



CLEANHORIZON

The Energy Storage Experts

Update from the Field – March 2020

A monthly analysis note from the energy storage experts

Every month, Clean Horizon's team of energy storage experts delivers an analysis of key data and trends affecting the energy storage industry worldwide.

This monthly report updates and analyzes new relevant regulations, monitors commissioned and announced projects, and provides specific focus on key market trends which are likely to have a direct impact on industry stakeholders.



CLEAN**HORIZON**

The Energy Storage Experts



Update from the Field – March 2020

A monthly analysis note from the energy storage experts

Table of contents

Executive summary	2
New regulations and initiatives discussed this month	5
Americas	5
United States	5
Australia & Oceania	5
Australia	5
Europe	5
France	5
Project updates and announcements	8
Overview of the 2020 market for utility-scale energy storage projects	8
Projects announced or contracted this month	8
Australia & Oceania	9
Americas	9
Projects commissioned this month	10
Australia & Oceania	10
Tenders this month	10
Australia & Oceania	10
Europe	10
Americas	12
Focus of the month: Fire Safety of Stationary Lithium-ion Energy Storage Systems	13
Technical aspects of the lithium-ion battery security risks	13
The process leading to the thermal runaway within lithium-ion batteries	13
Influence of the cell chemistry, age and state of charge on the failure risks	17
Recent lithium-ion battery fires and their takeaways	19
As the stationary Li-ion energy storage industry witnesses a remarkable boom, new safety codes and standards try to keep up	22
As they evolve, Li-ion ESS-related fire codes and standards come with their own set of rules and lead to some confusion within project stakeholders	23
Recommendations and good practices regarding fire protection and stationary Li-ion ESS	25
Better be safe than sorry: passive measures for risk prevention	26
Monitoring measures for early detection	26
Fire extinction measures	27
Addendum: Non-exhaustive list of main Lithium-ion ESS fire safety codes & standards	30



Update from the Field – March 2020

A monthly analysis note from the energy storage experts

Table of figures

Figure 1. Capacity awarded in the French AOLT auctions.....	6
Figure 2. 450 MW of batteries approved for 2025 under Germany's network extension plan.....	7
Figure 3. Utility-scale energy storage projects announced/contracted and commissioned in 2019 and 2020 (ongoing).....	8
Figure 4. Li-ion battery fire origin patterns s	13
Figure 5. Li-ion battery cell structure	14
Figure 6. Thermal Runaway apparition process.....	15
Figure 7. Detailed cell degradation stages preceding thermal runaway	15
Figure 8. Main chemical reactions involved in the thermal runaway process.....	15
Figure 9. Comparison of NMC/LFP properties influencing the fire risk	19
Figure 10. McMicken ESS Site after the explosion	20
Figure 11. Leading fire protection codes and standards for stationary Li-ion systems	25
Figure 12. Overview of must-have security features	25