

Power Purchase Agreements for Small Power Producers

by Steven Ferry and Anil Cabraal

Five Asian nations, India, Indonesia, Sri Lanka, Thailand, and Vietnam began designing or instituting Small Power Producer (SPP) programs in the mid-1990s to support energy development jointly with the private sector. This note draws on important markers and lessons for other countries on how to implement similar programs based on these experiences. While all Asian programs demonstrate certain commonalities due to fundamental legal relationships, each experience has been tailored to local conditions and requirements. Some have introduced innovative bidding, competitive, or incentive structures. The result is a rich palette of experience with small power projects in Asia.

Background

The power sector in Asia is expanding rapidly. Almost 60 percent of all new power generation capacity financed in developing countries is in the region. Over the past decade, a number of Asian countries began instituting small power programs to tap into their reservoir of renewable resources for more efficient and cost effective energy supply. Institutional policy, regulatory, contractual, and tariff regimes to support these programs were particularly successful in India, Thailand and Sri Lanka. By 2005, India had over 15,000 MW of small hydro, wind and biomass power developed by the private sector feeding power to the grids. These constituted more than 12 percent of total generation capacity in India. Thailand had more than 17 percent (4,600 MW) of its total power generation being supplied under its small power program. In Sri Lanka, 110 MW small hydro and biomass power plants out of a total generation capacity of under 2,500 MW (more than 4 percent), is operating or under construction. Experiences in Indonesia and Vietnam were less successful due to the financial crisis that hit Indonesia in 1997, and regulatory uncertainties faced by the small power programs in both countries.

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These five Asian nations comprised of different government structures and each depended on different available fuel sources (hydro, wind, biomass, gas etc.) In addition, some of the national electric systems have an integrated high-voltage transmission system, whereas others have a non-interconnected grid or island system. Despite these differences, there are key similarities:

- ❑ All are in need of long-term increases in power generation capacity.
- ❑ 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 Power Purchase Agreement (PPA), although it is not necessarily a neutral or consensual document in all cases.
- ❑ Although avoided cost concepts for establishing the SPP tariff are recognized in each nation, avoided cost concepts are applied differently in each of these countries' SPP programs.

An important lesson derived from their experience in SPPs is that programs must be designed to ensure efficiency, credibility and long-term viability. In three of five countries considered the national or state utility has a monopoly on

the purchase of wholesale power, thus SPP suppliers are still dependent on a single state buyer, both to purchase as well as transmit their power. In the case of India, while sales to third parties were not permitted, wheeling power to the developers' own or their 'sister' firm facilities is allowed. In the absence of adequate regulation, it is imperative that the overwhelming bargaining power of the state utility be mitigated and that the utility operate in its role as purchaser and transmission entity subject to objective PPA and tariff principles.

Based on the lessons derived from these five-country experiences, this note outlines four emerging areas to implementing successful SPP programs:

1. Contractually Established Standardized PPA

A properly designed and standardized PPA must provide a fair, neutral, and financeable contractual arrangement between the power seller and purchaser. Without it, resources are expended unnecessarily, inefficiently and unpredictably.

The PPA must be contractually established and binding in order to maintain investor confidence and long-term program viability. In Indonesia, for example, a series of unilateral changes in the PPA, including revisions to the tariff structure, led to problems of price stream uncertainty and undermined project financeability in many cases. Even though only a few PPA clauses were altered, they were crucial in determining the allocation of the risk of the venture.

As a binding legal relationship, it is essential that the contract anticipates a variety of construction and

operating contingencies. However, these must be set out in the PPA and not subject to unpredictable revisions.

The PPA must be neutral and objective. The contents of the PPA is critical in attracting private capital and if—as was the case in Thailand—the PPA is seen as being overly simplistic or not reflecting SPP interests, investment will be difficult to secure.

2. Structured tariff

The tariff establishes the economic framework for the long-term power transaction. Over time, tariffs must take into account changes in the marginal cost of generation in order to reflect either estimated (at the time of contract execution), actual long-term (for a contract including energy and capacity payments), or short-term (for a contract with only energy payments) avoided cost. In some cases the tariff can equalize at the outset, according to estimated future costs, however in most cases the tariff will need to gradually change in response to movements in the marginal cost. It is important that the methodology on which these changes arise be predetermined and credibly secure, such that long-term investment decisions can be made with confidence.

Avoided cost is generally deemed the equitable foundation on which to base the tariff structure of a standardized PPA. Avoided cost reflects the cost to a utility of acquiring power either by purchase (from external sources or at market rates), or by constructing additional generating capacity itself. Thus, with an avoided cost tariff, the utility system gets power at its opportunity cost of alternative power supply. There is, however, significant diversity in the tariff design. However, financiers need

Table 1: Overview of SPP Programs

Country Program	Year begun	Standard PPA	Maximum size	Premium for renewable energy	Primary fuel	Net meter-banking	Design elements
Thailand	1992	Yes	<60 or <90	Yes, competitive bid	Gas	Yes, if <1 MW	Utility purchases 65% of off-peak power
Indonesia	1993	Yes	<30 Java <15 other island grids	No	Renewable Energy	No	Steep on peak incentives; differentiated for each island grid
Sri Lanka	1998	Yes	<10	No	Hydro, biomass	No	Calculated annually, based on three-year moving average imported oil price
India: Andhra Pradesh	1995	Not formal but a de facto standardized form	<20 Prior <50	Yes in tariff	Renewable energy	Yes	Reset every three
India: Tamil Nadu	1995	In development	<50	No	Renewable energy	Yes	Higher tariff for biomass than wind

some degree of predictability in prices, especially to reduce the downside risk of a avoided cost decline in the future. A floor price is used in some programs to mitigate this risk.

Most programs periodically adjust their tariffs. This is necessary to reflect the changes in the marginal costs of fuel, a significant element of avoided energy cost, as well as changing costs of operation such as tax changes, or law and regulation changes. In Sri Lanka the tariff is revised annually but based on a three-year moving average fuel price in order to smooth out volatilities.

Some programs, such as the Indonesian program, have indexed their tariffs to foreign exchange. This ensures that the project cash flow is held constant in the converted currency in which international investments in capital equipment are foreign sourced. The necessity of this has been demonstrated in India, where IPP contract prices have not always been respected when currency devaluations alter the expected cost of power in the equivalent local currency.

Many of the smaller renewable power projects are not dependent on foreign exchange and—on the basis that borrowing will be local—do not currently index their tariffs. This will need to change if projects are to attract foreign direct investment (FDI). For example, during the financial crisis of 1997, some Thai projects that had borrowed in foreign currency were receiving PPA payments in Baht.

Tariffs can also be designed to provide financial incentives for SPP delivery of power at peak times. The Indonesian program, for example, provided for strong incentives for on-peak hourly delivery of SPP power, and correspondingly decreasing off-peak hourly prices so that the weighted average is equal to the avoided cost.¹ The economic incentive can be maximized where the incentive is embedded in the energy payment rather than split into a fixed capacity plus an energy payment; when power is not supplied, the SPP loses 100% of the potential revenue stream, thus creating the strongest incentive for reliability of power delivery.

The alternative to financial incentives built into the tariff, is to include legal sanctions in the PPA for non-delivery. This however, has proven more controversial as it necessitates complicated decisions on the reason for failure to deliver, and ultimately recourse to a reliable arbitration or litigation process.

3. Solicitation and Funding

The value renewable energy SPP projects that contribute to fuel source diversity or reduction in fuel imports can be captured by giving a premium above avoided cost. This

can be accomplished by an express subsidy as in the Thai system. Import duty exemptions and income tax holidays, can encourage renewable SPP developers to overcome perceive risks in the start up of their programs. With significant oil price increases in recent years, the need for incentives has de



clined. However, there are still some utilities that resist adjusting the tariff to reflect full avoided cost. While the principle that avoided cost is an efficient economic pricing formulation still holds, the utilities argue that the developers are reaping windfall profits and that there needs to be 'sharing' of benefits. It is also important to ensure that any incentive payments that support a national interest are not solely borne by the power purchaser as it results in a reluctance of the purchaser to participate in such a program.

Competitive bidding has been particularly successful in minimizing the requirements for incentive payments. This system has been used in Thailand where prospective SPPs bid for the amount of subsidy per kWh that is required to enter into a PPA. SPPs are then awarded subsidy in the order of the lowest bid, until the gross subsidy allocation is exhausted. This guarantees the most cost-effective projects are subsidized.

In Sri Lanka, the developer who receives a Letter of Intent (LoI) has 6 months to obtain permits for development for site before the LoI can be revoked. This prevents award recipients from attempting to prospect for hydroelectric sites for which they have no resources to develop, and once controlling these rights, try to sell them to other developers.

4. Legal Infrastructure

Dispute adjudication – there must be a system of law and regulation that facilitates orderly SPP development. For example the difficulties involved in accessing neutral court

¹ NB: Indonesia program was designed, and solicitations obtained, but contracts never issued due, *inter alia*, to the Asian financial crisis.



adjudications in Indonesia is thought to have contributed significantly to the truncation of commercial international capital flow by undercutting confidence in a fair adjudication as became evident during and after the financial crisis

In order to introduce competition into the distribution of electricity, thereby reducing the monopsony power of state distributors, many countries are considering allowing SPPs to provide power directly to third party consumers. However, if the retail structure is not based on reasonable cost-based principles, any form of competition, whether that is net metering, energy banking, or retail sales, the risk of cream-skimming emerges.² This occurs when only the most attractive customers, those paying a tariff above the cost of marginal supply, are served directly by the private SPP causing those loads cross-subsidizing the system to be the first to utilize and benefit from these innovations and exit as captive customers. This can further erode system revenues for the utility. This has been a major concern in India, where regulatory commissions are being urged to increase wheeling tariffs to prevent private developers taking over the utility's prime customers.

Great diversity exists in how systems allocate risk of nonperformance between seller and buyer, in most cases risk is disproportionately placed with the seller. The Thai program reduces the SPP capacity payment where the producer does not deliver, but has no equivalent sanction against the utility for failure to take power. In the Vietnam program, by contrast,

even though the energy-only (non-firm) PPA obligates neither party to sell or buy power, the design shifts the risk to the utility by requiring it to pay for 'deemed energy' even when it does not accept SPP energy.³

Conclusion

Some of the recent SPP programs in developing countries were initiated in response to funding opportunities from the World Bank or other multilateral funding authorities. These targeted efforts have provided technical assistance to the countries for the development of a structure for the SPP program. From past experience it has emerged that a standardized PPA, standardized tariff structure and increased access to long-term financing can be crucial to the success of SPP programs. If not developed in an impartial, credible, and secure manner, PPAs can become extremely contentious between various stakeholders, leading to the risk of project failure. It is in the interest of any nation that needs additional generation capacity to most efficiently mobilize SPP and renewable energy resources. When the objective is to mobilize private capital, a standardized SPP agreement is the most efficient and cost-effective—as well as transparent—mechanism.

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² Under net metering, the owner of a self-generation system receives retail credit for at least a portion of the electricity they generate in excess of their own requirements. In effect the electricity meter counts supply to the grid against demand drawn down from it, effectively banking excess electricity production for future credit. Retail sales are where regulations are introduced to allow power producers to sell electricity directly to consumers.

³ Note that the 2001 Vietnam system design cited in this study is not yet in place, and may well be rewritten before being made operational.

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Production Team: Marjorie K. Araya, Douglas F. Barnes, and Samantha M. Constant

Contact Information: esmap@worldbank.org

Steven Ferrey is Professor of Energy and Contract Law at Suffolk University Law School in Boston, MA. Anil Cabraal is Lead Energy Specialist at the Energy and Water Department, Sustainable Development Vice Presidency at the World Bank in Washington DC. This note is based on an investigation conducted in 2003-2004 under the auspices of the World Bank Asia Sustainable and Alternative Energy Program. Further acknowledgements to Enrique Crousillat, Lead Energy Specialist, and Daniel Farchy, a Junior Professional Associate, in the Latin America and Caribbean Region at the World Bank.

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