



Industry Advisory Board Meeting Highlights December 6-8, 2023



Georgia Institute of Technology in Atlanta, GA

This December, the Industry Advisory Board (IAB) meeting took place at the Georgia Institute of Technology in Atlanta, GA. The meeting venues were the Global Learning Center and The Georgia Tech Hotel and Conference Center.

150 people attended the meeting:

- 34 industry members representing 18 industries
- 44 university faculty and staff from 10 universities
- 49 students
- 23 guests

Our host during the 3-day meeting was Sakis Meliopoulos, site director at Georgia Tech. We thank him and the Georgia Tech staff, for working with us to manage the local logistics and accommodations for our guests.

Wednesday, December 6th

After breakfast, our meeting began with a warm welcome from Sakis Meliopoulos. Following Sakis, we were fortunate to hear from the Dean of Engineering at Georgia Tech, Dr. Raheem Beyah.

After the welcome from Georgia Tech, we began the stem meeting sessions led by the stem chairs:

Markets:

- Kory Hedman (Arizona State), *Chair*
- Tongxin Zheng (ISO-NE), *Vice Chair*

Systems:

- Venkataramana Ajarapu (Iowa State), *Chair*
- Bo Gong (SRP), *Vice Chair*

T&D:

- Sakis Meliopoulos (Georgia Tech), *Chair*
- Kurt LaFrance (CMS), *Vice Chair*

Following the stem sessions, attendees had the opportunity to listen to presentations from 2023 PSerc Solicitation 8 Proposal Finalists. The proposal finalist presentations were:

- **Proposal Finalist (T&D Stem): *Grid Integration and Interoperability Evaluation of Multi-Vendor IBRs and Protection Systems for Reliable Power Grid Operation***
Saeed Lotfifard (Washington State University)
Mladen Kezunovic (Texas A&M University)
- **Proposal Finalist (T&D Stem): *Data-Driven Model Validation, Monitoring, and Control for Reliable Operation of Active Distribution Systems***
Anamitra Pal (Arizona State University)
Vijay Vittal (Arizona State University)
Anamika Dubey (Washington State University)
- **Proposal Finalist (T&D Stem): *Advancing Control, Protection, and Stability in Hybrid AC/DC Grids***
Maryam Saeedifard (Georgia Tech)
Dominic Gross (University of Wisconsin-Madison)
- **Proposal Finalist (Markets Stem): *Market Integration of Renewables and Aggregate DERs: Flexibility Characterization, Flexible Resource Bidding, and Enhancement***
Bai Cui (Iowa State University)
Zhaoyu Wang (Iowa State University)
Anna Stuhlmacher (Michigan Tech)
- **Proposal Finalist (Markets Stem): *Enhancing Resource Adequacy Accreditation and Operational Incentives for Energy-Limited Resources***
Jacob Mays (Cornell University)
Josue Campos do Prado (Washington State University)
Elnaz Kabir (Texas A&M University)
- **Proposal Finalist (Systems Stem): *Multiple Event Recordings for Grid Evaluation***
Mladen Kezunovic (Texas A&M University)
Vijay Vittal (Arizona State University)
Mani Venkatasubramanian (Washington State University)

- **Proposal Finalist (Systems Stem): *Characterization and Enhancement of System Services for Large-Scale Deployment of Renewable Generation***
Dominic Gross (University of Wisconsin-Madison)
Saeed Lotfifard (Washington State University)
- **Proposal Finalist (Systems Stem): *Data-Driven Resilience Modeling, Prediction, and Enhancement***
Ian Dobson (Iowa State University)
Zhaoyu Wang (Iowa State University)
Anamika Dubey (Washington State University)

Thursday, December 7th

Thursday morning began with our student poster session. The poster session featured 21 student posters of ongoing PSerc research projects and 5 invited student posters sharing work that our students are doing outside of the PSerc research projects. The ongoing PSerc research project posters were entered into the annual *Best Student Poster* competition evaluated by PSerc industry members.

Following the student poster session, we began the Special PSerc Workshop: *Power Systems Optimization and Markets*. This carefully formulated workshop was comprised of four sessions and panels. The sessions, panels, and invited participants were:

- **Session #1: *Advances in AC Optimal Power Flow***
Host: Daniel Molzahn (Georgia Tech)
Speaker: Daniel Bienstock (Columbia University)
Title: *Recent Work on ACOPF*
Speaker: Larry Pileggi (Carnegie Mellon University / Pearl Street)
Title: *Grid Optimization with Physics-Based Models and Real Industry Constraints*
- **Panel #1: *Advances in AC Optimal Power Flow***
Panelist: Daniel Bienstock (Columbia University)
Panelist: Larry Pileggi (Carnegie Mellon University / Pearl Street)
Panelist: Andy Sun (MIT)
- **Session #2: *Optimized Cross-Border Congestion Management in Europe***
Host: Line Roald (University of Wisconsin-Madison)
Speakers: Joris Chmielewski and Arnaud Schulke (CORESO)
Title: *CORESO: A Cooperation Centre for the European TSOs Coordination*
Speaker: Nicolas Omont (Artelys)
Title: *European Remedial Action Optimizers: Current State and Future Developments*
- **Panel #2: *Transmission Switching: Is There Something to Learn from the European Experience?***
Panelist: Nicolas Omont (Artelys)
Panelist: Richard P. O'Neill (Consultant)
Panelist: Kwok Cheung (GE)
- **Session #3: *Market and System Operations Developments for Greater Resource Flexibility***
Host: Tongxin Zheng (ISO New England)
Speaker: Anthony Giacomoni (PJM)
Title: *PJM Real-Time Market and System Operation Enhancements*
Speaker: Alex Papalexopoulos (ZOME)
Title: *Virtual Power Plant Aggregation and Risk Based Participation in Wholesale Energy Markets*

- **Panel #3: Market and System Operations Developments for Greater Resource Flexibility**
 Panelist: Anthony Giacomoni (PJM)
 Panelist: Alex Papalexopoulos (ZOME)
 Panelist: Richard P. O’Neill (Consultant)
- **Session #4: Mathematical Optimization Algorithms for Electric Power Industry Applications**
 Host: Jacob Mays (Cornell University)
 Speaker: Thomas Gueuning (N-SIDE)
Title: Multi-Area Reserve Dimensioning using Chance-Constrained Optimization – European Use Case
 Speaker: Ed Klotz (GUROBI)
Title: Spatial Branch and Bound for Global Mixed Integer Nonlinear Programming
- **Panel #4: Mathematical Optimization Algorithms for Electric Power Industry Applications**
 Panelist: Thomas Gueuning (N-SIDE)
 Panelist: Ed Klotz (GUROBI)
 Panelist: Pascal Van Hentenryck (Georgia Tech)

The session closed with remarks about the path forward from Richard P. O’Neill and Daniel Molzahn.

At the end of the day, we awarded the two *Best Student Poster* competition winners Trishant Roy (PSerc project M-44) and Salman Shiuab (PSerc project S-103G). Congratulations to our winners and a special thank you to our industry members who participated in evaluating the student posters.

Friday, December 8th

The final day of the meeting was entirely dedicated to our **Special NERC-PSerc Workshop: IBRs and Emerging Challenges**.

The NERC-PSerc Workshop began with the presentation, *Intro and ERO Identified Risk Issues and Strategies* from our keynote speakers Mark Lauby, SVP and Chief Engineer, and Soo Jin Kim, VP, from NERC. Thank you to Mark and Soo Jin for their comments and for taking the time to kick-off the Workshop.

Following our keynote speakers, we began the first of four sessions and panels of the Workshop. The sessions, panels, and invited participants were:

- **Session #1: IBR Modeling, Validation, and Advanced Analytics**
 Host: Alex Shattuck (NERC)
 Speaker: Alex Shattuck (NERC)
Title: NERC IBR Modeling, Validation, and Disturbance Report
 Speaker: Manish Patel (Southern Company)
Title: IEEE 2800 Overview
- **Panel #1: IBR Modeling, Validation, and Advanced Analytics**
 Panelist: Manish Patel (Southern Company)
 Panelist: Vijay Vittal (Arizona State University)
- **Session #2: Towards Understanding and Operating Reliable, Resilient IBR Dominated Grids**
 Host: Maryam Saedifard (Georgia Tech)
 Speaker: Ulrich Muenz (Siemens)
Title: Protection of Inverter-dominated Transmission Systems: Gap Analysis and First Solution Approaches
 Speaker: Aditya Ashok (Opal-RT)

Title: Accelerating Large-Scale, High-Fidelity EMT Simulations for IBR Integration and System Planning by Leveraging Real-Time Simulation Technology

- **Panel #2: Towards Understanding and Operating Reliable, Resilient IBR Dominated Grids**
Panelist: Ulrich Muenz (Siemens)
Panelist: Aditya Ashok (Opal-RT)
Panelist: Brian Johnson (University of Texas, Austin)
- **Session #3: Protection and Control in the New Environment**
Host: David Till (NERC)
Speaker: Richard Bauer (NERC)
Title: IBR Protection and Tripping in Disturbances
Speaker: Benton Vandiver (Hitachi)
Title: When Standards Fail: Utility Scale DER Inverter Plants
- **Panel #3: Protection and Control in the New Environment**
Panelist: Benton Vandiver (Hitachi)
Panelist: Russ Patterson (Qualus)
Panelist: Sakis Meliopoulos (Georgia Tech)
Panelist: Richard Bauer (NERC)
- **Session #4: Future Role of IBRs and DERs**
Host: JP Skeath (NERC)
Speaker: JP Skeath (NERC)
Title: NERC SPIDERWG, BPS Impact of Aggregate DER
Speaker: Deepak Divan (Georgia Tech)
Title: From Legacy Passive Grid to Decentralized Active Grid – Challenges and Opportunities
Speaker: Mahesh Morjaria (Terabase Energy)
Title: IBRs Providing Essential Grid Services
- **Panel #4: Future Role of IBRs and DERs**
Panelist: Deepak Divan (Georgia Tech) <https://pserc.wisc.edu/may-2024-iab-agenda/>
Panelist: Mahesh Morjaria (Terabase Energy)
Panelist: Ben Kroposki (NREL)

To end the NERC-PSerc Workshop, JP Skeath and Sakis Meliopoulos provided their closing remarks on the path forward and highlighted the takeaways of the Workshop.

The meeting adjourned at 3:45 p.m. We would like to express our gratitude to our attendees for making this IAB meeting one to remember. A special thanks to NERC for collaborating with PSerc to organize a great Workshop. Finally, we would like to acknowledge our host, Georgia Tech, for all their contributions to the December 2023 IAB Meeting,