustainable option

Approximately 40 percent of all CO_2 emissions are attributable to the electric power sector.[30] Energy use, and the construction of fossil-fuel fired power generation facilities, is increasing as population growth and development continue, particularly in developing nations.[31] Unprecedented vigorous deployment of renewable energy generation alternatives will be required to alter this trend.[32] Renewable power technology exists to accomplish this. The cost-effective and most accessible place to transition to sustainable energy options is where there is installation of the most new power generation capacity in developing countries where the need for new energy infrastructure is increasing most rapidly. Developing countries are at the forefront of this challenge, since they are expected to add about 80 percent of all new electric generation capacity worldwide in the next two decades.[33]

Renewable energy can provide opportunities for poverty alleviation, supply energy, and enhance energy security by relying on domestic renewable resources.[34] Unlike fossil fuels, renewable resources are widely disseminated across the globe. While many nations—particularly developing nations—have no significant fossil fuel reserves of oil, coal or natural gas, every nation has significant renewable energy in some form, such as hydropower, sunlight, wind, agricultural biomass waste, wood, or ocean wave power.

My earlier work for the World Bank[35] analyzed the demonstrated 'best practices' techniques in developing countries for small renewable power.[36] Its conclusions for several developing countries' 'best practices' are highlighted below. It compared the experiences in a cross-section of developing countries including those with:

- different forms of government including market economies and centrally planned economies
- reliance on different primary forms of fuel for generation of electric power
- implementing different amounts of electrification of their economies
- different kinds of renewable energy potential, including wind and small hydroelectric resources
- Centralized national electric grids, as well as multiple regional unconnected power mini-grids

2.1 Sri Lanka

The Sri Lanka small power renewable energy program is considered one of the most successful developing country small power producer (SPP) standardized power purchase agreement (PPA) programs in the world. What is distinctive about the Sri Lanka program is that it successfully employed an avoided cost tariff[37] 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 to make a significant contribution to a country seeking additional generating resources.

28 See http://cdm.unfccc.int/index.html.

29 Michael Wara, *Measuring the Clean Development Mechanism's Performance and Potential*, 55 UCLA L. Rev. 1759, 1779 (2008).

30 See U.S. Energy Info Admin. U.S. Dept. of Energy (EIA), «Emission of Greenhouse Gases in the United States 2005: Executive Summary-Carbon,» DOE/EIA-0573, available at http://www.eia.doe.gov/oiaf/1605/ggrpt/summary/carbon.html; U.S. Energy Info Admin. U.S. Dept. of Energy (EIA), 'Emission of Greenhouse Gases in the United States 2008: Executive Summary-Carbon,' December 2009, Figure 3 (40.6% for power sector), available at <http://www.eia.doe.gov/oiaf/1605/ggrpt/index.html#total.

31 World Bank Statement, Ministerial Segment – COP11 – Montreal 4, available at http://siter.esources.worldbank.org/ESSDNETWORK/Resources/MINISTERIALSEGMENTCOP11Montreal.pdf; International Energy Agency, Org. for Econ. Coop & Dev., 'World Energy Outlook 2004,' 2004 (IEA World Energy Outlook 2004), available at www.worldenergyoutlook.org/2004.asp; International Energy Agency, Org. for Econ. Coop & Dev., 'World Energy Outlook 2010,' 2010, available at http://www.worldenergyoutlook.org/2010.asp.

32 Neal J. Cabral, *The Role of Renewable Portfolio Standards in the Context of a National Carbon Cap-and-Trade Program*, 8 Am. U. Sustainable Dev. L. & Pol'y 13, 14-15 (2007).

33 *Id.*

34 Mohamed T. El-Ashry, *An Overview of this Issue:Framework for a Post-Kyoto Climate Change Agreement*, 8 Am. U. Sustainable Dev.L. & Pol'y 2, 3 (2008).

35 Steven Ferrey, «Small Power Purchase Agreement Application for Renewable Energy Development: Lessons from Five Asian Countries» 2004 (hereinafter «Steven Ferrey – World Bank»), available at http://siteresources.worldbank.org/EXTRENENERGYTK/Resources/5138246-1237906527727/5950705-1239137586151/Small0Power0Pu1e0Energy0Development.pdf., or http://siteresources.worldbank.org/EXTRENENERGYTK/Resources/5138246-1237906527727/Regulation_of_Grid_and_Off-Grid_Electrification.pdf.

36 Id.

37 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.

Sri Lanka introduced a standardized small power PPA in 1997. 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.[38] In 2003 the program was modified to adopt a controlled solicitation process, with application fees and earnest money deposits from successful PPA recipients. Most successful SPPs in Sri Lanka to date are small hydroelectric projects. 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.[39] 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. The average size project is approximately 2.5 Mw, with biomass and wind projects being larger and solar smaller than the average. See Table 1.

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**

2.2 Thailand

Thailand has a target of 20% renewable power by 2020. Thailand serves 99.3% of its populated area with electricity, with per capita annual consumption of 2243 Kwh.[40] There is an installed capacity of 31,447 Mw,[41] with 66% of energy supply sources from natural gas, 20% from coal, and 5% from non-hydro renewable energy sources.[42]

Thailand was one of the first Asian countries to implement a feed-in tariff program.[43] The SPP regulations allow SPPs to deliver for sale to the Electricity Generating Authority of Thailand (EGAT), the national utility, up to sixty Mw, although up to ninety Mw is within the discretion of EGAT to accept on a case-by-case basis; it has accepted several of these larger projects. Contract terms of twenty to twenty-five years are the norm for these larger cogeneration projects under firm contracts. The program has not restricted participation to renewable sources.[44] As of 2013, Thailand independent power project («IPP») development contributes approximately 50% of power supply in the country. EGAT owns about 50% of generation assets and 100% of transmission assets. The other half of the generation assets is developed and owned by private companies, including IPPs, SPPs, and VSPPs.[45]

Thailand makes publicly available a model standard form PPAs to be used for SPP and Very Small Power Producer (VSPP) projects.[46] 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 maximum subsidy was up to 0.89 US cents/kWh (0.36 Baht/kWh) for the first 5 years of operation. The average subsidy was 0.25 Baht/kWh (0.65 US cents/kWh), awarded to 31 projects for 513 MW.[47] An earlier phase of Thailand's grid-connected renewable energy support includes a net-metering program designed for generation installations of no more than 1 Mw in size.

In 2001, the VSPP program was introduced for renewable energy generating facilities with a

38 Ferrey – World Bank, at 56.

39 See CEB website, at http://www.ceb.lk/PVT/PPP%20Home2.htmwww.ceblk.

40 *World Bank, World Development Indicators.*

41 See, http://www.eppo.go.th/info/5electricity_stat.htm.,

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

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

44 Ferrey – World Bank. 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 ($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 ($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.

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

46 Id.

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

power export delivery capacity of up to 1 Mw net (later increased to 10 Mw). 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.D. $0.08 - $0.21/Kwh.[48] The cost of the adder is financed through a pass-through mechanism to all electric power customers.[49] In 2009, a bid bond, or security deposit of approximately $6/kW was required of projects to discourage the hoarding and re-marketing of sites for independent power projects.

With program maturity, that competitive renewable «adder» system has been replaced by a current consideration of a FiT system or an RPS system being adopted to provide a more established subsidy level, rather than competitive bidding. VSPPs and SPPs that utilize solar, wind, biomass, biogas, hydro, and waste energy were eligible to participate in the renewable 'adder' program.[50] As of 2012, more than 260 renewable energy facilities were operational under the SPP and VSPP systems, constituting about 1 Gw of power generation, or twice this amount of capacity including off-grid and utility-owned renewable energy plants. An additional 8 GW were in various stages of development. As of 2012, Thailand's SPP program had approximately 8,000 Mw of renewable generation projects in the pipeline seeking renewable adders, or about 27% of the current installed capacity in Thailand. The majority of IPP projects are natural gas–fired IPP cogeneration projects, which enjoy the firm power sale contracts.

2.3 India

India is forecast to experience a 10% peak power shortage, which gap was partly responsible for the massive power grid collapse in July 2012 causing the world's largest 'blackout'; during this blackout, renewable plants operating through local community grid systems were not affected.[51] India is regarded as one of the top five-rated countries in attractiveness for additional renewable energy development.[52] Any generating company may construct and operate a generator without obtaining a license, as long as technical grid standards are observed.[53] Transmission, distribution, and trading of electricity require a government license.[54]

Of India's 35 separate states, below I highlight on the SPP programs in 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 in size to the population of Thailand or Germany.

The state of Andhra Pradesh has more than 7,000 Mw of total installed electric capacity, and is the most advanced in installing wind capacity, with 189 Mw of wind capacity in operation.[55] Andhra Pradesh has approved the construction of 1,013 MW of nonconventional generation. There is no formal standardized contract for SPPs or 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 in application.

In another India state, Tamil Nadu, the total system generates more than 7,000 Mw.[56] Tamil Nadu state has a significant fraction of India's wind turbine capacity and a significant percentage of renewable biomass projects. Most of the SPP projects are wind, bagasse,[57] cogeneration, biomass gasification, and photovoltaic generation. An SPP eligible maximum size limit of 50 Mw is imposed. There is no sovereign or currency risk hedge mechanism. Wheeling of power to an affiliated location of the SPP owner (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]

2.4 Indonesia

Indonesia currently ranks third in the world, after the US and China, as the highest emitter of greenhouse gases among all nations. Indonesia's 240 million inhabitants live on more than 6,000

48 This premium «adder» is funded by a small surcharge per kWh paid by all retail electricity consumers in Thailand.
49 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 renewable energy 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.
50 At the end of 2008, a total of 1,075 applications, for 5,147 megawatts of renewable capacity, were filed to receive Adders.
51 Ernst & Young, Renewable Energy Country Attractiveness Indices, Nov. 2012, at 28-29.
52 Id.
53 India Electricity Act (2003), Section 7, p. 9. Certain conditions are imposed on the development of hydroelectric generations to ensure the highest use of water resources for competing uses. Id., Section 8, p. 9.
54 Id., Section 12, p. 11. Conditions may be imposed on the license. Id., Section 16, p. 13.
55 Ferrey – World Bank.
56 Ferrey – World Bank at 49.
57 Bagasse electricity production results from burning the dry, fibrous residue remaining after the extraction of juice from the crushed stalks of sugar cane.
58 Ferrey – World Bank at 53.

islands of the more than 17,000 islands comprising the country, with 80% of the population living on the three islands of Java, Bali and Sumatra.[59] Java is the most populous island in the world, alone substantially exceeding the population of Japan or Britain; four of these Indonesia islands are among the most populous islands in the world.[60]

The Indonesia system of Perusahaan Listrik Negara (PLN), the national utility, now has approximately 50,000 Mw of generation capacity grid-connected; PLN, owns 86% of all grid generating capacity, exclusive of captive power that is not grid-connected, and controls the transmission and distribution system.[61] The remaining 14% of generating assets, exclusive of captive power, is owned by Independent Power Producers (IPPs) which sell electricity to PLN via 15-30 year PPAs.[62] Only two-thirds of total power generation capacity is grid-connected. Indonesia has 600 mini-grids operated outside the Java-Bali grid by PLN for which PLN maintains and operates 4700 diesel generators comprising 44 percent of outer regions' generation capacity.[63]

One-third of the Indonesia population does not have access to electricity. To meet now underserved demand, as well as 6.2% economic growth and the 91% electrification target for 2019, the Government of Indonesia (GoI) will need to increase the installed capacity of 50 Gw to approximately 81 Gw.[64] This will require an additional 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 Indonesia capacity is fossil-fuel based, and future plans call for continued development of coal-based generation.

The original Indonesia SPP renewable energy program adopted in 1995 was one of the most sophisticated 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 7 island grids.[65] The Indonesian SPP program rolled out in 1996, designed to supply up to one-third of national new power supply capacity additions from small, renewable sources up to 30 Mw in size on the primary island, and half that size on smaller island grids. The standardized PPA in its original design contemplated either a firm or non-firm power sale, based on 100% of PLN's avoided costs.

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.[66] Despite the inability to proceed with the original program, beginning in 2002, the PSK Tersebar[67] scheme was initiated for small projects of less than 1 Mw for PPA terms of only 1 year, and a parallel *Prisai Sakti Mataram* (PSM) Tersebar program 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 cost Benchmark PSK/PSM tariff were set at either 60% or 80% of the retail tariff, by voltage.[68] The tariff in these PPAs provided 80% of PLN average production costs in the particular Willayah or region.

There is now 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 central or more remote 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% for projects located on island grids in Sumatra and Sulawesi, multiplied by 130% for SPP projects located in island grids in the islands of Kalimantan and Malucca, and multiplied by 150% for eligible SPP projects located in island grids on the island of Papua New Guinea, Timur, and Nusa Tenggara. These tariffs are much lower than were calculated under the original PPA program in 1996. In late 2008, the Government began a second 10,000 Mw Fast-Track Program which included a goal of

59 US International Trade Administration, «*Renewable energy market assessment report: Indonesia*». Washington, DC. (2010).
60 See, World's Most Populous Islands, http://www.worldislandinfo.com/POPULATV2.htm. These include Java, Sumatra, Borneo/Kalimantan, and Sulawesi.
61 Indonesia MEMR Regulation 02/2011, Article 2.5.
62 Id.
63 U.S. AID, «Indonesia Energy Sector Assessment,» November 22, 2008, at Executive Summary.
64 Id.
65 Ferrey – World Bank.
66 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/US$ in September 1996 to Rp 17,000/US$ by January 1998, a more than 80% depreciation in the value of the currency.
67 This is translated as «diffuse» or «spread».
68 U.S. AID, «Indonesia Energy Sector Assessment,» November 22, 2008.

4,000 Mw of geothermal capacity.[69] As of March 2013, there were already installed 39.7 Mw of small hydroelectric SPP projects.

2.5 Vietnam

Vietnam electric demand is expected to continue growing at a faster pace than gross domestic product (GDP) from 2010 to 2030, with demand for electricity rising between 15 percent and 18 percent per year.[70] 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 during 2010-2030.[71]

The Vietnam electricity market has been in the gradual process of deregulation since 2005.[72] Under the government's current energy roadmap, the electricity sector will be opened and partially deregulated in phases until fully to retail/household competitive 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 in 2005[73] and 2006[74] identified the institutional impediments and needs for a viable SPP market in Vietnam to construct a more mature electric market. Consultants designed a new non-negotiable standardized small power program (NSSPP), PPA and tariff as part of a Non-Negotiable Standardized Power Purchase Agreement (NSPPA).

3. Lessons for COP 20

In developing countries which have a need for long-term increases in power generation capacity, there are proven models of what will work and simultaneously advance the country to a more sustainable electric model. They can achieve in just a few years a substantial contribution of new renewable small power projects to power the national energy supply. The key legal document to facilitate private sector PPAs is a fair and neutral power purchase agreement which obligates the utility to purchase independently produced renewable power at fair prices. The PPA can incorporate successfully either avoided cost tariffs or feed-in tariffs. Several important lessons for future design of legal infrastructure of successful renewable programs are revealed from the multi-developing-country experience to date[75]:

- **Transparent Regulatory Process.** A transparent regulatory process is required to build investor, developer, and lender confidence.

- **Standardized PPA.** Programs should employ either *de jure or de facto* a standardized PPA to afford some form of long-term firm contract commitment.
- **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 sellers of renewable 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.[76] For example, 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 ($12 per kW) of capacity pledged in the PPA.[77] This puts at risk «earnest money» of the developer to proceed expeditiously. Sri Lanka,eginning in 2003, placed a new six-month limit on

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* (2011, May 18). 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. U.S. AID, «Indonesia Energy Sector Assessment,» November 22, 2008.

70 See, Nhan T. Nguyen, et al., «Improving the Clean Development Mechanism Post 2012,» 2010.

71 Id.

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

73 Steven Ferrey and Robert Vernstrom, «RESPP Planning and Preparation,» Final Report prepared for Vietnam Ministry of Industry, 2005.

74 Id; Nguyen Tuan Minh, «Legal Assistance to Ministry of Industry on Legal Issues Relating to RESPP Development in Vietnam,» July 2006.

75 Ferrey – World Bank, at 11-13.

76 For a discussion of these topics, see S. Ferrey, The Law of Independent Power, supra. n.1, Vol. I, at § 3:10.

77 Ferrey-World Bank, at 12, 16, 24.

the validity of Letters of Intent granted to renewable project developers and required bid security bonds of SL Rs. 2,000 per kW ($20 per kW)[78] to prevent developers from hoarding renewable energy sites.

- **Tariff Principles.** A state utility has a monopsony on the purchase of wholesale power in most of the electric sectors of developing nations of the world. In many countries, 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 (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.
- **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 twenty-nine U.S. states employs a renewable portfolio standard to subsidize a minimum percentage of renewable energy power incorporated in the supply portfolio of each retail seller of power.[79]
- **Third-Party Sales.** None of the developing country SPP programs highlighted above currently allows 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.[80]
- **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».[81] Several of the Asian countries adopted energy banking variants, and in 2009, Sri Lanka adopted net metering.

For COP 20 in Lima in 2014, the implications of the proven model for renewable energy in developing countries are important if there is ever to be any success in achieving climate change mitigation goals. It is possible to work within the exiting international institutional legal system, and to implement successful renewable power initiatives going forward. There is a proven model: Developing countries of every political persuasion, have successfully developed renewable power projects in carefully designed programs over the past two decades. A key demonstrated element is utilization of a standardized power purchase agreement which creates and memorializes a pre-approved fair legal exchange for the power produced as part of a long-term obligation of the purchasing national utility. They have done so utilizing both avoided cost tariffs and feed-in tariffs as part of their SPP PPAs.

For the COP 20 agenda in Lima in 2014, the multi-lateral focus will be on re-creating and solidifying an overarching legal structure to continue a now-in-suspension world protocol for carbon control. Immediately after addressing creation or sustenance of the macro-legal structure, the micro implementation issue of how to involve developing countries in shifting fundamental infrastructure to sustainable power is the essential issue that must be addressed. Without including a shift to lower-carbon power resources as part of the rapid increase in demand for electric power, there is no way that the Kyoto Protcol can achieve its targets for climate control. While this is not all that is required, it is a necessary and essential step that must be taken now before power generating capacity which will last for the next two generations is chosen and installed.

The achievement of successful GHG control will be achieved by the micro choices of what is implemented on the ground within the legal structure. There are new financial resources available to the international community to underwrite implementation. Developed countries have committed to the largest sustained international transfer of wealth in history: The United Nations Climate Change Conference at the 2007 Bali COP,[82] the 2009 Copenhagen COP,[83] and at the 2010 Cancun COP,[84] set a goal of mobilizing $100 billion per year by 2020 to support GHG mitigation and adaptation activities in developing countries, plus USD $30 billion in «fast start» finance during 2010-2012. [85] This adds a completely new mechanism to underwrite the additional costs of renewable development. There are three criteria I would suggest for utilization of these funds.

First, renewable energy power capacity development is one of the few GHG emission

78 Ferrey-World Bank, at 53, 58.58.
79 See S. Ferrey, «Renewable Orphans: Adopting Legal Renewable Standards at the State Level,» Electricity Journal, March 2006, at 52, 54.
80 Ferrey-World Bank, at 14.
81 S. Ferrey, «Nothing But Net,» 14 Duke Environmental Law & Policy Journal, 1, 15, 55 54 (2003).
82 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.
83 United Nations Secretary-General's High-Level Advisory Group on Climate Change on Financing, «Report,» Nov. 5, 2010, at 2; see, http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf#page=4.
84 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.
85 See http://pdf.wri.org/climate_finance_pledges_2010-10-27.pdf.

mitigation measures which affects essential infrastructure investments. The increasing demand for electricity will not be thwarted; the challenge is satisfy it in a sustainable manner. Renewable power capacity does that in an already technologically proven manner. Electricity infrastructure investments have a long endurance,[86] so it becomes even more important to utilize government regulation to implement the correct long-term choices.

Second, the new Green Climate Fund adds a critical new dimension to the existing CDM program, which rewards the largest GHG reductions at the most modest investment. While that CDM reward is efficient profit maximization in a market economy, it does not necessarily create long-term social benefit. CDM projects to date have addressed only a few gases with «little contribution to sustainable development»[87] and have targeted shorter-term investments not related to essential national infrastructure or renewable power. The offsetting of HFC-23, produced in the manufacturing of Teflon in plastic processes, resulted in certain carbon investors producing HFC-23, just so they could offset it for market revenues 47 times the cost of carbon reduction in tradable CDM credits.[88] Capturing methane from oil drilling in Vietnam and coal mines in China has resulted in the revenues being plowed back into fossil fuel production that produces more carbon than switching to a renewable resource alternative.[89] An evaluation of projects in developing countries concluded that 25% of them offered little or no environmental benefit at all.[90]

Renewable energy investments do not similarly suffer. There is an obvious connection between renewable power options and carbon reduction strategies, according to both Australian data and testimony to the U.S. Congress.[91] A report by the World Wildlife Fund found that many CDM programs fail to support sustainable development in host CDM countries.[92] The same study found that twenty percent of the CDM projects would have occurred notwithstanding CDM qualification, and another study found that one-third of projects in India failed to demonstrate their «additionality» from what would have been otherwise implemented.[93] The World Wildlife Fund claimed that one out of every five certified CDM projects actually increases carbon, instead of reducing it.[94]

Third, renewable power is a means to satisfy an accelerating demand for power through an alternative which has demonstrated sustainable benefits for the world, while meeting local needs. Electric power is distinct from all other commodities in the world economy: It cannot be stored and is not tangible or fungible.[95] Targeting proven sustainable energy 'best practices' in developing countries, developed through legal and regulatory replicable models of successful sustainable power projects, makes sense. Certain policy initiatives have been demonstrated in developing countries over two decades. Independent PPA programs have worked for developing countries and for world carbon control, benefiting both developing countries, and the world community through less GHG emissions.

It can be implemented within the existing Kyoto Protocol legal structure. Ensuring that unprecedented available funds and international legal mechanisms promote sustainable electric infrastructure is a key issue for the Kyoto Conference of Parties. It is an investment which will benefit the demand for power in developing countries, while reducing GHG emissions in the world. Pursuant to the three criteria above, renewable power development is the logical target for international regulation, priority for use of the new Green Climate Fund, and reoriented emphasis for approval of future CDM projects approved by the Kyoto Protocol. This is a pivotal challenge for the agenda at COP 20 in Lima.

86 National Energy Foundation, «*Fuel Consumption Statistics,*»available at http://www.nefl.org/ea/eastats.html.

87 M.T. El-Ashry, «Framework for a Post-Kyoto Climate Change Agreement,» American U. Sustainable Development Law & Policy, Winter 2008, at 2, 5.

88 Benjamin J. Sovacool, *Building Umbrellas or Arks?Three Alternatives to Carbon Credits and Offsets*, 23 Electricity J. 29, 32-33 (2010). This caused the company affected to make 35 times more revenue from selling carbon credits than manufacturing it products.

89 *Id*. at 33.

90 *Id.*

91 Neal J. Cabral, *The Role of Renewable Portfolio Standards in the Context of a National Carbon Cap-and-Trade Program*, 8 Sustainable Dev. L. &Pol'y 13, 14–15 (Fall 2007).

92 *See* Lambert Schneider, Is the CDM Fulfilling Its Environmental and Sustainable Development Objectives? An Evaluation of the CDM and Options for Improvement 72 (2007), *available at* http://www.oeko.de/oekodoc/622/2007-162-en.pdf.

93 *Id.* at 40. To receive approval, CDM projects must meet three requirements: (1) voluntary participation by the parties involved; (2) real and measurable mitigation of emissions; and (3); reductions that are additional to any that would have occurred in the absence of the project (referred to as «additionality»). *See* Kyoto Protocol, *supra,* art. 12, para. 5. CDM «creates perverse incentives to manipulate baselines,» undercutting the intention of the additionality requirement. *See* Michael L. Brown, *Limiting Corrupt Incentives in a Global REDD Regime*, 37 Ecology L.Q. 237, 244 (2010). This can motivate CDM project hosts to strategically increase environmental emissions leading up to a project so they can show a greater reduction when the project is completed, thus undercutting the ultimate purpose of the CDM process. *Id.* at 246.

94 Michael Szabo, *A Fifth of U.N. Carbon Credits May Be Bogus*, Reuters, Nov. 29, 2007, *available at* www.reuters.com/article/EnvironmentNews/idUSL2926519020071129?pageNumber=2&virutalBrandChannel=O&sp=true.

95 Steven Ferrey, «»Inverting Choice of Law in the Wired Universe: Thermodynamic, Mass and Energy,» 45 William & Mary L.R. 1839, 1914 (2004).