Indonesia moves to capitalise on renewable resources

Indonesia was the world's fourth-largest emitter of greenhouse gases in 2015. Will a new, government-driven renewables programme be able to improve the country's environmental profile as it strives to expand energy access? David Hayes takes a look at progress so far.

> R esource-rich Indonesia is moving ahead with plans to add 35 GW of power generation capacity to national supply, which will boost the nation's total installed capacity to 115 GW on completion in 2025. The government's so-called '35 GW programme' is intended to increase electricity supplies by about one third and forms a key part of Indonesia's 10-year 2018 Electricity Supply Business Plan, known as Rencana Usaha Penyediaan Tenaga Listrik (RUPTL).

The 35 GW programme is also designed to expand investment in independent power producers (IPPs) and raise the share of renewable energy in the country's primary energy supply. Meanwhile, the government hopes the initiative will help to virtually eliminate oil-fired generation and reduce the coal-fuelled share of the country's overall energy mix.

Although many IPP investors are interested in building power plants, progress to date has been slower than the Energy and Mineral Resources Ministry had originally hoped.

Various factors, including IPP operator difficulties in obtaining bank loans, are responsible. Private investors are also taking a cautious approach as they navigate what many consider to be an opaque IPP project licensing process.

Uncertainty over the outcome of Indonesia's presidential election earlier this year also slowed progress. However, final confirmation in July of President Joko 'Jokowi' Widodo's re-election for a second term, following legal challenges by the defeated opposition party, has helped to restore some investor and lender confidence.

35 GW ambitions

The election result has ensured the 35 GW programme, originally launched by President Widodo in 2015, and related government energy policies supporting IPP and renewable energy development, remain in place as before. Previously hesitant investors are now expected to move forward with their IPP plant construction plans, encouraged by new regulations introduced last year to simplify IPP project licensing procedures, making them less costly and quicker to complete.

So far, just 3,600 MW, or 10% of the government's total targeted new generating capacity, has begun commercial operation after entering service during the first half this year. Power plants already in operation were built by national power company Perum Listrik Negara (PLN) total 2,200 MW in installed capacity. Meanwhile, former PLN acting President Director, Djoko Abumanan, told Indonesia's House of Representatives during a recent hearing that operational IPP schemes total 1,300 MW.

New power stations totalling a further 20 GW are under construction by IPP operators and PLN, of which six units totalling a further 2,200 MW are due for completion by the end of this year. Three of the units nearing completion are coal-fired plants totalling 2,100 MW – the Kasel plant in South Kalimantan, Jawa-7 in Banten and Jawa-8 in Central Java. The three other units are smaller gas-fired and renewable energy-fuelled plants.

According to Abumanan, IPP plants amounting to 15.7 GW account for most of the new capacity being built, while PLN's under-construction units total some 4,300 MW. PLN is planning to raise about \$2bn from new loans this year to finance its power generation, transmission and distribution programme, Abumanan said.

Abumanan explained that PLN has signed power purchase agreements (PPAs) with IPP developers for additional power plants totalling 9,500 MW installed capacity, equivalent to 27% of the 35 GW scheme's target capacity, but construction work on these new units had yet to start.

Originally due for completion in 2019 to coincide with the end of President Widodo's first term in office, the 35 GW programme's ambitious completion date was officially pushed back to 2025

It's estimated that Indonesia has about 8 GW of economically viable undeveloped hydropower potential The World Bank is supporting Indonesia's renewable energy programme through a \$49mn loan to fund geothermal exploration drilling in about **12** locations throughout the archipelago – these include drilling sites in Eastern Indonesia, which is heavily reliant on expensive oil-fired generatio<u>n</u>

following a slowdown in electricity demand growth and delays in progress with IPP project implementation.

Funding snags

Representing a majority of the total 56 GW new generating capacity planned for installation during the 2018 RUPTL 10-year programme, the government's 35 GW scheme has attracted the interest of well over 100 potential IPP investors since its launch. However, a sizeable number have been unable to proceed with their projects as planned, particularly investors wanting to set up small or medium-scale renewable schemes who have failed to obtain bank loans after signing a PPA with PLN.

According to a recent report published by the Independent Power Producers Association of Indonesia (APLSI) in cooperation with PwC Indonesia, about 38 small IPP hydropower projects reported difficulties obtaining loan finance in 2018 after the Energy Ministry approved in principle at least 50 small hydropower PPAs the previous year.

Investor interest has not diminished, however, as IPP projects will play an important role in achieving Indonesia's power development plans in future. The APLSI report noted that over 100 companies submitted prequalification applications to PLN in 2018 for future hydropower schemes. The results of these applications have not been announced as yet.

Other renewable schemes, including solar and bioenergy projects, have also faced financing difficulties after IPP developers signed PPAs. Complications are believed to have arisen in some cases because Indonesian bank managers, many of whom are inexperienced in renewable energy project funding, are uncertain whether the IPP loan applicant's PPA tariff and supply conditions agreed with PLN will ensure profitable operation.

New dawn for renewables

As part of multilateral development bank efforts to support Indonesia's renewable energy sector, the Asian Development Bank (ADB) is providing Singapore-registered Equis Energy with a \$40mn loan to construct wind power and solar energy schemes in Eastern Indonesia – one of the country's least developed regions.

The wind and solar projects are intended to help reduce Indonesia's reliance on fossil fuels and demonstrate the financial viability of renewable energy schemes to local banks and other lenders to accelerate development of Indonesia's large renewable energy potential.

Phase 1 of the ADB loan scheme involves constructing a 72 MW wind power farm. Phase 2 consists of constructing Indonesia's first solar power plant, a 21 MW scheme in Likupang, North Sulawesi. In addition, three 7 MW solar power plants will be built on Lombok island in West Nusa Tenggara. All the power plants will supply their electricity to PLN for distribution through the local power grid network.

The World Bank is also supporting Indonesia's renewable energy programme through a \$49mn loan to fund geothermal exploration drilling in about 12 locations throughout the archipelago. These include drilling sites in Eastern Indonesia, which is heavily reliant on expensive oil-fired generation and for which geothermal energy is a low-cost, low pollution alternative.

Although Indonesia's estimated 27 GW geothermal reserves represent about 40% of the world's total, only about 1,700 MW has been developed so far. The World Bank project is designed to identify geothermal deposits for development by PLN or IPP operators and will help reduce the use of fossil fuels. The project is being supported by a \$6mn New Zealand government grant to fund the setting up of a national database to track geothermal resources and exploration activities.

Rich in energy, mineral, marine and other resources, Indonesia is Southeast Asia's largest economy and is the world's fourth most populous country, with a population of more than 260mn people living in the world's largest archipelago of over 17,500 islands. Currently, almost 80% of installed capacity is in Java, while the remaining capacity is in unconnected grids on major islands. Hundreds of isolated mini-grids exist in remote rural areas in Java-Bali and the outer islands.

Coal remains

Given Indonesia's diverse geographical features, renewable energy offers large growth potential as resources are spread throughout the country. However, coal-fired generation will continue to play a major role as renewable energy development gains pace. The country's large coal reserves are relatively easy to mine and distribute through existing transport infrastructure, providing low cost fuel in the absence of renewable infrastructure.

According to the Directorate General of New and Renewable Energy and Energy Conservation, Indonesia's abundant renewable energy resources total an estimated equivalent of 425 GW of electricity generating capacity. The country's photovoltaic resources are sufficient to generate an estimated 208 GW, while hydropower reserves sufficient to generate 75 GW have been identified, as well as 61 GW of wind power resources.

State-run PLN's installed generating capacity currently totals 58 GW of which 29 GW, almost exactly half, is contributed by coal-fired stations while gas-fired power plants totalling 17 GW account for a further 29% of the utility's total installed generating capacity.

Hydropower plants are PLN's other major source of generation, accounting for 7.5% of the utility's total power output in March. PLN is due to build new power plants totalling 10 GW as the utility's 28.5% share of Indonesia's planned 35 GW new generating capacity target.

Indonesia's installed IPP generating capacity, meanwhile, is estimated at about 10 GW of which about half consists of coal-fired stations while gas-fired units account for a further estimated 25% share. Hydropower and geothermal projects provide much of the country's remaining privately invested IPP capacity.

The 2018 RUPTL plan calls for new power plants totalling 56 GW to be built by 2027, including power schemes listed under the 35 GW programme. Oil-fired generation will be almost eliminated by 2027 when diesel-fired plants will provide about 0.4% of Indonesia's electricity supply compared with 5.8% of supply in 2017.

However, coal-fired stations will account for almost half of Indonesia's new generating capacity and are expected to generate 58% of electricity supplies in 2027, largely unchanged from 2017. However, the coal share of Indonesia's primary energy mix is expected to decrease slightly due to the planned increase in renewable energy capacity.

Whether Indonesia's plans for upping renewable generation are enough to align with global carbon targets remains to be seen. With so many resources to exploit – from geothermal reserves to ample sun – the potential to transform the country's energy mix is very real.