## Singapore bets big on power imports

**Singapore** | Singapore is battling the need to decarbonise without the land availability to establish sufficient large-scale renewables plants. With the government looking to import electricity from overseas, Jules Scully looks at prospective power import projects and the consortiums behind them.



www.ith limited space to install renewables projects and 95% of its electricity currently generated using natural gas, Singapore is betting big on importing clean power from abroad as it aims to improve energy security and support regional decarbonisation efforts.

The city-state announced plans in October 2021 to import up to 4GW of low-carbon electricity by 2035, which is expected to make about one-third of its electricity supply.

Trade and industry minister, Gan Kim Yong, said at the time that the energy transition will be especially challenging for the country as it has little wind, hydro or tidal power, while heavy cloud cover and a lack of land limit solar potential.

He explained that even if Singapore

were to maximise all available space for solar deployment, it would still not be able to generate enough power to keep the lights on with the technology alone, even accounting for efficiency improvements.

"Meaningful abatement can only come through tapping on low-carbon energy beyond our shores," he said. "Importing low-carbon energy will be a key needle mover in Singapore's energy transition in the near to medium term."

A notable milestone was reached in June when Singapore commenced its first renewable electricity import, which comes from 100MW of hydropower in Laos, transported via Thailand and Malaysia using existing interconnections. Singapore's Energy Market Authority (EMA) said the project is one of the trials it has been A 5MWp floating solar project from Sunseap in Singapore. working on to pave the way for larger imports.

According to a guide to electricity imports published by the EMA in July, importers must provide offers into the energy market and compete to secure dispatch into Singapore's network for halfhourly periods.

For projects that come from intermittent generation sources, power should be dispatchable, with imported electricity required to achieve a minimal quarterly load factor of 75% within five years of commercial operation.

And with existing local generation achieving 90% availability, the EMA said each imported supply shall achieve similar availability standards that would make it equally reliable.



Such rules mean battery energy storage systems (BESSs) feature prominently in project proposals put forward so far.

The electricity import policy has so far garnered a lot of interest, says Joo Yeow Lee, associate director of power and renewables at financial information provider S&P Global Commodity Insights, adding that the first request for proposals (RFPs) received 20 proposals from prospective import projects, with a significant number to be sited in Indonesia and feature solarplus-batteries.

Launched last November, the first RFP closed with proposals to supply electricity from sources such as solar, wind, hydro and geothermal power from four countries: Indonesia, Laos, Malaysia and Thailand. A second RFP was issued in July, with potential importers required to demonstrate their supply reliability, credibility, track record and cost-competitiveness.

Having received requests from participants of the first RFP for more time to develop their proposals, the EMA said it would combine the two RFP rounds as part of a more streamlined process.

## **Developers join forces**

Among the developments to have been proposed so far include a project that would feature 7GWp of solar coupled with more than 12GWh of energy storage systems to be deployed in Indonesia's Riau Islands.

Led by Singapore-based developer Sunseap, the consortium behind the installation aims to achieve economies of scale and optimise the capacity of a proposed subsea cable by linking the solar systems – including 2.2GWp of floating PV – from various islands, providing 1GW of non-intermittent energy.

"Energy storage will allow us to deliver stable high-quality power to our clients in a very reliable manner. It will also allow us to provide energy 24/7 as opposed to just daytime when the sun is shining," says

"Meaningful abatement can only come through tapping on low-carbon energy beyond our shores"

a spokesperson from Sunseap, which was acquired by EDP Renewables earlier this year.

Sunseap previously said the consortium aims to be one of the parties to help fulfil 20 – 25% of the 4GW of low-carbon electricity imports to Singapore.

Noting that foreigners cannot own land in Indonesia, the spokesperson says that EDP Sunseap has partnered with local companies to secure the land, adding: "Having all the right permits and licenses is crucial, and good progress is being made on this front."

When announcing the power import policy last year, minister Gan Kim Yong

warned that imported electricity may not mean cheaper electricity for Singapore. He explained that while the cost of generation may be lower, the costs of transmission and backup, as well as necessary grid enhancements, will add to the overall price tag. "This is an inevitable but necessary trade-off in the energy transition," he said.

The Sunseap spokesperson says that while the interconnection will require "significant capital investment", the advantage of solar is being able to maintain a stable price for its clients and not be subject to volatility often associated with fossil fuels. "This reliable stable delivery of clean energy is very much sought after by our clients who want to avoid the risks of fluctuating energy prices."

Sun Cable, the company behind a development that bids to transmit 2GW of electricity from Australia to Singapore via 4,200km of high voltage direct current (HVDC) cables, is forecasting "commercially acceptable" transmission losses, says the project's director, Andrew Barton. The loss calculation is also a function of a costbenefit analysis, as various design choices will impact the transmission losses.

Set to include 17 – 20GWp of solar and 36 – 42GWh of battery storage in Australia's Northern Territory, Sun Cable's Australia-Asia PowerLink will enable 24/7 dispatchable electricity, according to the company.

Barton explains that advances in renewables generation, energy storage and HVDC cable transmission technologies have made it commercially and technically viable to transmit dispatchable, renewable electricity over long distances. HVDC, he says, has "evolved to a point where the voltage is high enough at 525kW to support projects that need to transfer electricity over long distances".

The subsea cable will pass through Indonesian waters, with authorities in the country granting Sun Cable a subsea survey permit in September 2021. But as of May, no other formal permits or licenses have been issued to the company by Indonesia, Elrika Hamdi, an energy finance analyst at the Institute for Energy Economics & Financial Analysis (IEEFA), wrote in a recent commentary. She says: "They haven't been able to receive the subsea cable transmission permits, which is the crucial part."

Another consortium planning to transmit renewable energy from Indonesia to Singapore includes Abu Dhabi renewables company Masdar and France's EDF Renewables, whose agreement envisages the development of as much as 1.2GW of solar PV and "potential associated storage".

The partners have released limited details about the project, including its proposed location in Indonesia and how

"Energy storage will allow us to deliver stable high-quality power to our clients in a very reliable manner"

much generation it plans to transmit to Singapore. According to EDF Renewables, the company and its partners are working on the project's development but are at "a very early stage".

A statement from Masdar reads: "We are still working with our partners on evaluating the best options for all stakeholders and prefer not to discuss specific details at this stage."

Their consortium also includes Singapore utility Tuas Power and PT Indonesia Power, a subsidiary of Indonesian stateowned utility PLN. When details of the project were released earlier this year, PT Indonesia Power said it "is an essential partner for the power export in Indonesia".

According to IEEFA's Hamdi, PLN and its PLN Batam subsidiary are the only two entities that are legally allowed to export

## Consortiums' project proposals in Indonesia

- A consortium led by developer Sunseap plans to construct 7GWp of solar coupled with multiple energy storage systems totalling more than 12GWhr in Indonesia's Riau islands. The project aims to provide 1GW of non-intermittent clean energy for Singapore and Indonesia. Other consortium members include EPC Samsung C&T and energy storage solutions provider Durapower.
- Developers Quantum Power Asia and ib vogt are partnering to construct more than 3.5GW of solar PV and 12GWh of storage systems, also in the Riau Islands. The US\$5 billion installation is expected to be fully commissioned in 2032 and deliver about 8% of Singapore's annual electricity generation, according to the companies. A joint venture between the pair has partnered with an electricity retailer in Singapore that will handle connectivity of imported clean energy to residential, industrial, and commercial customers.
- Abu Dhabi-based Masdar and France's EDF Renewables are part of another consortium that is exploring the development of up to 1.2GW of solar and "potential energy storage" in Indonesia. They are joined by Singapore utility Tuas Power and PT Indonesia Power, a subsidiary of Indonesian state-owned utility PLN. At the time of writing no information on the proposed location of their project had been announced.
- Singapore energy company Sembcorp Industries has partnered with another PLN subsidiary, PLN Batam, as well Indonesian renewables developer PT Trisurya Mitra Bersama (Suryagen) for a proposed project in the Riau islands that would feature 1GWp of solar. They said the installation would also include a largescale energy storage system.
- Singaporean utility PacificLight Power, independent power producer Medco Power Indonesia and investment company Gallant Venture are developing a 670MWp solar PV project in the Riau islands. It is expected the installation will provide 100MW of electricity to Singapore through a dedicated plant-to-grid 230kV HVAC subsea cable.

power from Indonesia without additional permitting processes. In a recent commentary she wrote that obtaining the relevant power export permit is time-consuming and complicated, and that "significant risks persist for current bidders, especially those who do not include PLN subsidiaries in their consortium".

Another consortium that includes a PLN subsidiary, PLN Batam, was announced last year by Singapore energy company Sembcorp Industries and also features Indonesian renewables developer PT Trisurya Mitra Bersama. They signed an agreement to develop 1GWp of solar power and energy storage in Indonesia's Riau Islands.

Also eyeing the Riau Islands for electricity exports to Singapore are developers Quantum Power Asia and ib vogt, which are planning to construct 3.5GW of solar PV and 12GWh of storage systems. A joint venture between the companies has secured agreements from corporates in Singapore to supply more than 4TWh a year of imported clean energy from the installation, set to span more than 4,000 hectares.

Finding land or water to construct the projects in the Riau Islands "would not be too difficult", says Hamdi of IEEFA, who suggests some developers may have found suitable land already. More of a problem, she argues, is securing the political willingness from the Indonesian government to supply electricity to Singapore.

**Political headwinds in Indonesia** Prospective project developers have banked on being able to deploy their



A 14.5MWp PV plant from Quantum Power in Indonesia.



renewable energy export projects in Indonesia after Malaysia's government announced last year that only non-renewable energy would be allowed to be exported to Singapore, while power sales through self-developed transmission and interconnection facilities to the city-state would be banned.

Malaysia's energy ministry said the decision was made to boost the development of local renewable energy, as it expanded a solar net metering initiative in the country following the announcement.

Singapore and Indonesia signed a memorandum of understanding on energy cooperation in January, spanning areas such as solar project development, crossborder electricity interconnection and an increase in human resource capacity.

However, comments made since by Indonesia's investment minister, Bahlil Lahadalia, indicate the government is having second thoughts on parts of the collaboration. He said the country will not export renewables generation, instead focusing on domestic needs first. "We haven't thought about exporting [renewable energy] yet," the minister said in May.

Daniel Kurniawan, a solar analyst at Indonesian thinktank the Institute for Essential Services Reform, says there has been a "huge change" from last year, when there were announcements in Indonesia related to joint development agreements with Singapore. Quantum Power's 7.25MWp Sambelia solar project in Indonesia. The current situation, Kurniawan explains, "is that the Indonesian government seems to be not giving clear certainty" for the solar developments, representing a "major setback".

A similar view is taken by IEEFA's Hamdi, who says Bahlil's comments should be of concern to solar developers.

One consideration for the Indonesian government is the structure of subsea cables, she says. "It becomes another bottleneck for the Indonesian government to decide whether or not they will want to go ahead with this."

Analysts have also warned that a strategy of transmitting new renewables generation to Singapore by the country's neighbours could leave them reliant on fossil fuel-powered generation.

"This is definitely a concern, especially if the exporting country does not have an abundance of renewable power currently," says Joo Yeow Lee of S&P Global Commodity Insights. "This is also a reason why Malaysia has banned the export of renewable energy from peninsular Malaysia to Singapore."

According to energy major bp, coal is increasingly dominant in domestic power generation in Indonesia, with a 66% share in 2020, compared to 6.1% for renewables. Figures from the International Renewable Energy Agency reveal Indonesia had just 211MW of installed solar as of 2021. However, large foreign investments into new renewables projects could help to kickstart the nascent renewables sector in Indonesia, Joo Yeow Lee suggests, especially if governments can structure deals so that they also support some renewable development in their own country.

Kurniawan believes the proposed solar export project in Indonesia could support the growth of local EPCs, while regulators could also benefit as they work on crossborder electricity exports.

This is in addition to job creation potential. The JV between Quantum Power and ib vogt, for example, estimates that it could create up to 30,000 new jobs in the Riau Islands.

When Singapore started energy imports from the Laos hydropower plant in June, the EMA said it will serve as a pathfinder towards realising the broader ASEAN Power Grid vision of multilateral electricity trading beyond neighbouring countries in the region.

Hamdi says that with that pilot project taking at least eight years to carry out, this reflects how difficult it is to transmit power from one country to another.

She adds that while the ASEAN nations have been discussing a regional power interconnection for a long time, it hasn't been easy to implement because of energy security concerns, transmission issues and politics.