Towards safer deployment of stationary battery products and its applications in power management

Advancer Smart Technology (AST) - Lim Chee Chong. PhD

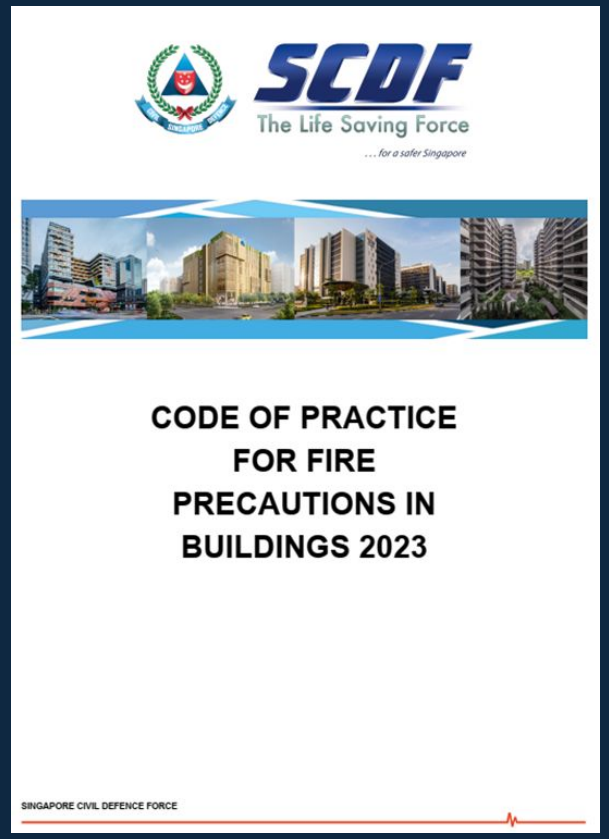
Overview

Setting the context

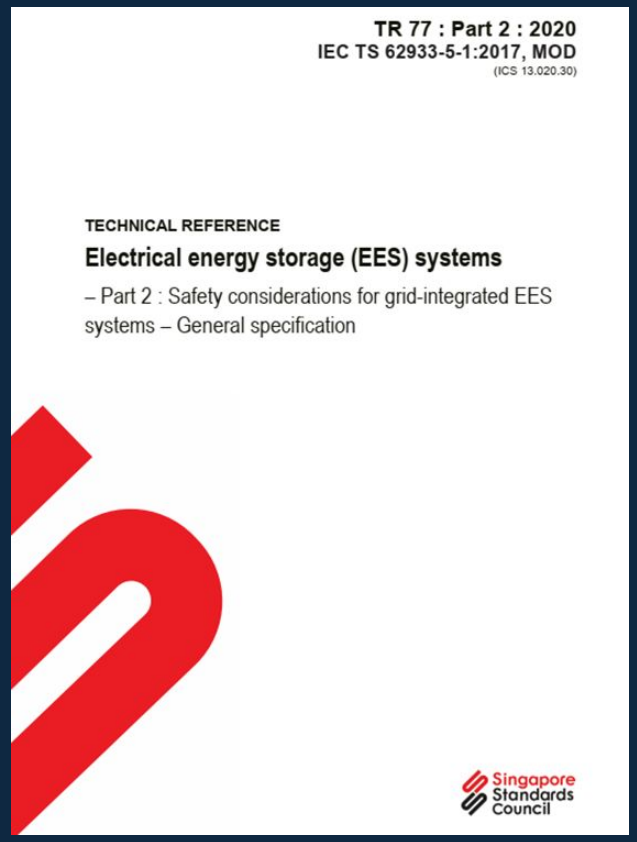
Is Your Battery Safe to Deploy Anywhere?

- Battery safety depends on **chemistry**, **design**, and **environment**.
- Factors like **temperature**, **ventilation**, and **proximity to people** dictate safe deployment.
- **Rigorous testing**, **certifications**, and **risk assessments** are essential before installation.
- These processes are generally **costly, lengthy and non-scalable**.

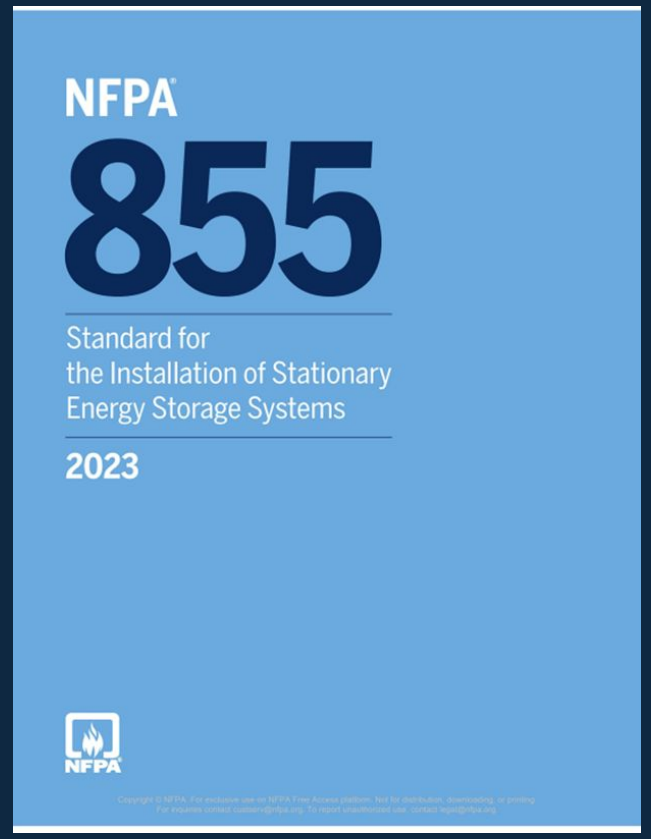
Local Codes & Standards



Master Fire Code 2023



TR 77: Electrical Energy Storage (ESS) systems



NFPA 855

Other Standards

UL 9540 – Standard for Safety for Energy Storage System Equipment

UL9540A – Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

NFPA 855 - Standard for the Installation of Stationary Energy Storage Systems

Product Safety

Environment Safety

What does the standards state?

- Current codes and standards **mandate ground-floor-only** installation for energy systems **>20 kWh (for Lithium-Ion Batteries).**
- This severely restricting **deployment flexibility** in multi-story buildings/urban environments.

TABLE 10.3.1: STORED ENERGY CAPACITY OF ENERGY STORAGE SYSTEM

Type	Threshold Stored Energy [a] (kWh)	Maximum Stored Energy [a] (kWh)
Lead-acid batteries, all types	70	600
Nickel batteries [b]	70	600
Lithium-ion batteries, all types	20	600
Sodium nickel chloride batteries	20	600
Flow batteries [c]	20	600
Other batteries technologies	10	200

Note:

[a] It shall refer to an aggregated stored energy capacity per compartment. For battery rating in Amp-Hours, kWh is equal to maximum rated voltage multiplied by amp-hr rating divided by 1000.

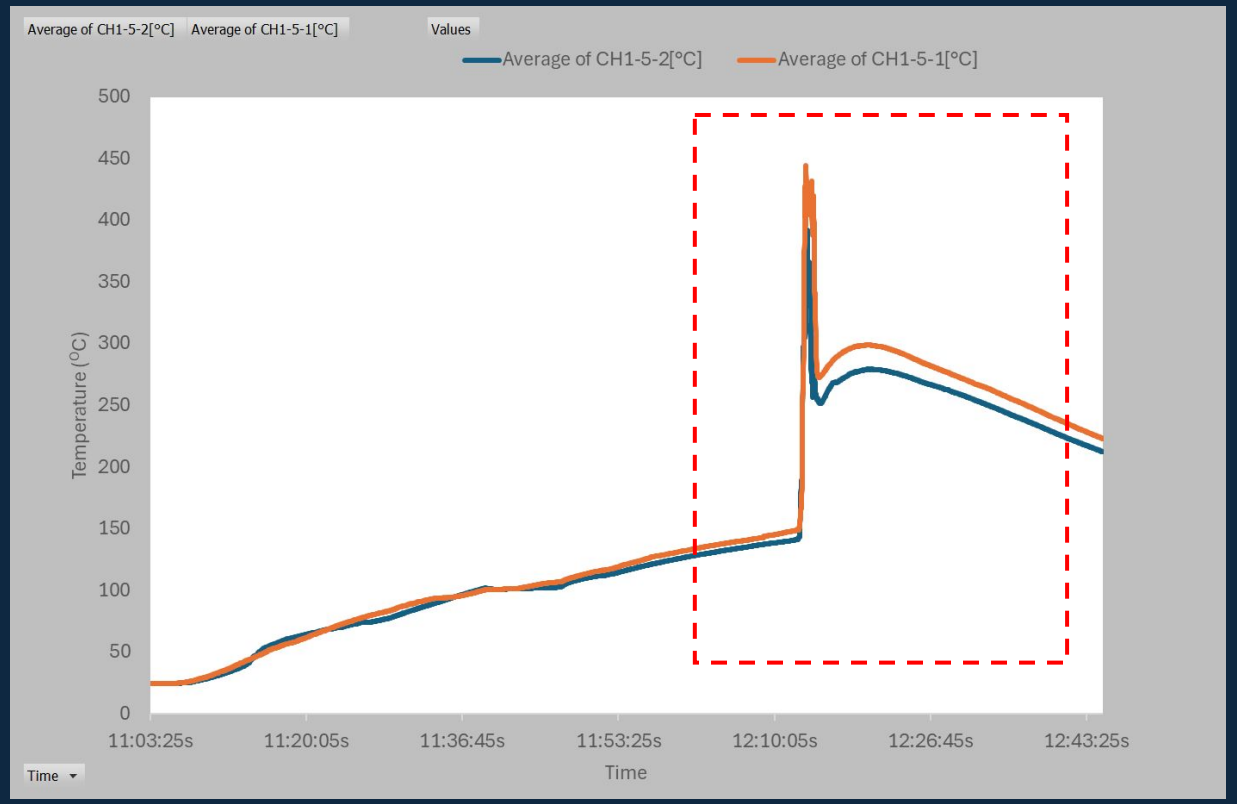
[b] Nickel battery technologies include nickel cadmium (Ni-Cad), nickel metal hydride (Ni-MH), and nickel zinc (Ni-Zn).

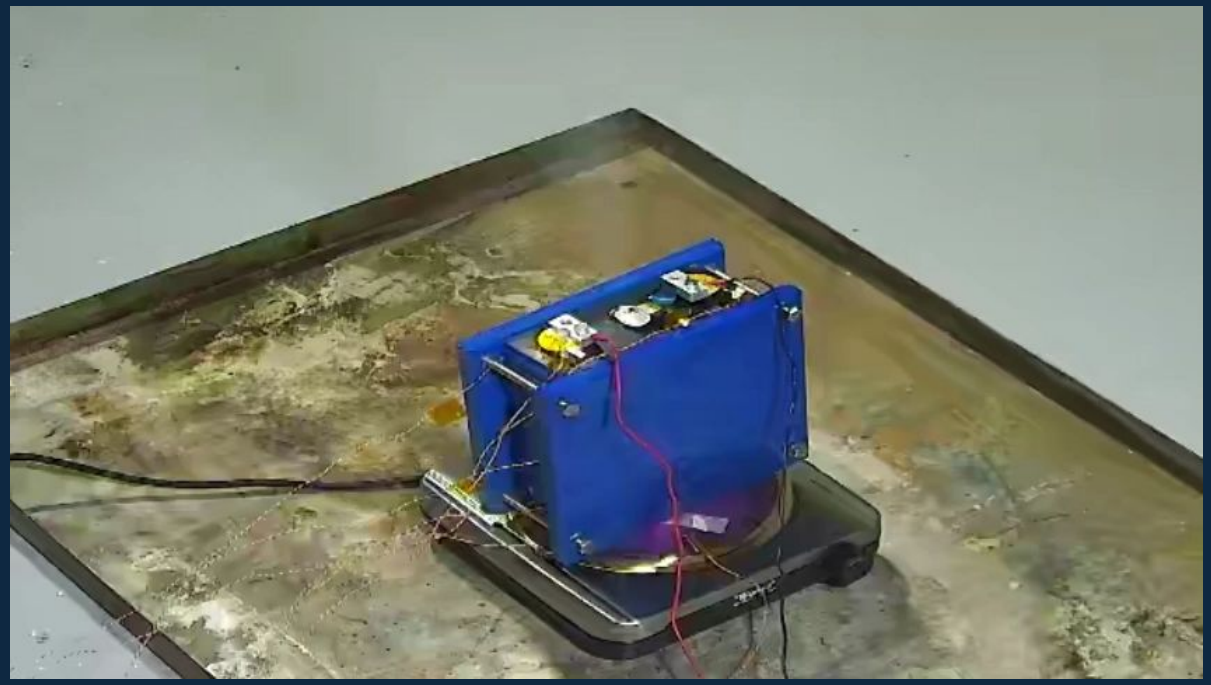
[c] Includes vanadium, zinc-bromine, polysulfide-bromide, and other flowing electrolyte-type technologies.

Safety Features

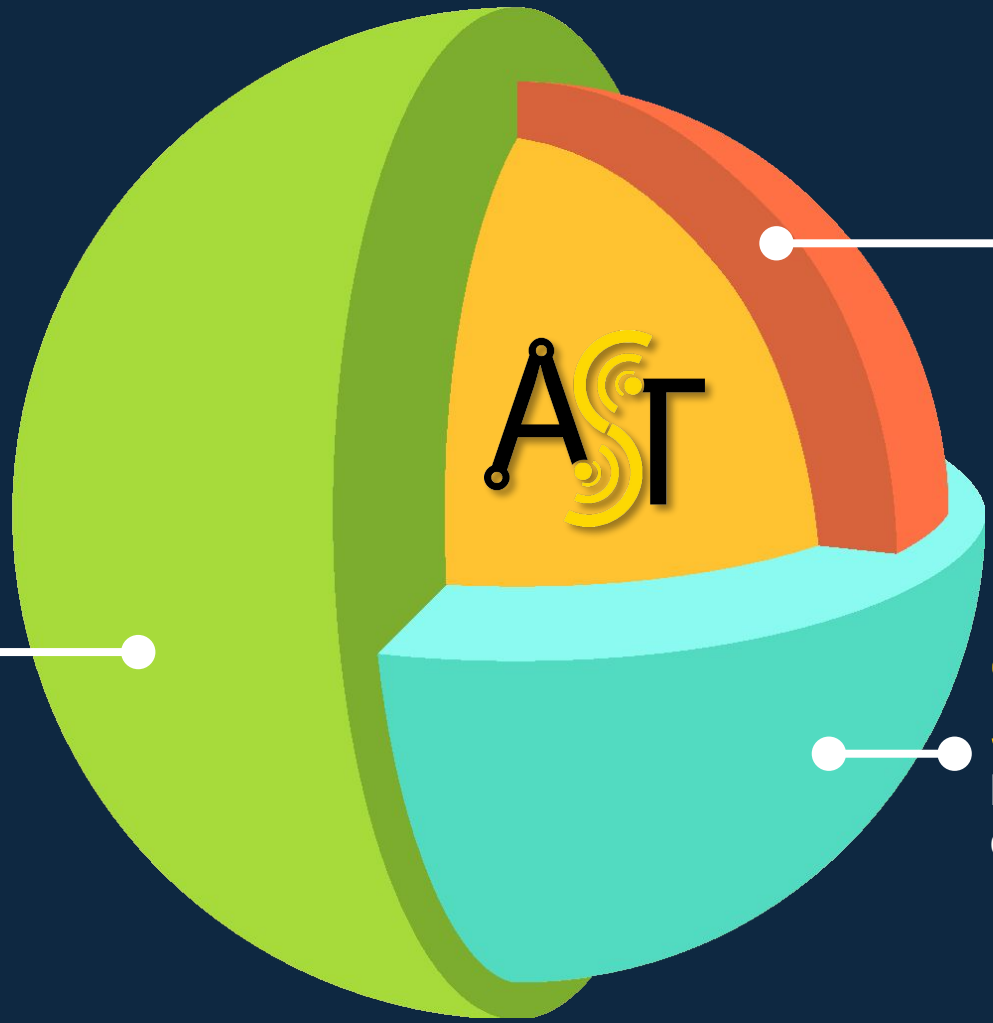
Store energy, not risk!

Lithium-ion Battery Thermal Runaway





Novel Safety Sphere - AST Battery Product



Temperature Management System
Keeping the Battery Cool & Safe

Battery Management System
Monitors, balances, and safeguards cells.

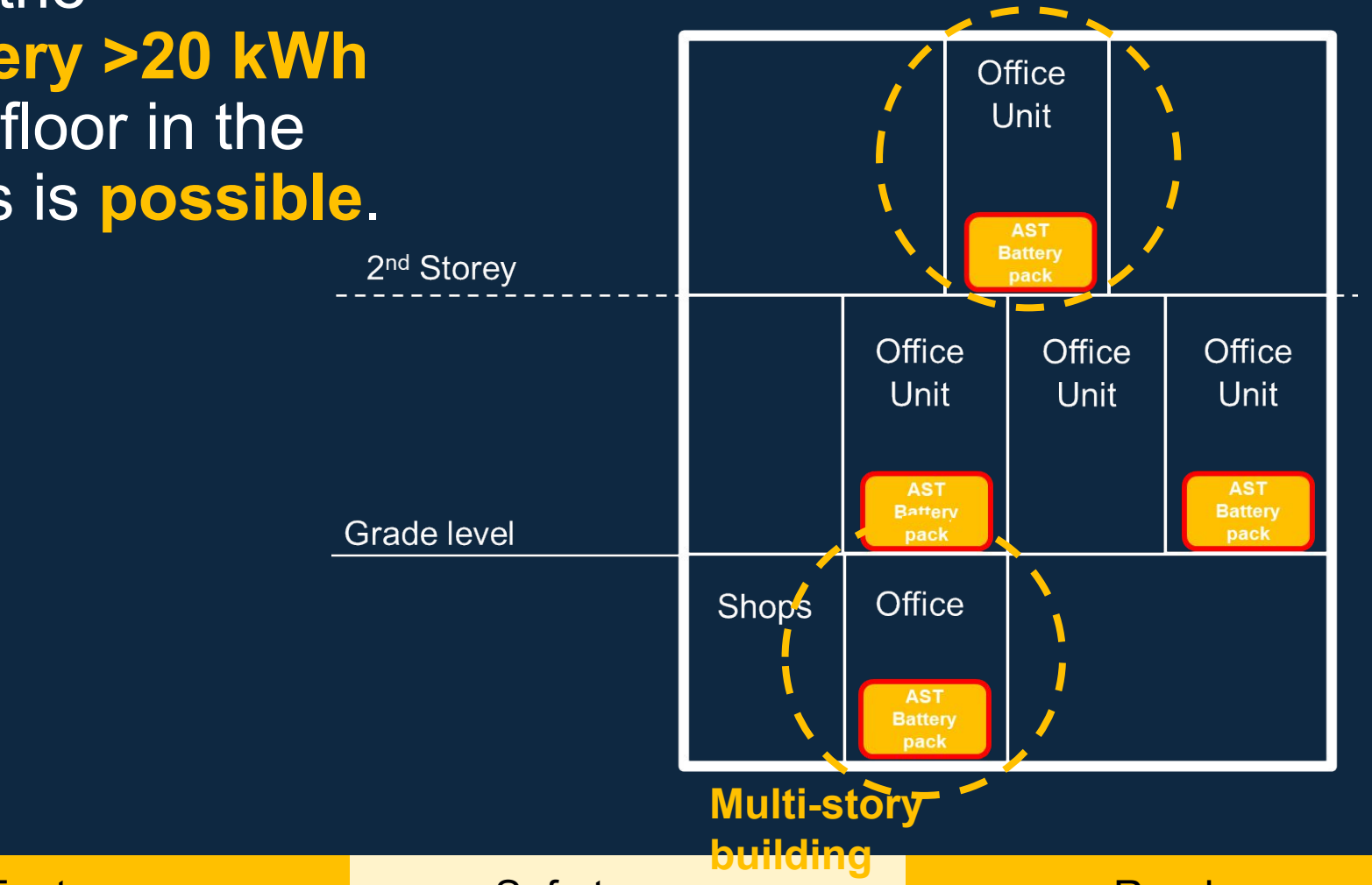
Gaseous Management System
Minimize the harmful gases discharge

Safe to Deploy

Compliant with UL 9540A safety standards

Application

- With our invention, the deployment of **battery >20 kWh** beyond the ground floor in the multi-story buildings is **possible**.



Application

- This application will be rigorously tested in **A*STAR Battery Testing Facility (ABTF)**.
  - **Module** level
  - **Unit** level

Roadmap

Stay Tuned

- We’re thrilled to announce that our next-generation battery design is on track for product launch in the **second half of 2025**.
- Currently undergoing rigorous **UL 9540A testing** and **certification** with **A*STAR**, this breakthrough solution will set new benchmarks in safety and performance.
- Stay tuned for major updates

Q&A

Thank you for your time