



Smart Energy, Sustainable Future



Factsheet: More Users to Benefit from Enhanced Pulau Ubin Micro-Grid

More residents and businesses on Pulau Ubin will benefit from a cleaner and more reliable electricity supply with an upgraded and expanded Pulau Ubin Micro-Grid. Supported by the Energy Market Authority (EMA), the micro-grid will feature a test-bed which can potentially meet 90% of the daily electricity demand in the Main Village using solar power. The National Parks Board (NParks) will also be extending the micro-grid beyond the Main Village to Kampong Sungei Durian, to benefit 13 more households on the island. This will help address the villagers' request for a cleaner and more reliable electricity supply and raise their quality of life.

Solar is Singapore's most promising renewable energy source. However, solar output is intermittent in nature as it is affected by weather conditions such as cloud cover and rain. Our warm and tropical climate also poses a challenge to solar photovoltaic (PV) systems, as efficiency declines when operating at higher ambient temperatures. To overcome these challenges, EMA has awarded EDPR Sunseap APAC, as the micro-grid's operator, to test-bed two innovative solutions on the island by 2023.

First, a Solar Green Roof featuring the co-location of a 285 kilowatt-peak solar PV system and greenery will be deployed near the Main Village. This test-bed will examine the use of greenery to regulate ambient temperatures of rooftop solar deployments. The Solar Green Roof is expected to reduce the ambient temperature of solar PV modules by 3 to 8°C and increase the efficiency of the solar PV system by between 1.5 to 4%.

Second, a Vanadium Redox Flow Battery (VRB) Energy Storage System (ESS) will be deployed to enhance the reliability of the electricity supplied from the Solar Green Roof. ESS is an essential technology to manage solar intermittency and maintain grid reliability as it actively manages any mismatches in supply and demand caused by



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changing weather conditions. The VRB ESS utilises a smart pump to regulate the flow of electrolyte which increases the efficiency of the ESS by up to 3%.

EMA launched the Pulau Ubin Micro-Grid earlier in 2013 to provide more than 30 of the island's residents and businesses (e.g. restaurants and bicycle shops) with a more reliable, cleaner and affordable electricity supply. The micro-grid also performs as a living lab to test-bed innovative clean energy solutions.

As part of Singapore's energy transition, Singapore aims to have at least 2 gigawatt-peak of solar capacity by 2030, sufficient to power around 350,000 households yearly. This will be supported by having at least 200 megawatts of ESS by 2025. The test-bedding of these new innovations on a micro-grid infrastructure will provide useful learnings for main land applications and support the journey towards a more sustainable energy future for Singapore.

Photos of the Test-Bed at Pulau Ubin Micro-Grid



Artist Impression of the Solar Green Roof

Photo Credit: EDPR Sunseap APAC



Vanadium Redox Flow Battery Energy Storage System (VRB ESS)

Photo credit: EDPR Sunseap APAC



Location of the Test-Bed on Pulau Ubin Micro-Grid

Photo credit: EDPR Sunseap APAC



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About the Energy Market Authority (EMA)

The Energy Market Authority (EMA) is a statutory board under the Singapore Ministry of Trade and Industry. Through our work, we seek to forge a progressive energy landscape for sustained growth. We aim to ensure a reliable and secure energy supply, promote effective competition in the energy market and develop a dynamic energy sector in Singapore. Visit www.ema.gov.sg for more information.

Instagram: @EMA_Singapore | Facebook: facebook.com/EnergyMarketAuthority |
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About National Parks Board (NParks)

The National Parks Board (NParks) is responsible for enhancing and managing the urban ecosystems of our City in Nature. We are the lead agency for greenery, biodiversity conservation, and wildlife and animal health, welfare, and management. We are also working closely with the community to enhance the quality of our living environment.

NParks manages some 400 parks, 3,347 hectares of nature reserves, the Singapore Botanic Gardens, Pulau Ubin and the Sisters' Islands Marine Park. Adding to this is the extensive network of Nature Ways, and the over 300 km Park Connector Network that links major parks, nature areas and residential estates island-wide. Every year, we run over 3,500 educational and outreach programmes across our various green spaces.

NParks has developed an urban biodiversity conservation model, which aims to conserve representative ecosystems in land-scarce Singapore. NParks also monitors and coordinates measures to enhance the presence of biodiversity in our urban landscape.

NParks is working closely with partners in the landscape, horticulture, veterinary and animal sectors to increase productivity, and provide training for all levels of the workforce. Enhancing competencies of the industry will support Singapore's vision of being a City in Nature.

For more information, visit www.nparks.gov.sg and www.facebook.com/nparksbuzz.