

# Chapter 7

## Conclusions and Policy Implications

### ASEAN

The ASEAN primary energy supply is projected to increase from 592 Mtoe in 2013 to 1,697 Mtoe in 2040, representing more than threefold increases during this period. This increase in energy demand will put pressure on energy security, access, and price. Thus, the study of distributed energy system (DES) is explored as part of the energy system that could promote energy access more efficiently at lower costs. The study found that DES is a modern small power generation system that is flexible in providing electricity to end users more effectively due to lower investment cost and easier handling compared with large national power plants and grids. If it is to be widely deployed, DES could also help to address the daunting issue of electricity access to about 130 million people whose rights have been denied. The flexibility of DES at multiple locations through the increasing availability of small power generation has been applied. Thailand's small power producers (SPPs) and very small power producers (VSSPs) have been widely used and their current share of 17.4% in the power generation mix in 2014 is expected to increase significantly.

At the ASEAN level, the idea of transboundary grids is being promoted in the ASEAN Power Grid. This grid is expected to make a major contribution to maximising ASEAN's benefit in avoiding the cost of power generation. However, it is expensive and it may take years to realise the connectivity. In contrast, DES can overcome cost constraints that typically inhibit the development of large capital projects and transmission and distribution lines. Thus, DES will be widely used. The modern grid system is also expected to handle the integration of DES into the grid system. DES could be a stand-alone power generation or connected to the power grid. So, its application is also very suitable for mountainous terrain, islands, and remote rural areas.

The study also estimated the DES-related renewable capacity and needed investment at the ASEAN level. The estimated power generation from combined renewable energy such as wind, solar photovoltaic (PV), geothermal, hydropower, and biomass in ASEAN

will increase significantly from the business-as-usual scenario (BAU) to the alternative policy scenario (APS); it also implies investment opportunities in this sector. Investment opportunities by 2040 in BAU for combined solar, wind, biomass, hydropower, and geothermal are estimated at US\$34 billion, and in the APS at US\$56 billion. Amongst DES-related renewable investment opportunities, those for solar and geothermal power are expected to double from BAU to the APS. Wind will increase more than threefold in terms of investment required to meet the expected generation output by 2040.

The introduction of DES also implies reduced CO<sub>2</sub> emission. The study estimates that BAU would lead to a reduction of 46.1 million metric tons of CO<sub>2</sub> emission and that the APS could lead to a reduction of 64.6 million metric ton of CO<sub>2</sub>.

## Indonesia

DES can be implemented in regions like Indonesia where grid-connected electricity supply is unavailable or uneconomically viable. It can be implemented in Indonesia to support the electrification faster than by waiting for supply from a grid connection. DES is cost competitive compared with current diesel power plants. As DES projects use local energy resources, and are not necessarily technology intensive, these projects may also increase the involvement of local people in the construction and maintenance of the system. This may create jobs in the region.

As the potential of DES is huge in Indonesia, its development can be even faster with the participation of local governments, for example by providing free land for the sites of DES projects. To optimise the development of DES projects and ensure their sustainability, government support – such as tax incentives, longer term low-interest loans, and a streamlined licensing process – is needed. Good electricity tariffs for DES that take account of production costs and reasonable margins are also needed.

## Malaysia

The implementation of DES is very important for the security of supply, especially for remote areas where the connectivity is far from the grid. To ensure the stability of electricity supply without disruption, equipment and other requirements for electricity generation should be properly installed and completed. DES is now the potential solution for this problem. Installing the transmission or distribution line to the national grid from remote areas is costlier. By using existing natural resources, such as biomass or biogas, DES can also reduce greenhouse gas (GHG) emissions.

Through DES, rural areas can achieve an electrification rate of 100%. Providing this basic amenity will help generate income for the economy. DES will also help boost tourism on several of Malaysia's islands. With some remote islands in the country located far from the national grid system, the implementation of DES will be a great solution.

Public and private funds are needed to ensure the success of DES' implementation.

Government can offer attractive incentives to attract local and international investors.

## Philippines

Evidently, the underlying principles of DES present substantial potentials that correspond to the current setting of the Philippine electric power industry, either through on-site embedded generation or stand-alone off-grid systems.

As the government aspires to bring inclusive economic development to the grassroots level, the concept of DES applications undeniably portrays an integral role in ensuring the security of energy supply in the flourishing economic and industrial zones of the country and, more importantly, of the remote communities.

Government has recognised that the deployment of DES applications is an alternative platform to complement centralised and decentralised electrification initiatives.

Harnessing the full potential of the cleaner set of fuels such as renewables is admittedly an effective mitigating measure to drastically reduce GHG emissions. This in the long run is foreseen to counter the adverse impacts of climate change. To take full advantage of this benefit, the country should pursue the development and increased use of indigenous renewable energy sources that are abundant in rural locations. But strong policy support and mechanisms from the government are imperative.

Fundamentally, DES applications are intended to provide an affordable and reasonable source of electricity. But because the private sector lacks confidence to invest in the off-grid generation business, the national government assumes responsibility for bringing the necessary electricity services to spur local economic development. To sustain the operations of DES in off-grid communities, government subsidises the costs of generating power. In turn, DESs have become costly compared with grid-connected power systems.

Moving forward, the Department of Energy, the government arm overseeing the local energy sector, has come up with the following initiatives to foster the development of and promote DESs in the country. Amongst others, the government is inclined to:

- Conduct studies that will strengthen the existing DESs.
- Declare and include future DESs as energy projects of national significance.
- Regularly update the Missionary Electrification Development Plan.
- Pursue and intensify the private sector participation programme.
- Accelerate the promotion, utilisation, and development of renewable energy as DESs.
- Explore emerging technologies that may be considered DESs.
- Develop and propose regulatory instruments that will open favourable opportunities to prospective private investors.
- Periodically review and assess existing policies, programmes, and mechanisms that will safeguard the interest of both public consumers and private investors.
- Pursue envisaged policies that are practicable and applicable to DESs.
- Study and implement a subsidy graduation programme for DES.
- Refurbish, rehabilitate, and upgrade old DES operated by the state-owned National Power Corporation – Small Power Utilities Group of the (NPC–SPUG).

## Thailand

DES has been widely applied in Thailand through small power producers (SPPs) and very small power producers (VSPPs). The current share of DES in Thailand is about 17.4% of the power generation mix, and its share and capacity will increase significantly in the future. Thailand’s experience could provide the best example for other ASEAN countries to use DES to respond to increasing energy demand.

DESs in Thailand are mainly used in the private industrial sector and investment in accordance with the government’s policy on subsidy. DESs in Thailand mainly promote solar and biomass. The on-grid DES of the country is expected to grow in the near future. Per the current policy on DES, about 10,000 MW DES growth is expected. However, off-grid DES demand could skyrocket when the price of self-generated electricity is lower than that of retailed electricity.

The new Cabinet provided the direction of Energy 4.0. To accommodate the government’s policy, the Ministry of Energy has kept the Energy 4.0 policy focused on the Thailand Integrated Energy Blueprint to drive energy innovation and given King Rama IX’s desire to strengthen families and communities. To enhance the power sector, the Ministry of Energy has set policies on DES in two areas – for places that experienced unbalanced fuel diversification and unstable renewable generation, and for places where the centralised generation and distribution system was faced with high investment in the transmission system.

## Policy Implications for DES in ASEAN

DES offers emerging ASEAN countries one of the best options in responding to increasing energy demand and providing energy access to remote rural, mountainous, and island areas, and economic zones as stand-alone generator or combined with the grid system. The promotion of DES is crucial, but DES will need careful policy support if it is to deploy renewable energy. Basically, the policies will work around reducing upfront investment costs of DES-related renewable generation. Those friendly policies are the required top-down renewable energy targets such as renewable portfolio standards and other policies; fiscal incentives such as exemptions from taxes (value added, fuel, income, import and export, and local taxes); and accelerated depreciation through premium tariff rates such as a feed-in tariff. ASEAN could consider the introduction of carbon tax in the future. Banking institutions will need to enlarge their role and policy to finance DES-related renewable energy and find mechanisms to minimise risks, and to increase the profitability aspects of DES-related renewable investments. DES-related investment opportunities are large, and will provide jobs and many business opportunities to people and communities. DES is one of the modern generation systems and its deployment will also help address national energy security.