



Codes and Standards for Energy Storage System Performance and Safety

Government and Industry Collaboration

BRIEFING SUMMARY

The U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability Energy Storage Systems Program, with the support of Pacific Northwest National Laboratory (PNNL) and Sandia National Laboratories (SNL), and in collaboration with a number of stakeholders, developed a protocol (i.e., pre-standard) for measuring and expressing the performance characteristics for energy storage systems. The protocol was first published in late 2012 and has been updated and re-published in June 2014. This latest edition includes enhancements to the criteria. These enhancements included: refined the accuracy of performance measurement, reduced the duty cycle for peak shaving applications from seven to three days, added new performance metrics, and provided simplification to other parts of the protocol. In addition, criteria have been added that enable the protocol to be applied in assessing the performance of energy storage systems in an islanded microgrid application.



The application and use of the 2012 edition of the protocol is supporting more informed consideration and use of energy storage systems to meet our energy, economic, and environmental challenges. The June 2014 edition is intended to further the deployment of energy storage systems. As a protocol or pre-standard, the ability to determine system performance as desired by energy systems consumers and driven by energy systems producers is a reality. The protocol is serving as a resource for development of U.S. standards and has been formatted for consideration by IEC Technical Committee 120 on energy storage systems. Without this document, committees developing standards would have to start from scratch.

WHAT'S NEXT FOR PERFORMANCE?

A sub-group comprised of interested parties and stakeholders is working to add new criteria that will cover the application of energy storage systems for photovoltaic (PV) smoothing. Currently they are reviewing proposed duty cycles developed by SNL that are intended for energy storage systems used in this application. The metrics for this application are expected to be the same as those in the protocol for peak shaving, frequency regulation, and islanded microgrid applications. Draft criteria will be circulated to the entire protocol working group after their finalization by the PV smoothing sub-group. The target publication date of the protocol which includes PV smoothing will be in late 2014. Based on the application and use of the protocol, continued enhancements will be made as necessary, and criteria for new applications will be considered as requested by the working group. As was done with the 2012 protocol, subsequent editions will be made available to U.S. and international standards initiatives.

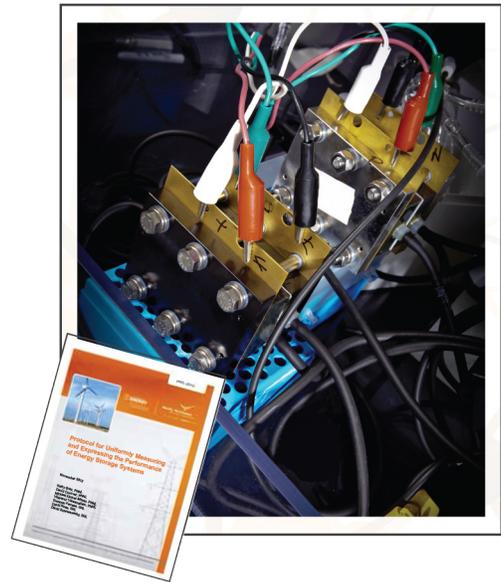
WHAT ABOUT SAFETY?

At the request of Dr. Imre Gyuk, Program Manager for Energy Storage Research at the US Department of Energy's (DOE) Office of Electricity Delivery and Energy Reliability (OE), a Workshop on Energy Storage Safety was held February 17-18, 2014 in Albuquerque, NM. The goals of the workshop were to: 1) bring together all of the key stakeholders in the energy storage community, 2) share knowledge on safety validation, commissioning, and operations, and 3) identify the current gaps in understanding, managing, standardizing and validating safety in energy storage systems. At the workshop, an overarching driving force was identified that impacts all aspects of documenting and validating safety in energy storage; deployment of energy storage systems is ahead of the codes, standards and regulations (CSRs) needed to appropriately regulate deployment. To address this lag between CSR and technology development and deployment, three critical components or gaps were identified at the workshop that must be immediately addressed: 1) the lack of standardized methods and the scientific basis necessary to validate system safety, 2) the need to update codes, standards and regulations relating to safety of energy storage systems, and 3) incident preparedness is not fully developed or standardized for these new technologies. Addressing these needs will require coordination and collaboration in a manner similar to that which occurred in development of the protocol.

Since the workshop two short term activities have been underway and the results will be available in draft form for public review and comment in June 2014. One activity is the development of a CSR Primer that can inform all stakeholders on the environment within which codes, standards and regulations are developed, adopted and compliance documented and verified. The other is an Inventory of Current Requirements and Compliance Experiences that provides details of current CSR criteria that would apply to energy storage systems and how systems have been reviewed and approved to date. The former helps ensure all stakeholders have a uniform and robust understanding of the CSR process. The latter identifies the areas in CSR that need to be updated and enhanced to fully support safe system installations. These activities will assist with short-term system review and approval to ensure safety under current CSR. These activities will also assist with longer-term revisions and enhancements to CSR to provide the necessary guidance to ensure safe installations and facilitate timely review and approval of energy storage system installations.

ABOUT PNNL

Interdisciplinary teams at Pacific Northwest National Laboratory address many of America's most pressing issues in energy, the environment and national security through advances in basic and applied science. PNNL employs 4,500 staff, has an annual budget of nearly \$1 billion, and has been managed for the U.S. Department of Energy by Ohio-based Battelle since the laboratory's inception in 1965. For more information, visit the PNNL News Center, or follow PNNL on Facebook, LinkedIn and Twitter.



For more information contact:

Dave Conover, Engineer
Pacific Northwest National Laboratory
P.O. Box 999, MSIN K6-05, Richland, WA 99353
david.conover@pnnl.gov
(703) 444-2175

Franny White, Media Relations
Pacific Northwest National Laboratory
P.O. Box 999, MSIN K1-36, Richland, WA 99353
frances.white@pnnl.gov
(509) 375-6904

www.pnnl.gov



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