IEEE Power and Energy Society
AMPS Annual Report
2022

Entity: Committee on Analytic Methods for Power Systems (AMPS)
Website: http://sites.ieee.org/amps/
Chair: Kwok W. Cheung
Vice-Chair: Stephen S. Miller
Secretary: Yanfeng Gong
Past Chair: Kevin P. Schneider
TCPC: Zhenyu (Henry) Huang

1. Significant Accomplishments:

This committee is composed of six subcommittees:

- Big Data Analytics Subcommittee (BDAS)
- Computing and Analytic Methods Subcommittee (CAMS)
- Distribution System Analysis Subcommittee (DSAS)
- Intelligent Systems Subcommittee (ISS)
- Risk, Reliability and Probability Applications Subcommittee (RRPAS)
- Transient Analysis and Simulation Subcommittee (TASS)

The AMPS Committee and its subcommittees met in-person at the IEEE PES General Meeting (GM) in Denver on July 20, 2022. Officer rotations had occurred at the end of 2022. The table below shows the 2022 officers and 2023 officers.

Position	2022	2023
Chair	Kwok Cheung	Stephen Miller
Vice-Chair	Stephen Miller	Yanfeng Gong
Secretary	Yanfeng Gong	Zhenyu (Henry) Huang
TCPC	Zhenyu (Henry) Huang	Zita A. Vale
Past-Chair	Kevin Schneider	Kwok Cheung
Awards Chair	Kevin Schneider	Kwok Cheung
Standards Coordinator	Chris Dent	Chris Dent
Web Master	Dagmar Niebur	Dagmar Niebur

For PESGM 2022, AMPS reviewed over 227 technical papers for the GM and accepted 108, plus 33 transaction papers. AMPS has had the highest or second highest number of papers among technical committees for several years. The number of submissions for the 2022 PES GM under AMPS increased by 35% as compared to 2021. Note that the submission in 2021 was down approximately 50% as compared to 2020. The variation in paper submission of our committee is consistent with those of the other committees and is attributed to various pandemic recovery conditions around the world.

The Technical Council of PES has established paper quotas in such a way that each subcommittee has been requested to accept no more than half of the papers sent to them for review, although the committee TCPC retains overall control of the review process.

Accepted papers are presented at the GM in one of three formats: in a poster session; in a paper forum, or at a panel session. The detailed breakdown of paper submission to each subcommittee is shown in the following table:

Subcommittee Name	**Submitted Conference Papers** 2022 (2021) (2020)	**Accepted Conference Papers** 2022 (2021) (2020)	**Transactions Papers** 2022 (2021) (2020)
Computer Analytical Methods	22 (23) (62)	12 (11) (24)	6 (3) (11)
Distributed System Analysis	66 (61) (93)	32 (38) (44)	9 (6) (12)
Intelligent System	37 (25) (53)	14 (11) (25)	4 (3) (2)
Big Data Analysis	40 (13) (66)	20 (5) (27)	5 (6) (8)
Transient Analysis and Simulation	33 (24) (31)	16 (11) (19)	4 (9) (24)
Reliability and Risk Analysis	29 (22) (41)	14 (11) (19)	5 (5) (3)
Total	**227 (168) (347)**	**108 (87) (168)**	**33 (32) (60)**

At the 2022 GM, the AMPS Committee also sponsored 39 panel sessions and all conducted panel sessions are 2-hr sessions with a total duration of 78 hours which is approximately a 25% increase compared to 2021 (2021: Total 32 panel sessions, 64 hours; 2020: Total 29 panel sessions, 62 hours).

The details of all panel sessions are listed below.

Subcommittee	Title	Hours	Chair	Co-Chair
BDAS	Learning to Predict, Trade and Operate in the Electricity Market	2	Nanpeng Yu	Hao Zhu
BDAS	Pushing Distribution Grid Analytics to the Edge: Opportunities, Challenges and Best Practices	2	Kevin Chen	Song Zhang
BDAS	Event Characterization Using Synchrophasor Big Data	2	Mladen Kezunovic	
BDAS	Big Data and AI Applications for Enhanced Power Grid Security and Reliability	2	Rui Fan	
BDAS	Data-Driven State and Parameter Estimation in Power Distribution Systems	2	Yuzhang Lin	Nanpeng Yu
BDAS	Enhancing power system operation through online analytics	2	Panagiotis Papadopoulos	
BDAS	Using Data Analytics to Improve Energy Storage Modeling, Dispatch, and Valuation	2	Di Wu	
BDAS	Data collection and future needs to account for the continuous growth of sensing data in control rooms	2	Rafael Segundo, Petr Korba	
BDAS	Data challenges and analytical system requirements for distribution grids with high solar penetration	2	Bo Yang	
BDAS	Synchrophasor Data Analytics for Power System Monitoring, Operation and Planning	2	Nanpeng Yu	
CAMS	Distributed Optimization in the Power System: Advancement, Challenges, and Applications	2	Anurag Srivastava	Daniel Molzahn
CAMS	Cybersecurity and Resiliency for Future Grid with Renewable and EV Integration	2	Manimaran Govindarasu	Adam Hahn
CAMS	High-Performance Simulation of Power System on GPU and Heterogeneous Parallel Computing Environments	2	Shrirang Abhyankar	Yin Xu
CAMS	High-Performance Computing: Lessons Learnt and Way Forward for Power & Energy Society	2	Suman Debnath	
CAMS	From Smart Grid to Energy Internet: Recent Advances in Security and Resilience	2	Charalambos Konstantinou	Manimaran Govindarasu
CAMS	Simplifying the Common Information Model or CIM	2	David Bogen	Margaret Goodrich
CAMS	Proxy Application Driven Codesign for Power Systems Analytics on Extreme-Scale Architectures	2	Sayan Ghosh	Milan Jain
DSAS	Forensic Analysis of California Electric Safety Wildfire Ignition Incidents	2	Wendy al-Mukdad	Tom McDermott
DSAS	Impact of Extreme Weather on Planning and Operational Practices of Power Distriubtion Grids	2	Sumit Paudyal	Anamika Dubey
DSAS	New sensors and measurement methods for distribution grids: stability, state, power quality	2	Alex McEachern	Alexanda von Meier
DSAS	New applications and utility demonstrations in distribution state estimation	2	Ravindra Singh	
DSAS	Distribution System Operation and Protection Impacts of DER Operation for Bulk System Stability	2	Barry Mather	
ISS	Advanced Applications of Modern Optimization and Artificial Intelligence Methods on Active Distribution Networ	2	José Rueda	Pedro P. Vergara
ISS	Performance Evaluation Metrics for Artificial Intelligence (AI) and Traditional Approaches in Modern Power Systen	2	Ganesh Kumar Venayagamoorthy	
ISS	Deep learning methods and applications for power and energy	2	Zita Vale	Tiago Pinto
ISS	Intelligent decision making in power and energy systems using multi-agent systems	2	Tiago Pinto	Amin Kargarian
ISS	Advanced Techniques of Modern Heuristics for Robust Optimization in Smart Grid	2	Hiroyuki Mori	Eduardo Asada
ISS	Benchmarking of artificial intelligence methods for energy generation and consumption forecasting	2	Zita Vale	Tiago Pinto
ISS	Emerging Technologies for Complex and Large-scale Problems in Multi-energy Systems	2	José Rueda	Ganesh Kumar Venayagam
ISS	Artificial intelligence approaches for energy management in rural and urban energy communities	2	João Soares	Joshua New
ISS	Multi-agent systems for distributed optimal power flow in integrated Microgrids	2	Ashkan Rahimi-Kian	Tiago Pinto
RRPA	Resilience Valuation: Methodologies and Tools	2	Eliza Hotchkiss	Mohammed Ben-Idris
RRPA	Resilience Valuation: Implementing Projects and Solutions	2	Mohammed Ben-Idris	Eliza Hotchkiss
RRPA	Addressing Variable Energy Resource Generation in Standard 762 – Reporting Electric Generating Unit Reliability,	2	Douglas Logan	Murty Bhavaraju
RRPA	Reliability Impacts of Inverter Based Resources on Power Systems	2	Masood Parvania	
TASS	Modeling, Measurement, and Risk Assessment of Nuisance Distributed Energy Resource Islanding	2	Xiaoyu Wang	Alexandre Nassif
TASS	Resonances and Oscillations in Wind Farms and Solar PVs	2	Lingling Fan	Yunzhi Cheng
TASS	Co-Simulation of Power and Energy Systems	2	Trevor Hardy	Peter Palensky
TASS	Accurate Electromagnetic Transient Type Modeling of Inverter Based Resources	3	Aboutaleb Haddadi	Jean Mahseredjian
TASS	Combining physics-based and data-driven modeling and simulation for power systems	2	Qiuhua Huang	Hantao Cui

The AMPS Committee is the sponsor of record for three IEEE Standards, namely IEEE 762, IEEE 859 and IEEE 1729. IEEE 762 - Standard Definitions for Use in Reporting Electric Generating Unit Reliability, Availability, and Productivity is due for renewal by the end of 2022. There has been an active WG led by Doug Logan to make a substantial revision to incorporate performance measures for "renewable" or "variable energy resource" (VER) generators such as wind and solar generation resources. Upon AMPS approval, the WG had submitted the revision to IEEE Standard Association (SA) for Mandatory Editorial Coordination and formal balloting in September of 2022. P762 was approved by ballot voting in the following month and is at the Comment Resolution stage as of this writing. IEEE 859 was renewed with minor clarifications, resulting in the new 2018 edition. IEEE 1729 - Recommended Practice (RP) for Electric Power Distribution System Analysis is due for renewal at the end of 2024. There is an active PAR for renewal and there has been a dedicated WG under DSAS for IEEE 1729. We can expect a substantive update on WG progress in 2023 GM. Note that the three standards and RPs discussed above are under the *individual* process in which the WG comprises Standards Association (SA) individual members participating as individuals. However, AMPS is often time requested to be engaged in oversight of standards activity under the *entity* process, in which organizations participate in the standards WG who are corporate members of the SA. AMPS currently also oversees one entity activity, namely IEEE 2869: Synchronous Monitoring of Direct Current (DC) Bias Magnetic current Distribution in Power Grid. IEEE 2869 which is due for renewal at the end of 2031.

Within the AMPS Committee, and the Subcommittee, there are multiple Working Groups and Task Forces (TF). In 2022, A few proposals for new Working Groups and Task Forces were evaluated. 2 TFs were elevated to become WGs with extended scope. 4 TFs were terminated, and 2 new TFs were newly formed. Current AMPS has a total of 24 Working Groups and 25 Task Forces.

As with other Technical Committees, the AMPS Committee maintains an Awards Working Group with the structure that the chair is the AMPS past-chair and its members are the subcommittee past-chairs. This structure ensures that the members are aware of recent activities occurring in the subcommittees. A few new members including a new chair have rotated in for the WG in 2022.

The Committee resumes to hold administrative meetings of Committee officers in-person at the GM in 2022. Most AMPS officers except two attended the meeting in-person. One attended virtually and the other was excused due to a medical reason.

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

The work of the AMPS Committee facilitates publication and presentation of technical work within the scopes of the subcommittees within its jurisdiction, by forming a structure for scheduling paper and panel sessions as well as reviewing papers and technical reports. Where a sufficient body of "best practice" exists, the Committee organizes a Working Group to propose new IEEE Standards and continue to revise existing Standards.

3. Benefits to Volunteer Participants from the Committee Work:

The subcommittees under AMPS provide a network of engineers with common technical interests. Participation in WG/TF activities and technical paper/report reviews exposes members to the latest developments and advances in many topics of technical interests. Participants also have the great opportunities to co-work with and learn from many top-tier, experienced engineers and researchers of our industry.

4. Recognition of Outstanding Performance:

The Committee plans to systematically nominate retiring Committee and Subcommittee officers for appropriate recognition where appropriate. This will be executed by the awards working group, chaired by the AMPS past-chair, but will require nominations from the greatest cross section of members as possible. An Award WG meeting will be planned in early 2023 to discuss among the award nominations.

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

At the end of 2022 the coordinating committee representatives were renewed and will begin to reengage with the various technical committees. The current representatives are shown in the table below.

Coordinating Committee Representatives		
Energy Internet Coordinating Committee (EICC)		Stephen McArthur
Intelligent Grid & Emerging Technologies (iGET)		Yanfeng Gong
Marine Systems (MSCC)		Kevin Schneider
Renewable Systems Integration (RSICC)		Kwok Cheung

6. New Technologies of Interest to the Committee:

Because AMPS is primarily a “methods” committee, there is significant interest in coordinating with other committees which are leading new technologies. One example of this is machine learning and artificial intelligence (ML/AI). AI/ML is a fast-growing area of research that AMPS is examining and is ensuring that the formation of new working groups and task forces on this topic are in line with other existing efforts in. Due to the popularity and significant interests in Big Data, a few TFs of BDAS are elevated to become WGs in 2022.

7. Global Involvement& YP Involvement

PES is looking to increase involvement with members from Regions 8, 9 and 10 (Africa, Europe, Middle East, Latin America, Asia and Pacific). AMPS has one new committee officer coming out from Regions 8, 9 and 10. Due to lacking of a functional Association Management System, some statistics associated with AMPS committee members were not updated.

Total Number of committee members	Number of Young Professionals (under 35 years of age) – Including committee & subcommittee	Officers from regions 8,9 and 10	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8,9, and 10
129 (Not updated)	Unavailable in 123signup	3	4	Unavailable in 123signup

8. Problems and Concerns:

(i) There was a concern raised by the Technical Council of having one of our committee TF sponsoring a special issue for non-IEEE Journal. It is fine that some PES members personally interested in organizing special issues for non-IEEE journals. However, they should not have sponsored those activities on behalf of their IEEE/PES TFs according to the norm of all committee practices of IEEE. The issue was immediately addressed by our committee and proper adjustment and clarification had been made to our committee members of concern.

(ii) There is a concern in principle that it may be difficult to find volunteers to oversee entity process standards, as due to the requirement for corporate membership a significant proportion of SA members under AMPS are effectively excluded from the entity development process.

(iii) Dr. Luis Marti, had passed away in early January of 2022. The rest of the subcommittee officers were willing to step up and filled the gap of Dr. Marti's roles as Subcommittee Chair as well as the Chair of the WG on **Geomagnetic disturbance and Geomagnetically Induced Current**.

(iv) Lacking a functional Association Management System in 2022 makes some committee administrative and statistics collection tasks more difficult. This also poses a concern of violating some privacy issues of handling of personal contact information.

9. Significant Plans for the Next Period:

The structure for AMPS has been prepared to transition into the new Association Management System (AMS), memberPlanet, throughout the course of 2023 and beyond.

Submitted by: Kwok W. Cheung, Chair **Date: 31st December, 2022**
Steven S. Miller, Vice Chair
Yanfeng Gong, Secretary
Kevin Schneider, Past Chair
Zhenyu Huang, TCPC