

Electrifying ASEAN

Off-grid distributed renewable energy systems provide solutions for unstable supply



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Some 134 million people in the Association of Southeast Asian Nations (ASEAN) region do not have access to electricity (IEA and ERIA, 2013). At the end of 2015, the ASEAN community declared that lack of power and energy access could threaten the region's economic growth and its economic transition. Many industrial and commercial economic zones, and remote areas in ASEAN's emerging countries that contribute to economic growth, are faced with an unstable energy supply. This is likely to prevent companies and households from investing and providing economic activities such as goods and services. Off-grid distributed energy systems (DES) using renewable energy could be a solution to this problem, thanks to the increasing

availability of small power generation and renewable energy technologies.

Off-grid DES-related renewable energy sources include biomass, solar and hydro, with generating capacities ranging from a few kilowatts to as much as 50 MW. Such renewable energy technologies can either be integrated into local distribution grids or used as "stand-alone" systems in areas where extension of transmission lines is not economically viable.

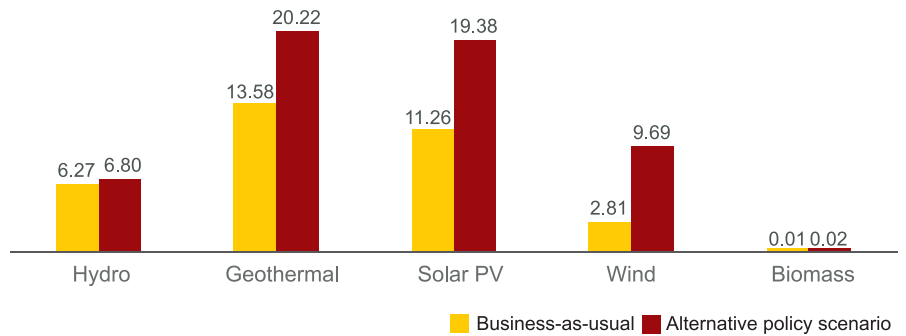
As energy supply from off-grid DES-related renewable sources could significantly increase in emerging ASEAN countries, the Economic Research Institute for ASEAN and East Asia (ERIA) attempt-

ed to estimate the off-grid DES-related renewable energy potential using both a business-as-usual (BAU) scenario and an alternative policy scenario (APS). A BAU scenario was developed for each ASEAN country and outlines current energy policies and economy-wide energy consumption assuming no significant changes in government policies. An APS was set to examine the potential impacts if additional energy efficiency goals, action plans, or policies were developed that are currently, or likely to be, under consideration. The results showed that the electricity supply from off-grid DES-related renewable sources will increase from 65,608 GWh-hours under the BAU scenario to 91,854 GWh-hours in the APS. The investment opportunity estimated for the combined use of solar, wind, biomass, hydropower, and geothermal is about \$34 billion for the BAU scenario, and about \$56 billion under the APS. Amongst the DES-related renewable energy sources, investment in solar and geothermal power is expected to double under the APS compared with the BAU scenario, while investment in wind energy is expected to increase more than threefold to meet the expected generation output by 2040 (see figure).

From the potential increase in off-grid DES-related renewable energy sources in ASEAN, it is also estimated that CO₂ emission reduction in the ASEAN region as a result of the application of off-grid DES-related solar, wind, biomass, geothermal and hydro power will be about 46.1 million metric tonnes (mmt) in the BAU scenario, and 64.6 mmt under the APS scenario.

But to realise the potential of off-grid DES-related renewable capacity and investment, an enabling policy framework that provides long-term government commitment and credible targets will be needed. ASEAN may need to consider a wide range of policy options and instruments, although it has already targeted a 23 per cent share of renewable energy in primary energy supply

Estimates of off-grid distributed renewable energy system investment opportunity by 2040 (\$ billion)



by 2025. The framework of policy options worth considering is the following.

- **National policy design** aims to provide a trajectory for the future energy mix. It includes a renewable energy target; a renewable energy law or strategy; a biomass and biofuels law or programme; and a solar heating, solar power, wind and geothermal law or programme.
- **Fiscal incentives** aim to reduce the upfront cost by introducing fiscal policy instruments such as exemptions of value added tax, fuel tax, income tax, import and export duties, and local taxes; and introduction of a carbon tax and accelerated depreciation.
- **Grid access** aims to give project developers confidence to invest through grid access priority and a transmission discount policy if electricity is produced from renewable energy.
- **Regulatory instruments** aim to provide incentives for investing in renewables through the implementation of energy policies such as feed-in tariffs, feed-in premiums, auctions, net metering, and quotas.
- **Finance** aims to reduce risk for investors through the implementation of currency hedging, dedicated funds, eligible funds, or guarantees.

In conclusion, the increase in off-grid DES-

related renewable energy supply in the ASEAN region will have multiple benefits for people and the environment. Its expansion and application could promote energy access at lower cost and more efficiently, and it could also address the challenging issue of electricity access for about 134 million people whose rights have been denied. Its application would also contribute to CO₂ reduction at the ASEAN level by reducing emissions by as much as nearly 65 mmt in the APS scenario. ASEAN will enjoy quality growth by investing more in off-grid DES-related renewable energy sources. ■

Dr Han Phoumin is currently working as an energy economist with ERIA, based in Jakarta, Indonesia. His areas of expertise include renewable energy including bio-fuels, energy efficiency and savings, energy security, energy consumption and forecasting, and water resource development and management. Dr Phoumin has more than 17 years of professional experience in the ASEAN region and East Asia., and has dealt with a number of development issues related to economic, social and environmental development such as water, poverty and energy. He has a PhD with specialisation in economic development and policies from Kobe University, Japan.

The views expressed in the article are personal and do not reflect ERIA's position.