
Title of Project:

Develop a next-generation hybrid energy storage solution to meet the growing demand for renewable energy in Southeast Asia.

APPROVED

Description of Project:

This project aims to develop a hybrid vanadium redox flow (VRF)-lithium ion battery (LiB) energy storage system (ESS) to leverage the unique advantage of each battery and mitigate their individual disadvantages. The hybrid battery ESS solution will be designed as a single package equipped with all necessary power conversion system (including a unique dual active bridge converter), battery management system (BMS) and energy management system (EMS). The operation of the hybrid battery ESS will be optimised for the micro-grid application to achieve high roundtrip efficiency, high power, high energy capacity and a long system life. The hybrid VRF-LiB ESS will leverage artificial intelligence (AI) to achieve superior performance and eventually be rolled out to other international sites based on demand. This solution will balance the power and energy workloads between the different types of batteries, enabling a wider range of applications while prolonging life expectancy and improving performance significantly.

Potential benefit:

The hybrid ESS is equipped with advanced power converters and EMS, and optimised for the micro-grid application. The hybrid VRF-LiB ESS deployment in a smart micro-grid will be the first of its kind in Southeast Asia. It will demonstrate superior performance over the use of conventional LiB batteries for electric vehicle (EV) fast-charging and grid stability applications.

It also aligns with the region's uptake of clean energy solutions in the coming decade. Hybrid ESS technology is a key enabler for the clean energy transition in urban cities such as Singapore. It can support existing EV charging infrastructure and micro-grids, and contribute to grid stability and resiliency.



Schematic of a hybrid ESS supporting a smart urban micro-grid.
 (Link to download high-resolution image: [Please click here](#))