IEEE Power and Energy Society
Entity Annual Report
2022

Entity: Energy Storage Stationary Battery Committee (ESSB)
Website: https://cmte.ieee.org/pes-essb/
Chair: Babu Chalamala
Vice-Chair: Steve Vechy
Secretary: Jason Wallis
Immediate Past Chair: Curtis Ashton

1. Significant Accomplishments:

(Please explain why these are significant and include details and examples)

We continued the expansion of the technical activities of ESSB to include extensive engagement with other PES technical committees, IEEE coordinating committees, growing the technical programming at the PES General Meeting and T&D, development of new standards in emerging areas, and a greater reach out to membership across all areas of energy storage and battery technologies.

Significant accomplishments include:

- This year, ESSB took over EESAT conference, a well-established energy storage conference that was organized by Sandia National Laboratories, US Department of Energy, and the Energy Storage Association since 2000. ESSB successfully organized the 2022 ESSAT conference as an IEEE led event in November 2022.
- ESSB Committee Winter and Summer general meetings are back to in person mode. The committee hosted the Winter General Meeting in Gulf Shores, AL, Jan .. with 70 attendees in person. The Summer General Meeting was hosted in person in Sonoma, CA, July.. with over 80 members in attendance. Both the meetings had technical symposia….
- ESSB presented a day long tutorial session on Grid Energy Storage at the 2022 IEEE T&D Conference and Expo in New Orleans. This was attended by about 80 attendees.
- We continued the development of collaborations through the newly established Energy Storage Collaborative Team (ESCT)
- Continued growth of energy storage related technical sessions and panels at IEEE PES General Meeting and T&D.

2. Benefits to Industry and PES Members from the Committee Work:

(Provide specific examples and explain what the benefits are)

ESSB provides an excellent opportunity for the industry and PES members with continuing education, outreach, and the opportunity to develop IEEE led global standards related to energy storage, stationary batteries and charging systems. The committee is also a great avenue for outreach and engagement with utilities, regulatory bodies at the state and federal levels.

3. Benefits to Volunteer Participants from the Committee Work:

(Provide specific examples and explain what the benefits are)

The EESB committee is in a technical domain with a rapidly growing interest across many cross-cutting areas including grid modernization, firming of renewables with energy storage, batteries and charging infrastructure for the electrification of transportation, and a growing range of applications for stationary batteries in traction, UPS, and backup power applications. Participation in the committee work provides a range of opportunities for members and volunteers. Benefits include:

- Continuing education through seminars and tutorials offered by ESSB and content on the PES Resource Center
- Networking opportunities through participation in ESSB Winter and Summer meetings. Both the meeting have seminars and tutorials providing opportunities for continuing education for members. The meetings also provide opportunities for knowledge-sharing, learning, and networking.
- Leadership roles in standards development through contribution to standards activity through various working groups.
- Opportunity to participate in a range of technical activities in PES conferences on topics related to energy storage, stationary batteries, electrification, and grid modernization.
- Expanded horizons of many seasoned volunteer members to the possibilities and opportunities in the battery energy storage systems market.

4. Subcommittee Reports

ESSB has three subcommittees: Energy Storage (ES), Stationary Batteries (SB), and DC & Related Systems (DCRS). The China Satellite Chapter of ESSB also has a growing membership and technical programming to support member needs in China.

ES, SB and DCRS Subcommittee Reports:

All three subcommittees support IEEE led standards development and have a number of Working Groups (WG) that are involved in developing standards and related activities.

Important standards related updates include:

- IEEE 1184 (UPS Batteries) was reissued with the addition of Li-ion for UPS, including sizing.
- Work continues (with possible publication in 2023) on IEEE P2962 for Li-ion installation, operation, and maintenance, a joint effort begun by KEPIC.
- IEEE 2405 / NEMA PE5 (stationary battery chargers) was published as the first joint IEEE/NEMA standard.
- A new (updated) edition of IEEE 1188 (VRLA maintenance) with new additional information/guidance on internal ohmic testing, maintenance decisions based on criticality, replacement percentages within strings, and ripple current is almost ready to be published.
- Award-winning standard IEEE 1679.1 on characterization of Li batteries was reopened (new PAR) for update
- Work continues apace on brand new IEEE 1679.3 (flow batteries) and 1679.4 (alkaline battery technologies other than Ni-Cd)

- Work continues apace on a new standard IEEE 2685 on stationary engine starting energy storage (e.g., batteries) devices
- IEEE P2686 (BMS) is almost ready to be published as a first edition
- Work continues apace on IEEE P2688 (ESMS)
- A new PAR was approved to work on an IEEE standard on battery cabinets
- The P2688 Energy Storage Management Systems (ESMS) working group made substantial progress in specifying the input signals, output commands, and actions that the ESMS can perform. This progress included the creation of schematics covering three primary categories of ESMS operation: power management system (PMS), power plant controller (PPC), and energy management system (EMS). The working group also made significant progress in defining the roles of the ESMS in performance of grid applications including active power control, reactive power control, energy arbitrage, and blackstart. The working group has also drafted a sub-clause on the ESMS role in safe operation of a battery system.
- 485 Working group has begun investigating the feasibility of creating more accurate temperature compensation factors, specifically for VRLA. No PAR in place at this time but the work is being spearheaded based on some good questions being asked by the group.
- Work continues (with possible publication in 2023) on IEEE P2962 for Li-ion installation, operation, and maintenance, a joint effort begun by KEPIC.
- IEEE 2405 / NEMA PE5 (stationary battery chargers) was published as the first joint IEEE/NEMA standard.

In addition, IEEE 1013 / 1562 calculator for sizing off-grid PV arrays and batteries was published on the IEEE Resource Center.

Codes Working Group

Codes Working Group worked closely with UL to publish lead-acid and Ni-Cd appendices for UL1973, UL9540, and UL9540A.

Codes Working Group worked closely with the NFPA to get favorable battery-related changes into the 2nd edition of NFPA 855, the NEC (NFPA 70) 2023, NFPA 70E (electrical safety, including DC arc flash work), and NFPA 70B (maintenance).

China Satellite Subcommittee

- ESSB China Satellite Committee trained for members on application and development of IEEE standards on June 21, 2022. Promoted the establishment of two standard working groups and apply for standard project approval, which are “The designing of the combined wind/PV/storage system. interconnecting with electric power grid” and “Parallel DC power supply systems in substations” are being reviewed.
- A case series on new energy storage initiated by ESSB China Satellite Committee and China Society of Electrical Engineering is being compiled, which includes almost 100 typical energy storage projects in China.

• China Satellite Committee has held many online meetings and invited experts to give keynote presentations, seminars and exchanges, and salons to offer suggestions for the development of energy storage technologies.

5. Meetings Update

ESSB Winter and Summer Meetings

ESSB Winter General Meeting was organized in Gulf Shores, AL, January 24-28, 2022. The meeting was attended by over 70 members in person and about 20 members participating virtually. The meeting was supported by Southern Company, our local utility host. Here is the agenda for the meeting:

AGENDA for IEEE PES ESSB MEETING - Jan 24-28, 2022 (Gulf Shores)

Today's Date: 11/19/21 Rev 3 - Draft

DAY	DATE	TIME PERIOD		*Gulfview Ballromm II*	*Gulfview Ballroom I*	*Live Oak I & II*
Monday-Thursday	1/24 - 28	7:00 AM	5:00 PM	ESSB Registration		
MON Morning	1/24/22	10:00 AM	12:00 PM	Technical Symposium #1:		
MON Afternoon	1/24/22	1:30 PM	3:15 PM	ESSB General Meeting		
MON Afternoon	1/24/22	3:45 PM	5:30 PM	SubCommittee Reports (ES)		
TUE Morning	1/25/22	8:00 AM	9:45 AM	SubCommittee Reports (SB, DCRS)		
TUE Morning	1/25/22	10:15 AM	12:00 PM	Technical Symposium #2:		
TUE Afternoon	1/25/22	1:30 PM	3:15 PM	1188 - VRLA Maintenance (SB)	1184 - UPS Batteries (SB)	1491 - Monitoring (DCRS)
TUE Afternoon	1/25/22	3:45 PM	5:30 PM		485 - Lead Acid Sizing (SB)	
WED Morning	1/26/22	8:00 AM	9:45 AM	2686 - BMS (ES)	535 - Nuclear Qualification (SB)	Codes
WED Morning	1/26/22	10:15 AM	12:00 PM			
WED Afternoon	1/26/22	1:30 PM	3:15 PM	2688 - ESMS (ES)	Nuclear WG	
WED Afternoon	1/26/22	3:45 PM	5:30 PM		1115 - NiCd Sizing (SB)	2685 - Engine Start (DCRS)
WED Evening	1/26/22	6:00 PM	8:00 PM		Social (Dunes Terrace)	
THU Morning	1/27/22	8:00 AM	9:45 AM	2962 - Li-ion Ins/Op/ Main/Test/Repl (ES)	1187 - VRLA Installation (SB)	
THU Morning	1/27/22	10:15 AM	12:00 PM			
THU Afternoon	1/27/22	1:30 PM	3:15 PM	1679.1 - Li Batt Guide (ES)	1189 - VRLA Selection (SB)	
THU Afternoon	1/27/22	3:45 PM	5:30 PM	1679.4 Alkaline Batt Guide (ES)		
FRI Morning	1/28/22	8:00 AM	9:45 AM	1679.4 Alkaline Batt Guide (ES)	1635 - ASHRAE Ventilation and Thermal Mgmt (DCRS)	Glossary
FRI Morning	1/28/22	10:15 AM	12:00 PM			
FRI Afternoon	1/28/22	12:00 PM	1:00 PM	Wrap-Up Mtg		

Morning Break:	9:45 am to 10:15 am	Technical Symposiums:		
Afternoon Break:	3:15 pm to 3:45 pm	#1.	Battery Mgmt Systems	David Rosewater to chair (presenter
Lunch Break:	Noon to 1:30 pm	#2.	Engineering Large BESS	Babu Chalamala to chair (presenters

In additional to regular WG meeting, the Winter Meeting included two, 2-hour technical symposia which provided continuing education on two important topics:

- Engineering large-scale BESSs – Jim McDowall, SAFT Batteries
- Engineering Considerations for FFR-Capable BESS - Charlie Vartanian, Pacific Northwest National Laboratory
- Battery Management Systems – David Rosewater, Sandia National Laboratories
- Battery Systems Integration and Communication – Valerio De Angelis, Sandia National Laboratories

The technical symposia from the 2022 Winter Meeting was recorded and is posted on the IEEE PES Resource Center.

Summer General Meeting of ESSB was held in Sonoma, CA on June 13-17, 2022. The meeting was attended by over 80 members. It was locally supported by our members from Enviroguard.

Here is the agenda for the meeting:

AGENDA for IEEE PES ESSB MEETING - June 13-17 Sonoma, CA

Today's Date: 05/31/22 **Rev 6**

DAY	DATE	TIME PERIOD				
Monday-Thursday	6/13-6/16	7:00 AM	5:00 PM	ESSB Registration		
MON Morning	6/13/22	10:00 AM	12:00 PM	Technical Symposium #1: Non-Li ES		
MON Afternoon	6/13/22	1:30 PM	3:15 PM	ESSB General Meeting		
MON Afternoon	6/13/22	3:45 PM	5:30 PM	SubCommittee Reports (SB, DCRS)		
TUE Morning	6/14/22	8:00 AM	9:30 AM	SubCommittee Reports (ES)		
TUE Morning	6/14/22	10:00 AM	12:00 PM	Technical Symposium #2: Solar ES		
TUE Afternoon	6/14/22	1:30 PM	3:15 PM	Safety Codes & Standards WG	2686 BMS in ES Application	
TUE Afternoon	6/14/22	3:45 PM	5:30 PM	1188 VRLA Maint. & Testing		1679.4 Alkaline Characterization
WED Morning	6/15/22	8:00 AM	9:45 AM	Nuclear WG	1679.1 Guide to Li-Based	
WED Morning	6/15/22	10:15 AM	12:00 PM	Nuclear WG (& 535 1 hour 11-12)		2688 Energy Storage Mgmt.
WED Afternoon/ Evening	6/15/22	1:30 PM	8:00 PM	Enviroguard Social		
THU Morning	6/16/22	8:00 AM	9:45 AM	1561 Optimize Lead in Hybrid	1189 - Battery Selection	2685 Engine Start
THU Morning	6/16/22	10:15 AM	12:00 PM	Lithium Sizing		
THU Afternoon	6/16/22	1:30 PM	3:15 PM	1187 VRLA Installation	1679.4 Alkaline Characterization	2688 Energy Storage Mgmt.
THU Afternoon	6/16/22	3:45 PM	5:30 PM		450 VLA Maintenance & Test	
FRI Morning	6/17/22	8:00 AM	9:45 AM	2962 Li Batteries IOM	946-1375 Integration	
FRI Morning	6/17/22	10:15 AM	12:00 PM			1881 Glossary
FRI Afternoon	6/17/22	12:00 PM	1:00 PM	Wrap-Up Mtg		

Technical Symposium #1: Non-Li ES
Technical Symposium #2: Solar ES

Agenda included two, 2-hour technical symposia on non-Li ion energy storage technologies and solar energy storage system integration.

- High-temperature sodium batteries – Andrew Miraldi
- Redox flow batteries – Reed Wittman, Sandia National Laboratories
- Rechargable Zinc-MnO2 batteries – Benoit White, Urban Electric Power
- Solid-state batteries – Brandon Bartiling, 3M Company
- Solar Energy Storage Integration – Curtis Ashton, American Power Systems

Tutorials

ESSB sponsored a day long tutorial program on Grid Energy Storage Technology and Applications at the 2022 IEEE T&D Conference and Expo, New Orleans, LA, on April 25, 2022. The tutorial had 80 registered attendees.

Introduction	EESB Committee and Energy Storage	Babu Chalamala, Sandia National Laboratories	
Session 1 - Energy Storage Technologies (8:20 am - 10:30 am)			
	Lithium-ion Batteries	Jim McDowall, Saft Batteries America; Curtis Ashton, American Power Systems	30 min
	Flow Batteries	Vince Sprenkle and Charlie Vartanian, Pacific Northwest National Laboratory	30 min
	Advanced Lead-Acid Batteries	Chris Searles, CGS Associates	30 min
	Long Duration Energy Storage	Rick Fioravanti, Quanta Technology	30 min
Break 10:30 am - 10:45 am			
Session 2 - Engineering Energy Storage Systems (11:00 am - 1:30 pm)			
	Energy Storage Management Systems	Tu Nguyen, Sandia National Laboratories	30 min
	ESS Grid Interconnection & Integration	Charlie Vartanian, Pacific Northwest National Laboratory	30 min
Lunch Break (12:00 - 1:00 pm)			
	Developing & Deploying Battery Energy Storage Systems	Waylon Clark, Sandia National Laboratories	30 min
Session 3 - Applications and Valuation (1:30 pm - 3:15 pm)			
	Applications of Energy Storage	Ray Byrne, Sandia National Laboratories	50 min
	Storage Valuation for Distribution Applications	Ralph Masiello, Quanta Technology	50 min
Break (3:15 pm - 3:30 pm)			
Session 4 - A Closer Look at Safety, Codes and Regulations (3:30 pm -4:30 pm)			
	Safety and Reliability of Energy Storage Systems	David Rosewater, Sandia National Laboratories	30 min
	Code Compliance for Stationary Battery Systems	Chris Searlies, CGS Assoc., Curtis Ashton, American Power Systems, Bill Cantor	30 min

The tutorial program was recorded and posted on the IEEE PES Resource Center website.

IEEE EESAT Conference Summary

A 2022 highlight for the IEEE ESSB Committee was organizing the first IEEE Electrical Energy Storage Application and Technology (EESAT) conference on the campus of the University of Texas at Austin on November 7-9, 2022 (https://cmte.ieee.org/pes-eesat/). EESAT was a well established biannual energy storage conference with its first meeting in 2000. The EESAT conference started as a US Department of Energy (DOE) led conference in September of 2000 and organized by Sandia National Laboratories. In 2011, Energy Storage Association joined as a co-sponsor. Over a twenty year period, EESAT emerged as a leading conference for energy storage technology and applications.

EESAT was co-located with the yearly DOE Office of Electricity Energy Storage Program Peer Review meeting. Papers and presentations at EESAT were not all funded by DOE. Many of them were from research partners like CEC, EPRI, or BPA to name a few. This offered a chance for researchers from government labs, industry, utilities, and universities to meet and talk about what they were working on. Once a nascent industry, energy storage is now on an exponential growth trajectory. The maturity of the technology and industry requires a different set of organizing principles for the premier technical conference. However, it was felt that with the rapidly expansive growth of energy storage, the conference needed to reach out to a broader audience of engineers who were actively engaged in the multi-faceted areas of energy storage technologies. The IEEE ESSB committee has taken up the mantel of EESAT to enable it to grow and also provide a peer reviewed publication platform through IEEExplore.

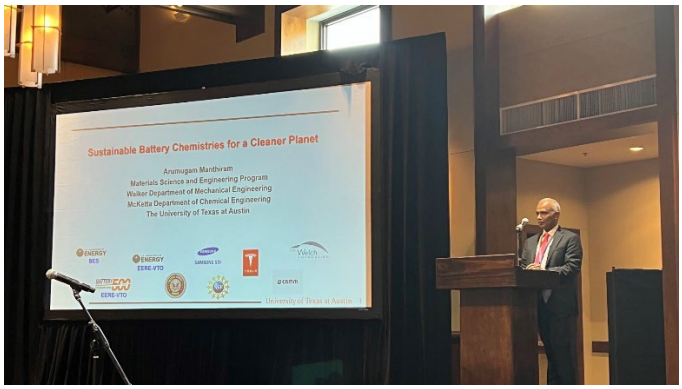
Over 125 technicians, engineers, research and development scientists, manufacturers, ES developers and associated industry leaders attended the conference. A total of 21 papers and 9 poster presentations highlighted the five technical sessions and addressed the following areas:

- Energy storage as a transformative agent to traditional power systems.
- Energy storage optimization.
- Energy storage applications, economics, and policy.
- Advanced battery technologies in addition to lithium.
- Advanced power electronics.

The three ESSB subcommittees conducted panel sessions with subject matter experts that addressed:

- A window into the ES future – Energy Storage Subcommittee.
- Latest breakthroughs in Pb Technologies – Stationary Battery Subcommittee
- Transformative technologies at the grid edge – DC Related Systems Subcommittee.

The complete 2022 EESAT conference program is included in the Appendix A. An opening night welcome keynote session brought together four subject matter experts from ERCOT, Southern California Edison, Sandia National Laboratories and GDS Associates to debate the challenges associated with the transformation of the grid.



Photos showing opening plenary session and the keynote by Prof. Ram Manthiram.

Another highlight was a keynote lecture by Dr. Arumugam Manthiram, PhD., Cockrell Regents Chair in Engineering at the University of Texas Materials Science Institute, discussing current research in developing low-cost battery materials. Dr, Manthiram worked alongside of John Goodenough, PhD and one of the principal inventors of the Lithium battery. Dr. Manthiram gave the honorary speech announcing Dr Goodenough's acceptance of the Nobel Prize in Chemistry in 2019.

An IEEE survey taken following the conference showed a high level of interest for a follow-on conference which is now in the initial stages of planning for January 2024.

The key organizers of the 2022 EESAT meeting are:

Chris Searles, Conference Chair
Steve Vechy, Conference Vice Chair
Curtis Ashton, Publicity & Outreach Chair
David Rosewater, Technical Program Chair
David Sokoloff, Communications & Marketing Chair

We also received support from Roseann Jones, IEEE PES Liaison Coordinator and John Teehan, IEEE MCE as the Registration Coordinator.

6. Recognition of Outstanding Performance:

With a large number of working groups and growing collaborative work, the committee has a number of dedicated volunteers who provide tremendous service to IEEE PES and the industry through standards development and other technical activities. There are not that many opportunities to recognize the outstanding service of our members. Here we would like to highlight recognize the following:

- ESSB nominated IEEE Std 946-2020 Working Group for recognition with the Technical Committee Working Group Award. This is recognition of outstanding work the working group has done in developing IEEE Std 946-2020, "IEEE Recommended Practice for the Design of DC Power Systems for Stationary Applications"
- Tom Carpenter was presented with the ESSB Technical Committee Distinguished Service Award, in recognition of his leadership as Treasurer of ESSB and his outstanding contributions in launching the committee's finances.
- 946 Working Group –Chair Haissam Nasrat and members of the Working Group were presented with Awards for their contributions to the recent revision of this standard.

7. Coordination with Other Entities (PES Committees, CIGRE, standards, etc.):

ESSB has a range of collaborations with ILTSC, SCC21, IAS, the Energy Storage Committee of ASME, and NFPA.

The joint IEEE-SA SC(C) 21 and ESSB collaboration called the ESCT liaised with other SDO committees on energy storage, including IEEE PES's RSICC, the IEEE IAS DataCenter Energy Storage committee, IEC TC120, EPRI, MESA SunSpec, and the ASME ESS committee.

As part of the ESCT work, Curtis Ashton and Mark Siira joined the IEEE Global Power Systems Transformation Consortium (GSPTC) to provide input on BESS and grid interconnectivity.

The first joint standard from IEEE-SA SC(C) 21 and ESSB (IEEE 1547.9) was published.

Issue 3 of IEEE 1635 / ASHRAE 21 was published with the addition of Li-ion thermal runaway gassing.

8. New Technologies of Interest to the Committee:

There are a range of new topics of interest to the committee. These include the development and applications of energy storage for a range of new applications. We currently have new Working Groups coming up to address the following:

- Long duration energy storage is an emerging area of interest
- Fast charging and the role of energy storage in charging infrastructure
- Data standards for ESS: Work has begun with EPRI to start work on a PAR to issue portions of their joint EPRI/Sandia data guide as an IEEE standard. This will hopefully be the first of many such collaborations between EPRI and ESSB.
-

9. Global Involvement

PES is looking to increase involvement with members from Regions 8, 9 and 10 (Africa, Europe, Middle East, Latin America, Asia and Pacific). Please provide the following information.

Total Number of committee members	Officers from regions 8,9 and 10	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8,9, and 10
86	2	2	4

EESB Satellite Committee – China has over 200 PES members. We are working on developing a framework to coordinate activities with the China Satellite Committee.

10. Problems and Concerns:

ESSB WG leadership is primarily led by members in US. We anticipate significant growth in new standards activities from the ESSB Satellite Committee – China. We also see opportunity to bring new members from other regions outside the US. Finding additional volunteer leaders to support the expected growth is challenging.

11. Significant Plans for the Next Period:

- Continue recruiting new members
- Set the framework of collaboration with other entities via MoUs
- Keep building ESSB related technical program at the PEG GM, T&D, ISGT and other venues.
- Continue to develop the Electrical Energy Storage Applications and Technology (ESSAT) into a standalone technical conference led by ESSB.
- Continue to grow the engagement with the ESSB Satellite Technical Committee – China.
- Continuing our excellent outreach work with tutorials

Submitted by: **Date: Jan 16, 2023**
Babu Chalamala, ESSB Chair
Steve Vechy, ESSB Vice Chair
Jason Wallis, ESSB Secretary

EESAT

Austin, TX November 7-9, 2022

IEEE PES Power & Energy Society®

IEEE ESSB COMMITTEE

ENERGY STORAGE TRANSFORMING THE GRID

CALL FOR PAPERS

The IEEE Electrical Energy Storage Applications and Technologies (EESAT 2022) conference will be held November 7-9, 2022, at the AT&T Hotel and Conference Center in Austin, Texas. The Electrical Energy Storage Applications and Technologies (EESAT) conference has been the premier technical forum for presenting advances in energy storage technologies and applications since it began in 2000.

The technical program will highlight advances in:

- Energy storage technologies including new battery chemistries, advanced mechanical energy storage designs, and thermal energy storage
- Novel approaches to energy storage such as demand response, long duration, and second-use battery pros and cons
- Power conversion systems that make grid-scale as well as distributed/renewable energy storage more efficient and effective
- Energy management and device management system advances that maximize value while enabling safe and reliable operation
- Markets, standards, and policies that unlock energy storage as a critical enabler of the clean energy transition

Researchers and practitioners are encouraged to submit papers for review and possible presentation. Accepted papers will be presented in an oral or poster presentation format, and published in IEEE Xplore.

IMPORTANT DATES:

JUNE 28 2022 - PAPER SUBMISSION SITE CLOSES

AUGUST 29 2022 - NOTIFICATION OF ACCEPTANCE

FOR MORE INFORMATION INCLUDING MANUSCRIPT SUBMISSION DETAILS AND PEER REVIEW PROCESS, VISIT THE EESAT CALL FOR PAPERS AT:
HTTPS://CMTE.IEEE.ORG/PES-EESAT/CALL-FOR-PAPERS/

EESAT ORGANIZING COMMITTEE

Babu Chalamala, IEEE ESSB Committee Chair
Chris Searles, Conference Chair
Steve Vechy, Conference Vice Chair
Curtis Ashton, Publicity & Outreach Chair
David Rosewater, Technical Program Chair
David Sokoloff, Communications & Marketing Chair
Roseanne Jones, IEEE PES Liaison Coordinator
John Teehan, Registration Coordinator

EESAT 2022 is sponsored by the IEEE Energy Storage and Stationary Battery (ESSB) Committee, a part of the IEEE Power and Energy Society.

Monday, November 7, 2022

4:00 – 8:00pm	Registration
5:00 – 6:30pm	Reception & Buffet Dinner

Welcome Keynote Session:
Transforming the Grid – Evolution or Revolution?

Time	Presenter	Organization
7:00 – 9:00pm	Hisham Othman (Moderator)	Quanta Technologies LLC
	Clayton Stice	ERCOT
	Manuel Avendano	Southern California Edison
	Kevin Mara	GDS Associates, Inc.
	Charles Hanley	Sandia National Laboratories

Tuesday, November 8, 2022

7:00 – 8:00am	Registration and Breakfast

Welcome to EESAT

Time	Presentation	Presenter	Organization
8:00 – 8:15am	Welcome, Introduction, and Opening Remarks	Babu Chalamala	Chair, IEEE ESSB Committee / Sandia National Laboratories
8:15 – 8:30am	Recent Developments in IEEE PES	Wayne Bishop	VP Meetings, IEEE PES

Opening Plenary Session:
Application of Energy Storage to Address Decarbonization Challenges

Time	Presentation	Presenter	Organization
8:30 – 9:45am	Sharma Kolluri (Moderator)		IEEE PES Corporate Engagement Program
	Grid Strategy and Analytics	Justin Odom	Commonwealth Edison (ComEd)
	New England Distributed Generation — The Whole Picture	Michael Porcaro	National Grid
	Where We Go from Here	Matt Lind	1898 & Co (Burns & McDonnell)
9:45 – 10:00am	Break		

Technical Session 1:
Energy Storage Transforming Traditional Power Systems

Time	Presentation	Presenter	Organization
10:00 – 11:30am	Steven Willard (Moderator)		Electric Power Research
	Evaluation of a Solar Plus Battery Energy Storage Microgrid Topology Transition from AC to Hybrid	Rafaela Nascimento	University of Pernambuco
	Hydro-battery Hybrids – A Case for Holistic Assessment of Hybrid Energy Systems	Vishvas Hiren Chalishazar	Pacific Northwest National Laboratory
	Energy Storage Gas Peaker Replacement: Optimal Sizing and Environmental Benefits	Amanda West	Georgia Institute of Technology
	Analysis of Energy Justice and Equity Impacts from Replacing Peaker Plants with Energy Storage	Bethel Tarekegne	Pacific Northwest National Laboratory
	Energy Equity: Making the Case for Peaker Plant Replacement with Battery Energy Storage	Khoi Vu	Quanta Technology
11:30am – 1:30pm	Lunch and Technical Poster Session		

Poster Session

Poster Presentation	Presenter	Organization
Mitigation of PV Voltage Fluctuations using Adaptive Moving Average and Volt-var Control	Eliot Jiménez Ortega	The University of Texas at Austin
Validation of the Power Plant Controller for Frequency Support Applications using Hardware in the Loop Testing	Reza Salehi	Quanta Technology
Underground Pumped Storage Hydroelectric Using Salt Domes	William Taggart	Cavern Energy Storage
Implementation of Model Predictive Control for Frequency Support in a Real-time Digital Simulator	Ujjwol Tamrakar	Sandia National Laboratories
Effect of Time Resolution on Modeling of Storage	Pedro Andres Sanchez Perez	University of California, Merced
Global Energy Storage Database: Enhancing Features and Validation Procedure	Alvaro Furlani Bastos	Sandia National Laboratories
Optimal Battery Dispatch to Assist a Water Injection System with Offshore Wind Power	Bruna de Lima	University of São Paulo
Recommended Practice for Energy Storage Management Systems in Grid Applications	David Schoenwald	Sandia National Laboratories
A Lumped Analytical Model for Thermal Management of Sodium Nickel Chloride Battery Module	Jae Sung Yang	Pusan National University

Energy Storage Sub-Committee Panel Session: A Window into the Energy Storage Future

Time	Presenter	Organization
1:30 – 2:45pm	David Rosewater (Moderator)	IEEE EESAT Technical Program Chair / Sandia National Laboratories
	Chris Searles	IEEE EESAT Conference Chair / CGS and Associates
	Casey Shull	Go Electric
	Michael Hoff	American Battery Solutions
	Jose Marrero	Southern Company
	Mark Siira	IEEE Standards Coordinating Committee 21
2:45 – 3:00pm	Break	

Technical Session 2: Energy Storage Optimization

Time	Presentation	Presenter	Organization
3:00 – 5:00pm	Ray Byrne (Moderator)		Sandia National Laboratories
	Optimal Mobile Energy Storage Pre-Placement for Black-Start Restoration	Joshua Yip	The University of Texas at Austin
	In Situ Adaptive Battery Parameter Estimation Algorithm with Cross-Validation and Observer	Oindrilla Dutta	Sandia National Laboratories
	Impact of Extreme Weather on Sizing Battery Energy Storage Systems: A Case Study of Fairbanks, Alaska	Walker Olis	Sandia National Laboratories
	Optimal Coordination of Distributed Energy Resources Using Deep Deterministic Policy Gradient	Avijit Das	Pacific Northwest National Laboratory
	Detection of False Data Injection Attacks in Ambient Temperature-Dependent Battery Stacks	Victoria Obrien	Texas Tech University
	Optimal Sizing and Operation of a Hybrid Clean Energy Center	Xu Ma	Pacific Northwest National Laboratory
5:00-6:00pm	Open Posters & Conference Supporters Session		

Wednesday, November 9, 2022

7:00 – 8:00am	Breakfast	
8:00 - 8:15am	Opening Remarks	Chris Searles - IEEE EESAT Conference Chair

Opening Plenary Session: Material Advances with Lithium, Sodium, and Potassium: Leadership from the Texas Materials Institute

Time	Presentation	Presenter	Organization
8:15 – 9:00am	Advances with Li Technologies	Arumugam (Ram) Manthiram	Endowed Chair of Engineering
9:00 – 9:45am	New Developments with Lithium, Sodium, and Potassium	David Mitlin	Endowed Professor, Department of Mechanical Engineering
9:45 – 10:00am	Break		

Technical Session 3: Applications/Economics/Policy

Time	Presentation	Presenter	Organization
10:00am – 12:00pm	Charlie Vartanian (Moderator)		Pacific Northwest National Laboratory
	Vanadium Redox Flow Battery Field Testing Results	Steven Willard	Electric Power Research Institute
	Multiple-Use Application Between Wholesale Market and Distribution Level Microgrid with Vanadium Flow Battery	Riichi Kitano	Sumitomo Electric Industries, Ltd.
	Capacity Expansion Planning for LA Basin: The Role of Energy Storage	Patrick Maloney	Pacific Northwest National Laboratory
	pIRP: A Probabilistic Tool for Long-Term Integrated Resource Planning of Power Systems	Khoi Vu	Quanta Technology
	Assessing the Energy Equity Benefits of Energy Storage Solutions	Jessica Kerby	Pacific Northwest National Laboratory
	Equitable Design of Behind-the-Meter Energy Storage Programs: A Customer Perspective	Jeremy Twitchell	Pacific Northwest National Laboratory
12:00 – 1:00pm	Lunch		

Stationary Battery Subcommittee Panel Session: Latest Breakthroughs in Pb Technologies

Time	Presentation	Presenter	Organization
1:00 – 2:15pm	Latest Breakthroughs in Pb Technologies	Curtis Ashton (Moderator)	IEEE ESSB Stationary Battery Sub-Committee Chair
		Matt Raiford (Co-Moderator)	Consortium for Battery Innovation (CBI)
		Jay Frankenhouser	EnerSys Inc.

Technical Session 4: Other Advanced Battery Technologies

Time	Presentation	Presenter	Organization
2:15 – 3:00pm	Matt Raiford (Moderator)		Consortium for Battery Innovation (CBI)
	Novel Sodium – Polysulfide Flow Battery Grid-scale Energy Storage Technology	Sai Bhavaraju	Enlighten Innovations, Inc.
	Deterioration-detection and Failure-detection Algorithms for Storage Batteries Using Hysteresis Characteristics	Jun Tsunoda	Research & Development Group Hitachi, Ltd.
3:00-3:15pm	Break		

DC Related Systems Subcommittee Panel Session: Transformative Technologies at the Grid Edge

Time	Presentation	Presenter	Organization
3:15 – 4:15pm	Transformative Technologies at the Grid Edge	Richard Hutchins (Moderator)	IEEE ESSB DCRS Sub-Committee Chair
		Charlie Vartanian (Co-Moderator)	Pacific Northwest National Laboratory
		Alex Huang	University of Texas Austin
		Matthew Benbow	ABB
		Hawk Asgeirsson	Detroit Edison (retired)

Technical Session 5: Advanced Power Electronics

Time	Presentation	Presenter	Organization
4:15-5:00pm	Valerio De Angelis (Moderator)		Sandia National Laboratories
	Enhanced Inertial Support: Modeling Fast Frequency Response Controls for Energy Storage System Inverters	Ahmad Tbaileh Manuel Avendano	Pacific Northwest National Laboratory Southern California Edison
	An Intelligent Power Electronic System for Secondary Use Batteries	Benjamin Dean	Oak Ridge National Laboratory

Closing Remarks

Time	Presentation	Presenter	Organization
5:00 – 5:15pm	Conference Closing Remarks	Steve Vechy	IEEE ESSB and EESAT Vice Chair / Concentric Inc.