

WOODLANDS UTILITY-SCALE ENERGY STORAGE SYSTEM TESTBED



PROJECT SUMMARY

In view of climate change concerns, Singapore is moving towards a greener and more sustainable energy future. Solar is the most viable renewable energy source in Singapore, but its energy output is dependent on weather conditions such as cloud cover and rain. With solar energy deployment expected to quadruple to 1.5GWp by 2025, Energy Storage Systems (ESS) is critical to manage solar generation intermittency and provide fast-response energy reserves to stabilize the power grid.

The Woodlands 2.4MW/2.4MWh Utility-scale Energy Storage System Test-bed, being Singapore's first grid-tied Battery Energy Storage System (BESS) aims to assess the performance of Li-Ion BESS for grid applications under Singapore's hot and humid weather conditions, and establish clear technical and safety guidelines to facilitate future deployment of ESS in Singapore.



View of Battery Enclosure in the customised 40-foot container with battery racks and compartments for electrical and fire suppression devices. Externally accessible during operation and maintenance.



Close-up of the CATL's Lithium Iron Phosphate (LFP) battery modules.

PROJECT OUTCOMES



- The Woodlands 2.4MW/2.4MWh Utility-scale Energy Storage System (UESS) Test-bed is successfully installed at a decommissioned 66kV substation and connected with the 22kV power grid.
- Physical site challenges to deploy the UESS were resolved through extensive consultations with SCDF and other key stakeholders. This ensured that the site plan and ESS engineering design adhered to local requirements and safety restrictions.
- The technical insights gleaned from implementing the UESS contributed to the development of TR77, a set of Technical References to facilitate the safe deployment of Electrical Energy Storage Systems in Singapore and an ESS deployment handbook to inform interested parties on how to deploy ESS in Singapore.
- Sunseap would develop an optimised bidding strategy for the UESS Test-bed in the National Electricity Market of Singapore (NEMS) with constant assessment of operational costs and revenue derived from offering grid services.
- The operational data from the UESS Test-bed would pave the way for the development of a sound ESS market framework, and enable commercial feasibility assessments to benefit Market Participants offering grid support services in the NEMS, and operators providing commercial ESS deployments.



View of Battery Enclosure 1, MVPS 2, E-house with 22kV Switchgear 3 and Auxiliary Transformer 4.



Aerial view of ESS site location at Marsiling Lane.

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