

Asia Clean Energy Summit Byline Editorial

Hed: Singapore goes solar

Dek: Asia's city-state embraces year-round sunshine as it harnesses solar energy

Hot, humid and sunny is how many people would describe Singapore. But for a country that sits on the equator and receives ample amounts of sunshine every year, solar energy contributes less than one percent of Singapore's electricity generation mix today.

But that's all changing, and in a big way. Last year, the-city state announced it was investing close to US\$700 million over the next five years to fund research and development in Urban Solutions and Sustainability, which includes solar energy. Singapore now has the world's largest floating photovoltaic (PV) test-bed on Tengeh Reservoir, and the government plans to scale up floating solar adoption on more reservoirs. Over the last 10 years, the country has grown its installed solar capacity by about 1,000 times, to nearly 140 megawatt-peak (MW_p). The goal is to have 350 MW_p of solar power by 2020 — enough to meet five percent of Singapore's peak electricity demand in the day.

Moving towards sustainable solutions, such as clean energy, is crucial for “a highly urbanised city-state with limited resources” to continue experiencing economic growth, says Goh Chee Kiong, Executive Director, Cleantech, Singapore's Economic Development Board (EDB). “And solar energy is the most viable renewable energy technology for large-scale adoption in Singapore.”

The drive towards solarising Singapore is ambitious, and not without its challenges. “The three main barriers are cost, space availability and grid integration of PV,” says Dr Thomas Reindl, deputy CEO of the Solar Energy Research Institute of Singapore (SERIS). Of these, the limited space available for the deployment of solar panel arrays is probably the biggest, says EDB's Goh. Reindl and Goh are both speaking at the upcoming Asia Clean Energy Summit to be held in Singapore later this month, on a panel exploring how to solarise Singapore and Asia.

Given that Singapore is an urban environment dominated for most part by tall buildings, Reindl's department has to think about how solar systems could be integrated into existing buildings — on roof-tops or vertical facades. This is known as building-integrated photovoltaics (BIPV). “PV systems become part of the building envelope, replacing traditional building elements, while ideally providing additional functionalities,” explains Reindl. For example, there are special shading devices that can shield the building and its occupants from the sun's rays, which at the same time be used to generate solar power.

Employing the use of advanced technologies such as 3D modelling can go a long way in helping to tackle space constraints too. Modelling buildings that are close together in an urban setting allows planners to identify the most suitable areas for PVs to be installed so that the space and energy yields can be optimised, says Reindl.

But because space on buildings is limited, it's also important to think out of the box when it comes to harnessing solar energy, he says. "In Singapore, this is predominantly done in the form of 'Floating Solar' — in other words, utilising water surfaces for the deployment of PV."

[Results](#) so far appear promising. In September, PUB announced that the test PV systems did not significantly alter the reservoir's wildlife or water quality. Plus the panels outperformed typical rooftop systems thanks to the cooler temperatures over the water. PUB is now calling for tenders for environmental and engineering studies to build an even larger floating system — [50 MW_p, which is enough to power roughly 12,500 four-room HDB flats](#) — and to expand testing to another reservoir. "The concept of a floating PV system is still quite nascent globally. Singapore has made good progress in the utilisation of floating PV systems as an alternative to land-based systems," says Goh. To underline its global leadership position in floating PV, SERIS is organising the world's first conference in this highly dynamic and innovative area: the International Floating Solar Symposium (IFSS), which is part of the Asia Clean Energy Summit and accessible with the same badge.

The government isn't the only player sinking its teeth in the game. "The private sector is looking very much into green energy as well," says Reindl. Today, there are about 100 clean energy companies based in Singapore. This includes leading solar manufacturer REC, which has its operational headquarters in Singapore. REC's 2,000 employees work round the clock to produce 20 containers worth of panels every day.

"Singapore is cementing its position as a leading research and innovation hub for exportable clean energy solutions for the region," says Goh. His department strives to attract clean energy firms to the nation and also groom local enterprises, which can also tap on Singapore's position as a financial centre offering instruments such as project bonds and green business trusts. The idea is for such firms to use Singapore as a springboard for entry into Asia Pacific and beyond. As part of the Asian Sunbelt, the region holds vast potential for clean energy investments — Southeast Asia receives up to [50 percent more sunlight](#) than temperate regions such as Japan or Germany, has a combined population of over 600 million people and its projected growth in annual power demand is [6 percent](#).

To that end, Singapore is positioning itself as a "living lab" where companies can test and commercialise their solutions before applying them to Asia and beyond. "Widely regarded as the reference city in Asia, Singapore is well-positioned to be the Asian hub for smart and sustainable urban solutions for the region," says Goh.