

## **PUB STUDYING CLEAN ENERGY SOLUTIONS FROM BLUE SPACES**

*Comprehensive studies to be carried out before a decision is made on deploying floating solar PV systems at reservoirs*

**Singapore, 29 September 2017:** Tapping on reservoirs' vast surface areas, floating solar photovoltaic (PV) systems are a potential source of clean and renewable energy for Singapore. Today, PUB, Singapore's National Water Agency announced plans to further explore floating solar PV systems at reservoirs. The agency is calling tenders for engineering and environmental studies for a 50 megawatt peak (MWp) floating solar PV system in Tengeh Reservoir and a 6.7MWp floating solar PV system in Upper Peirce Reservoir (see Annex A).

Solar PV technology has been identified as a key renewable energy source that has high potential for large-scale deployment in Singapore. Solar energy reduces Singapore's reliance on fossil fuels, contributes towards the national climate change mitigation pledges, and supports PUB's efforts to adopt renewable energy in our operations. Already, this form of clean energy is becoming increasingly cost-competitive and is being deployed extensively in Singapore and elsewhere in the world. While most solar PV panels are deployed on land or rooftops, waterbodies with significant surface areas present greater potential especially in land-scarce countries like Singapore. Overseas, China has a 40MWp floating solar PV system in Anhui province's Huainan city, while United Kingdom has a 6.3MWp floating solar PV system in London.

A floating solar PV system test-bed was launched at Tengeh Reservoir in October 2016. Results so far show that the system performed better than a typical rooftop solar PV system in Singapore, due to the cooler temperatures of the reservoir environment. To date, there were also no observable changes in water quality in the reservoir and no significant impact on wildlife from ongoing studies on water quality and biodiversity. Building on the results of the test-bed, PUB is exploring the feasibility of deploying a 50 MWp floating solar PV system at Tengeh Reservoir. The amount of energy generated can potentially power about 12,500 4-room HDB homes.

With its close proximity to the Chestnut Avenue Waterworks, Upper Peirce Reservoir is another potential location that PUB is considering for floating solar PV. Solar energy generated can be fed directly to the nearby Waterworks for its water treatment operations, helping it reduce its reliance on grid energy.

PUB will be carrying out comprehensive environmental studies at the two reservoirs before making any decision on implementation. The studies also include developing environmentally sensitive designs and construction processes. For example, there will be no infringement into the forested areas. It is envisaged that the solar panels will occupy about 2 percent of Upper Peirce Reservoir's water surface area and about one-third of Tengeh Reservoir's water surface area.

To make a thorough assessment, the consultants to be appointed for the environmental studies will be assessing the significance of the impacts on all flora and fauna and water

quality of the reservoirs. They will then recommend corresponding mitigation or avoidance measures and appropriate monitoring framework, which will be documented in an Environmental Management and Monitoring Plan (EMMP).

PUB has also consulted environmental groups (see Annex B) such as Nature Society of Singapore on the scope of the environmental studies, and will continue to consult relevant groups as the projects develop.

Besides the testbed at Tengeh Reservoir, past solar projects by PUB include solar panels at land installations such as Choa Chu Kang Waterworks and Marina Barrage. PUB is also participating in HDB's solar leasing contracts, under the government-led solar programme SolarNova, to install solar PV systems at Changi Water Reclamation Plant, Bedok Waterworks and WaterHub.

"PUB will continue to study the feasibility of adopting clean energy in our installations. This will help us reduce our dependence on grid energy and carbon footprint. However, the lack of deployable land space imposes a limit on what we can reap from this clean energy. The natural option is our vast water surface but we want to study the possible impact and relevant mitigating measures very carefully before reaching a decision to proceed with large-scale floating solar PV deployment. We will continue to consult relevant groups as the studies progress," said Tan Nguan Sen, Chief Sustainability Officer, PUB.

### **About PUB, Singapore's National Water Agency**

PUB is a statutory board under the Ministry of the Environment and Water Resources. It is the national water agency, and manages Singapore's water supply, water catchment and used water in an integrated way.

PUB has ensured a diversified and sustainable supply of water for Singapore with the Four National Taps (local catchment water, imported water, NEWater, desalinated water).

PUB calls on everyone to play a part in conserving water, in keeping our waterways clean, and in caring for Singapore's precious water resources. If we all do our little bit, there will be enough water for all our needs – for commerce and industry, for living, for life.

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PROPOSED FLOATING SOLAR PV DEPLOYMENT

	Tengah Reservoir	Upper Peirce Reservoir
<b>Estimated System Capacity</b>	~50MWp	~6.7MWp
<b>Estimated Size</b>	About one-third of reservoir surface coverage	About 2 percent of reservoir surface coverage
<b>Proposed deployment location</b>	 <p>Source: Onemap</p>	 <p>Source: Onemap</p>
<b>Energy Feed</b>	Feed energy to the grid	Feed energy directly to Chestnut Avenue Waterworks

**NATURE & ENVIRONMENTAL GROUPS ENGAGED BY PUB**

- Dr Shawn Lum, Nature Society (Singapore)  
“Singapore has reaffirmed its commitment to the Paris Climate Agreement, an unprecedented coming together of nations to deal with the shared threat of climate change. Whether large or small, wealthy or not, all nations will be subject to the disruptions and destabilising effects of climate change, unless we confront and address the issue together. Singapore aims to reach a level of peak emissions by 2030 even though energy demand will increase in the years ahead. The only way to achieve this is to reduce energy wastage, increase energy use efficiency, and to generate clean energy. Though it has a limited physical resource base and land area, Singapore can still do quite a bit toward reducing carbon emissions. For energy generation, the best option appears to be solar energy. We have sunshine year round and we have the technical know-how and research capacity to improve our solar energy output in the years ahead. What we do not have much of, however, is space, which means we will not have the luxury of placing solar panel arrays directly on the ground as is done in some countries.

There are rooftops and buildings available for solar panels, but one interesting option being explored by PUB is to deploy floating solar panel arrays on some of our 17 freshwater reservoirs. It might be possible to significantly increase our clean energy generating capacity without reducing the development and recreational potential of our limited land area if we develop floating solar panel arrays.

Reservoirs are not dead space however, as it is used for recreation by people, and as a home to aquatic plants and animals, or as a feeding area for some animals. The PUB understands this and will thus commission impact assessments before, and conduct intensive monitoring of aquatic life during and after, the deployment of the floating solar panel arrays, to determine the possible impacts they might have on our freshwater ecosystems. Findings will guide the future development of floating solar as part of Singapore's overall efforts to reduce its carbon emissions. Solar energy will be an important part of Singapore's energy strategy, but its development will not, thankfully, take place without attempts to minimise possible impacts on our amazing nature heritage,” Dr Shawn Lum.

- Mr Leong Kwok Peng, Nature Society (Singapore)
- Dr Ho Hua Chew, Nature Society (Singapore)
- Mr Tony O’Dempsey, Nature Society (Singapore)
- Mr N Sivasothi, NUS Toddcats!  
“Singapore’s nature reserves and parks are subject to many stressors and it is critical that EIAs are required before any work is initiated in or near such areas. Formulating an assessment requires a combination of technical knowledge and experience of the site so

it is critical that the scope of an EIA be carefully prepared with local knowledge. In this exercise, nature groups were consulted to help in evaluating the scope and details of the EIA, and to identify the extent of scrutiny necessary to address concerns. While the process has been an admirable one, the constructive dialogue is ongoing because nature groups have counselled against initiating the Upper Peirce Reservoir project as that lies within the Central Catchment Nature Reserve. Impact to ecosystem functioning may be unknown and we urge the exploration of alternative sites further,” N Sivasothi.

- Ms Tan Beng Chiak, Jane Goodall Institute
- Dr Vilma D'Rozario, Cicada Tree Eco Place

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