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wtw | Willis



BESS Loss Case Studies

WTW Romania

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steegexp.com

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SteegeXP is a specialist loss adjusting and expert services company

- ~55 people worldwide / of ten in London

- Matthew Thurley – Senior Loss Adjuster
  - MEng Mechanical Engineering
  - Loss adjusting since 2017
  - Handling complex BESS and renewables claims

- **EMEA**
  - London
  - Dubai
- **Americas**
  - Houston
  - Ohio
  - Miami
  - Calgary
  - Rio de Janeiro
  - Sao Paulo
- **Asia Pacific**
  - Singapore
  - Kuala Lumpur
  - Jakarta
  - Shanghai
  - Vietnam



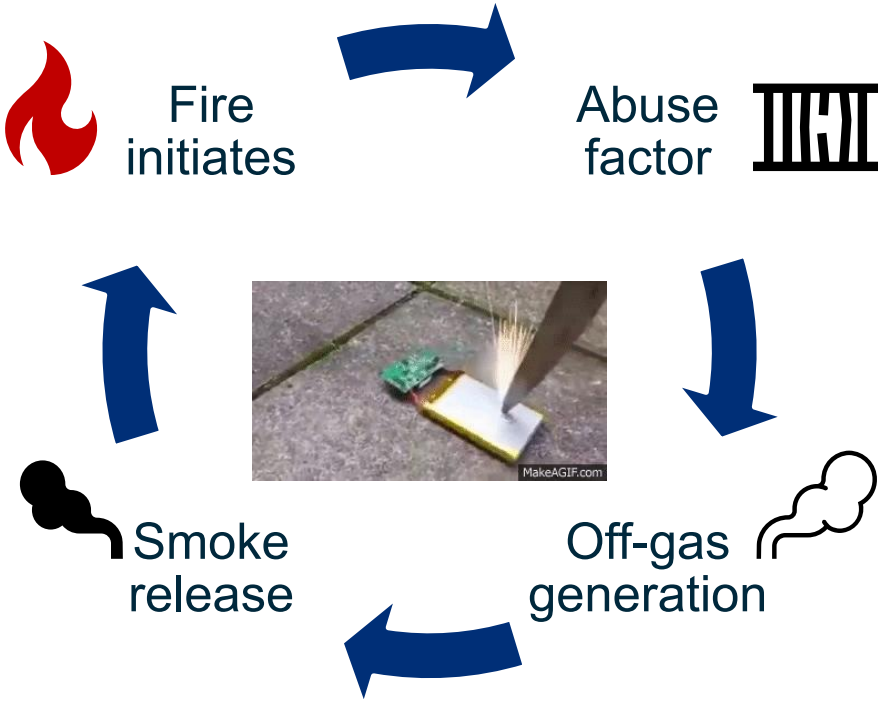


Thermal runaway

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Thermal runaway

Propagation to nearby units



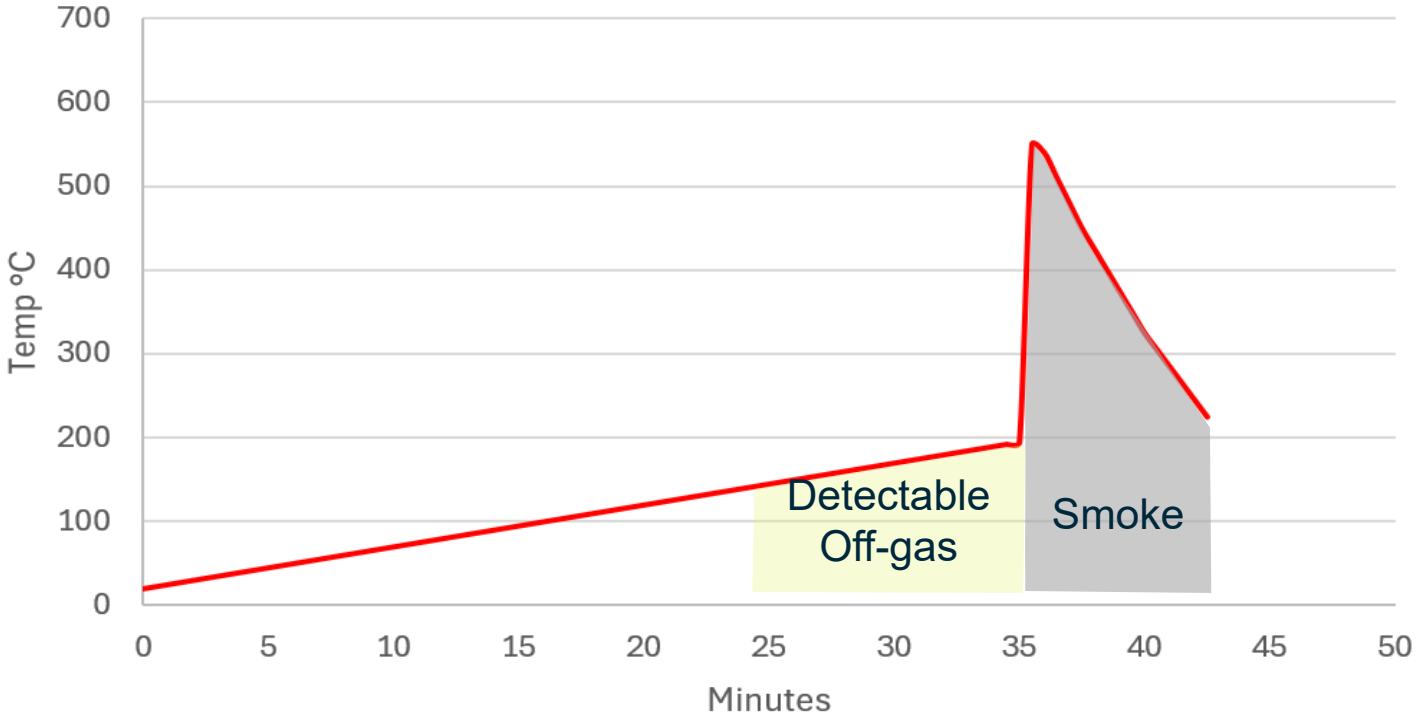
- Thermal
- Mechanical
- Electrical

Imminent failure

Several minutes prior to runaway

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Failure timeline

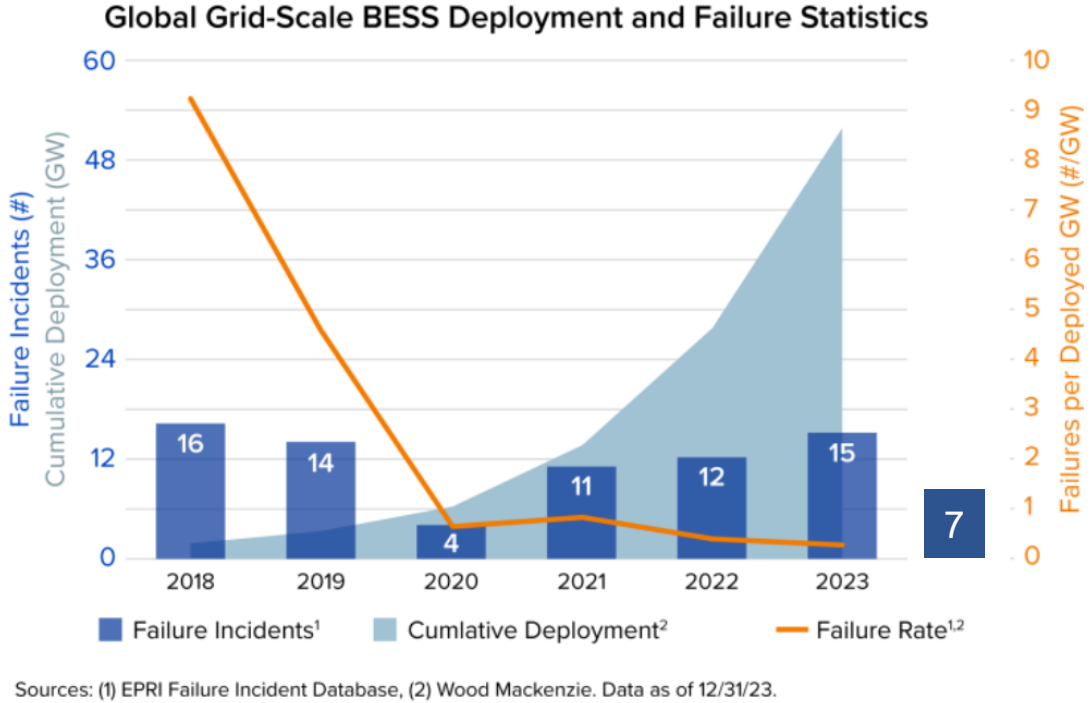


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Stats for failures & thermal runaway

- Still Limited data on failures!
- ~120 total
- ~36 at sites >10MWh
  - 9 in 2022
  - 8 in 2023
  - 3 in 2024
  - 7 in 2025

- Testing, commissioning, early ops
- Limited data on 5+ years ops



failure incident rate has dropped 97% between 2018-2023

Source: Electric Power Research Institute

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BESS Fire

Operational asset

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CASE STUDY 1

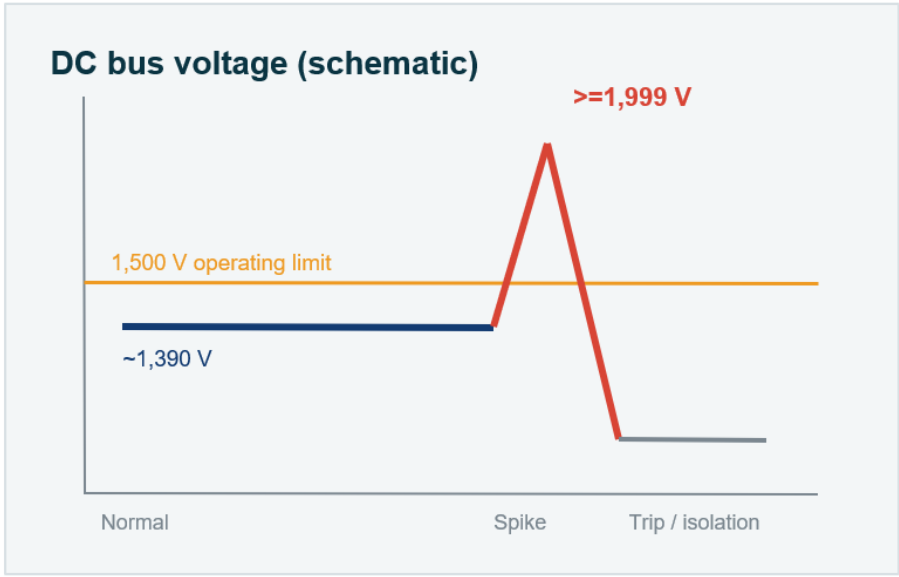
Thermal runaway at a co-located site

Operational hybrid site

- Approximately 20 MW solar and 50 MWh of battery storage
- Four stations, each using a shared inverter / PCS
- Three BESS containers connected to the affected station
- Incident began with a sudden overvoltage at one station

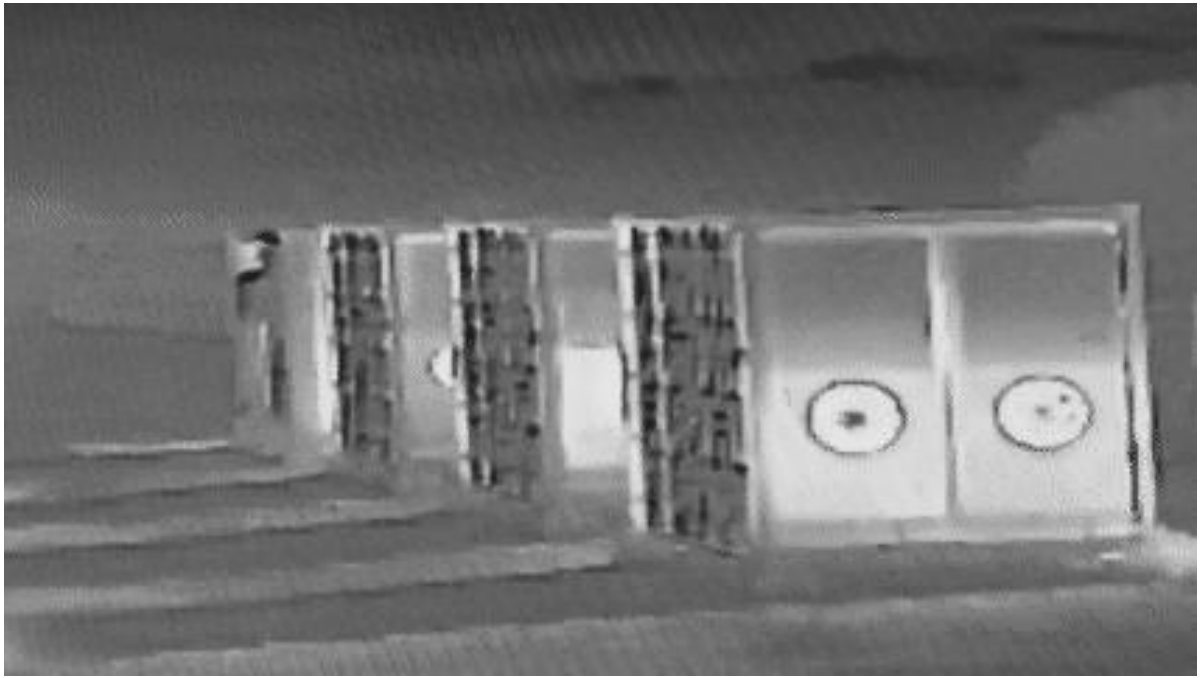
Shared architecture turned a local battery event into a whole-site restart decision.





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Fire!



13:39 Voltage rises above measurable range

13:45 Explosion and fire in first container

16:14 Second container fire alarm

16:20 Water wall protects third unit and PCS

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Fire!



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Outcome





2 containers total loss

0 Damage to PV / plant

ENTIRE SITE OFFLINE

- Inspections across all BESS containers and all PCS
- OEM data was needed to understand the event
- Restart became a design and risk-mitigation exercise
- isolated while investigations and a safe restart strategy progressed



Claim lesson: the longest delay was proving how unaffected assets could safely return to service.

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Switchgear failure

Shortly after construction (M&D)

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CASE STUDY 2

Switchgear installation defect

- 100+ MWh BESS site
- One switchgear T-boot installed incorrectly
- Failure of the individual switchgear and took all switchgears offline

RCA

Incorrect clamping screw left a stand-off

↓

Partial discharge and flashover

↓

No damage was reported to the BESS, PCS or transformers.



ENTIRE SITE OFFLINE

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Flash!



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Outcome

Mitigation

Two compatible panels were diverted from another project under construction.

63 days offline

Loss amplifiers

- Common busbar and a single primary switchboard
- Safety isolation and forensic investigation before repair
- Compatibility, protection testing and full recommissioning
- If a project spare was not available – **estimated 300 days offline!**
- Failed parts not hugely expensive, but lead times are large, and site outages are costly

reported lead time for new panels:

~36 weeks

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Contingent BI

Operational

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CASE STUDY 3

CBI: No BESS damage, 81 days offline

Claim lesson: Sometimes you can do everything right and still have a loss…

- 100+ MWh BESS site
- Termination failed on transformer at the neighbouring substation
- Transformer was exclusively used for this project
- No equipment on Insured's site damaged… but entire site offline
- Limited contractual rights against grid operator





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Outcome

81 **days offline** **~10 days** repair campaign

- Questions with regards to design decisions and repairs
- Owner/operator of BESS has limited influence on the repairs
- Long lead times for low value items
- Limited information shared regarding RCA makes evidencing claim difficult

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Three different failures; the same recurring loss drivers

BESS Thermal Runaway | **On-site Switchgear flashover** | **Third-party grid failure + CBI**

Similar outcomes

- Extended lead times
- Delay in commencing repairs due to high level of safety precautions and cause investigations
- Not the actual battery that caused the failure

Challenges

- Assessing BI/DSU values
- Complex causation
- Pace of development vs standards
- Co-operation from stakeholders
- Suitable indemnity periods?
- Policies still developing

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