

La Fonda Hotel, Santa Fe, NM | February 22-24, 2017

Welcome to ***Meeting the Challenge: 2017 ESS Safety Forum***. This event provides a platform for discussing the current state of ESS (ESS) safety and mitigation strategies for improving cell to system level safety and reliability. This open forum will provide presenters an opportunity to present their work in ESS safety, and it provides attendees the chance to see the work that is creating the future of ESS safety.

February 22, Day 1

Day 1	Speaker	Organization	Talk Title
7:00am	Registration Opens and Buffet Breakfast		
8:00am	Summer Ferreira	Sandia National Laboratories	Opening Remarks
8:15am	Dr. Imre Gyuk	Department of Energy	Welcome
Fundamental Science Session 1 (Session Chair: Chris Orendorff, Sandia National Laboratories) – New Mexico Room			
8:30am	Partha Mukherjee	Texas A&M University	Thermo-electrochemical Analytics in Li-ion Battery Safety (presented by Aashutosh Mistry)
9:00am	Britt Reichborn-Kjennerud	Consolidated Edison	The Con Edison – NYSERDA Battery Safety Testing Program: Overview and Takeaways
9:20am	Bessma Aljarbou	Qnovo	Li-Ion Batteries – Lessons from the Consumer Electronics Industry
9:40am	Erik Spoerke	Sandia National Laboratories	Safety-by-Design in All-Inorganic Sodium Batteries
10:00am	Break		
Fundamental Science Session 2 (Session Chair: Jorge Araiza, Southern California Edison) – New Mexico Room			
10:30am	Dan Steingart	Princeton University	Transitioning Electrochemical Acoustic Analysis into a Predictive Technique for Understanding Complex Behaviors
11:00am	Ankur Jain	University of Texas Arlington	Safety of Li-ion Batteries – A Thermal Engineering Perspective
11:20am	Heather Barkholtz	Sandia National Laboratories	Addressing Lithium-Ion Battery Safety and Failure Containment for Modern Grid Energy Storage
11:40am	Josh Lamb	Sandia National Laboratories	Understanding Lithium Ion Safety Through Abuse Testing
12:00pm	Lunch, day 1 (on-site catered) – Santa Fe Room		

Day 1	Speaker	Organization	Talk Title
Application to Scale Session 1: Setting The Stage (Session Chair: Kavita Ravi, Massachusetts Clean Energy Center) – New Mexico Room			
1:15pm	Steve Willard	Electric Power Research Institute	Field Application of Storage Codes and Standards
1:30pm	Arthur O'Donnell	California Public Utilities Commission	Safe Storage Requires Safety Regulation — A California Case Study
1:45pm	Roger Lin	NEC Energy Solutions	Practical and Functional Safety in Energy Storage Systems
2:00pm	Clifford Ho	Sandia National Laboratories	Safety of Thermal Storage Systems for Concentrating Solar Plants
2:15pm	45 minute panel discussion		
3:00pm	Break		
Application to Scale Session 2: Fire Services (Session Chair: Alice Muna, Sandia National Laboratories) – New Mexico Room			
3:30pm	Andrew Blum	Fisher Engineering, Inc.	Fire Tests of a Lithium Ion Battery Energy Storage System
3:45pm	Paul Rogers	Fire Department of New York	First Responder ESS Fire Operations
4:00pm	Brian O'Connor and Andrew Klock	National Fire Protection Association	NFPA Standards and Fire Service Training for Energy Storage Systems
4:15pm	Howard Hopper	Underwriters Laboratory	Energy Storage Systems – Fire Safety Concepts in the 2018 International Fire and Residential Codes
4:30pm	45 minute panel discussion		
5:15pm	Summer Ferreira	Sandia National Laboratories	Closing Remarks
5:30pm-6:30pm	Welcome Reception sponsored by UniEnergy Technologies – Santa Fe Room		

February 23, Day 2

Day 2	Speaker	Organization	Talk Title
7:00am	Buffet Breakfast		
8:00am	Summer Ferreira	Sandia National Laboratories	Opening Remarks
Fundamental Science Session 3 (Session Chair: Todd Olinsky-Paul, Clean Energy Group) – New Mexico Room			
8:30am	Bor Yann Liaw	Idaho National Laboratory	A Viable Pathway from Durability to Reliability and Safety
9:00am	Hsin Wang	Oak Ridge National Laboratory	Mechanical Abuse and Safety Risks of Large Format Li-ion Batteries
9:20am	Judy Jeevarajan	Underwriters Laboratory	Safety of Aged Commercial Lithium-ion Cells
9:40am	Gary Yang	UniEnergy Technologies	Intrinsically Safe Vanadium Battery Solution for Large-Scale Energy Storage
10:00am	Break		
Fundamental Science Session 4: Modeling (Session Chair: Erik Spoerke, Sandia National Laboratories) – New Mexico Room			
10:30am	Kevin Marr	University of Texas at Austin	Modeling of Heat Generation during Thermal Runaway of Lithium-Ion Batteries in an Accelerating Rate Calorimeter
10:50am	John Hewson	Sandia National Laboratories	Modeling for Understanding and Preventing Cascading Thermal Runaway in Battery Packs
11:10am	Ofodike Ezekoye	University of Texas at Austin	Development of a Diffusion-Reaction Formalism for Describing Thermal Runaway in Battery Systems
11:30am	Don Bender	Sandia National Laboratories	Recommended Practices for the Safe Design and Operation of Flywheels
12:00pm	Lunch, day 2 (on-site catered) – Santa Fe Room		

Day 2	Speaker	Organization	Talk Title
Application to Scale Session 3: 3rd Party Testing and Risk Assessment (Session Chair: Laurence Sombardier, State of Hawaii) – New Mexico Room			
1:15pm	Nick Warner	DNV GL	Energy Storage Failure and Fire: An Overview of Lessons Learned and Myths Dispelled for the Storage Industry
1:30pm	Benjamin Ditch and Sujit Prushuthaman	FM Global	Risk Based Hazard Assessment of Li-ion Energy Storage Systems
1:45pm	Hiroyuki Kubo	National Institute of Technology and Evaluation	Approach to Ensure BESS Safety in Japan
2:00pm	Laurie Florence	Underwriters Laboratory	How Safety Standards Address the Hazard of Fire Propagation in Battery Systems (presented by Judy Jeevarajan)
2:15pm	45 minute panel discussion		
3:00pm	Break		
Application to Scale Session 4: Codes and Standards (Session Chair: Chris LaFleur, Sandia National Laboratories) – New Mexico Room			
3:30pm	David Conover	Pacific Northwest National Laboratory	Why C/S Matter to ESS and What is Going on in the U.S. on ESS Related C/S
3:45pm	Vilayanur Viswanathan	Pacific Northwest National Laboratory	International Electrotechnical Commission Standards Development for Energy Storage System Safety
4:00pm	45 minute panel discussion (additional panel members: Matthew Paiss, IAFF and Howard Hopper, Underwriters Laboratory)		
4:45pm	Vincent Sprenkle and Babu Chalamala	Pacific Northwest National Laboratory and Sandia National Laboratories	Closing Remarks
5:00pm	Dr. Imre Gyuk	Department of Energy	Closing Remarks
5:30pm – 7:30pm	Dinner at The Shed – 113 East Palace Avenue, Santa Fe, NM, 87501		

February 24, Day 3

The development and deployment of ESS has been and will continue to occur at a significant rate, although there continues to be challenges associated with documenting and validating system safety and understanding how to respond to safety related incidents. Under the leadership of the DOE Office of Electricity Energy Storage Program, Sandia National Laboratories and Pacific Northwest National Laboratory have been building a coordinated ESS safety effort in collaboration with a wide range and significant number of private sector stakeholders since early 2014. This includes utility, manufacturing, first responder, contractor, code official, testing, and inspector sectors who have come together under an ESS Safety Working Group to facilitate collaboration and provide a focal point for identifying and addressing all of the challenges associated with the timely deployment of safe ESS. Day 3 of the ESS Safety Forum will be an opportunity to ‘reboot’ and ‘invigorate’ the future efforts undertaken by the ESS Safety Working Group during an open meeting on behalf of all stakeholders connected to or impacted by ESS safety in any way. *Don’t miss this unique opportunity to focus on and help chart the course to ensuring ESS safety through this unique collaboration.*

Day 3	Activity
7:30am	Buffet Breakfast
8:00am	ESS Safety Working Group Meeting – <i>New Mexico Room</i>
8:45am	Codes and Standards Breakout Session – <i>Santa Fe Room</i> Research and Development Breakout Session – <i>Exchange Room</i> Incident Response and Outreach Breakout Session – <i>Ballen Boardroom</i>
10:10am	Break
10:30am	ESS Safety Working Group Joint Session, Report Out and Summary
12:00pm	End of Forum