COMMENTS OF THE ELECTRIC POWER RESEARCH INSTITUTE ON

CALIFORNIA PUBLIC UTILITY COMMISSION

[CPUC Resolution ESRB-13]

California Public Utility Commission's (CPUC's) Resolution Electric Safety and Reliability Branch (ESRB)-13, Adopts General Order (GO) 167-C, Enforcement of Maintenance and Operation Standards for Electric Generating Facilities and Energy Storage Systems

February 24, 2025

The Electric Power Research Institute, Inc. (EPRI) respectfully submits the enclosed comments on the California Public Utility Commission's (CPUC's) *Resolution Electric Safety and Reliability Branch (ESRB)-13, Adopts General Order (GO) 167-C, Enforcement of Maintenance and Operation Standards for Electric Generating Facilities and Energy Storage Systems*. EPRI appreciates the opportunity to comment on this standard update.

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These comments on Resolution ESRB-13 reflect EPRI technical research and development results related to the safety, operation, and maintenance of energy storage systems. EPRI's comments on this resolution focus on the technical aspects of the reporting requirements mandated in the new standard as well as conformity to current leading industry practices in battery safety. These comments reflect EPRI's research activities in that they are technical rather than legal in nature. The enclosed comments reflect only EPRI's research and expertise and do not necessarily reflect the opinions of those supporting and working with EPRI to conduct collaborative research and development.

EPRI hopes that its comments and technical feedback will be valuable to the CPUC.

Sincerely,

Daniel Brooks

Sr. Vice President, Energy Delivery and Customer Solutions

February 24, 2025

COMMENTS

CALIFORNIA PUBLIC UTILITY COMMISSION
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On January 27, 2025, the CPUC issued Resolution ESRB-13, to enhance the safety and reliability of battery energy storage facilities. EPRI's comments focus on the technical aspects of safety and reliability reporting requirements and leading practices.

Comment on Medium Facility Exceptions

*Section 3.3 Medium Facilities: "such facilities much follow **prudent practices** as required by Sections 4.2, 5.2, 6.4, and 7.4"*

*Section 4.2 and 7.4: "**reasonable** log of operations and maintenance in a manner consistent with **prudent industry practice**"*

EPRI comments that "prudent industry practice" is somewhat vague. It should be noted than many Inverter-Based Resources are now required to report to specific North American Electric Reliability Corporation (NERC) guidelines in terms of NERC Generating Availability Data System (GADS) requirements (which will be further defined in future steps for ESS) and NERC reliability reporting. The NERC GADS requirements apply to bulk electric system-connected ESS of 20 MW or greater. Linking 4.2 and 7.4 to NERC requirements would further define "industry practice" for medium facilities. Refer to the comment on Section 9.1 and 9.3.1 for more detail on logging requirements.

Comment on Outage Reporting

*Section 9.1 Provision of Information (f): "event or outage data concerning a GA or ESS including, but not limited, **unavailability reports or outage cause reports**"*

*Section 9.3.1 Outage Report to ISO: "…ESS in California shall provide an **outage report** to the ISO that identified any periods when the generating or storage facility is unavailable to produce or discharge electricity or is available only at reduced capacity. The report shall also **identify the reasons** for any such unscheduled unavailability or reduced capacity."*

EPRI uses CAISO generator data to support reliability characterization of ESS as a technology class[1]. Understanding real-world reliability and availability parameters of ESS is necessary to inform both current operation and future planning exercises that support grid reliability. At the moment, ESS resources use traditional outage

[1]Pathways to Improved Storage Reliability. EPRI. Palo Alto, CA. 2024 https://www.epri.com/research/products/000000003002030387

codes and have limited storage-specific trouble codes to report unavailability or curtailment, mostly using 'Plant Trouble' when offline. EPRI notes that more options for ESS-specific trouble codes could facilitate data collection, analysis, and reporting on ESS reliability. EPRI's research[1] notes that additional ESS outage codes delineating specific ESS issues associated with unavailability or reduced capacity would support more complete reliability assessments and provide data to improve ESS availability. Providing specific ESS codes that isolate external causes from internal equipment and controls issues would serve this purpose. Further, alignment of defined NERC cause codes with CAISO cause codes related to unavailability could drive consistency in reporting to both NERC and CAISO.

Comment on Safety Incident Reporting

9.4 Safety-Related Incidents: "Such reporting shall include any incident that…involves a GA or ESS malfunction or failure resulting in ***fires, explosion, hazardous emissions, or safety*** *related reports to other agencies."*

EPRI notes that more detail on the information required in reports of safety-related incidents can facilitate identification of common issues, simplify root cause analysis, and allow quicker assessment of health and safety impacts. EPRI has created air quality[2], soil, surface water and groundwater screening models[3] that have been used for representative and site-specific case studies. Publicly available environmental monitoring data from past incidents can support the improvement and validation of these models and similar ones used by other entities during facility design, permitting or emergency response planning. Pursuant to the mention of hazardous emissions, the inclusion of data on environmental monitoring conducted during and after the incident, such as air quality, suppression water runoff, and soil sampling results, would enable improved understanding and characterization of hazardous emissions and, assuming that data is released publicly, support future ESS design improvements and emergency response planning. The lack of environmental data may mean that potentially over- or under-restrictive guidance could be provided to the public during the emergency response process and that design choices for BESS would not be sufficiently informed and robust in the event that a failure incident progresses to a fire.

EPRI also notes that there is currently no requirement within the document to report the results of any investigation or root cause analysis (RCA) of the incident, nor to share RCAs publicly. Mandatory reporting of both incidents and the subsequent learnings from investigations would support efforts to reduce the frequency and severity of future failures. EPRI maintains the most comprehensive public dataset[4] on ESS safety-related incidents, including root cause information. Research on failure incidents has yielded valuable insights into causes and recommendations to help prevent future failures[5], but this work is incomplete. Only 32% of failures in EPRI's database had root cause information available, making analysis results inconclusive. More complete public information on RCAs could provide additional real-world insights for improved BESS designs and emergency response approaches.

The New York State Inter-Agency Fire Safety Working Group, convened in 2023, considered mandating the release of RCAs through the state fire code, though they did not ultimately include this in their final recommendations[6]. They did provide several considerations for any future such requirement, including instituting a template and deadline for providing RCAs, emphasizing the importance of transparency between all stakeholders, and considering including a peer review requirement to ensure accuracy and credibility[6]. Given the scope of GO 167-C is far different from a state fire code and includes other reporting requirements, inclusion of RCA release requirements could further efforts to reduce the frequency and severity of future failures.

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[2] Lessons Learned from Air Plume Modeling of Battery Energy Storage System Failure Incidents. EPRI. Palo Alto, CA. 2024. https://www.epri.com/research/products/000000003002030586

[3] BESS Fire Suppression Water Runoff: Hypothetical Case Study with Reactive Transport of Constituents. EPRI. Palo Alto, CA. 2024. https://www.epri.com/research/products/000000003002030363

[4] EPRI BESS Failure Incident Database. https://storagewiki.epri.com/index.php/BESS_Failure_Event_Database

[5] Insights from EPRI's Battery Energy Storage Systems (BESS) Failure Incident Database: Analysis of Failure Root Cause. EPRI. Palo Alto, CA. 2024. https://www.epri.com/research/products/000000003002030360

[6] New York State Interagency Fire Safety Working Group Fire Code Recommendations. July 2024. https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Energy-Storage/Fire-Code-Recommendations-Report.pdf

Comment on Logbook Standards

Generating Asset and Energy Storage System Logbook Standards III. B. 1) Logbook Requirements for Renewable Generating Assets and Energy Storage Systems

EPRI's review of this section focused on the requirements pertaining to ESS. The list of required facility status and event data is in accordance with leading industry practices[7], which largely automate the gathering and storage of such data[8].

Comments on Operation Standards

Appendix D Operation Standard for Generating Asset and Energy Storage System Owners.

*11. OS 11 Operations Facilities, Tools, and Equipment: "**Physical separa**tion such as, but not limited to, egress requirement, **clearance** for electrical equipment, and ESS equipment shall be maintained."*

EPRI notes that NFPA 855 provides guidance and thresholds for clearance and spacing between ESS equipment based on past experience and may be a useful resource for mention in this section.

20. OS 20 Preparedness for On-Site and Off-Site Emergencies

*d) In developing any emergency plans, the GAO and ESSO will **coordinate** with local emergency management agencies, unified program agencies, and **local first response agencies**; and*

*e) The owner or operator of each ESS facility shall **develop and submit** an emergency response and emergency action plan for the ESS that complies with Public Utilities Code, Section 761.3, subdivision (g). The owner or operator of the ESS facility shall **submit the emergency response and emergency action plan** to the county, local emergency management agencies, local first response agencies, and if applicable, the Authority Holding Jurisdiction (AHJ) and the city where the facility is located.*

EPRI's research finds that it is a leading industry practice for ESS owners and operators to proactively engage with local emergency and first responders[9] as mandated in OS-20.d. Based on past EPRI work with ESS developers, owners and operators on the creation and maintenance of emergency response plans (ERP)[10] for ESS, EPRI notes that review and refresh of ERPs on an annual basis would help to keep plans and procedures up-to-date with rapidly developing industry leading practices. Additionally, EPRI has observed that on-site and tabletop training with all stakeholders has improved incident response and outcomes. Stakeholders who can benefit from participation include local agency officials, emergency responders, environmental and public health experts, public spokespeople etc. Regular refresher training can keep response protocols fresh in the minds of stakeholders as well as provide an avenue to update stakeholders on new science. Annual refresher trainings are common industry practice[9]. Lastly, EPRI notes that the ERP and emergency action plans would be most effective when informed by environmental modeling and community risk assessments, such as offgassing and combustion plume modeling and deposition, suppression water runoff studies and other studies specific to the site. EPRI has conducted research and provided leading practices on plume modeling for ESS[2] as well as models for runoff water impacts[3].

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[7] Energy Storage Operations and Maintenance Tracker. EPRI. Palo Alto, CA. 2020. https://www.epri.com/research/products/3002019222

[8] Electrical Energy Storage Data Submission Guidelines, Version 3. EPRI. Palo Alto, CA. 2023. https://www.epri.com/research/products/000000003002025977

[9] Proactive First Responder Engagement for Battery Energy Storage System Owners and Operators. EPRI. Palo Alto, CA. 2021. https://www.epri.com/research/products/000000003002021774

[10] Emergency Response Planning for Battery Energy Storage System (BESS): Review and Guidance. EPRI. Palo Alto, CA. 2024. https://www.epri.com/research/products/000000003002030488