

## IEEE Power and Energy Society Entity Annual Report

2019

**Entity: Energy Storage and Stationary Battery (ESSB) Committee**

**Chair: Curtis Ashton**

**Vice-Chair: Babu Chalamala**

**Secretary: Steve Vechy**

### 1. Significant Accomplishments:

- “Spread the word” (and educate) through the Tutorial (chaired by Ralph Masiello) and Codes/Standards (chaired by Bill Cantor) Working Groups
  - Were involved in at least eight major presentations / panel sessions
    - “Meet the Committee” webinar (first of its kind) via the PES Resource Center (over 150 attendees)
    - Energy Storage half-day panel session at the 2019 PES General Meeting (about 100 attendees)
    - Session on Energy Storage and our ESSB-related work at the annual KEPIC (Korean Electric Power Institute Code) conference in Jeung-Sun, South Korea
      - In spite of pressure from some entities in South Korea, successfully pushed back (with the help of the Nuclear Working Group) against the idea of a Li-ion Battery Qualification Standard for Class 1E Nuclear applications
    - Two Presentations on Battery and Li-ion Safety for the IEEE PSES (Product Safety Engineering Society) Southern California chapter (the most active PSES chapter)
    - Panel session on ESS for CREA (Colorado Rural Electric Association) with 250+ attending.
    - Presentation and panel session on new Code impacts for future ESS deployments to the New York City metro area chapter (the largest chapter) of the 7x24 organization (about 160 registered attendees).
    - Outreach presentations presented by IEEE SCC21 included ESSB Solar PV standards, IEEE P1547.9, etc. These included workshops at IEEE PES GM, Solar Power International IEEE Anchorage AK, and a planned workshop at the ASHRAE General meeting. Collaboration with SCC21 through the ESCT Team liaison activity has increased ESSB visibility.
    - Sandia and PNNL (under the leadership of the DOE and Babu Chalamala) gave and continue to give quarterly Energy Storage tutorials to various regulatory bodies across North America, following the general outlines put together last year by our Tutorial working group, and using many of its members
- Increased membership by approximately 15%
  - Will continue to try to grow as we are now directly responsible for 30 active IEEE standards documents (along with 4 other working/interest groups, and sponsoring 2 entity-based standards) with a “participant” membership of only 78 (this is a ratio of about 2½ participants per published standard or active PAR, which has to be an IEEE record?).

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

- Key members joined NFPA to represent standby stationary battery interests, especially as it relates to NFPA 855, NFPA 1 and other safety codes
  - Fought hard for reasonable regulations in the first edition of NFPA 855.
- Agreed to sponsor a new entity-based (out of China) working group (P2836) on solar-powered charging stations for electric mobility applications; and provided them with a new P&P that we'll continue to use for future entity-based working groups that we sponsor
- Subcommittee Highlights
  - SB (Stationary Standby Batteries) –
    - Finished revising 484 (Vented Lead-Acid Battery Installation)
    - Continued work on the open revision PAR for 1184 (UPS batteries), including closer collaboration with the prime “customer” (the 1188 VRLA maintenance working group)
    - Opened a PAR to revise 1187 (VRLA Installation).
    - Expanded the scope of the open PAR on 1188 (VRLA maintenance) to include more information on ripple current effects, and to provide guidance for different maintenance intervals for varying applications/criticalities (which we hope to expand to other maintenance standards), along with maximum cell/bloc replacement criteria guidance
    - New leadership to advance the difficult task of revising open PAR 1189 so that it will give guidance for the selection of all battery types (not just VRLA) for stationary standby applications.
  - DCRS (DC and Related Sub-Systems) –
    - In final balloting with the update to 946 (which was given to us by EDPG), with a greatly expanded scope, so that it now includes DC systems for all electric utility (typically 125 and 250 VDC) applications, as well as telecom (typically 24 and 48 VDC) applications. This standard and P2405, which are power electronics based, helped broaden the membership and the scope of ESSB work to include the subsystems that affect batteries moreso than in the past.
    - New leadership for the open revision PAR for 1491 (battery monitoring), and closer coordination between this group and their principal target (VRLA battery maintenance working group 1188)
    - Getting close to releasing new IEEE standard P2405, Utility Battery Chargers
    - Significant Progress made on the new P2686 standard (Engine Starting ESS)
  - ESCT (Energy Storage Collaboration Team) – see more on ESCT work in Section 5
    - Working Group P1679.3 (Flow Batteries) made good progress towards a first draft of a standard (guide) on these technologies
    - Formed a new Working Group which is now in the process of developing a new standard (Guide) to help characterize emerging or renewed interest non-Ni-Cad secondary (rechargeable) alkaline batteries (IEEE P1679.4).
    - Kicked off a new Working Group that will write a standard for Battery Management Systems (P2686 - BMS)

### **3. Benefits to Volunteer Participants from the Committee Work:**

- Expanded horizons of many seasoned volunteer members to the possibilities and opportunities in the BESS market
- Increased knowledge-sharing, learning, and networking due to the larger membership and the semi-annual face-to-face meetings.

### **4. Recognition of Outstanding Performance:**

- Fellow Nomination and Development
  - The ESSB past-chair re-nominated Jim McDowall for IEEE Fellow consideration. He has long been considered as a viable candidate for a Fellow award, but this was the first time that the Committee engaged in the process of a formal nomination.
- Continued our emphasis (under the leadership of our awards chair, Lesley Varga) on recognizing Committees and members who contributed significantly to ESSB and/or IEEE related activities.
  - IEEE 1679.1 (under the leadership of chair Mike Nispel, and vice-chair Jim McDowall) was awarded the working group of the year at the 2019 PES awards banquet. This is a significant honor, given that there are approximately 600 working groups within PES.
  - Andrew Miraldi (1679.2): Presented awards to several members of his working group for their contributions to the first ever IEEE standard on sodium beta batteries.
  - Curtis Ashton (1635 / ASHRAE 21): Presented awards to several members of both his committee and the corresponding ASHRAE GPC 21 for the 2<sup>nd</sup> edition of their joint standard on battery room ventilation and thermal management, which included significant additions around variations in gassing among NiCd technologies, and tutorial information to help mechanical HVAC engineers understand the key data from battery data sheets/manufacturers

### **5. Coordination with Other Entities (PES Committees, CIGRE, standards, etc.):**

- SCC21 / ESCT liaison efforts:
  - With SCC 21, re-issued 5 PV-related standards, and got them completely transferred over to ESSB.
    - 937 – Installation and Maintenance of Lead-Acid Batteries in PV Installations
    - 1013 – Sizing Lead-Acid Batteries for Stand-Alone Photo-Voltaic (PV) Installations
    - 1561 – Optimizing Lead-Acid Battery Life in Remote Hybrid Power Systems
    - 1562 – Stand-Alone PV Array Sizing
    - 1661 – Testing Lead-Acid Batteries in PV Hybrid Applications
  - With SCC 21, started a revision (PAR) to IEEE 1526 (Performance of Stand-Alone PV Systems), with the ultimate goal of re-publishing this standard quickly (within a year), then moving this standard from under the auspices of SCC21 over to the auspices of ESSB (like the 5 standards above)
  - Jointly (with SCC 21) kicked off a new working group (P1547.9) to provide guidance on interconnecting ESS with the grid
  - ESCT completed a survey within IEEE of all the various groups working on Energy Storage, so that we can begin to coordinate and liaise with those we weren't aware of (and those who weren't aware of us on Energy Storage issues, standards, tutorials, etc.

- SCC18 – ESSB Safety Codes WG Chair (Bill Cantor) serves as the IEEE principal to NFPA 70B and IEEE 855. We’re in-process submitting applications to SCC 18 to add ESSB members to be the IEEE principal representative for NFPA 1 and as an alternate representative for NFPA 855.
- Worked with NEMA to take over ownership of their old PE 5 standard, and turn it into a jointly sponsored IEEE standard P2405, Utility Battery Chargers, which is now close to balloting
- Provided guidance to KEPIC (Korean Electric Power Institute Code) on proposing/forming new individual-based voting Working Groups within ESSB to build off existing KEPIC standards to create up to IEEE standards on Li-ion Battery Installation, Maintenance, and Performance/Safety

**6. New Technologies of Interest to the Committee:**

- Flow Batteries – have initiated a PAR and WG development for Flow Batteries as highlighted above. This is a relatively new class of electrochemical batteries with about 10% of the global BESS market for grid-scale energy storage applications. Its advantage is that power and energy are decoupled (can be sized/grown separately).
- Battery Management Systems - have initiated a PAR and WG development for Battery Management Systems (BMS) for non-aqueous battery technologies (such as NiMH, Li-ion, etc.) as highlighted above.
- Engine Start Batteries/ESS – Working Group is fleshing out a new document for engine starting energy storage systems (batteries, supercaps, etc.) that will combine knowledge from several disparate documents and entities into one excellent document.
- Formed a new Working Group which is now developing a new standard (Guide) to help characterize emerging or renewed interest non-Ni-Cad secondary (rechargeable) alkaline batteries (IEEE P1679.4). This includes Ni-Zn, NiFe, NiMH, and ZnMnO2 technologies, all of which are old chemistries, but in which there have been significant advances in material science that have allowed them to be potentially viable alternatives for cycling battery energy storage applications.

**7. 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
82	0	0	2 Region 9 members 1 Region 10 member

**8. Significant Plans for the Next Period:**

- Continuing to re-organize our sub-committees to better divide the workload (plans are to move standards away from ESCT into a new Energy Storage (ES) subcommittee.
- Potentially collaborating with SCC 21 on an Energy Storage Management System (EMS) Guide? This would provide a standard for the final interface between the grid-tied inverters and the BMSs of the batteries themselves.
- In-place succession plan (vice-chair/TCPC Babu Chalamala will become chair in January 2021)



- Continuing our excellent outreach work with tutorials
  - Presently, a full-day tutorial, along with 2 ESS-themed panel sessions are planned for the PES T&D show in April, and at least 1 panel for the 2020 PES General Meeting

**Submitted by: Curtis Ashton**

**Date: 01/25/2020**