



*Image credit: Sembcorp*

## **CASELET**

# **Energy Storage System Standards: Powering Resilient Grids and Beyond**

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## **Energy Storage Systems - Enabling Grid Resilience in Singapore**

As Singapore accelerates its energy transition, energy storage systems (ESS) are becoming essential enablers for grid resilience. With at least 3 GWp of solar capacity planned by 2030, the power grid must accommodate more intermittent generation while maintaining flexibility and resilience.

ESS supports a broad range of grid services, including backup power, disturbance management, and peak energy shifting. Batteries provide rapid response capabilities, making them well suited to fluctuating system needs. ESS is increasingly used in microgrids, data centres, and to improve gas turbine performance, reinforcing its role in a resilient power system.

### **Standards that Enable Scale and Confidence**

ESS deployment faces challenges such as land constraints, battery safety risks in dense environments, and evolving regulatory requirements. Addressing these issues requires robust standards.

Globally, the International Electrotechnical Commission (IEC) develops international standards for electrical and related technologies. Its IEC 62933 series, developed by Technical Committee 120, provides a comprehensive framework for electrical energy storage systems.

In Singapore, these standards are adapted to local needs through the Technical Reference (TR) 77 series, published by the Singapore Standards Council. This series covers planning and performance assessment, safety considerations for grid-integrated EES systems, and additional requirements for power-intensive and renewable integration applications.

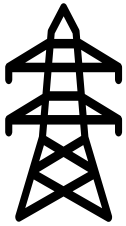
Standards such as Singapore Standard (SS) 638 on Electrical installations and SS IEC 62619 on Safety requirements for lithium cells and batteries, for use in industrial applications also support the deployment of EES solutions in Singapore.

### **Sembcorp's Standards-Led ESS Deployment**

Sembcorp, a leading Asian renewable and low-carbon energy player, operates the largest utility-scale ESS in Singapore. Rising electrification and AI-driven demand are increasing the need for fast, flexible storage, with Sembcorp expanding solar-plus-battery projects in the region. Sembcorp's experience highlights how standards unlock safe, scalable

deployment opportunities, creating resilient grids and fast-tracking energy transition goals.

## Standards supporting Sembcorp's ESS Deployment



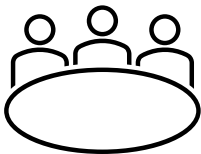
### Enabling safe, large-scale deployment

Standards guide system design, battery sizing and safety, enabling large-scale projects like the 326 MWh ESS on Jurong Island, which enhances grid reliability and energy security. National standards, such as the TR 77 series, SS 638 and UL 9540A ensure safety and performance.



### Strengthening trust

Sembcorp obtains safety certifications and adheres to recognised standards to significantly lower insurance premiums. Systems that comply with IEC standards and local electrical codes signal reduced risk to insurers. Likewise, the quality of fire suppression systems, thermal management, and emergency response procedures directly influences pricing.



### Building up capabilities of partners

Sembcorp applies a Minimum Functional Specification (MFS) for EPC contractors which incorporates key ESS standards. It covers electrical, civil, mechanical, and fire protection requirements. This builds up the capabilities and competence of its supply chain to deliver safe deployment of ESS.

Looking forward, future energy storage systems standards adopted and developed by Singapore could expand to cover a broader range of battery applications, including behind-the-meter systems and specialised grid services. Additional guidance such as sample compliance checklists for power conversion systems, energy management systems, communications, and cooling which could further support both residential and non-residential deployments.