

## Destructive Testing for Energy Storage

Independent testing that provides vital product design and safety insights for battery energy storage systems (BESS)



### Benefits of Destructive Testing

- **Enhance Product Safety**  
Manufacturers and integrators can use test results to meet regulatory requirements to prevent thermal runaway as well as optimize design of the overall storage solution.
- **Improve Project Design**  
Test results help developers and EPCs design more effective safety controls and fire mitigation strategies for their energy storage projects.
- **Inform Emergency Response Plans**  
Data from destructive testing helps first responders manage thermal events safely, quickly and effectively.



The image above shows a battery energy storage system in thermal runaway during destructive testing.

### Who We Are

PVEL is the leading independent lab of the downstream solar industry. Our bankability testing and data-driven reports connect manufacturers and integrators with a global network of PV and storage equipment buyers and investors that represent over 30 GW of annual buying power.

### What is Destructive Testing?

PVEL follows the UL9540A test standard for destructive testing, which requires the evaluation of potential safety hazards in BESS. Destructive testing forces BESS into thermal runaway, a phenomenon that occurs when an uncontrolled rise in temperature causes the cells within the battery to create more heat than they can dissipate. During testing, the propagation of thermal runaway is documented while off-gas content and other hazards are measured.

Destructive testing is performed at the cell-, module-, unit-, and installation level to provide a full understanding of the possible risks of thermal runaway, off-gassing and fire. UL9540A testing is already a project requirement in many U.S. energy storage markets, and widespread global adoption of similar protocols is expected as BESS demand grows. As an ISO 17025 accredited lab, PVEL conducts testing with first responders and authorities having jurisdiction (AHJs).

### Insights from Destructive Testing

- Off-gas composition, explosion risk and hazard analysis
- Where, when and how quickly a fire can spread within the BESS
- Best practices for first responders
- The potential for re-ignition or off-gassing in BESS
- How to safely dispose of hazardous materials

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