

Executive Summary

Background and objectives

The research aims to identify and update the most effective policies in the Asian context, especially for the Association of Southeast Asian Nations (ASEAN) countries, China and India. Specifically, it addresses what policies could effectively mitigate the most prominent risks related to renewable energy investments and therefore facilitate the application of the most promising financial mechanism in the region.

The project invited field experts to contribute research papers to give a timely update on the most important policy issues related to the financing of renewable energy development in the developing East Asian countries. The working group of authors consists of field experts in renewable energy financing issues from top energy research institutes such as the Brunei National Energy Research Institute, the Chinese Academy of Social Sciences, the Energy Research Institute of Chulalongkorn University, the Energy Studies Institute of National University of Singapore, North China Electric Power University, and ERIA; and international financial institutes such as the Asian Development Bank; as well as universities such as Nanyang Technological University in Singapore, Ohio State University, and Southwestern University of Finance and Economics in China.

The following financing issues are highlighted for the customised studies on the policy options for these countries:

- ❖ Financing mechanisms, including debts, equity, hybrid structures, and risk-sharing and mitigation, for the projects of different technologies – wind, solar, biomass, etc. A greater emphasis is given to the following in the Asian context:
 - Financing small-scale distributed renewable energy projects in urban areas as well as rural areas
 - The feasibility of smaller-scale lending through micro-credit, the fees for the service model, the revolving funds model, and the cooperatives model in rural areas
 - The feasibility of equity financing, such as joint ventures, specialised investment funds, and venture capital

- ❖ Other innovative financial mechanisms such as loan guarantees and political risk insurances
- ❖ Liberalising energy markets, removing subsidies on fossil fuels and internalising the negative externalities of fossil fuel usage, and opening up of renewable energy markets

Methodology and organisation of the project

Specifically, all studies chosen highlight one or a few of the key issues in the following five dimensions as shown in Figure 1.1. The focal points which link these five dimensions of issues in financing renewable energy are: the business models, the financial mechanisms, the electricity market design, and the framework of supportive policies.

Figure 1.1: Five Dimensions of Issues to Promote the Financing of Renewable Energy



Note: IRR = internal rate of return; PPA = power purchase agreement.
Source: Prepared by the authors.

Policies pertaining to the five dimensions include: 1) market creation policies such as the renewable portfolio standard, the renewable energy certificate (REC), and carbon credit and trading; 2) reducing uncertainties of investment in renewable energy through

the provision of stability of policies, regulations, institutions, and legislation; 3) improving profitability of renewable energy projects through the provision of power purchase agreements (PPA), net-metering, proper retail pricing, and even fiscal incentives; 4) regarding the barriers related to technologies, support should be given on R&D, grid-connection, data of renewable energy resources, and capacity building for all stakeholders of renewable energy projects; and 5) widening the sources of funds dedicated to renewable energy and lowering the financial costs for renewable energy projects. For both purposes, the involvement of public financing would be necessary to eventually leverage on private investments.

However, a country must be selective in choosing among these policy tools to build up its own framework and mechanisms of support for renewable energy, as the characteristics of renewable energy resources, technological capacities, maturity of the domestic electricity market, financial market readiness, and availability of public financing are all different. We thus emphasise the studies on the experience and lessons learned from each country in this region, and highlight the importance of integrating the design of policies from all five dimensions into a rational mesh of incentives for renewable energy investment. The selected studies are as follows:

No.	Studies
1	Renewable Energy Policies in Promoting Financing and Investment among the East Asia Summit Countries: Quantitative Assessment and Policy Implications
2	Assessment of Instruments in Facilitating Investment in Off-grid Renewable Energy Projects – Global Experience and Implications for ASEAN Countries
3	Business Models and Financing Options for a Rapid Scale-up of Rooftop Solar Power Systems in Thailand
4	Analysis of Distributed Solar PV (DSPV) Power Policy in China
5	Innovative Business Models and Financing Mechanisms for Distributed

	Solar PV (DSPV) Deployment in China
6	Exuberance in China's Renewable Energy Investment: Rationality, Capital Structure, and Implications with Firm-level Evidence
7	The Impacts and Interaction of Upstream and Downstream Policies for the Solar Photovoltaic Industries of China
8	Retail Electricity Tariff and Mechanism Design to Incentivise Distributed Generation
9	Financing Solar PV Projects: Energy Production Risk Reduction and Debt Capacity Improvement
10	Bond Financing for Renewable Energy in Asia
11	Utilising Green Bonds for Financing Renewable Energy Projects in Developing Asian Countries
12	Renewable Energy Policies and the Solar Home System in Cambodia

For each topic chosen, a comprehensive review of the issues in these countries is required, followed by an analysis of how specific policies should be applied to address the issues. A clear, solid, and consistent analytical framework is applied within each study. The highest academic standards are also applied to each study for publication purposes.

Policy implications

In general, the developing economies of the East Asia region, especially the ASEAN countries, have to work in all five policy dimensions with the following issues highlighted: 1) A weaker form of renewable energy market exists. In other words, market-based policies such as REC and net-metering should be implemented further. 2) Renewable energy acts are to be established in many countries in the region, although renewable energy targets widely exist. 3) Insufficient emphasis has been given to technological factors, such as the availability of accurate and comprehensive data of renewable energy

resources, smart grid capability, and capacity building for technicians, engineers, financiers, entrepreneurs, and other stakeholders. 4) Although policies to improve profitability of renewable energy projects and efforts to enhance the availability of financial resources are already prevalent in the region, policy stability and predictability should be emphasised.

For off-grid renewable energy and mini-hybrid systems, especially regarding rural areas: 1) A clear electrification plan should be provided to reduce the risks of investing in renewable energy off-grid systems. 2) Public financing is still to a large extent needed in rural areas considering the low-income levels and the high upfront cost of renewable energy systems. 3) For business models, which provide electricity from renewable energy as a service to rural residents, information technology tools for remote metering, monitoring, fee collection, and regulating consumption are needed. 4) Engagement with and capacity building for the local communities, in designing, installation, operation, and maintenance, are key to the successful adoption of renewable energy systems. 5) Training of local engineers and setting up of local service networks need to be developed with government support. 6) Capacity building for local small business entrepreneurs to develop viable business models is important for the adoption and operation of renewable energy in rural areas on a commercial basis. 7) Governments can significantly cut the upfront cost of investment if measures are taken along the whole supply chain from procurement of equipment to installation, to minimise transaction costs.

Distributed generation (for example, solar rooftop), requires different types of support from large-scale renewable energy stations and farms. 1) Net-metering, which works more efficiently than feed-in tariffs (FIT) in promoting distributed generation from renewable energy. 2) An innovative grid connection mechanism similar to the network access mechanism for the mobile phone industry, to shift the grid connection procedure from end users of distributed generation systems to the product manufacturers and installation and maintenance service providers. 3) Proper retail electricity pricing to provide incentives for distributed generation, together with a cost allocation mechanism to avoid impacts on the utility's ability to recover investment costs on the grid and conventional power generation assets. 4) Simplifying permit processes and reducing transaction costs. 5) Providing tax credit, which will especially help residential solar

leasing models to be financially feasible. 6) Building a qualified installation workforce with certification systems as well as standard systems for equipment and services. 7) Defining and regulating innovative financing mechanisms such as internet financing to raise small funds for small investment projects such as distributed generation systems.

The availability of financial resources and a dedicated financial market for renewable energy is especially important for developing economies, as they do not typically have deep capital markets. This report highlights the potential of bond financing, which could help attract a new class of investors in this region, for financing renewable energy projects. To accelerate the development of a green bond market in the region, various policies could contribute, including the following: 1) Develop a pool of long-term investors that can invest in long-term green bonds. 2) Encourage and facilitate the issuance of retail bonds to attract small investors and enable small to medium-sized renewable energy companies to tap the bond market for financing. 3) Make historical data about the performance of renewable energy projects available to reduce investors' perceived risks of renewable energy projects. 4) Create national regulation rules, standards, and classification systems for green bonds. 5) Create incentives for the issuance of green bonds. 6) Develop a regional financial market for fixed-income instruments, which helps increase the liquidity of green bonds.

Policymakers should also keep the spill-over effects of policies and overinvestment issues in mind. 1) Supportive policies for downstream renewable energy industries, namely the adoption and application of renewable energy, have strong feedback effect and help the upstream industries reducing the costs of the products. 2) Supportive policies for upstream renewable energy industries, namely the manufacturing of materials and equipment, have smaller spill-over effects on downstream industries to help reduce the cost of investment. 3) Typical firm-level investment decisions may overreact to policy stimulus in the form of 'free cash'. However, this would not necessarily lead to overinvestment, as many firms may have limited access to debt financing.