



A sensor that provides real-time information to the NUS Solar Energy Research Institute of Singapore. ST PHOTO: NG SOR LUAN

S'pore power market to employ solar output prediction tool by 2023

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In 2013, a thunderstorm blanketed Singapore in less than an hour, causing solar intensity on the island to plummet by almost half.

Such cloudy conditions are common in the tropics, due to weather phenomena such as the Sumatra squalls, making it difficult for the Republic to reliably harvest sunshine, its most viable renewable energy source.

But by 2023, a model that forecasts how much sunshine Singapore can harvest up to one hour ahead of weather conditions will be incorporated into the nation's power system, to help the grid manage such intermittency, said the Energy Market Authority (EMA) and National University of Singapore's Solar Energy Research Institute of Singapore (Seris) on Thursday.

This comes after the completion of a one-year trial of the model at EMA's power system control centre in September.

The tool will allow Singapore to maintain a stable supply of electricity as the nation increases its dependence on solar power, as part of efforts to reach net-zero greenhouse gas emissions by 2050.

In 2021, solar energy contributed less than 1 per cent of the total electricity generated in Singapore, or the equivalent of powering around 75,000 households here for a year.

This is projected to rise from a capacity of above 700 megawatts-peak (MWp) at the moment to at least 2 gigawatts-peak by 2030. Megawatt-peak is a unit of measurement for energy generated by solar power systems under ideal conditions.

As solar power takes up a larger portion of Singapore's energy mix, accurate forecasts are important for the power market to be efficient, stable and reliable, said Dr Thomas Reindl, deputy chief executive at Seris, who led the project team.

The tool, developed by Seris and supported by EMA and Meteorological Service Singapore,

draws on historical and real-time solar intensity data collected from 25 irradiance weather stations across the island, satellite imagery, weather prediction models and other information to predict solar power output with an average error rate lower than 10 per cent, one of the lowest for solar forecasting in the tropics.

It was funded by a \$6.2 million research grant awarded by EMA in 2017 to improve Singapore's ability to plan for future demand and supply of electricity in the national grid.

With enhanced forecasts, the Energy Market Company (EMC) – which operates Singapore's wholesale electricity market where prices change every 30 minutes according to supply and demand – will be able to provide more accurate schedules for power generation companies on the amount of energy required by the grid, said Mr Lim Wee Seng, EMA's director of energy management systems department.

When solar output is forecast to be low on a cloudy day, for instance, the electricity market may procure additional reserves or make adjustments to the output of power generation plants and energy storage systems to increase electricity supply ahead of time and meet demand, he said.

As solar intermittency is better predicted with forecasting, this may reduce the amount of reserves required from power generation to balance the power grid, said Mr Lim.

Said EMC chief executive Toh Seong Wah: "The solar forecasting model is a great tool in helping Singapore anticipate the electricity generated from our solar assets. Solar forecasting improves the accuracy of forecast of real-time demand and makes accurate market schedules possible."

Going forward, Seris plans to commercialise the forecasting model beyond Singapore.

The institute also plans to launch forecasts customised for large solar farms, said Dr Reindl.

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