Information for the Commercialisation of Renewables in ASEAN (ICRA)

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Renewable Energy Policies in ASEAN

Background Paper

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1. INTRODUCTION

Southeast Asia is endowed with abundant renewable energy resources such as wind energy, biomass, hydropower, geothermal, solar energy and others. Despite their huge potential, their current utilization is relatively marginal compared with fossil and mineral energy resources. Currently, most governments are pursuing to develop these resources with various objectives such as energy security enhancement, environmental protection, energy access improvement, and investment promotion.

This background report forms the basis for the policy orientation paper being developed for the Renewable Energy Sub-sector Network (RE-SSN) of the ASEAN. It synthesizes the policies being developed and implemented in the region, and analyses these policies within the context of best practice framework. Areas examined in the paper are the overall renewable energy policy framework, policy instruments and financial assistance. The analysis identifies the strengths and deficiencies in the approach adopted by each member country.

The report is one of the background reports prepared under the project **Information for the Commercialization of Renewables in the ASEAN** (ICRA) co-financed by the EC-ASEAN Energy Facility. The main objective of the project is to contribute towards the further mainstreaming of RE applications in the region in collaboration with the RE-SSN by i) updating and expanding on the range of ACE RE information resources available, ii) contributing European experience and approaches to the regional dialogue on 4 key policy themes: framework conditions and policy instruments for fostering mainstreaming of renewables; harmonisation of PV standards; promotion of biomass technologies for electricity production; the potential role of carbon credits – looking specifically at the opportunities offered by the European trading scheme.

2. RENEWABLE ENERGY RESOURCES AND UTILIZATION

The ASEAN is endowed with abundant renewable energy resources such as wind energy, biomass, hydropower, geothermal, solar energy and others. Despite their huge potential, their current utilization is relatively marginal compared with fossil and mineral energy resources.

Wind energy resources. Globally, wind energy development is one of the fastest among renewable energy resources. Wind capacity has been doubling every 3 years since the past decades while technology costs have been declining. Current costs are US$850-950/kW for onshore and US$1,100-1,200/kW for offshore (IEA, 2003). ASEAN countries with commercially exploitable wind regimes are Cambodia, Indonesia, Lao PDR, Philippines, Thailand and Vietnam (Table 2.1). Wind measurement, project studies and development are actively undertaken in the Philippines, Vietnam and Thailand. Despite the huge potential in wind energy, however, the utilization of wind resources is relatively small.

Table 2.1: Wind resource potential and utilization

Country	Potential	Utilization
Cambodia	**Theoretical potential** 1.3 GW (7-8 m/s) 120 MW (8-9 m/s)	
Indonesia	**Theoretical potential** Significant (3-6 m/s)	0.5 MW
Lao PDR	**Theoretical potential** 24 GW (7-8 m/s) 2,7 GW (8-9 m/s)	
Philippines	**Theoretical potential** 76,600 MW **Technical potential** 7,404 MW	1.18 MW (commercial operation)
Thailand	**Theoretical potential** 3 GW (7-8 m/s) 52 MW (8-9 m/s) **Technical potential** l,600 MW	0.7 MW
Vietnam	**Theoretical potential** 103 GW (7-8 m/s) 8.7 GW (8-9 m/s) 452 MW (>9 m/s)	

Sources: Cambodia - *TrueWind Solutions, LLC (2001);* Indonesia – *Ministry of Energy and Mineral Resources (2004)*; Lao PDR - *TrueWind Solutions, LLC (2001);* Philippines – *Department of Energy, Wind Power Kit (2004) and Philippine Energy Plan (2005)*; Thailand – *DEDE (2004) and TrueWind Solutions, LLC (2001);* Vietnam – *TrueWind Solutions, LLC (2001).*

Hydropower resources. Hydroelectric power is the most important renewable source of commercial energy worldwide. Asia, in general, accounts for the highest technically exploitable hydropower resource. Hydropower resources (from micro to large) are available in most of the ASEAN countries and its exploitation is significant in Indonesia, Lao PDR, Malaysia, the Philippines, Thailand and Vietnam (Table 2.2). Despite the abundance of mini/micro-hydro resources in most of the countries, its exploitation is relatively low.

Biomass energy. Biomass energy resources include agricultural and forestry residues, energy/forestry crops, animal residues, municipal solid waste, etc. The composition of biomass resources in ASEAN vary from country to country due to differences in the production structures of agriculture, forestry, livestock and industry. As shown in Table 2.3, the biomass energy resource potential is high in Cambodia, Indonesia, Malaysia, the Philippines, Thailand and Vietnam. The level of utilization is however, low.

Table 2.2: Hydropower resource potential and utilization

Country	Potential	Utilization
Cambodia	**Technical potential** 300 MW (mini/micro/pico) 10,000 MW (large)	 1 MW (mini/micro/pico) 20 MW (large)
Indonesia	**Technical potential** 75,000 MW (large) 459 MW (mini/micro)	 4,200 MW (large) 64 MW (mini/micro)
Lao PDR	**Theoretical potential** 26,500 MW **Technical potential** 18,000 MW (total)	 615 MW (large) 13 MW (small/micro hydropower) 1515 MW (total)
Malaysia	Technical potential 29,000 MW (large)	2,026 MW (large) 40 MW (minihydro)
Philippines	**Technical potential** 11,223 MW (large and small hydro) 1,847 MW (minihydro) 27 MW (microhydro)	 2,867 MW (total)
Thailand	**Technical potential** 700 MW (small hydropower)	 139 MW (small hydro)
Vietnam	**Technical potential** 800 – 1400 MW (total small hydro) 90-150 MW (picohydro) 300-600 MW (isolated mini-grids) 400-600 (grid-based minihydro)	 110-155 MW (total small hydro) 20 MW (isolated mini hydro) 60 MW (grid mini hydro) 30-75 (pico hydro)

Sources: Cambodia – *Ministry of Industry, Mines and Energy (2004);* Indonesia – *Ministry of Energy and Mineral Resources (2004)*; Lao PDR – *Ministry of Industry and Handicrafts (2004);* Malaysia – *Pusat Tenaga Malaysia (2003);* Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Thailand – *DEDE (2004);* Vietnam – *ESMAP (2001).*

Table 2.3: Biomass resource potential and utilization

Country	Potential	Utilization
Cambodia	**Technical potential** 700 MW	
Indonesia	**Technical potential** 49,810 MW	 302 MW
Malaysia	Technical potential 2,700 MW	211 MW
Philippines	**Commercial potential** 120 MW	
Thailand	**Technical potential** 7000 MW	 560 MW
Vietnam	**Technical potential** 400 MW	50 MW

Sources: Cambodia – *Ministry of Industry, Mines and Energy (2004);* Indonesia – *Ministry of Energy and Mineral Resources (2004)*; Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Thailand – *DEDE (2004);* Vietnam – *ESMAP (2001).*

Solar energy. The ASEAN region is well endowed with solar energy resources. The daily incidence of solar radiation ranges from 4 – 7 kWh/m^2. Solar photovoltaic technologies are widely used in the region with high penetration in Indonesia, the Philippines, Thailand and Vietnam (Table 2.4). Solar PV generates electricity for various applications such as water pumping, home and street lighting, telecommunication networks and navigational aids. The cost of solar PV cells has fallen down considerably since the past decades.

Geothermal and other energy resources. Geothermal energy is natural heat from the core of the earth. Indonesia and the Philippines are among the geothermal areas in the world with fluids above 200°C at economic depths for electricity production. The cost of generating electricity from geothermal resources ranges from US$0.025 to over US$0.025 per kWh while the cost of generating steam is around US$0.035 per ton. The Philippines has the second highest geothermal power capacity in the world next to the US while Indonesia also has a high geothermal power capacity. The estimated geothermal resource potential in key

ASEAN countries is summarized in Table 2.5. Again the current exploitation of the resource in ASEAN is relatively small compared with the resource potential.

Other renewable energy resources are ocean energy and landfill gas. The potential of these resources is high in the Philippines and Malaysia.

Table 2.4: Solar energy resource potential and utilization

Country	Potential	Utilization
Cambodia	5 kWh/m^2/day (6-9 hrs)	700 kW solar PV
Indonesia	4.8 kWh/m^2/day	5 MW
Lao PDR	-	285 kW solar PV
Malaysia	4.5 kWh/m^2/day (4-8 hrs)	1.5 MWp (PV Stand alone) 450 kWp (grid connected PV)
Philippines	5.1 kWh/m^2/day	1 MW (centralized solar PV)
Thailand	>5,000 units (solar PV)	6 MW
Vietnam	5 kWh/m^2/day (4-5.9 hrs) 2 MW	0.6 MW (solar PV)

Sources: Cambodia – *Ministry of Industry, Mines and Energy (2004);* Indonesia – *Ministry of Energy and Mineral Resources (2004)*; Lao PDR – *Ministry of Industry and Handicrafts (2004);* Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Thailand – *DEDE (2004);* Vietnam – *Institute of Energy (2004).*

Table 2.5: Geothermal and other energy resource potential and utilization

Country	Potential	Utilization
Indonesia	**Technical potential** 27,000 MW (geothermal)	802 MW (geothermal)
Philippines	2,600 MW (geothermal) 170,000 MW (ocean)	1,931 MW (geothermal)
Thailand	-	1 MW
Vietnam	**Technical potential** 200 – 340 MW	

Sources: Indonesia – *Ministry of Energy and Mineral Resources (2004)*; Malaysia - Pusat Tenaga Malaysia (2004); Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Thailand – *DEDE (2004);* Vietnam – *ESMAP (2001).*

Huge renewable energy resources remain untapped in ASEAN despite the surge in energy demand in the past decades. While energy demand is projected to grow robustly in the long term, the share of renewable energy will remain modest given the prevailing policies and conventional energy price scenarios.

Renewable energy development is hampered by barriers, which put renewable energy at an economic, regulatory or institutional disadvantage. Barriers are numerous but they could be organized into three broad categories: costs and pricing, legal and regulatory, and market performance. Barriers related to cost and prices include subsidies to conventional fuels, high initial capital costs of renewable energy projects, difficulty of assessing conventional fuel price risks, unfavourable power pricing rules, high transaction costs, and non inclusion of environmental externalities in investment decisions. Legal and regulatory barriers include lack of legal framework for independent power producers, restrictions on siting and construction, unfavourable transmission access, unclear utility interconnection requirements, excessive liability insurance requirements. Barriers that affect market performance include lack of access to credit, perceived technology performance, uncertainty and risk, and lack of technical or commercial skills and information.

Barriers to renewable energy development in selected ASEAN countries are shown in Table 2.6. While some of these barriers fall into the above categories, others are country-specific and are influenced by several factors such as level of development, cultural and institutional structures, etc. The most important barriers that hinder the deployment of these resources are the following: i) lack of policy and regulatory frameworks; ii) lack of financial incentives and

mechanisms; and iii) lack of capacity and awareness from both policy makers and private investors.

Table 2.6: Barriers to renewable energy development

Cambodia
- Lack of policy and legal framework
- Lack of access to financing of renewable energy devices
- Lack of data and information
- Weak institutional capacity for planning, implementation and maintenance
- General lack of experience

Indonesia
- High investment costs and less competitive to conventional fuels
- Lack of financial incentives and funding mechanisms
- Lack of policy, knowledge and awareness on renewable energy
- Limited markets
- Lack of industry capability

Malaysia
- Difficulty in obtaining financing at competitive rates of conventional energy facilities
- Financial institutions are unfamiliar with new technologies
- High financing costs
- Renewable energy technologies have not realized the economies of scale with short payback period
- Widespread public perception that renewable energy is still experimental
- Lack of certainty in fuel supply
- Fuel supply risks from competing markets

Philippines
- Institutional. Non-comprehensive development plan of RE; clear policies and appropriate legislations have not been enacted by the Philippine Congress.
- Financial. Difficulty in accessing traditional financing windows; unsuccessful delivery mechanisms.
- Technical. Inadequacies in the area of RE technology development such as lack of product standards, quality control measures, testing and verification as well as highly reliant on imported technologies.
- Market. Inadequate knowledge of RE market conditions; lack of private sector involvement on small to medium scale RE projects.
- Information and training. Non availability of up-to-date and comprehensive RE data; inadequate success stories on sustainable RE applications; lack of technology extension to users and suppliers of RE technologies.

Thailand (biomass)
- Lack of information and services provided to the potential biomass power and cogeneration project developers.
- Limited financial incentive policies for biomass power projects
- Lack of appropriate mechanisms to support biomass co-generation/power projects
- Uncertainties and difficulties of biomass fuel supply
- Lack of successful models to demonstrate large-scale and efficient biomass co-generation/power systems and project development models

Vietnam
- Lack of an adequate policy and regulatory framework that encourages renewable electricity where it is least cost.
- Inadequate information about the technologies, their costs and effectiveness, for potential investors, financing agencies, and for government officials at all levels.
- Lack of commercial businesses to provide renewable electricity equipment and services.
- Lack of financing for consumers, businesses and developers.
- Locally manufactured technologies are of lesser quality than systems available internationally.
- Inadequate resource and market data to plan a major program and to develop projects.

Sources: Cambodia – *Ministry of Industry, Mines and Energy (2004);* Indonesia – *Ministry of Energy and Mineral Resources (2004)*; Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Thailand – *NEPO (2002);* Vietnam – *ESMAP (2001).*

3. RENEWABLE ENERGY POLICY FRAMEWORK

3.1 Renewable Energy Policy Goals

The ASEAN countries have recognized the importance of renewable energy in meeting their various energy and developmental goals, and each country has developed specific renewable energy policy framework or have integrated renewable energy concerns in the overall energy and development policy framework (Table 3.1). Each country framework reflects current government priorities, developmental concerns, status of renewable energy development, level of liberalization in energy markets, etc.

Table 3.1: Policies promoting renewable energy development

Cambodia

National Policy on Renewable Energy-based Rural Electrification

- provide access to reliable, safe and environmentally clean electricity services to rural areas
- act as a market enabler and encourage private sector participation in providing rural renewable electricity services;
- provide effective legal and regulatory framework for enabling access to reliable, safe and clean electricity services to rural areas
- encourage the most efficient systems for generation, transmission and distribution of electricity from clean and renewable energy sources
- promote renewable electricity systems for rural applications, provided they are the least-cost option for the national communities; and
- ensure adequate resources and appropriate institutional mechanisms to empower the poor, particularly those in rural areas.

Indonesia

National Energy Policy (2004)

- Guarantee sustainable energy supply to support national development

Green Energy Policy (2004)

- Provide sufficient supply to satisfy needs of the community
- Secure sufficient supply for future generation

Lao PDR

Power Sector Policy

- Maintain and expand an affordable, reliable and sustainable electricity supply to promote economic and social development
- Promote power generation for export to provide revenues for developmental objectives
- Develop and enhance legal and regulatory framework
- Strengthen institutions and institutional structures

Malaysia

Five-Fuel Diversification Policy (2000)

- Renewable Energy as the fifth fuel
- Ensure reliability and security of supply
- Balance energy supply mix
- Protect the environment

Philippines

Renewable Energy Policy Framework (2003)

- Reduce the country's dependence on imported energy
- Broaden resource base
- Save foreign exchange and reduce emissions

Singapore

National Energy Efficiency Committee (2001)

Address the increasing energy consumption

- Promote energy conservation; use of cleaner energy sources and renewable energy; promote test-bedding of pioneering energy technologies and commercialisation of energy technologies

Thailand

Strategic Plan for Renewable Energy Development (2003)

- Seek alternative to fossil fuels
- Reduce import and save foreign exchange
- Reduce environmental impacts
- Optimise the value of domestic energy resources

Vietnam

Rural Electrification Policy (2001)

- Provide electricity services in the rural areas, either grid-based or off-grid, to improve the living conditions of the rural population and ability to earn household income as well as to reduce poverty in the rural areas

Sources: Cambodia – *Ministry of Industry, Mines and Energy (2004);* Indonesia – *Ministry of Energy and Mineral Resources (2005*); Lao PDR – *Ministry of Industry and Handicrafts (2004);* Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Singapore – *National Environment Agency (2004);* Thailand – *DEDE (2005);* Vietnam – *Institute of Energy (2005).*

In theory, renewable energy policies are formulated and implemented to level the playing field for renewable energies, internalise external costs, provide specific and targeted incentives for the market development of renewable energy, and combine energy service supply for rural areas with poverty reduction. Though policy goals in ASEAN include some of the above objectives, most national strategies have an overarching goal of promoting energy security, environmental protection, energy access and investment promotion.

Cambodia, Indonesia, Malaysia, the Philippines and Thailand have elaborated specific renewable energy policy frameworks. Energy security goals are very prominent in the policy goals of Indonesia, Malaysia, the Philippines and Thailand though environmental protection, energy access and investment promotion goals are also considered important. These policy goals reflect the concerns of growing dependence on imported energy as well as environmental issues related to power generation in the Philippines and Thailand. Malaysia, despite its being a net energy exporting country, also recognizes the increased depletion of its mineral energy resources and has pursued a balanced development of renewable and depletable resources. Singapore, being a small country with very limited renewable energy resource but with high per capita energy consumption, encouraged the use of renewable energy in the context of energy conservation.

In Cambodia, Lao PDR and Vietnam, renewable energy development is pursued within the context of improving energy access (rural electrification) in rural communities to promote economic development. This relates to the low electrification levels in Cambodia, Indonesia and Lao PDR. Vietnam has also recognized the relevance of renewable energy resources development as a least-cost option to increase electricity access in remote and isolated regions of the country.

3.2 Strategies and Targets

Setting of national renewable energy targets is one of the key components of renewable energy policy strategies in many developed countries. The European Union for example has prescribed an indicative target of 12% share of renewable energy in the total energy mix and 22 % in the total electricity consumption in 2010. Targets are specified as part of the primary energy supply, share of electricity generation, or generation capacities. Many of the targets are long-term, though some countries have specified short and medium term targets.

ASEAN countries which have effectively promoted private investments in renewable energy have also developed national policy strategies and targets that set out the country's approach and commitment to promote renewable energy development. These strategies and targets provide long-term direction and sends correct signals to market actors.

The differences in priorities, resources, goals and market structures result in diversity of strategies in promoting renewable energy development in each ASEAN member country (Table 3.2). Thailand, which has a record of successfully stimulating private investments in grid-connected renewables in the recent years through Small Power Producers (SPP) Programme and subsidies to renewable energy power producers, have moved forward by developing a new national strategy, the *Strategic Plan for Renewable Energy Development* in 2003. The strategic plan aims to increase the share of renewable energy in the primary energy consumption from 0.5% at present to 8% in 2011. To achieve this, the government of Thailand passed the Renewable Portfolio Standards setting 4% share of renewable energy generation for new power plants in 2011. It is also currently developing incentive measures and other support mechanisms.

Malaysia's *Five Fuel Diversification Policy* provides the renewable energy policy guidance while the current grid-based renewable energy programmes embodies national renewable energy strategy. The Small Renewable Energy Power (SREP) Programme allows small

power generators connection to the grid at selling rates defined by the Renewable Energy Power Purchase Agreement (REPPA). The SREP programme sets a target capacity of 500 MW to be integrated into the grid by the end of 2005. To accelerate investments in the palm-oil industry, the government launched the Biomass-Based Power Generation and Cogeneration (BioGen) Programme. Furthermore, the government established a National Steering Committee to identify priorities for research and development of new energy sources from solar, hydrogen and fuel cells.

Table 3.2: Renewable energy strategy and targets

Cambodia

National Policy for Renewable Energy-based Rural Electrification

- specifies the use of renewable electricity systems for rural applications, as part of the national portfolio of grid and off-grid technologies, provided they are least-cost option to the communities

Renewable Energy Action Plan

- 10 year target: 5% of new electricity generation will come from renewables; 100,000 HH will be supplied competitively by renewables; 12,000 HH will be served by SHS; sustainable market for renewable electricity systems

Indonesia

National Energy Policy (2004)

- 5% of the power capacity should be based on RE in 2020

Lao PDR

Power Sector Policy

- Renewable energies as one of the key options to expand and improve off-grid electricity supplies, increase energy self-sufficiency and maximize long-term environmental sustainability.

Malaysia

Small Renewable Energy Power Programmes (2001)

- 5% (or 500 MW) grid-connected electricity to be generated from renewable energies by the end of 2005

Biomass-based Power Generation and Cogeneration in the Malaysian Palm Oil Industry (BIOGEN)

- The strategy involves the implementation of barrier-removal activities (2002-2004) and the implementation of innovative loan/grant mechanism(2005-2008)

Philippines

Renewable Energy Policy Framework (2003)

- increase RE-based power capacity by 100% by 2013 (from 2003 levels); increase non-power contribution of RE to energy mix by 10 MMBFOE in the next 10 years

Regulation governing RE Development

- Geothermal - Presidential Decree No. 1442 – An Act to Promote the Exploration and Development of Geothermal Resources
- Mini-hydro - Republic Act No. 7156 – Mini-hydro Law
- Ocean, Solar and Wind - Executive Order 232

Thailand

Strategic Plan for Renewable Energy Development: New Options for Thailand (2003)

- increase the share of renewable energy to 8% of commercial primary energy consumption in 2011
- renewable portfolio standard (RPS), 4% of new power plants must be generated by renewable energy in 2011
- incentive measures being developed

Vietnam

National Energy Policy (September 2004 Draft)

- targets in 2020: 3% share in primary commercial energy; 5-6% in electricity generation

Rural Electrification Policy

- to provide electricity services in the rural areas, either grid-based or off-grid, to improve the living conditions of the rural population and ability to earn household income as well as to reduce poverty in the rural areas

Renewable Energy Action Plan

- to support an acceleration of renewable electricity production, to meet the needs of isolated households and communities that cannot receive electricity services from the national grid, and to supplement grid supply cost effectively in remote areas
- Phase 1 targets the addition of 25-51 MW of renewable energy capacity; Phase 2 aims to achieve between 175-251 MW additional renewable energy capacity

Sources: : Cambodia – *Ministry of Industry, Mines and Energy (2004);* Indonesia – *Ministry of Energy and Mineral Resources (2005)*; Lao PDR – *Ministry of Industry and Handicrafts (2004);* Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Thailand – DEDE (2005); Vietnam – *Institute of Energy (2005).*

The Philippines' *Renewable Energy Policy Framework* issued in 2002 aims to increase the renewable power capacity by 100% in 2013 and non-power contribution to energy mix by 100 million barrels of fuel oil equivalent. The government programs aim to achieve this through the existing laws and orders regulating the development of geothermal (Act to Promote the Exploration and Development of Geothermal Resources), hydro (the Mini-Hydro Law) and wind energy resources (Executive Order 232 encouraging private participation in the development of ocean, solar and wind resource for power generation). To further accelerate the deployment of renewable energies, the government hopes that the Philippine

Congress will pass into law the long pending Renewable Energy Bill. The Bill aims for comprehensive renewable energy development and specifies specific measures such as renewable portfolio standard, renewable energy trust fund, fiscal and financial incentives, etc.

Indonesia's *National Energy Policy* issued in 2004 sets a 5% target of renewable energy in power generation by 2020. The National Energy Policy, Electricity Law, Geothermal Law and Green Energy Policy provides overall policy guidance particularly on the use of renewable energies as means to promote economic development in remote communities. The only concrete measure being implemented is the power purchase programme for small scale power generation using renewable energy (*PSK Tersebar*). Moreover, the newly elected government of Indonesia has recently introduced a new law (*Government Rule No. 3, 2005*) granting the state utility PLN to select renewable energy developers directly without undertaking a competitive tender process.

Vietnam's draft *Energy Policy* has also specified targets for renewable energies but the current overall renewable energy strategy is embodied in the *Rural Electrification Policy*, which explicitly encourages renewable energy development by foreign or local investors for off-grid supply in remote areas where grid extension is not feasible. To complement this policy, the Ministry of Industry prepared the *Renewable Action Plan* as a framework to scale up renewable electricity development for rural electrification and grid supply. The Action Plan also sets renewable energy development targets during its 10-year implementation phase.

Cambodia's strategy to promote renewable energy development is also embodied in the *National Policy for Rural Electrification*, which specifies the use of renewable electricity systems for rural applications, as part of the national portfolio of grid and off-grid technologies, provided they are least-cost option to the communities. More recently the Ministry of Industry, Mines and Energy launched the *Renewable Energy Action Plan* (REAP) as a framework to increase awareness, mobilize international funding and create favourable environment for market development and private participation. REAP defines renewable energy targets and sets-up funding mechanisms for rural electrification projects using renewable energy.

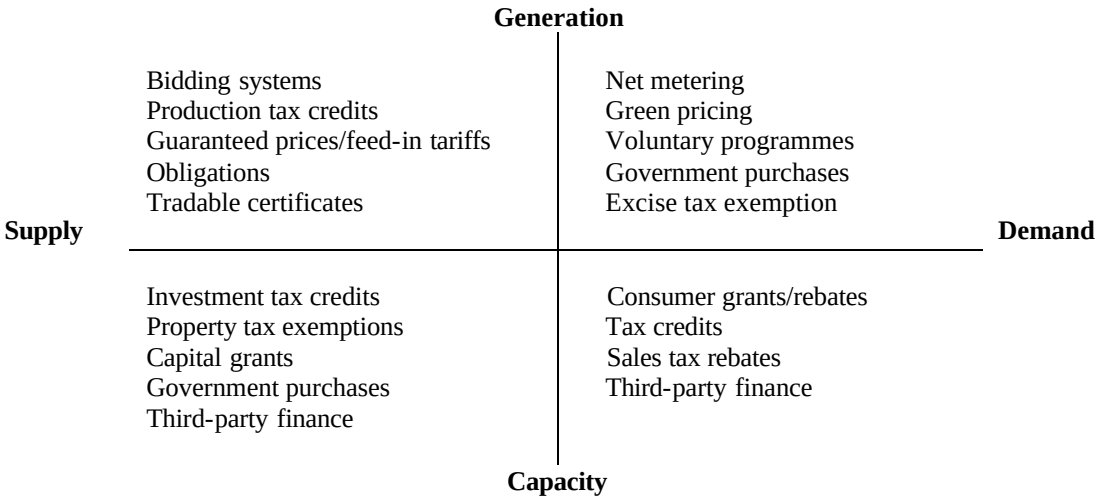
Lao PDR's *Power Sector Policy* recognizes the role of renewable energy in meeting its goal of maintaining and expanding sustainable electricity supply particularly in rural areas. Renewable energies are promoted to expand and improve off-grid supplies, increase energy self-sufficiency and security, and maximize long-term environmental sustainability.

4. RENEWABLE ENERGY POLICY INSTRUMENTS

4.1 Market Deployment Policy Instruments

Policy instruments to increase the deployment of renewable energies could be categorized based on targeted policy variables such as the consumers (demand-side), producers (supply-side), capacity (facility and/or capital costs) or generation (product and/or the associated price to the consumer (Figure 4.1).

Figure 4.1: Market Deployment Policy Instruments



Source: *IEA (2004)*

Supply and capacity

Policy instruments that address both the supply and capacity include investment incentives, tax measures and government purchases.

- *Investment incentives* are used to reduce the capital cost of deploying renewable energy technologies and to reduce risks facing developers. Various forms of incentives are being successfully employed in practices such as capital grants and third-party finance where governments assume risks or provide low interest loans.

- *Tax measures* are used to encourage production or discourage consumption. Investment tax credits and property tax exemptions reduce tax payments for project owners.

- *Government purchases* of renewable energy systems constitute an investment incentive. In many cases, governments purchased renewable energy systems for public buildings and schools.

Supply and generation

Policy instruments that address both the supply and generation are incentive tariffs, tax measures, obligations and tradable certificates.

- *Incentive tariffs* are tariffs at above market rates such as guaranteed price systems, feed-in tariffs and preferential rates. The price is often differentiated by technology

and is paid either by the consumers or taxpayers through the utility. Guaranteed price systems have been adopted in the US since the 1970s.

- *Tax measures* such as production tax credits, which reduce tax payments, were also used in the US to stimulate investments in wind power.

- *Renewable energy portfolio standards* (RPS), also known as quota systems, are a form of *obligation*, which requires suppliers to provide a set of quantity or percentage of their supply from renewable energy sources. Obligations could be based on the final product (kWh) or capacity (kW). *Mandatory targets*, being used in the EU and Australia, determine different levels of obligation for each renewable technology, sometimes with a penalty for non-compliance.

- *Renewable energy certificate* is an instrument that tracks and registers renewable electricity production. In a renewable energy certificate system, the green attribute of renewable energy is separated from the physical electricity product. Certificates are often used in quota systems to document compliance, but they are also exchanged in a voluntary green power market. The establishment of a renewable energy certificate system provides greater market flexibility in achieving the goals of other policy instruments.

Demand and generation

Policy instruments that address generation and demand include voluntary programmes and tax measures.

- *Voluntary programmes* include *voluntary agreements* between power utilities and generators for the purchase of renewable power or energy. *Green pricing* is another form of voluntary programme where customers voluntarily pay a price premium to cover the incremental cost of the renewable energy. Another voluntary arrangement is *net metering* where customer-generators are allowed to 'bank' at the utility any excess electricity generated from qualified renewable systems. The customer-generator pays only for the 'net' electricity over the billing period.

- *Tax measures* under demand and generation category refer mainly to *tax exemptions* for renewable energy consumption. Germany and the Netherlands, for example, introduced 'ecotax' on final energy consumption in the 1990s to internalize externalities associated with energy production and consumption. In the Netherlands, renewable energy consumptions were exempted from the tax.

Demand and capacity

Policy instruments that address demand and capacity include investment incentives and tax measures.

- Instead of supporting energy producers, *investment incentives* can also be extended to end-users to reduce capital costs of isolated or individual renewable energy technologies. These incentives include *consumer grants* and *third-party finance*. The government reduces end-users' risks by either providing low interest loans or bringing down the capital cost of the renewable energy systems.

- *Tax measures* could be in the form of *tax credit* or *system rebate* where owners of individual systems are allowed to recover a portion of up-front capital costs more quickly after the investment is made.

4.2 Policy Effectiveness

Various policy instruments are therefore available for ASEAN member countries from the renewable energy policy toolkit. The best policy instrument or instruments are those that contribute to the sustainable growth of renewable energy market. In theory, the effectiveness of each policy instrument could be assessed by a set of criteria and evaluated according to intrinsic design features of instruments. In practice, however, policy instrument effectiveness is influenced by various factors such as policy goals, institutional arrangements, electricity reforms, renewable energy resources, etc.

Table 4.1 compares effectiveness of policy instruments based on 3 criteria: quantitative effectiveness, cost-effectiveness and industry certainty. Quantitative effectiveness refers to achievement in terms of capacity (kW) added or amount of renewable energy generated. Cost-effectiveness measures the amount of result per $ or € spent. This is expressed either in terms of kW/€ (capacity) or kWh/€ (production). The third criterion is related to the impact of the instrument on risks (market, technical and policy risks).

Table 4.1: Policy effectiveness

Instrument	**Effectiveness**
Feed-in tariffs	Feed-in tariffs can be regulated, and costs distributed. This makes relatively high levels of support possible, with a long-term certainty. Feed-in tariffs provide no guarantee for attaining policy targets.
Quota	Quota obligations are most effective in reaching policy targets for renewable energies, as they put a clear obligation on an actor in the electricity chain to produce, buy, supply or trade a certain amount of renewable energies, with a penalty in case this actor fails to meet this obligation. The obligation to individual actors is set to meet the overall policy target.
Subsidies and fiscal measures	For subsidies and fiscal measures no guarantee about their effectiveness can be given. High impact is possible, the total effect on volumes depend on the level of subsidy/fiscal incentive and the available and continuity of budgets.
Competitive bidding	Tendering systems can be very effective in stimulating new capacity as the amount of capacity to be tendered is set at forehand. The total volume installed or generated will not surpass the size of the tender. It is important that the bidding system is designed in such a way that at least sufficient bids are solicited to 'fill' the tender.
Instrument	**Cost effectiveness**
Competitive bidding	Bidding mechanisms drive down the price of projects, making this a very cost effective instrument.
Quota	Quota has the potential to reach cost-effective outcomes in case there is a supply surplus relative to the quota obligation. However, when there is scarcity the market price is determined by the penalty rather than by competition amongst producers.
Fixed feed-in tariffs	Fixed feed-in tariffs are relatively non cost-effective. Although project developers will minimize costs to maximize profits, there is no strong direct incentive for product cost reduction. A cost reduction on the supply side does not lead to a reduction of the cost of the instrument to society at large. One way of increasing the cost-effectiveness of feed-in systems is to differentiate the tariff per technology (with possible subcategories) and to decrease the tariff for new installations according to expected technological development.
Investment support	Investment subsidies and fiscal measures stimulating investment do not create competition among market players, and do not form an incentive to reduce costs. The costs cannot be allocated directly to market players, and funds therefore need to be assigned from government budgets.
Instrument	**Industry certainty**
Fixed feed-in tariffs	Fixed feed-in tariffs provide almost absolute market certainty with respect to the tariff revenue stream to investors. A long-term contract (at least 10 years) is an essential part of the tariff to create certainty.
Investment support	Both technical risks and market risks are reduced. However, policy uncertainty is commonly high- as investment support schemes are prone to adaptations.
Quota	Uncertainties for investors arise from possible fluctuations in market prices. Partly such fluctuations depend on the design of the trading system, and thus they can be minimised. The remaining uncertainty results from the dynamics of the market, for which market solutions, such as long-term contracts, forwards and futures can be used.
Labeling and green tariffs	Very uncertain: future revenues are entirely dependent on consumer preferences without providing financial incentives to stimulate demand for renewable electricity.

Source: A.L. van Dijk, L.W.M. Beurskens, M.G. Boots, M.B.T. Kaal, T.J. de Lange, E.J.W. van Sambeek, M.A. Uyterlinde (2003).

Feed-in tariffs can achieve higher renewable energy capacity additions or generation compared with other policy instruments. Investors are attracted with fixed prices, which

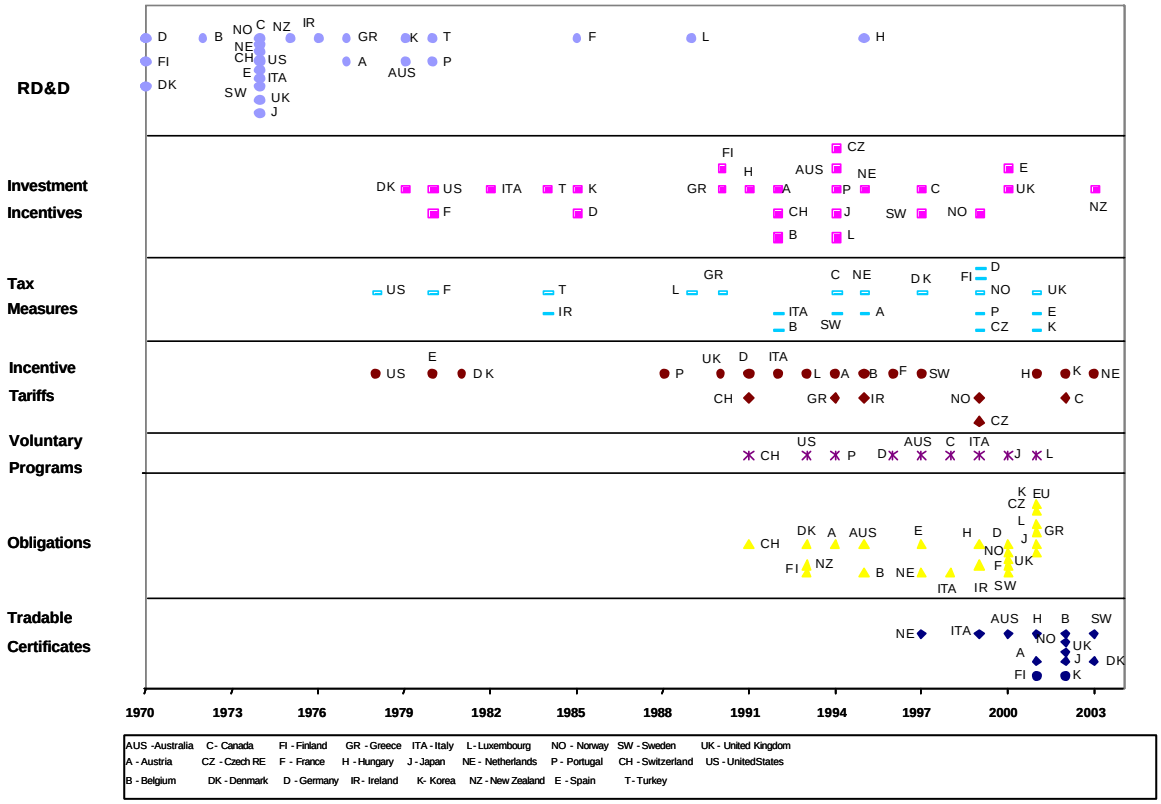
ensure safe investment with better predictability and stable investment framework, and lower transaction cost for each project. On the other hand, competitive bidding is more effective in controlling the cost of government incentive policies. With tenders for quotas, the government can maintain direct control over capacities or generation and indirect control of marginal production costs. The same control can be achieved under renewable portfolio standards and green certificate schemes.

4.3 Policy instruments employed in EU and ASEAN

Evolution of policy measures in the EU

For more than 30 years, developed countries have introduced various policies to promote renewable energies. In the early 70s, most European countries started to allocate funds for research, development and demonstration (RD&D) of renewable energy technologies (Figure 4.2). Investment incentives and tax measures were also implemented around the same time. Denmark, France and Italy were among the first to institute these measures in the late 1970s while other European countries started to adopt these instruments only in the late 1980s.

Figure 4.2: Evolution of Renewable Energy Policies in the IEA



Source: IEA, 2004

Spain and Denmark were also the first to implement guaranteed price systems in the late 1970s. During 1988-1994, most European countries introduced feed-in tariffs, which started a new wave in policy intervention. Many governments tried to reinforce feed-in tariffs with investment incentives and tax measures.

Switzerland launched the first voluntary programme in 1991, and six other European countries, the US and Japan developed their own voluntary programmes between 1993 and 2003.

Switzerland was also first to establish a target from renewable energy sources in 1991. Denmark and Finland followed in 1993, while other European countries, with the aim to open and widen renewable energy markets, introduced obligations and quota-based measures in the late 1990s. In 2001, the EU issued the Directive for Electricity Produced from Renewable Energy Sources, which set indicative targets requiring member countries to adopt relevant national policies.

Most recently, renewable energy certificate systems were introduced in Europe. The Netherlands was the first to utilize the certificate system to efficiently achieve its renewable energy targets. Italy followed in 1999 while the other European countries established their tradable certificate systems between 2000 and 2003.

Despite this apparent trend, it must be noted that each country selected policies and measures that corresponded to their own resource endowments, economic structure and market development objectives.

Policy instruments in the ASEAN

One interesting development in Europe is that governments have started to rely mainly on policy instruments under the supply-generation category in combination with policy instruments under the supply-capacity category. Instruments under the former are also found to be more effective than the latter category.

Among the ASEAN countries, as mentioned earlier, Thailand introduced a supply-generation policy instrument, the renewable energy portfolio standard, in 2004. The government is currently designing incentive measures to support this policy instrument. The Philippines' Renewable Energy Bill also contains policy instruments under the supply-generation category.

ASEAN countries have relied mainly on investment incentives and tax measures (supply-capacity category policy instruments). Income tax holidays, equipment duty exemptions, property tax exemption, and accelerated depreciation for the equipment are the common fiscal incentives in Malaysia, the Philippines, Singapore and Thailand (Table 4.2). Non-fiscal incentives in the Philippines and Thailand include easy repatriation of capital investments and remittance of earnings as well as permission to bring in foreign experts and their families otherwise prohibited with the current employment regulations. In order to further stimulate private investments on renewables, the Thai government introduced pricing subsidy for the capacity generated by renewable energy on top of the normal power purchase rate from Small Power Producers (SPP) Programme. The program started in 2002, and it projected that at least 300 MW of electricity generated by these renewable SPPs can be exported to the grid by the year 2005.

Table 4.2: Policy instruments in ASEAN

Malaysia

- Pioneer status with tax exemption of 70% of statutory income for a period of 5 years or Investment Tax allowance of 60% in the qualifying capital expenditure incurred within a period of 5 years
- Import duty and sales tax exemption on equipment used in the project and are not produced locally. Equipment purchased from local manufacturers is also given sales tax exemption.

Philippines

Geothermal (Presidential Decree No. 1442 – An Act to Promote the Exploration and Development of Geothermal Resources)

- i) Recovery of operating expenses not exceeding 90 percent of the gross value in any year with carry-forward of unrecovered cost; ii) Service fee of up to 40 percent of the net proceeds; iii) Exemption from all taxes except income tax; iv) Exemption from payment of tariff duties and compensating tax on the importation of machinery, equipment, spare parts and all materials for geothermal operations; v) Depreciation of capital equipment over a ten (10) year period; vi) Easy repatriation of capital investments and remittance of earnings; vii) Entry of alien technical and specialized personnel (including members of immediate family.

Mini-hydro (Republic Act No. 7156 – Mini-hydro Law)

- i) Special privilege tax rates – Tax payable by developers/grantees to develop potential sites for hydroelectric power and to generate, transmit and sell electric power shall be 2 percent of their gross receipts; ii) Income tax holiday for seven (7) years from start of commercial operations; iii) Tax and duty free importation of machinery, equipment and materials - Exemption from payment of tariff duties and value-added tax (VAT) on importation of machinery and equipment (within seven (7) years from date of awarding of contract); iv) Tax credit on domestic capital equipment - For developers who buy machinery, equipment, materials and parts from a local manufacturers, tax credit is given equivalent to 100 percent of value of VAT and custom duties that would have been paid to import said machinery, equipment, etc. v) Special realty tax rates on equipment and machinery – Realty and other taxes on civil works, equipment, machinery and other improvements of a registered mini-hydroelectric power developer shall not exceed 2.5 percent of their original cost; vi) VAT Exemption - Exemption from payment of 10 percent VAT on gross receipts derived from sale of electric power whether wheeled via the NPC grid or electric utility lines.

Ocean, Solar and Wind (Executive Order 232)

- i) The government shall waive the signature bonus on the first project to reduce pre-operating cost burden on the OSW production-sharing contractor; ii) Payment of production bonus shall be applied only after the project has fully recovered its pre-operating expenses; iii) OSW developers shall be allowed to charge the cost of assessment, field verification and feasibility studies of other sites to its current commercial projects; iv) The government shall facilitate developers in obtaining all applicable fiscal and non-fiscal incentives, including registration as pioneer industry under the Board of Investments (BOI) and securing of access to lands and offshore areas where OSW resources shall be harnessed.

Singapore

Solar (heating, cooling and energy collection devices)

- One-year accelerated depreciation allowance – allows companies to write-off their qualifying equipment in one year instead of three.

Thailand

Board of Investment Incentives

- Income tax exemption for 3 to 5 years, or up to 8 years in exceptional cases.
- Accelerated depreciation of the cost of installing or constructing facilities.
- Double treatment of costs for the purpose of calculating income. These costs include the costs of transportation, electricity, and water supply.
- Approval for remittance of money in foreign currency to repay funds brought into the country plus dividends and interests.
- Authority to lease or exclusively occupy and use land otherwise prohibited under the Land Code.
- Authority to bring foreign experts, technicians and staff (including their families) even though prohibited under the normal practice of the Administering the Alien Employment Act; and
- Exemption from or reduction of import duties on equipment and machinery used in the construction and operation of the project.

Small Power Producers Subsidy.

- A budget of 2060 million Baht was allocated from the Energy Conservation Fund for the energy payment subsidy. The government targets that EGAT could increase its power purchase from non-utility generators by around 300 MW within 2005.

Sources: Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy, Renewable Energy Policy Framework (2003)*; Singapore – *National Environment Agency (2004);* Thailand – *NEPO. (2002).*

5. GRID-ACCESS REGULATION AND PROGRAMMES

Renewable energy polices in Europe were introduced almost in parallel with the liberalization of the electricity markets. Hence, the right conditions for market deployment policies were already established. Market regulations that create the right conditions for renewable energy deployment include the following: i) the independent power production laws which require utilities to interconnect and sign power purchase contracts with qualifying renewable energy facilities; ii) market liberalization schemes that allow generators and independent marketers to wheel power to retail customers though the cost of this access are sometimes very high; and iii) access of small-scale renewable energy systems suppliers to consumer retail outlets as well as end-users access to the distribution grid.

In ASEAN, parallel to the introduction of renewable energy investment incentives, and fiscal and non-fiscal measures, some member countries have introduced various levels of reforms and partially liberalized their electricity markets. Reform measures undertaken include the opening up of the electricity generation market to private investors and introduction of regulatory frameworks for independent power production. To further support grid-based renewable energy investments, Indonesia, Malaysia and Thailand have even developed renewable energy specific access frameworks and programmes (Table 5.1). On the other hand, the electric power industry reforms in the Philippines, which introduced competitive electricity markets, have promoted access of renewable energies to national grids.

Table 5.1: Grid access programmes

Indonesia

Small Scale Distributed Power Generation Using Renewable Energy, PSK Tersebar (2002)

- Obliges PLN – the national electric utility – to purchase up to 1 MW capacity generation using renewable energy sources by small enterprises
- Tariff rate is 80% of PLN's production cost if the electricity purchased is interconnected to medium voltage network, or 60% of production cost if it is interconnected to low voltage network.

Malaysia

Renewable Energy Power Purchase Agreement (REPPA)(2001)

- Selling price is capped at a ceiling of RM 0.17 sen/kWh (USD 0.045 cent/kWh)

Philippines

Electric Power Industry Reform Act (2001)

- Priority dispatch for renewable energy generation.
- Distribution utilities and contestable markets can negotiate directly with electricity generators including renewable energy producers.

Thailand

Small Power Producers (SPP) Program (1992)

- Encourage participation by SPPs in electricity generation; promote the use of indigenous by-product energy sources and renewable energy for electricity generation; promote more efficient use of primary energy; reduce the financial burden of government investment in electricity generation and distribution.
- Buy-back rate were based on the avoided costs of the Electricity Generating Authority of Thailand (EGAT). A firm contract pays both capacity and energy generation while a non-firm contract considers energy payment only. In the 1990s, the avoided fuel was fuel oil. The oil price increase in 2000 shifted EGAT's marginal plant to natural gas-fired power plant. Consequently, the reference technology was changed from fuel-oil fired to natural gas-fired power plant.

Very Small Renewable Energy Power Producers Programme (2002)

- to promote participation of small generators (less than 1 MW) in electricity generation and efficient use of domestic natural resources that are environmentally friendly.

Sources: Indonesia – *DGEEU (2005)*; Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy (2005);* Thailand – *NEPO (2002).*

In Thailand, the Small Power Producers (SPPs) program was introduced since the early 1990s and is designed to promote grid-connected electricity generation from renewable energy and cogeneration. A flexible power purchase agreement has been introduced (firm and non-firm) to respond to the technical limitations of renewable energy technologies. Power purchase price is based on the utility's avoided costs.

In 2002, Thailand introduced a new framework that promotes small-scale renewable electricity generation known as Very Small Renewable Energy Power Producers (VSREPP).

A VSREPP is defined as a generator with his own generating unit, whose power generating process utilizes renewable energy sources, agricultural and industrial wastes and residues, or by-product steam, and who sells no more than 1 MW of electrical power directly to a distribution utility. The VSREPP regulations allow for net metering arrangements and streamlined interconnection process and requirements so as to minimize the costs of connecting a VSREPP to the distribution systems. Generators with net generation can generate income by selling electricity to the distribution utilities at the latter's avoided costs (the wholesale price that the distribution utilities pay to EGAT for bulk electricity). The main targets of the VSREPP Program are pig farms and food processing industries.

Malaysia recently introduced the Small Renewable Energy Power Programme (SREP) whose aim is to facilitate the implementation of grid-connected renewable energy resource-based small power plants. Grid-connection of SREP is governed by the Renewable Energy Power Purchase Agreement (REPPA). REPPA's power purchase price is capped by the government at 4.5 cent US$/kWh.

In the late 1990s, Indonesia issued the legislation on Small Power Generation from renewable energy covering procedures for small private power generation from renewable energy interconnected to the grid of the state-owned utility PLN. The power purchase tariff is, however, to be negotiated between PLN and the developer. The renewable energy policy was recently strengthened with the passage of the legislation in 2002, allowing renewable energy power plants up to 1 MW capacity to be interconnected to the grid. The purchase tariff is calculated at 80% and 60% of the utility's (PLN) announced electricity base price for interconnection at medium and low voltages, respectively.

With the operation of competitive electricity markets in the Philippines, electricity generators will have direct access to national and distribution grids. The wholesale electricity spot market (WESM) rule also specifies priority dispatch for renewable energy generation. Electricity wholesalers, retailers and contestable customers on the other hand can directly negotiate with generators (including renewable energy) for the bilateral trade of electricity. This however does not guarantee that the wholesale market-clearing price will provide sufficient returns to renewable energy generators. The government at present is studying various options to stimulate private investments on renewable electricity generation under the competitive electricity market setting.

6. FINANCIAL SUPPORT AND MECHANISMS

Another key issue in the promotion of renewable energy development is how to finance renewable energy projects. The enabling environments and incentive structures discussed earlier are important conditions but are not sufficient to generate financing of renewable energy investments. While the finance and banking community responds to appropriate policies and regulatory signals, it applies its own criteria in assessing bankable projects.

Renewable energy projects have generally been more costly than the conventional fossil fuel power plants. Renewable energy technologies are associated with high costs, particularly those still faced with steep learning curves. Mature renewable energy technologies such as hydro, wind and biomass have become more efficient because of improved engineering and increased competition among manufacturers and suppliers. It is generally agreed that renewable energy technologies are becoming more price-competitive, the technology more widespread and that new financing mechanisms are being created. Despite this, the path to a fully developed market is still difficult and complex.

Several obstacles make RE projects difficult to attract sources of financing. Key issues are i) high capital to O&M cost ratio, ii) high project development to investment cost ratio, iii) small total investment requirements, iv) difficulty guaranteeing cash flow, v) weak basis for non recourse financing, vi) disproportionately high transaction costs, vii) inaccurate perception of risk, and viii) inaccurate pricing of energy production costs. This results in an increased risk profile for most projects that need to be addressed to satisfy lenders and investors.

Renewable energy projects come in various sizes but it is important to distinguish between on-grid and off-grid projects. The challenges in accessing financing, the types of financing available and the level of institutional support needed differ substantially.

6.1 On-grid Projects

On-grid renewable energy projects are often developed by large energy companies or specialized project development companies. With the financial strength of sponsors, such projects have significant chances of accessing commercial bank debt of project financing. The sponsors can also finance a larger part of the project costs from their own balance sheets. Gaps and barriers exist in project development, financial structuring and risk management but specialized financial tools and measures are already available to address these deficiencies (Table 6.1). Many on-grid RE projects such as hydro, wind and biomass are commercially proven and several insurance companies are willing to provide coverage for such projects.

Given the availability of financing, each project must demonstrate stable cash flows. For this, renewable energy projects require price support mechanisms that insulate them from potentially volatile power prices. Because renewable energy projects have inherent difficulties showing stable cash flows, they require some sort of support mechanism that will lower their risk profile and make them acceptable to lenders. As discussed in the previous section, there exist a variety of incentive mechanisms that countries in the region can adopt. The most important form of public intervention for on-grid projects is the creation of price support mechanisms. If regulatory instruments are in place, private capital can be found for commercially viable renewable energy technologies.

As presented earlier, the establishment of independent renewable power producer frameworks attracted private investments on renewable energy projects in Indonesia, Malaysia and Thailand. These frameworks provide grid access with fair transmission charges, and permits wheeling and the creation of power purchase agreements that provide long-term tariffs. The

suspension of the Renewable Energy Power Program of the National Power Corporation in the Philippines, on the other hand, retarded mini-hydro development, which has been promoted by the government through various fiscal and non-fiscal incentives.

For small-scale grid-based renewable energy technologies, secure and favourable revenues may not sometimes be sufficient due to high transaction costs. There are, however, available financial mechanisms suitable for these options, such as i) dedicated funds, ii) bundling of investments with services for small-to-medium-sized enterprises, and iii) customer-based investments. Transactions costs could also be reduced by creating 'fast-track' financing to standardized renewable energy projects.

Table 6.1: On-grid Finance Continuum

	Project Development	**Financial Structuring**	**Risk Management**
Often secured	Developers/sponsors equity	Corporate/project financed loans	Insurance
Occasionally secured	Grants	Mezzanine finance	Export credits, other risk management
Gaps and barriers	Under-financed project developers	Widening debt-equity gap Bankers lacking experience with NRE Elevated transaction costs	Lack of appropriate risk management instruments Lack of actuarial data, difficulty assessing risks Non traditional RE risks Inflexible underwriting mentalities
Proposed interventions	Contingent project development grants Public participation in Private equity funds Tax incentives for 3rd party investors	Public participation in mezzanine funds Banker training and awareness raising Investment transaction support	Change underwriter risk perceptions and rating methodologies Extend existing insurance products to RE Promote new non-insurance products Public/private partnerships to share risks and costs/benefits of innovation

Source: Sontag-O'Brien, V. and Usher, E., 2004

6.2 Off-grid Projects

Off-grid RE projects tend to be smaller and face significant obstacles in accessing financing. Their small size and unpredictable cash flows make them uninteresting for lenders and risk-averse investors. The gaps of the off-grid renewable energy technologies and measures to address these gaps are shown in Table 6.2. Off-grid projects in developing countries, therefore, need support in various forms as follows: i) seed capital; ii) business developments grants to small and medium-sized enterprises, iii) lines of credit to local banks for on-lending to renewable energy projects, iv) credit enhancements such as risk and credit guarantees that make banks more willing to extend credit to renewable energy projects; v) interest rate subsidies; and small and medium enterprises growth capital funds that provide equity or debt directly to projects.

A number of development financing institutions and not-for-profit organizations have developed various financial support to renewable energy developers and entrepreneurs in Asia and the Pacific. This includes the Grameen Bank of Bangladesh, Indian Renewable Energy Development Agency (IREDA), Development Bank of the Philippines (DBP), Industrial Finance Corporation of Thailand (IFCT). IREDA and ICFT provide low-interest loans while DBP provide lines of credit to renewable energy project developers. The financial support in these countries is not only extended to off-grid projects but to on-grid renewable power projects as well. The Grameen Bank established a revolving fund for its entrepreneur clients through its affiliate not-for-profit Grameen Shakti.

Various business development grants are also emerging in Asia. In India, for example, the Solar Projects and Enterprises Development Fund provides grants to entrepreneurs who

present concepts for new commercially viable solar energy projects/enterprises that offer innovative approach, rely on local commercial sources of capital growth, illustrate ease of scale-up, and present an income generation scope/productive use opportunity, that are commercially viable.

Table 6.2: Off-grid Finance Continuum

	Start-up Capital	Operating Capital	End-User Finance
Often secured	Entrepreneurs equity		Supplier credit
Occasionally secured	Grants	Bank loans	
Gaps	Lack of business development support Lack of seed and early stage risk capital Lack of intermediaries, brokers, platforms to channel seed finance	Lack of appropriately priced growth capital Lack of support from local banks in local currency	Lack of consumer, micro, transaction finance to pay for RE products and services
Proposed interventions	Entreprise development service Donor supported seed capital funds managed by specialized entities Policy support to increase role of SME's in energy service delivery	Public/private SME growth capital funds Support to local banks through capacity building, lines of credit and credit enhancements	Consumer finance Micro-credit Leasing, rental, fee-for-service 3rd party finance

Source: Sontag-O'Brien, V. and Usher, E., 2004

At the end-user level, various models exist for financing renewable energy technologies. These include: i) supplier credit – renewable energy supplier finances the transactions with end-users; ii) consumer credit (micro-credit) – loans are made by local banks or entities that specialize in originating small-scale loans; iii) fee-for-service model – customers pay for an energy service; and leasing – similar to fee-for-service in that the lessor retains ownership of the equipment and hence responsibility for maintenance and equipment replacements.

Supplier and consumer credits have been extensively applied to promote solar home systems in Asia. In the World Bank/GEF funded solar home projects in Indonesia, India, Sri Lanka, Vietnam, Bangladesh and China, dealers purchase systems or components from manufacturers and sell them directly to households on credit. Several variants of consumer credit delivery mechanisms were also piloted in the region. Consumer credit through dealers was tried in India, Indonesia, Sri Lanka, Bangladesh and Vietnam, through established micro finance organization in Sri Lanka and through local development finance organizations in Vietnam (Martinot et al 2001).

6.3 Sources of Funding

A variety of funding sources can be accessed by renewable energy project developers and entrepreneurs in Asia. The rising interest in renewable energy has resulted in a proliferation of new funds and initiatives designed to promote renewable energy. Many existing projects have drawn on a mixture of government (or multilateral) and commercial funding sources.

Sources of funds that have been successfully used in the past to fund renewable energy projects will continue to be the most important means to obtain investment capital for renewable energy projects include i) export credit agencies, ii) multilateral organizations, iii) private equity funds, iv) bank debt, v) public debt, and vi) private placements.

In recent years, several funds have been raised through *public-private partnerships* (PPP). PPP is a collaborative effort between the public sector and private enterprises to achieve common objectives pursuing their own interests. Each partner shares in the design of the project, contributes a portion of the financial; managerial and technical resources needed to execute and sometimes operate the project in accordance with each partner's comparative advantage; and partially shoulders the risks associated with the project and obtains the

benefits that the project creates. Public-private partnerships span a spectrum of models that progressively engage the expertise and/or capital of the private sector.

6.4 Financial Support and Renewable Energy Funds in ASEAN

Many ASEAN countries provide financial assistance and grants to renewable energy developers, and at the same time established funds to support renewable energy development. Many of these funds raised are not mainly intended for renewable energy development but for rural electrification, environmental protection, energy conservation and social obligations (Table 6.3).

Cambodia is establishing the *Rural Electrification Fund* with financing from the World Bank (IDA) and Global Environment Facility. The Fund is a component of the Rural Electrification and Transmission project jointly funded by the World Bank and Asian Development Bank. The Fund provides a financial grant of up to 25% of the total project costs to renewable energy projects for rural electrification.

Malaysia's *MESITA Fund* is a social obligation fund contributed by power generators. Each utility puts in 1% of their annual audited revenue to the fund and this is being used to assist government projects and studies on rural electrification, energy efficiency and renewable energy. Recently, the government launched the *Renewable Energy Business Fund* to be used mainly for financing full-scale biomass energy demonstration projects. The Fund could provide financing of up to 80% of the total project cost. Funding will be sourced from the Bank Teknologi Malaysia, GEF and MESITA Funds with total amount of RM28 million.

The *Philippines* has two sources of financial support intended for rural electrification projects including renewable energies. The *Energy Regulation 1-94* (ER 1-94) mandates power generators to set aside PhP 0.01 per kWh of electricity sales to be used for financing projects that benefit the host communities such as rural electrification, watershed management and livelihood programs. The second source is the *Universal Charge*, a non by-passable charge sanctioned by Electric Power Industry Reform Act (RA 9136). At present the missionary electrification subsidy and environmental charge are levied to the ratepayers through the universal charge. To provide assistance to project developers, the Development Bank of the Philippines (DBP), has established financing programmes providing low interest loans for new and renewable energy and rural power projects. The programme is funded by various overseas development assistance (ODA) funds and the World Bank. Moreover, the current GEF project 'Capacity Building to Remove Barriers to Renewable Energy Development' also established 3 funding portfolios to support projects that promote and apply innovative strategies and delivery mechanisms. These are project preparation fund, loan guarantee fund and micro-finance fund.

Thailand's *Energy Conservation Fund* (ENCON Fund) is a fund generated from the levy imposed on domestically sold petroleum products. The Fund mainly provides assistance on energy efficiency projects though part of it is used to support renewable energy development: i) as financial assistance to renewable energy project developers, and ii) as subsidy to small renewable energy power producers. More recently the *Energy Conservation Revolving Fund*, which is initially designed to provide financial assistance to energy conservation projects, has opened up to renewable energy projects. The Fund, managed by 6 commercial banks (Siam City bank, Bangkok Bank PCL, Industrial Finance Corporation of Thailand, Thai Military bank, Bank Thai and Sri Ayutthaya Bank), provides low interest loans at a fixed rate of 4%. The maximum amount set for lending per project is US$1 million. The government also plans to use the ENCON fund for the financial incentives being developed under the *Strategic Plan for Renewable Energy Development.*

Table 6.3: Funds to support renewable energy development

Cambodia

Rural Electrification Fund

- Part of the Rural Electrification and Transmission Project funded by the World Bank and Asian Development Bank
- Provides grant to private developers. The grant is expected to contribute 25% of the total project investment costs: REF grant (25%); private equity (25%); bank loan (50%).

Malaysia

Malaysia Electricity Supply Industry Trust Account (MESITA Fund) (1997)

- Independent power producers and Tenaga Nasional Berhad Generation contribute 1% of their annual audited revenue to the fund
- The Fund has been providing financial assistance to rural electrification, energy efficiency and renewable energy projects

Renewable Energy Business Fund

- To support the financial requirement of the full scale model projects (FSM) that would be established under BioGen Programme
- Funding will come from Bank Industry Teknologi Malaysia Berhad (RM 14 million), GEF (RM 9 million) and MESITA fund (RM 5 million)

Philippines

Energy Regulation 1-94

- ER 1-94 directs the power producers or energy resource developers to provide monetary and/or non-monetary benefits to host and affected communities
- Generating companies are required to set aside PhP 0.01 per kWh of electricity sales as benefit to host communities. In *non-highly urbanized region*, fifty percent of these benefits (PhP 0.005/kWh) are allocated to electrification fund (EF) while the remaining benefits are allocated to development and livelihood fund (DLF) and reforestation, watershed management, health and/or environment enhancement fund (RWMHEEF), PhP 0.0025/kWh each. In *highly urbanized cities*, the grant allocations are the following: PhP0.075/kWh for EF, and PhP0.00125/kWh each for DLF and RWMHEEF.

Universal Charge

- The universal charge is a non by-passable charge sanctioned by Electric Power Industry Reform Act (RA 9136) for the following purposes: i) recovery of stranded debts of NPC, and stranded contract cost of NPC and qualified distribution utilities, ii) missionary electrification fund, iii) equalization of taxes and royalties between the indigenous or renewable resources of energy vis-à-vis imported energy fuel, iv) environmental charge for the rehabilitation and maintenance of watershed areas, and v) mitigation fund for the removal of cross-subsidies.

Development Bank of the Philippines Financing Programmes

- Low interest loans extended to new and renewable energy and rural power projects. Funds come from various ODA funds and the World Bank.

Capacity Building to Remove Barriers to Renewable Energy (CBRED) Project Financing Mechanisms

- Established funds to address financing barriers: Project Preparation Fund; Loan Guarantee Fund; and Micro Finance Fund. Funds are sourced from GEF.

Singapore

Innovation for Environmental Sustainability Fund, $20 million (2001-2006)

- to encourage and assist companies to undertake innovative environmental projects that could help to meet the government's goal of environmental sustainability. Projects with strong elements of "innovation" and "early adoption" are sought. Of particular interest are developments that address the specific limitations that Singapore faces such as limited land resource and the densely populated and highly urbanized environment.

Thailand

Energy Conservation Promotion Fund (ENCON Fund)

- The ENCON Fund was established in 1995. The fund revenues are derived from a levy on petroleum products sold domestically. Since October 1998, the premium rate has been adjusted from 0.01 to 0.04 Baht/litre and imposed on gasoline, diesel, kerosene and fuel oil.
- The ENCON Fund provides renewable energy "project owners" with financial assistance or grants. "Project Owners" must be government agencies, state-enterprises, educational institutions, or non-profit organizations. Private entities can join as "Project Participants" of individual Project Owners. Proposed projects of "Project Participants" must have a higher Economic Internal Rate of Return (EIRR) than the minimum rate set by the ENCON Fund Committee. At the initial stage, the minimum rate is set at 9%.
- SPP Subsidy (2001). Request for Proposals (RFP) was issued in July 2001 inviting private investors and SPPs to submit a proposal for subsidy on energy payment on top of EGAT's energy payment under the SPP contract. A budget of 2060 million Baht was allocated from the ENCON Fund for the energy payment subsidy. The RFP calls for viable projects that require additional incentive of no more than 0.36 Baht/kWh for a period of up to 5 years.
- Energy Conservation Revolving Fund. The fund is managed by 6 commercial banks. Provide low interest loans (fixed at 4%) to energy conservation and renewable energy projects. Proponents can borrow up to US$1 million per project, and payable within 7 years.

Vietnam

Remote Area Renewable Energy Fund

- The Fund was set up by the Ministry of Industry and will be used to provide grants to the provinces for establishing remote area commune grids
- Funds were raised from GEF and IDA funds

Sources: Cambodia – *Ministry of Industry, Mines and Energy (2004);* Malaysia – *Pusat Tenaga Malaysia (2004);* Philippines – *Department of Energy (2005 and 2004),* Singapore – *National Environment Agency (2004)*; Thailand – *NEPO (2002), DEDE (2004);* Vietnam – *ESMAP (2001).*

The *Innovation for Environmental Sustainability* (IES) Fund of *Singapore* provides assistance through grants to project developers who undertake innovative environmental projects (including renewable energy projects) that satisfy the government's objective of environmental sustainability. The assistance is based on the various levels of support for different components of allowable cost, up to a maximum of S$2 million for each project.

The *Remote Area Renewable Energy* Fund of *Vietnam* is established to support the Renewable Energy Action Plan. Some funds from GEF and IDAs are placed into this account to support rural electrification projects in remote communities using renewable energies.

7. MARKET DEPLOYMENT OF RENEWABLES

The increase of renewable energy supply in developed countries since the 1970s is, to a large extent, the combined result of various policy instruments implemented over the years. New renewable energy technologies such as solar, wind and some biomass technologies have also been growing rapidly since the 1980s. The deployment of these new renewable energy technologies was largely due to the combined effect of various policy measures adopted in these countries such as investment incentives, fiscal incentives, incentive tariffs and obligations.

Private sector investments on renewable energies in ASEAN are, in a similar manner, driven by grid access programmes and various policy measures (Table 7.1). Among the countries in the region, Thailand has so far attracted significant private investments on renewables. Its *Small Power Producers* (SPP) programme and *Power Purchase Agreements* (PPA) coupled with investment incentives and production subsidies generated significant capacity additions. The subsidy programme initially budgeted a subsidy payment for around 300 MW capacity but it generated project proposals with more than 700 MW capacity. Even the country's *Very Small Power Producers* (VSPP) programme has attracted interests from various agro-industries with the potential of generating small power capacities. The newly adopted *Renewable Portfolio Standard* (RPS) supported by various incentives (currently being developed by the government) is expected to create capacity additions in the medium term.

Table 7.1: Market deployment of renewables in ASEAN

Indonesia

Small Scale Distributed Power Generation (PSK Tersebar)

- 4 projects in operation with total capacity of 156 kW
- 7 projects under construction/commissioning process with total capacity of 4.89 MW

Malaysia

Small Renewable Energy Producers (SREP) Program

- as of January 2005, 62 projects were approved with aggregate capacity of 355 MW; 2 projects were commissioned in 2004 with total capacity of 12 MW.

Philippines

Minihydro Incentives

- As of 2003, 52 mini-hydro projects with total installed capacity of 77 MW; 4 on-going private investor-owned projects

Geothermal Incentives

- As of 2003, 1175 MW capacity is developed by state-owned PNOC-EDC while 757 MW capacity is developed by private investors.

Wind Power Incentives

- 3 projects with total capacity of 0.21 MW; one on-going private sector project with total capacity of 25 MW

Thailand

Small Power Producers (SPP) Programme

- For the period 1992-2002 - 50 projects with total capacity of 3.5 GW, of which 23 projects with capacity of 509 MW were renewable energy-based.
- Status in 2004 - total of 38 RE projects with total capacity of 914 MW

SPP Subsidy results in 2002

- the programme targeted around 300 MW capacity additions through subsidy
- 31 projects were proposed with total capacity of 511 MW
- 14 projects were selected in 2003 with aggregate capacity of 194 MW

Very Small Power Producers (VSPP) Programme

- Status in 2004 – 15 projects were proposed with total capacity of 1.4 MW

Sources: Indonesia – *DGEEU (2005)*; Malaysia – *Pusat Tenaga Malaysia (2005);* Philippines – *Department of Energy (2005)*; Thailand – *DEDE (2005).*

Malaysia's *Small Renewable Energy Producers* (SREP) programme has also created strong interest from the private sector, as indicated by the number of proposals approved by the government. However, only 12 MW capacity has been added at the beginning of 2005 which is far below the Programme's target of 500 MW capacity addition at the end of 2005. The Malaysian government needs to modify the current *Renewable Energy Power Purchase Agreement* (REPPA) in order to attract private investments on renewables. Improvements proposed include the following: increase of the power purchase rate from the cap of RM

0.17/kWh to RM0.22/kWh to provide reasonable returns to investors, and standardization of REPPA to include performance flexibility and improved bankability provisions in order to attract investment financing.

Indonesia's *Small-scale Distributed Power Generation* Programme has also generated various interests from community-based projects. The results so far are modest and the programme is fraught with issues such as the following: i) the power purchase agreement stands only for one year which needs to be renewed annually; ii) many projects are not bankable and have difficulty in securing funding from financial institutions; iii) programme participation procedure is not transparent; iv) non-uniform tariff for each renewable energy which is based on the local production cost of the state utility PLN; and v) investment required to build a 1 MW power plant is too high for small businesses and communities. Proposals to increase investments on distributed power distribution include the following: i) development of long-term power purchase agreement; ii) increase of capacity limit to 5 or 10 MW; and iii) devolution of licensing and business permission to local governments.

The Philippines' fiscal and non-fiscal incentives for geothermal, mini-hydro, and OSW (ocean, solar and wind) also engendered interests from the private sector. Private investments on geothermal energy are significant as manifested by past capacity additions and proposed project developments in the medium term. The incentives for mini-hydropower development were introduced more than 10 years ago but it only generated modest investments from the private sector. The wind energy development incentives appear to attract more interest from the private sector as the government is aggressively opening areas with high wind power potential for development concessions. To enhance private investments, the government must formulate new frameworks and mechanisms that are consistent with the emerging competitive electricity market.

8. CONCLUSION AND POLICY RECOMMENDATIONS

Most ASEAN countries have already undertaken steps in the transition process towards more sustainable energy systems. The ASEAN region as a whole has rich experience in formulating national frameworks and strategies, in implementing policy and regulatory instruments and in attracting financing renewable energy investments. The lessons learned in the process are an important requisite in improving current practices and in realizing the market potential for renewable energy resources.

Despite these initiatives, the current utilization of renewable energy resources is far below its market potential. Efforts must be strengthened to develop a comprehensive approach in renewable energy development by formulating and implementing a coherent national renewable energy policy framework, policy instruments as well as financial tools and mechanisms.

National strategies and targets

- **Formulate national renewable energy policy framework and strategies.** At present, only Indonesia, Malaysia, the Philippines and Thailand have specific national frameworks on renewable energy. Other countries have integrated their renewable energy development frameworks in rural electrification policies, general power sector development and energy efficiency. A national framework and strategy for renewable energies promotes the development of renewable energies not only in specific markets (e.g. rural) but also in the national markets, as long as resources are available and demand for energy services exists.

- **Broaden policy goals and integrate other sector specific concerns to ensure sustainable support on renewable energies.** Common goals in promoting renewable energies in the ASEAN are energy security enhancement, environmental protection, energy access improvement and investment promotion. Most countries give priority to one or two of these goals though all are considered to be relevant. However, once a policy goal is achieved and benefits are realized, there exists a risk that the support for renewable energy would diminish. It is therefore essential that various values and benefits of renewable energies are recognized and stimulated in order to ensure continued support on renewable energy development. Goals promoting renewable energies in the ASEAN could be broadened to include technological innovation, climate change mitigation, employment generation, spur economic development, etc. To further ensure long-term sustainability of support to renewable energy, the ASEAN governments can integrate renewable energy issues into non-energy sector and cross-sector issues. Policy areas that have the highest potential to mainstream renewables include agriculture/forestry, transport, economic development, poverty alleviation, education, urban and land-use planning and infrastructure development.

- **Formulate and set ambitious targets.** National targets are increasingly becoming an important element of renewable energy policies in the ASEAN. At present, Cambodia, Indonesia, Malaysia, the Philippines and Thailand have officially set national renewable energy targets. Though these targets are indicative, they serve as catalyst for governments to take action and develop regulatory frameworks. It is a challenge therefore for other ASEAN member countries to include setting of national targets as key component of their renewable energy policy strategies. The targets set by most of these countries are however modest compared with those in industrialized countries. It is also a challenge to more institutionally advanced and resource-rich countries such as Malaysia, Thailand, the Philippines and Indonesia to set more

ambitious targets. Ambitious targets send correct signals to investors, enable stable technological development, and encourage research investments.

- **Strengthen public awareness frameworks.** The ASEAN countries have adopted various approaches in raising public awareness of the potentials, costs and benefits of renewable energies. The existing frameworks could be strengthened and their deficiencies be sufficiently addressed in order to effectively disseminate information and assists the development of renewable energy markets.

Policy instruments

- **Adopt effective policy instruments.** As presented in Section 4 of this paper, effective policy instruments which include feed-in tariff schemes, obligations, and tradable certificates are those under the supply and generation category. The European experience has shown that these instruments were responsible for rapid increase in renewable energy capacity additions. In ASEAN, only Thailand recently has adopted the renewable energy portfolio standard. Some countries rely mainly on investment incentives and tax measures as well as non-fiscal measures while a number of countries have not developed policy instruments to promote renewables. Each of the policy instruments has inherent strengths and weaknesses and a country's choice will be influenced by various factors such as policy goals, type of renewable energy resources, institutional arrangements, energy markets, level of financial support, etc.

- **Combine policy instruments.** Developed countries' experience shows that no renewable electricity market has been developed by a single policy. The success has been the result of combinations of policy instruments. The European experience shows that the combination of policy instruments under the supply and generation category (feed-in tariff schemes, obligations, and tradable certificates) with those of the supply and demand category (financial incentives and tax measures) could result in high penetration of renewable energies. Thailand for example is currently elaborating incentive measures to support its renewable energy portfolio standards. ASEAN member countries therefore must formulate a combined set of policy instruments in promoting renewable energy development.

- **Design effective policy mechanisms.** Successful policy mechanisms, although classified under the same category such as feed-in tariffs, obligations, tradable certificates, could differ from one country to another since national conditions and policy objectives are different. Essential elements that must be considered by ASEAN countries in the design of policy mechanisms may include the following: i) simple and transparent in design and implementation, ii) compatibility with polluter pays principle, iii) transparent and with integrity (protecting consumers, avoiding fraud and free riding), iv) compatibility with national power markets and with other policy instruments, v) encourage technology diversity, vi) encourage innovation, technology development and lower costs, vii) encourage local and regional benefits, public acceptance and site dispersion, viii) high effectiveness in deployment of renewables, ix) facilitate smooth transition, and x) high investor confidence.

Grid access

- **Remove electricity sector barriers.** Most ASEAN member countries have introduced various levels of reforms in their electricity supply industries in the past. At present, electricity market structures vary from country to country with a competitive electricity market in Singapore on one end to monopolistic markets in some countries on the other end. Barriers to renewable energies vary from one

industry and institutional structure to another. As part of the power sector reform process, countries such as Thailand, Malaysia and Indonesia introduced renewable energy power purchase programmes to facilitate interconnection and remove grid access barriers to renewables. Elements of power sector reforms that address renewable energy market barriers include the following: i) fair access to the grid at fair, transparent prices and removal of discriminatory access; ii) fair and transparent pricing for power throughout the network with recognition and remuneration for the benefits of distributed generation; iii) streamline and uniform planning procedures and permitting systems and integrated least cost network planning; iv) grid infrastructure development and reinforcement costs are carried out by grid management authorities rather than individual projects; v) unbundling of electricity industry functions separating generation from distribution; and vi) disclosure of fuel mix and environmental impact to end-users to enable consumers to make an informed choice of power source.

- **Remove electricity market distortions.** Market distortions in the electricity industries in the ASEAN include direct and indirect subsidies to conventional fuels and the external costs associated with conventional energies.

    - Subsidies to conventional fuels artificially lower the price of electric power making renewable energies less competitive in the electricity markets. While it may be difficult for ASEAN countries to completely remove the subsidies, governments must strive hard to gradually reduce it. As these subsidies are removed or reduced, the need for support to renewable energies would also reduce significantly.

    - Electricity generation from conventional fuels is associated with environmental externalities. The damage to the natural environment (local and regional) and human health caused by these externalities in ASEAN countries could be substantial. ASEAN governments could mitigate the environmental externalities by adopting policies consistent with the 'polluters pay principle', making power generators responsible for the damage it causes to the society through polluter pays taxation to polluting sources, or environmental compensation to renewable energy sources, as well as exclusion of renewable energy technologies to environmental taxation.

Financial Support

- **Establish frameworks that provide price support mechanisms for large-scale projects**. Large-scale on-grid projects have significant chances of accessing commercial funds and though gaps and barriers exists in project development, financial structuring and risk management, financial tools and measures are available. These projects could sufficiently attract private investments if regulatory frameworks exist to insulate them from risk and provide them stable cash flows.

- **Develop financial mechanisms that reduce transaction costs for small-scale projects**. Secure and stable revenues are not often sufficient for small-scale grid-based renewable energy projects since their transaction costs are high. Mechanisms that reduce transaction costs for these projects could include: dedicated funds, bundling of investments, customer-based investments, and fast-track financing to standardized projects.

- **Develop various support mechanisms for small-scale off-grid projects**. Small-scale off-grid projects face significant obstacles in accessing financing. Their small size and unpredictable cash flows make them uninteresting for lenders and risk-averse

investors. These support mechanisms could be in the form of the following: i) seed capital; ii) business developments grants to small and medium-sized enterprises, iii) lines of credit to local banks for on-lending to renewable energy projects, iv) credit enhancements such as risk and credit guarantees that make banks more willing to extend credit to renewable energy projects; v) interest rate subsidies; and small and medium enterprises growth capital funds that provide equity or debt directly to projects.

- **Establish trust accounts to provide financial assistance to renewable energy development**. Renewable energy projects remain more costly than conventional fossil fuel-fired power plants and that financial mechanisms are necessary in order to make it more price competitive. Moreover, small-scale projects (both on-grid and off-grid) require financial assistance to leverage financing. Establishing trust accounts to provide financial assistance is therefore necessary. A number of ASEAN countries have established several types of trust accounts with funds derived from various sources. One global emerging trend that ASEAN countries could emulate is the establishment of funds dedicated to renewable energy development through public-private partnerships.

- **Raise awareness and strengthen the capacity of financial institutions**. Albeit several renewable energy technologies have long been matured and are price competitive, many financial institutions in the ASEAN perceive the technology to be risky due to lack of awareness and understanding of the technology. Commercial credit facilities for renewable energy in the region are thus very limited. Raising and strengthening the capacity of these institutions on renewable energy financing is therefore crucial.

Regional Cooperation

- **Establish a regional framework for renewable energy**. The ASEAN region is at present composed of both net energy exporting and importing countries though in the medium term all countries are projected to be net energy importers. In the face of increasing dependence on imported energy, renewables can fill in the gap to provide security of energy supply in the region. The ASEAN, as a group, can formulate a regional framework with the objective of increasing the share of renewables in the energy mix of the region. The existing targets of some countries will form as basis of the regional target while those countries, which have not yet defined targets, will be urged to define indicative targets. Though these targets are not legally binding, it will motivate governments to formulate and innovate mechanisms that stimulate investments on renewable energies.

- **Promote regional sharing of experiences on policy formulation and implementation**. At present only few ASEAN countries have actually implemented policy measures that stimulate market deployment of renewable energies. Sharing these experiences could be extremely useful to other member countries.

- **Expand regional cooperation on renewable energies**. The regional cooperation on renewable energies under the ASEAN Plan of Action on Energy Cooperation 2004-2009 focuses on exchange of manufacturing capabilities, development of policy and institutional framework, cooperation on ASEAN made products and application of renewable energies for rural development. This cooperation could be further expanded to cover other renewable energies. One potential area is in the field of biofuels. With the period of cheap energy prices already gone and a number of ASEAN countries developing programmes on ethanol blended gasoline and biodiesel, it is an opportune time to promote cooperation on biofuels. The scope of ASEAN

cooperation may be broad ranging from the trade of biofuels or biofuel feedstocks, to the cultivation of the crops, to the technical aspects of biofuel production as well as policies promoting the use of biofuels.

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