2023 IEEE PES International Generation, Transmission & Distribution Conference and Exposition Asia, Istanbul

May 22-25, 2023
Istanbul-Türkiye
Dear Colleagues,

On behalf of IEEE and the Organization Committee, we are pleased to welcome you to the 2023 IEEE PES International Generation, Transmission & Distribution Conference and Exposition Asia, Istanbul. It is a great honor for us to see you here at Istanbul Congress Center (ICC), Turkiye. The 2023 IEEE PES GT&D Conference and Exposition Asia is an extension of more than 50 years of IEEE T&D, which is one of the IEEE flagship conferences & Exhibitions and is held every two years in the USA. The first GT&D Asia took place in March 2019 in Bangkok, Thailand. The second GT&D Asia was originally scheduled for spring 2021 in Istanbul, Turkey. Then, it was postponed to May 22-25, 2023 due to the pandemic conditions. This world-class event is the industry’s most comprehensive and immersive event in the field of renewable energy & storage, power generation, environment & de-carbonization as well as power transmission & distribution, which will cover cutting-edge innovations and technological developments.

2023 IEEE PES GT&D Asia Istanbul is an international scientific and technological platform for power and energy professionals from industry, utility, and universities around the world. These professionals are presenting their keynotes, papers, supersessions, and technical panels on their innovative ideas, research, developments, application experiences, and expertise. 2023 IEEE PES GT&D Asia Istanbul has 16 paper sessions, 2 keynote speeches, 4 supersessions/plenaries, and 6 industrial panels.

2023 IEEE PES GT&D Asia Istanbul also covers an international exposition. This exposition is being reserved for newly developed commercial products relating to the broader field of renewable energy development and power generation & storage, transmission, and distribution systems. Over 60 companies from around the world, North America, China, India, the Middle East, Germany, and Turkiye, take place in the Exhibition area to demonstrate their innovative products and related technologies.

In the frame of social events, Welcome Reception will take place at ICC Venue on May 23, Tuesday, and start at 17.30 pm. All Conference Delegates and Exhibiting company representatives are invited. Conference Gala Dinner will be at CVK Bosphorus Hotel, on May 24th, Wednesday. It will start around at around 19.00 PM. The gala dinner place is one of the top-of-the-line luxury hotels located near Taksim Square, and 10 min walk from the Event Venue, ICC.

Firstly, I would like to thank IEEE President Prof. Dr. Saifur Rahman and IEEE PES for their great support, and EnerjiSA, EAE Elektrik and ITU for hosting this global event. Secondly, my special thanks go to my colleagues, the members of the local organizing committee, the advisory committee, the international steering committee, and the technical committee for their great efforts to organize the event as a whole, and also to TravelE22 for their performance from the beginning to the end.

I do appreciate IEEE PES, EnerjiSA, SEL and Omicron Bahrain for sponsoring the 2023 IEEE PES GT&D Asia, and THY, ELDER, EPIAŞ, EMSAD, SIEMENS, CNN Turk Radio, APC Media, BEST, ELTAŞ, EMEK, TESAB, TÜREB, GÜNDER, LpsChain, Yeni Enerji, TEHAD, Kabloder, and Sanayi Gazetesi for their support for the event.

Yours Sincerely,

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Ozan ERDİNÇ, Yıldız Technical University
Mehmet BAYRAK, Sakarya University
Fatih Mehmet NUROĞLU, Karadeniz Technical University
### Day 0: Monday, May 22, 2023

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### TUTORIALS

**Tutorial A**  
EEE 1547- IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces  
*Babak Enayati*  
New Leaf Energy  
*Room: Yıldız 1*

**Tutorial B**  
Optimal Voltage Ride-Through of IBR-Dominated Power Systems  
*Bikash PAL & Yifei Guo*  
Imperial College London  
*Room: Yıldız 2*

**Tutorial C**  
Transforming Distributed Energy Resources into Valuable Grid Assets Methods, Technologies, and Applications  
*Reza Razzaghi & Mohsen Khorasany*  
Monash University & TYMLEZ  
*Room: Yıldız 1*

**Tutorial D**  
Condition Monitoring & Diagnostics of Power Assets  
*Murtaza Hashmi*  
Saudi Aramco  
*Room: Yıldız 2*
# DAY 1: TUESDAY, MAY 23, 2023

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<td>“The Use of Technology for the Mitigation and</td>
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<td>Adaptation of Climate Change”</td>
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<td>09:00-09:40</td>
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<td>09:45-11:15</td>
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<td>Moderator: Wayne Bishop, IEEE PES Vice President Meetings</td>
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<td><strong>Ben KROPOSKI</strong>, NREL National Renewable Energy Laboratory</td>
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<td><strong>Moderator: Lale Erdem Atılgan</strong>, Istanbul Technical University</td>
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<td>“Addressing the Challenges of Implementing OT Cybersecurity Solutions in Substations”</td>
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<td><strong>Moderator: Jassim Al Hamad</strong>, SEL</td>
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<td>“Technologies enable featuring the power grid” Including digital grid, battery storage, and blue portfolio/ decarbonization</td>
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<td><strong>Moderator: Merve Seval</strong>, Siemens Energy</td>
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Babak Enayati received his Ph.D. in Electrical Engineering from Clarkson University, Potsdam, NY in 2009. He joined National Grid, USA in 2009 and is currently the Manager of the Technology Deployment team, which is responsible for the development and implementation of the Transmission Network modernization strategy. He joined Institute of Electrical and Electronics Engineers (IEEE) in 2006 and currently is a Senior IEEE Member. Babak currently serves as the IEEE Power and Energy Society (PES) Governing Board Member-at-Large. Babak is also the Vice Chair: of the IEEE Standards Coordinating Committee 21 (SCC21), IEEE 1547 Standard for Interconnecting Distributed Energy Resources with Electric Power Systems, and IEEE P2800 Standard for Interconnection and Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems. Babak is a registered Professional Engineer (PE) in the state of Massachusetts.

Abstract: Many countries have implemented renewables portfolio standards (RPSs) to accelerate the pace of deployment of renewables generation, which are distributed across the distribution power system. As the penetration of renewable power generation increases, electricity grids are beginning to experience challenges, which are often caused by the intermittent nature of some common renewable generation types, sudden changes of the output power due to grid disturbances, low short circuit duty of the inverter based generators, and impact on the transmission and distribution system protection. Due to the increasing amount of Distributed Energy Resources (DERs) interconnections with the Electric Power System, the IEEE 1547 standard is going through a major revision to address some of the technical challenges associated with the high penetration of DERs. The participants will learn about the benefits and challenges of the renewable energy resources interconnections as well as major changes to the IEEE 1547 i.e. voltage regulation, response to abnormal system conditions, power quality, islanding, interoperability, etc. The participants will also learn about the utility concerns/solutions to adopt the revised IEEE 1547 standard. National Grid’s experience with smart inverters i.e. how to set power factor and Volt/VAR based on the location of the solar facility will also be presented in this tutorial.
Optimal Voltage Ride-Through of IBR-Dominated Power Systems

Bikash PAL & Yifei Guo, Imperial College London

Abstract: To decarbonize power systems, renewables (e.g., wind and solar) are being deployed to replace fossil fuels, which are connected to power grids through power electronics interfaces. This dramatically changes the system's behavior and challenges the system's stability. In recent years, there have been several large interruption and blackout events related to the tripping of inverter-based resources (IBRs) under voltage disturbances. Now, a consensus has been reached around the world that IBRs should not only ride through abnormal voltage conditions but also provide dynamic voltage support (DVS) to the grid. The existing DVS techniques are mostly heuristic, e.g., the reactive current provision in proportion to the retained voltage at the point of common coupling (PCC), which cannot unlock the maximum DVS capability of IBRs and may even cause instability. It is imperative to explore more sophisticated ways for IBRs to provide DVS. So, in this tutorial, we will introduce the advanced control strategies based on optimization to maximize the DVS from IBRs.
Reza Razzaghi received a Ph.D. degree in electrical engineering from the Swiss Federal Institute of Technology of Lausanne (EPFL), Lausanne, Switzerland in 2016. In 2017, he joined Monash University, Melbourne, Australia, where he is currently a Senior Lecturer with the Department of Electrical and Computer Systems Engineering. His research interests include distributed energy resources, power system protection, dynamics and transients. He has been the recipient of the 2019 Best Paper Award of the IEEE Transactions on EMC and the 2013 Basil Papadias Best Paper Award from the IEEE PowerTech Conference.

Mohsen Khorasany received the B.Sc. degree and M.Sc. degrees, both in Electrical Engineering, in 2010 and 2012, respectively. He completed his Ph.D. studies in the same field at the Queensland University of Technology in 2020. He is an energy specialist with a focus on climate and sustainability, energy transition, and empowering organizations and individuals to act. Currently, he works with TYMLEZ as the head of research and innovation, leading the research behind the TYMLEZ innovative solutions. He is also a Postdoctoral Research Fellow with the Department of Electrical and Computer Systems Engineering, at Monash University. His research interests include distributed energy resources integration, power systems optimization, electricity market design, transactive energy systems and distributed optimization.

**Abstract:** The transition to a low-carbon, climate-resilient and sustainable future is not possible without the decarbonization of the energy sector. Facilitating distributed energy resources (DER) integration into power systems will accelerate the energy sector decarbonization, which is critical for keeping anthropogenic warming below 1.5 ºC above pre-industrial levels. However, the grid infrastructure is designed to deliver large-scale centralized generation to consumers rather than to integrate millions of consumer-owned generators. Hence, the challenge is to coordinate large volumes of small-scale energy resources and integrate them into existing energy networks without undermining their stability. The tutorial will cover topics such as transactive energy, local energy and flexibility markets, virtual power plants, peer-to-peer trading and enabling technologies for grid digitization.
Murtaza Hashmi received Master’s Degree in electric power engineering from the Royal Institute of Technology (KTH) Stockholm, Sweden in 2001, and D.Sc. (Tech.) in condition monitoring and asset management from Aalto University, Finland in 2008. He worked as Power Distribution Specialist at ABB Oy for two years. From 2010-2013, he worked as Senior Scientist with Energy Systems Knowledge Centre at VTT Technical Research Centre of Finland. Currently, he is working as Condition Monitoring Expert at Power Systems, Saudi Aramco. His major interests are implementing online advanced condition monitoring technologies for substation equipment, conducting Partial Discharge (PD) measurements for insulation diagnostics of electrical equipment, power systems transients, and insulation coordination. He has published more than fifty research articles in reputed refereed international journals and conferences. He is member of IEEE and GCC CIGRE.

**Abstract:** Condition monitoring, Predictive maintenance, Smart sensing, Smart grids, Asset management
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| 10:30-12:00  | Supersession A
“The Use of Technology for the Mitigation and Adaptation of Climate Change”
Moderator: Saifur RAHMAN, IEEE President & Virginia Tech | Üsküdar    |
| 12:00-12:30  | Exposition/Exhibition Opening                                          | B5         |
| 12:30-13:30  | Lunch Break / Conference Luncheon                                     |            |
| 13:30-15:00  | Panel 1
“The Future of Energy Exchange”
Moderator: Avni Çebi EXIST (EPİAŞ)
Room: Üsküdar |            |
|              | Paper Session 1
The Global Energy Transition and De-carbonization
Room: Yıldız 1 |            |
|              | Paper Session 2
Distributed Storage & Generation Systems
Room: Yıldız 2 |            |
|              | Paper Session 3
HVDC & Flexible AC Transmission System
Room: Beylerbeyi |            |
| 15:00-15:30  | Coffee Break                                                          |            |
| 15:30-17:00  | Panel 2
“Advanced Clustering Techniques for Power System Data Analysis”
Moderator: Hiroyuki Mori Meiji University
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Power Quality Issues Associated with Microgrid
Room: Yıldız 1 |            |
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Power Generation & Renewables
Room: Yıldız 2 |            |
|              | Paper Session 6
Advanced Monitoring, Diagnostic, and Control Techniques
Room: Beylerbeyi |            |
| 17:30-19:30  | WELCOME RECEPTION                                                     |            |
Supersession A

Tuesday, 10:30-12:00
Room: Üsküdar

The Use of Technology for the Mitigation and Adaptation of Climate Change

**Moderator: Saifur Rahman,** President and CEO of IEEE

Professor Saifur Rahman is the founding director of the Advanced Research Institute (www.ari.vt.edu) at Virginia Tech, USA where he is the Joseph R. Loring professor of electrical and computer engineering. He also directs the Center for Energy and the Global Environment (www.ceage.vt.edu). He is a Life Fellow of the IEEE and an IEEE Millennium Medal winner. He was the president of the IEEE Power and Energy Society (PES) for 2018 and 2019. He was the founding editor-in-chief of the IEEE Electrification Magazine and the IEEE Transactions on Sustainable Energy. He has published over 140 journal papers and has made over four hundred conference and invited presentations. In 2006 he served on the IEEE Board of Directors as the vice president for publications. He is a distinguished lecturer for the IEEE Power & Energy Society and has lectured on renewable energy, energy efficiency, smart grid, energy internet, blockchain, IoT sensor integration, etc. in over 30 countries. He is the founder of BEM Controls, LLC, a Virginia (USA)-based software company providing building energy management solutions. He served as the Chair of the US National Science Foundation Advisory Committee for International Science and Engineering from 2010 to 2013. He has conducted several energy efficiency, blockchain and sensor integration projects for Duke Energy, Tokyo Electric Power Company, the US National Science Foundation, the US Department of Defense, the US Department of Energy and the State of Virginia.

**Topic:** The Use of Technology for the Mitigation and Adaptation of Climate Change.

**Speaker: Shuanglei Feng,** China Electric Power Research Institute

**Topic:** Wind power forecasting under the extreme weather conditions

**Speaker: Alireza Haghighatn,** Virginia Tech, USA

**Topic:** Role of Nuclear Power- Novel Reactor Design
**Abstract:** Climate change is an existential threat to mankind. It will be necessary to deploy innovative technology solutions to mitigate and adapt to the impact of climate change.

The focus of this supersession is the promotion of ‘Cleantech Solutions for Climate Resilience’. Panelists have come from Turkey, Europe, the Middle East, China and the United States. They will share their experiences, and future prospects for Energy Efficiency, Renewable Energy, Storage and Nuclear Power as prime technologies to deal with the impacts of climate change.
Moderator: Avni Çebi, EPİAŞ Türkiye

Speaker: Steve Edwell, Australian Regulation Authority
Topic: Liberalised Energy Markets

Speaker: Tamer Emre, EPİAŞ Türkiye
Topic: AI in Energy Trading

Speaker: Cristian Bear, EUROPEX, Belgium
Topic: European energy markets: Crisis lessons & the decarbonization challenge ahead

Speaker: Elif Düşmez, Deloitte, Türkiye
Topic: Digitalization in Energy Systems

Abstract: The use of fossil energy sources that we use today in the world begins with oil in the 1850s. In the first period, generation, transmission, and distribution processes in many parts of the
world were carried out in a vertically integrated structure, usually under a state-controlled company. With the development of business, the increase of players, and the widespread use of energy by wider masses, the prominence of efficiency, the quality of energy, and its timely production, the number of players in the sector started to increase and they turned into horizontal independent companies with the vertical structuring in the sector.

The sale of energy as a commodity in the markets first started with bilateral agreements. Later, with the development of organized markets, the trade of centrally produced energy in a central energy market with risk management began.

With the spread of renewable energies and the issue of climate change coming to the agenda of the world, on-site production and consumption issues came to the fore. With the widespread use of electricity and increasing digitization, the integration of distributed generation systems and centralized production systems, smart microgrids, electric vehicles, roof-top productions, prosumer, energy efficiency certificates, and carbon certificates, together with applications such as energy production and consumption, hundreds of thousands of producers and consumers.

Managing the ecosystem, ensuring energy supply security and electricity quality, and realizing energy trade between the parties lead us to seek a new energy exchange in the future. How will we provide the social benefit provided by the merit order price system in organized markets in an energy market with hundreds of thousands of consumers and producers, and who will be the new actors?
Panel 2

Tuesday, 15:30-17:00
Room: Üsküdar

Advanced Clustering Techniques for Power System Data Analysis

**Moderator:** Hiroyuki Mori, Meiji University, Japan

**Title:** Advanced Clustering Techniques for Power System Data Analysis: Beyond K-means

**Speaker:** Hsiao-Dong ChianG, Cornell University, USA

**Title:** Advanced Clustering Techniques for Power System Data Analysis: Beyond k-means

**Speaker:** Hirotaka Takano, Gifu University, Japan

**Title:** Advanced Clustering Techniques for Power System Data Analysis: Beyond k-means

**Abstract:** In this panel, advanced clustering techniques are discussed for power system data analysis. As a non-hierarchical clustering technique, k-means is widely spread, but improvements are required due to the poor solution quality. Thus, we need advanced techniques beyond k-means in power system data analysis. This panel covers Trust-Tech of nonlinear optimization, Random Forest of machine learning, and Brain Storm Optimization of Evolutionary Computation as alternative methods. A comparison is made between k-means and advanced clustering techniques to understand the features of the clustering techniques.
Paper Session 1: The Global Energy Transition and De-carbonization

Room: Yıldız 1

Date: Tuesday, 13:30-15:00
Chair: Babak Enayati

2023IEEEPESGT&D007
Energy Consumption Tokens for Blockchain-Based End-to-end Trading of Green Energy Certificates
Maximilian Eickhoff, Armin Exner and Axel Busboom

2023IEEEPESGT&D058
Investigating the Impacts of Resiliency of the Automation System on Distribution Network Resilience
Mohammad Sadeghian-Jahromi, Mahmud Fotuhi-Firuzabad, Sajjad Fattahian Dehkordi, Matti Lehtonen and Saeed Heidari

2023IEEEPESGT&D071
Short-Term Heat Demand Prediction Using Deep Learning for Decentralized Power-to-Heat Solutions
Pavani Ponnaganti, Jayakrishnan R Pillai, and Birgitte Bak-Jensen

2023IEEEPESGT&D102
Electricity Grid Enhancement in Puerto Rico by Establishing Renewable-Based Microgrids in Vieques and Culebra Islands
Mohammad Shahidehpour, Larissa Affolabi, Alex Nassif, Daniel Kushner, Muhidin Lelic, and Shay Baharamirad

2023IEEEPESGT&D125
Two-Stage Bi-Level Stochastic Model for Optimal Operation of a Green Hydrogen-Based VPP
Saman Baharvandi

2023IEEEPESGT&D127
Implementing Grid Supportive Behavior in Induction Motor-Driven Loads using Field Oriented Control
Zarka Mirza and Himanshu Jain
Paper Session 2: Distributed Storage & Generation Systems

Room: Yıldız 2

Date: Tuesday, 13:30-15:00
Chair: Vahid Vahidinasab

2023IEEEPESGT&D027
Model Identification of Distributed Energy Resources using Sparse Regression and Koopman Theory
Javad Khazaei and Faegheh Moazeni

2023IEEEPESGT&D029
A Coordinated Control Scheme to Integrate Flywheels Energy Storage Systems in AGC
Hany Farag, Ahmed Ibrahim and Ehab El-Saadany

2023IEEEPESGT&D031
Allocation of battery energy storage systems (BESS) to mitigate FIDVR in the Con Edison Transmission Systems
Chang Chen, Yilu Liu, Resk E Uosef, Matthew Koenig and Constantine Spanos

2023IEEEPESGT&D109
Battery Sizing and Location for Provision of Network Support Services
Njegos Jankovic, Marcelo Nogales-Balderrama, Javier Roldan-Perez and Milan Prodanovic

2023IEEEPESGT&D120
Battery Saving Mode for a Grid Forming Battery Storage System Operating in an Islanded Microgrid
Ammar Atif Abdalla Ibrahm, Mohamed El Moursi, Tarek El Fouly and Khalifa Hassan Al Hosani

2023IEEEPESGT&D131
Evaluation of the Effects of Noise And Sample Rate on the Detection of HIF With Machine Learning Methods on the Distribution System
Eren Baharozu, Suat Ilhan and Gurkan Soykan
Paper Session 3: HVDC & Flexible AC Transmission System

Room: Beylerbeyi

Date: Tuesday, 13:30-15:00
Chair: Kai Strunz/Emine Ayaz

2023IEEEPESGT&D014
Grid-Forming Control for VSC-HVDC Links Connected to Weak Grids – a Comparison Study to Vector Current Control
Lidong Zhang, Xiaobo Yang, and Chengyan Yue

2023IEEEPESGT&D015
A Study of a Damping Control-Based Predictive Strategy on an Inter-area Power System
Amro Sarayrah, Mohammed Haj Ahmed, and Eyad Feilat

2023IEEEPESGT&D016
Oscillation Damping Using Reinforcement Learning Controlled HVDC Transmission
Rui Fan, Renke Huang, Qiuhua Huang, Jie Tan and Yu Liu

2023IEEEPESGT&D035
Parametric Analysis of Lightning Overvoltages in High-Voltage Gas-Insulated Substation
Selma Grebović, Senad Smaka, Vahid Helać and Nermin Oprašić

2023IEEEPESGT&D089
An AGC Algorithm for Multi-Area Power Systems in Network Splitting Conditions
Armağan Temiz and A. Nezih Guven

2023IEEEPESGT&D110
AMPL-based Optimization Tool for Reliability Assessment of Multi-terminal HVDC Networks Using the Monte Carlo Method
Manuel Valois-Rodriguez and Lothar Lówer
Paper Session 4: Power Quality Issues Associated with Microgrid

Room: Yıldız 1

Date: Tuesday, 15:30-17:00
Chair: Aydın Çetin

2023IEEEPESGT&D048
Active Damping in LCL-filter Based Three Phase Converter Using Lead-lag Network and Kalman Filter
Imane Biyya, Ahmed Abbou and Mohamed Maaroufi

2023IEEEPESGT&D057
A PMU Placement Framework in an Active Distribution Network Based on Voltage Profile Estimation Accuracy
Amin Salehi, Mahmud Fotuhi-Firuzabad, Sajjad Fattahian Dehkordi and Matti Lehtonen

2023IEEEPESGT&D062
Fast Fault Current Injection of Renewable Energy Sources to Support Voltage During Dips
Roozbeh Torkzadeh, Vlademir Cuk and Sjef Cobben

2023IEEEPESGT&D090
AC Fault Current Limiting Using LC DC Circuit Breaker
Dragan Jovcic

2023IEEEPESGT&D094
Computationally Robust Line Outage Detection and Identification in Three-Phase Networks
Tuna Yıldız and Ali Abur

2023IEEEPESGT&D133
Excitation Current and Harmonic Analyses of a Three-Phase Five-Limb Transformer Under GIC According to Different Core Cross-Section Ratios
Emre Kervan and Mahmut Aksoy
Paper Session 5: Power Generation & Renewables

Room: Yıldız 2

Date: Tuesday, 15:30-17:00
Chair: Masood Parvania

2023IEEEPESGT&D021
Appropriate Evaluation of Primary Frequency Response and Its Applications
Chengwen Zhang, Mark Baldwin, Hongyu Li, Zhihao Jiang, Weikang Wang, Chujie Zeng, Chang Chen, He Yin and Yilu Liu

2023IEEEPESGT&D022
Analyzing the Computational Burden of Global-Linking Balance Equations in the Medium-Term Unit Commitment Problem
Luis Montero, Antonio Bello and Javier Reneses

2023IEEEPESGT&D041
Distributed Generation Control Using a Communication Multiprotocol Prototype Gateway and Ripple Signaling
Nikolaos Pasialis, Nikolaos Lettas, Evangelos Boutsiadis, Dimitrios Tsiamitros and Dimitrios Stimoniaris

2023IEEEPESGT&D069
Enhancing Machine Learning-Based Solar Generation Forecasting with Time Data Utilization
Lejla Pašić, Azra Pašić, Alija Pašić, István Vokony and József Biró

2023IEEEPESGT&D083
Machine Learning Applied to the Operation of Fully Renewable Energy Systems
Ruben Chaer, Ignacio Ramírez and Gonzalo Casaravilla

2023IEEEPESGT&D116
Maximum Power Point Tracking (MPPT) Enhancement of Variable-Speed Wind Energy Conversion Using Sliding Mode Controller (SMC)
Abdalrazak Seaf Aldean, Mujahed Aldhaifallah, A.A. Saif and S. Elferik
Paper Session 6: Advanced Monitoring, Diagnostic, and Control Techniques

Room: Beylerbeyi

Date: Tuesday, 15:30-17:00
Chair: Srdjan Skok

2023IEEEPESGT&D044
Distribution System Topology Identification using Graph Neural Networks
Rahul Madbhavi, Balasubramaniam Natarajan and Babji Srinivasan

2023IEEEPESGT&D056
Assessment of Non-Intrusive Load Monitoring as a Blind Source Separation Problem
Madhawa Herath, Migara Liyanage and Chitral Angammana

2023IEEEPESGT&D063
A Comprehensive State Estimation Methodology for Multimachine Power Systems
Natanael Vieyra, Paul Maya-Ortiz and César Ángeles-Camacho

2023IEEEPESGT&D082
Sustainable and Inclusive Demand-Side Resilience: A Semi-Dynamic Model for Outage Costs
Ali Safamanesh, Mohammad Sadegh Ghazizadeh, Mahdi Habibi and Vahid Vahidinasab

2023IEEEPESGT&D113
Optimal Dead Band Control of Load Tap Changers in Distribution Networks
Alper Savasci, Adedoyin Inaolaji, and Sumit Paudyal

2023IEEEPESGT&D128
Synchronized Multi-Partition Resilience System Based on IoT Platform for Interconnected Neural Power Grid- SynerGRID
Srdjan Skok, Hrvoje Balen and Zeljko Siranovic
### Day 2: Wednesday, May 24, 2023

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<tr>
<th>Time</th>
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<tr>
<td>08:30-17:00</td>
<td>Registration</td>
<td>Entrance</td>
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<td>10:00-18:00</td>
<td>Exposition Visit</td>
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<tr>
<td>09:00-09:40</td>
<td><strong>Keynote A</strong> “The Impact of the Energy Transformation On Wholesale Electricity Market Design and Regulation – The Australian Experience”</td>
<td>Üsküdar Room</td>
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<td><strong>Steve EDWELL</strong>, Australian Regulation Authority</td>
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<td>09:45-11:15</td>
<td><strong>Supersession B</strong> “Global Perspectives on the Utility of the Future”</td>
<td>Üsküdar Room</td>
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<td><strong>Moderator: Wayne Bishop</strong>, IEEE PES Vice President Meetings</td>
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<td>11:15-11:45</td>
<td><strong>Coffee Break</strong></td>
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<td>11:45-13:15</td>
<td><strong>Supersession C</strong> “Resilience and Reliability in Multi-Energy System Planning”</td>
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<td><strong>Moderator: Fran Li</strong>, The University of Tennessee</td>
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<td>13:15-14:00</td>
<td><strong>Lunch Break / Conference Luncheon</strong></td>
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<td>14:00-15:30</td>
<td><strong>Panel 3</strong> “Machine Learning for Power Systems”</td>
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<td><strong>Moderator: Fran Li</strong>, The University of Tennessee</td>
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<tr>
<td>14:00-15:30</td>
<td><strong>Paper Session 7</strong> Renewable Integration &amp; Operation 1</td>
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<td>15:30-16:00</td>
<td><strong>Coffee Break</strong></td>
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<td>16:00-17:30</td>
<td><strong>Panel 4</strong> “The Future of Transmission and Distribution Equipment Using SF6 Gas”</td>
<td>Üsküdar Room</td>
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<td><strong>Moderator: Zafer Arabul</strong>, EMSAD &amp; EMEK A.Ş.</td>
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<td>15:30-16:00</td>
<td><strong>Paper Session 10</strong> Cyber and Physical Security</td>
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<td>16:00-17:30</td>
<td><strong>Paper Session 11</strong> Advancements in Power Transmission &amp; Distribution</td>
<td>Room: Yıldız 2</td>
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<td>16:00-17:30</td>
<td><strong>Paper Session 12</strong> Big Data Utilization &amp; Analytics</td>
<td>Room: Beylerbeyi</td>
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<td>19:00-22:00</td>
<td><strong>Event Dinner</strong></td>
<td>CVK Bosphorus</td>
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Steve Edwell is an economist specialising in the energy sector. Most of Steve's work has been on behalf of Federal and State Governments across Australia, where he has both consulted and held various senior appointments. He has many years of professional experience working with the public sector, industry Agencies and Associations and private industry at the highest levels.

Steve has a deep understanding of energy markets, with over 25 years high level policy, regulatory and management involvement in both the Eastern State National Electricity Market and the Wholesale Electricity Market in Western Australia. He has advised on and implemented energy market reforms across Australia and has been a senior member of energy regulatory boards in Australia since 2005. He was inaugural full-time Chair: of the Australian Energy Regulator, an Associate Member of the Australian Competition and Consumer Commission and for eleven years was a member of the Governing Body of the Economic Regulation Authority of Western Australia, now returning as Chair:.

Abstract: The de-carbonization of electricity generation with increasing levels of renewable energy penetrating power systems is causing significant disruption to contemporary electricity wholesale markets. High levels of variable renewable energy (VRE), including rooftop solar are destroying the viability of baseload generation and challenging power system physics through reduced inertia and system strength, periods of low system load and fluctuations in frequency and voltage outside system tolerances. This energy transformation is also seriously challenging the economics of wholesale electricity markets – and both energy-only and capacity market designs are being found wanting. The fundamental problems are inadequate incentives for timely investment in “firm” generation capacity and a looming issue of revenue adequacy for intermittent facilities. Market designs are having to be recalibrated to respond. There are also new challenges to electricity market regulation – customer empowerment, price impacts, and mitigation of potential market power of new technologies, such as battery storage. I will address these problems in the context of the Australian experience.
Supersession B

Wednesday, 09:45-11:15
Room: Üsküdar

Global Perspectives on the Utility of the Future

Moderator: Wayne Bishop, IEEE PES Vice President Meetings

Wayne Bishop Jr is Senior Director of Industry Outreach at Quanta Technology, a subsidiary of Quanta Services, a Fortune 500 Company. Wayne also serves as Executive Advisor of LUMA Energy, the electric utility in Puerto Rico.

In addition, Wayne serves as IEEE PES Vice President of Meetings and Conferences, a member of the IEEE Power and Energy Governing Board, and a member of the IEEE PES Executive Committee.

As Vice President, he has overall responsibility for all IEEE PES Conferences and Meetings worldwide. He also helped write and implement the Long Range Strategic Plan for IEEE PES, and is a Senior Member of IEEE.

Previously, Wayne worked at OMICRON Electronics for 13 years where he was the Head of Marketing for North America. Prior to that, Wayne was employed at Doble Engineering Company for more than 16 years in several senior management positions. In 2007, he was appointed by Doble’s Board of Directors to serve on the Committee to broker the sale of Doble Engineering to ESCO Technologies.

Wayne Bishop Jr is a graduate of Merrimack College, Harvard University, and Suffolk University in Boston.

Topic: Global Perspectives on Utility of the Future

Speaker: Babak Enayati, New Leaf Energy, USA

Topic: Global Perspectives on Utility of the Future

Speaker: Dean Sharafi, Australian Energy Market Operator, Australia

Topic: Global Perspectives on the Utility of the Future
Abstract: The electric utility industry is being transformed and reshaped with renewable, clean, and more resilient energy solutions. Robust decarbonization goals are being set along with more pressure to increase reliability and become more resilient. This is coupled with the challenges of an aging infrastructure and changing workforce. Power utilities are at the center of this challenge; tasked with integrating record levels of new, renewable, energy assets while accommodating dramatically increased multidirectional power flows, and hardening the grid to prepare for increasingly severe weather events exacerbated by climate change. This panel is made up of international industry executives who will present and discuss ideas and initiatives driving Decarbonization, Grid Modernization, and the Utility of the Future.
Dr. Li is presently the James W. McConnell Professor in the Department of Electrical Engineering and Computer Science (EECS) at The University of Tennessee. He is also an adjunct researcher at the Oak Ridge National Laboratory (ORNL). His current interests include renewable energy integration, distributed energy resources, demand response, energy markets and power system computational methods.

He has received a number of research recognitions (e.g., 2016-2017 Highly Cited Paper Award by Applied Energy (IF=8.426) - as corresponding author; IEEE PES PSOPE Technical Committee Prize Paper Award in 2019 - as corresponding author; UTK College of Engineering Research Fellow Awards (or its succeeding variants) three times in 2018, 2015 and 2009; 2011 UTK Chancellor’s Award for Professional Promise in Research and Creative Achievement), professional service recognitions (e.g., 2015 IEEE PES Technical Committee Distinguished Service Award, 2017 Excellent Guest EIC of Journal of MPCE, 2017 Excellent Associate Editor of Journal of MPCE, 2018 IEEE PES “Technical Committee of the Year” award as a co-recipient), and teaching recognitions (e.g., 2006 Eta Kappa Nu Outstanding Teacher Award and 2019 UTK College of Engineering Teaching Fellow Award). His research team has been honored with Best Conference Papers/Posters eight times at various conferences.

**Topic:** Deep Reinforcement Learning-Based On-Line Dynamic Multi-Microgrid Formation to Enhance Resilience

**Speaker:** Srijib Mukherjee, Oak Ridge National Laboratory, USA

**Topic:** Vision of US national energy infrastructure resilience
**Speaker:** Liang Min, Stanford University, USA  
**Topic:** AI for Energy System Resilience

**Speaker:** Yilu Liu, The University of Tennessee USA  
**Topic:** Grid Strength Assessment of High-Penetration Renewable Scenarios

**Speaker:** Chen-Ching Liu, Virginia Tech, USA  
**Topic:** Microgrids for the Resilience of distribution systems

**Abstract:** Extreme events such as droughts, wildfires, polar vortexes, hurricanes, and cyberattacks have caused stressful conditions and even catastrophic failures of energy systems in recent years. It is essential to maintain the reliable and resilient operation of multiple energy systems including bulk power systems and natural gas systems during extreme events. This panel will focus its discussion on extreme event impacts on electrical and gas energy systems as well as resilience modeling and evaluation methods. Experts from academia, research labs, and industry will share their original ideas and insights on this challenging topic.
Moderator: Fran Li, The University of Tennessee, USA

Topic: Deep Reinforcement Learning-Based On-Line Dynamic Multi-Microgrid Formation to Enhance Resilience

Speaker: Yilu Liu, The University of Tennessee USA

Topic: Fast Online Stability Assessment Based on Machine Learning

Speaker: Joe Chow, Rensselaer Polytechnic Institute, USA

Topic: Classification for Transient Stability Assessment using Prediction Failure Probability

Speaker: Mert Korkali, University of Missouri, USA

Topic: Robust Data-Driven Decision Making for Power Grid Operation and Planning

Abstract: Deep Learning (DL) and Artificial Intelligence (AI) is the emerging technology for realizing the next generation smart grid. In recent years, significant efforts have been devoted to exploring the potentials of DL and AI for solving the complex power system problems, from generations all the way down to the demand side. In this panel, the focus will be given to the application of DL in broad areas of power system operation and planning. Experts from academia and industry will share their original ideas and insights to this challenging and inspiring topic.
Panel 4

Wednesday, 16:00-17:30
Room: Üsküdar

The Future of Transmission and Distribution Equipment Using SF6 Gas

**Moderator:** Zafer ARABUL, EMSAD & CEO of Emek Elektrik End. A.S.

**Topic:** The future of transmission and distribution equipment using SF6 Gas

**Speaker:** Edvina Uzunovic, Worcester Polytechnic Institute, USA

**Topic:** The US approach to SF6 conservation

**Speaker:** François Trichon, T&D Europe and Schneider Electric, France

**Topic:** Evolution of EU SF6 regulation and impacts on switchgear

**Speaker:** Mehmet Duran, EnerjiSA, Turkiye

**Topic:** SF6 Usage in Enerjisa Energy, Projects & Applications for Reducing SF6
Day 2: Wednesday, May 24, 2023

Speaker: Sabri Uzel, Eaton Türkiye

Topic: SF6 FREE Transmission & Distribution Equipment

Speaker: Veysel Selimoğlu, Ministry of Environment, Urbanization & Climate Change

Topic: HFC’s phase-down schedule and legislative application in Türkiye within the scope of the Kigali Amendment.
Paper Session 7: Renewable Integration & Operation 1

Room: Yıldız 1

Date: Wednesday, 14:00-15:30
Chair: Edvina Uzunović

2023IEEEPESGT&D030
Estimating the Feasible Operating Region of Active Distribution Networks using the Genetic Algorithm
Georgios Papazoglou, Aikaterini Forouli, Emmanouil Bakirtzis, Pandelis Biskas and Anastasios Bakirtzis

2023IEEEPESGT&D072
Hossein Ebrahimi, Amin Yazdaninejadi and Sajjad Golshannavaz

2023IEEEPESGT&D085
Insights for the Next Solar Eclipse in Turkish Grid with Increased Solar Capacity
Hasan Yılmaz, Sinem Kol and Gökturek Poyrazoğlu

2023IEEEPESGT&D092
Duel-objective Optimization Scheduling Model and Analysis for Regional Integrated Electricity-hydrogen System
Qinghan Wang, Yanbo Wang, Yanjun Tian and Zhe Chen

2023IEEEPESGT&D104
The Value of Ambiguity Quantification in Distributionally Robust Economic Dispatch Models for the Wind-Penetrated Power System
Yujia Li, Chenxi Hu, and Yunhe Hou
Room: Yıldız 2

Date: Wednesday, 14:00-15:30
Chair: Swasti Khuntia/Mehmet Bayrak

**2023IEEEPESGT&D020**
**Improve the Reliability of the Traveling Wave Fault Location**
Rustem Khuziashev and Ildar Minaev

**2023IEEEPESGT&D025**
**Analysis of Fault Detection Algorithms Used in Line Differential Protection (87L)**
Marziyeh Hemmati, Giambattista Gruosso and Massimo Ambroggi

**2023IEEEPESGT&D037**
**Improvement in Transformer Differential Protection using Singular Value Decomposition**
Het Bhalja, Bhaveshkumar Bhalja, and Pramod Agarwal

**2023IEEEPESGT&D040**
**Removal of DC Offset Components by Using Two Auxiliary Signals**
Nader Jalali Marand, Hassan Sam Daliri and Hossein Askarian Abyaneh

**2023IEEEPESGT&D073**
**An ENS-Oriented Voltage Protection Scheme for Inverter-based Generators in Active Distribution Networks**
Hossein Ebrahimi, Amin Yazdaninejadi, Sajjad Golshannavaz and Saeed Teimourzadeh

**2023IEEEPESGT&D074**
**Research on Relay Protection Equipment Maintenance Decision-making Method Based on Risk Assessment**
Limin Wang, Peng Guo, Yiqun Kang and Zhoutian Yan
Paper Session 9: Electrical Vehicles and Charging

Room: Beylerbeyi

Date: Wednesday, 14:00-15:30
Chair: Oben Dağ

2023IEEEPESGT&D026
Micro Substation with Power Voltage Transformers for EV Charging
Tiago Santos Guimaraes and Jorge Martins

2023IEEEPESGT&D042
Impacts of State-of-Charge Estimation Error on Frequency Regulation from Electric Vehicles
Chaowanan Jamroen, Dulpichet Rerkpreedapong and Sanchai Dechanupaprittha

2023IEEEPESGT&D060
Regional Impact of Freight Electrification on The Electricity Grid
Natalia Zuniga-Garcia, Vincent Freyermuth, Monique Stinson, and Olcay Sahin

2023IEEEPESGT&D097
Energy Management System of an Electric Vehicle Charging Station Using Q-Learning and Artificial Intelligence
Tapiwa N Matare and Komla Folly

2023IEEEPESGT&D119
Study of Electric Vehicles for Grid Services – A Gender-based Approach
Fathy Aboshady and Ioana Pisica
Paper Session 10: Cyber and Physical Security

Room: Yıldız 1

Date: Wednesday, 16:00-17:30
Chair: Mehmet Tahir Sandıkkaya

2023IEEEPESGT&D009
A Framework for Service Restoration of Cyber-Physical Power Systems
Chaudhry Talha Hassan and Tariq Mahmood Jadoon

2023IEEEPESGT&D046
Identifying Concept Drift with Supervised Algorithms in Smart Grids
Ayşe Sayın, Mostafa Mohammadpourfard and Mehmet Tahir Sandıkkaya

2023IEEEPESGT&D114
Machine Learning Approaches in Anomaly Type Detection and Localization in Distribution System
Mehdi Ganjkhani and Masood Parvania

2023IEEEPESGT&D115
Minimizing the Risk of Attacks in Electric Power Systems via Effective Grid Reinforcement of Counter-Threat Technologies
Lujia Zhan, Saharnaz Mehrani and Payman Dehghanian

2023IEEEPESGT&D136
A Novel Approach Detection for False Data Injection, and Man in the Middle Attacks in IoT and IIoT
Serkan Gönen, Mehmet Ali Barışkan, Derya Yildaş Kaplan, Ercan Nurcan Yilmaz and Aydınc Çetin
Paper Session 11: Advancements in Power Transmission & Distribution

Room: Yıldız 2

Date: Wednesday, 16:00-17:30
Chair: Ömer Usta/Oben Dağ

2023IEEEPESGT&D010
OSER – A Planning Tool for Power Systems Operation Simulation and for Impacts Evaluation of the Distributed Energy Resources on the Transmission System
Hussein Suprême, Martin de Montigny, Nicolas Compas, Guy Vanier, Mouhamadou Makhtar Dione and Niko Qako

2023IEEEPESGT&D019
Voltage Regulation in Transmission Systems: the Experience of TERNA
Francesco Del Pizzo, Cristiano Quaciari, Giorgio Maria Giannuzzi, Chiara Vergine, Cosimo Pisani, Alessandro Coretti, Tiziano D’Aversa, Angelo Raffaele Cassano, Vincenzo Galdi, Vito Calderaro, Lucio Ippolito and Giuseppe Graber

2023IEEEPESGT&D051
Parameter-Free Virtual Synchronization Technique for Terminals of Power Transmission Lines
Dian Lu, Yu Liu, Yuhao Xie, Rui Fan and Renke Huang

2023IEEEPESGT&D054
Challenges of DLR systems at the Implementation and Operation Level
Levente Rácz, Dávid Szabó, Gábor Gócsei and Bálint Németh

2023IEEEPESGT&D055
Identification of Visible Isolation for Substations Maintenance using Graph Theory
Samuel Marin, Juan Sebastian Salazar and Alejandro Garces

2023IEEEPESGT&D067
Distribution Grid Power Flexibility Aggregation at Multiple Interconnections Between The High and Extra High Voltage Grid Levels
Neelotpal Majumdar, Marcel Sarstedt and Lutz Hofmann
Paper Session 12: Big Data Utilization & Analytics

Room: Beylerbeyi

Date: Wednesday, 16:00-17:30
Chair: Aydin Çetin

2023IEEEPESGT&D065
Evolutionary-Based Neural Architecture Search for An Efficient CAES and PV Farm Joint Operation Strategy Using Deep Reinforcement Learning
Amirhossein Dolatabadi, Hussein Abdeltawab and Yasser Abdel-Rady I. Mohamed

2023IEEEPESGT&D066
An Improved Actor-Critic Reinforcement Learning with Neural Architecture Search for the Optimal Control Strategy of a Multi-Carrier Energy System
Amirhossein Dolatabadi, Hussein Abdeltawab and Yasser Abdel-Rady I. Mohamed

2023IEEEPESGT&D068
Separated Artificial Neural Network-Based Distribution System State Estimation
Lejla Pašić, Azra Pašić, Alija Pašić, István Vokony and József Bíró

2023IEEEPESGT&D084
Consumers’ Willingness to Invest in Smart Home Technologies Using Machine Learning: A Survey-based Analysis in Qatar
Taha J. Alhindi, Farhad Angizeh, Ammar Abulibdeh and Mohsen A. Jafari

2023IEEEPESGT&D132
Assessment of Different Health Index Aggregation Techniques for Electric Utilities
Swasti Khuntia and Bjorn Heling
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<tr>
<th>Time</th>
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<tr>
<td>08:30-17:00</td>
<td>Registration</td>
<td>Entrance</td>
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<td>10:00-18:00</td>
<td>Exposition Visit</td>
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<td>09:00-09:40</td>
<td><strong>Keynote B</strong>&lt;br&gt;“Grid Integration of Large-Amounts of Wind and Solar”&lt;br&gt;<strong>Ben KROPOSKI</strong>, NREL National Renewable Energy Laboratory</td>
<td>Üsküdar Room</td>
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<td>09:45-11:15</td>
<td><strong>Keynotes Panel / Supersession C</strong>&lt;br&gt;“Enhancing the Power Grid Resilience”&lt;br&gt;Moderator: <strong>Vahid Vahidinasab</strong>, Nottingham Trent University</td>
<td>Üsküdar Room</td>
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<td>11:15-11:45</td>
<td>Coffee Break</td>
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<td>11:45-13:15</td>
<td><strong>Supersession D</strong>&lt;br&gt;“Women in Power”&lt;br&gt;Moderator: <strong>Lale Erdem Atılgan</strong>, Istanbul Technical University</td>
<td>Üsküdar Room</td>
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<td>13:15-14:00</td>
<td>Lunch Break / Conference Luncheon</td>
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<td>14:00-15:30</td>
<td><strong>Panel 5</strong>&lt;br&gt;“Addressing the Challenges of Implementing OT Cybersecurity Solutions in Substations”&lt;br&gt;Moderator: <strong>Jassim Al Hamad</strong>, SEL</td>
<td>Üsküdar Room</td>
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<td><strong>Paper Session 13</strong>&lt;br&gt;Renewable Integration &amp; Operation 2</td>
<td>Room: Yıldız 1</td>
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<td><strong>Paper Session 14</strong>&lt;br&gt;T&amp;D Monitoring, Control, and Automation</td>
<td>Room: Yıldız 2</td>
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<td>15:30-16:00</td>
<td>Coffee Break</td>
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<td>16:00-17:30</td>
<td><strong>Panel 6</strong>&lt;br&gt;“Technologies enable featuring the power grid” Including digital grid, battery storage, and blue portfolio/ decarbonization&lt;br&gt;Moderator: <strong>Merve Seval</strong>, Siemens Energy</td>
<td>Üsküdar Room</td>
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<td><strong>Paper Session 15</strong>&lt;br&gt;Microgrids Integration &amp; Operation</td>
<td>Room: Yıldız 1</td>
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<td><strong>Paper Session 16</strong>&lt;br&gt;Forecasting for Grid Operation</td>
<td>Room: Yıldız 2</td>
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<td>17:30-18:00</td>
<td>Closing Remarks</td>
<td>Üsküdar Room</td>
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Keynote B

Thursday, 09:00-09:40
Room: Üsküdar

Grid Integration of Large Amounts of Wind and Solar

Ben Kroposki, Ph.D., PE, IEEE Fellow
Director of Power Systems Engineering Center
National Renewable Energy Laboratory

Dr. Ben Kroposki is the Director of the Power Systems Engineering Center at the National Renewable Energy Laboratory (NREL) where he leads NREL's strategic research in the design, planning, and operations of electrical power systems. He has over 30 years of experience in the design, testing, and integration of renewable and distributed power systems and has more than 150 publications in these areas with over 10,000 citations. Dr. Kroposki received his BSEE and MSEE from Virginia Tech and his Ph.D. from the Colorado School of Mines. Dr. Kroposki is the recipient of the IEEE Power & Energy Society (PES) Ramakumar Family Renewable Energy Excellence Award which recognizes outstanding contributions in the field of developing, utilizing, and integrating renewable energy resources in the national and global energy scenarios. As an IEEE Fellow, Dr. Kroposki was recognized for his leadership in renewable and distributed energy systems integration. Dr. Kroposki is also an Adjunct Professor at the Colorado School of Mines and the University of Colorado and teaches courses on integrating renewable energy into power systems. Dr. Kroposki serves as the organizational director for the Universal Interoperability for Grid-forming Inverters (UNIFI).

Abstract: Large amounts of inverter-based resources such as solar PV, wind, and battery energy storage are being deployed in power systems around the world. These variable renewable energy sources are different from conventional power plants in several ways, one is the variability and uncertainty of the resource. Another difference is that for the most part, these are using grid-following inverters that require a grid voltage to be synchronized. As the levels of inverter-based resources rise, there is a need for grid-forming inverter technologies to provide overall grid stability functions for the grid. This presentation will discuss how the power system should cope with the variability and uncertainty of wind and solar resources and also discusses the role of grid-forming inverters in future power systems.
**Moderator:** Vahid Vahidinasab, Director of Grid Lab, Department of Engineering, Nottingham Trent University, UK

**Subject:** Operational Resilience in Future Power Grids: Failure Localization via Tree-Partitioning

**Speaker:** Srdjan Skok, Assoc. Professor, the Algebra University College

**Subject:** Levelized Grid Resilience by TSO-DSO Data Equalized Distribution

**Speaker:** Masood Parvania, the University of Utah, USA. the Director of the Energy and Power Innovation Centre (EPIC)

**Subject:** Verifiable Artificial Intelligence for Enhancing the Cyber-Physical Resilience of Power Distribution Systems
Dr. Lale Erdem Atılgan completed her high school education at Robert College. She received her Bachelor’s degree in 2004, her Master’s degree in 2007, and her Doctorate degree in 2014 from the Department of Electrical Engineering at Istanbul Technical University (ITU). During her doctoral studies, she had the opportunity to conduct research for more than a year at the Lighting Technologies Institute of Karlsruhe Institute of Technology, supported by the Jean Monnet European Union Scholarship. Lale Erdem Atılgan focused her research on LEDs, lighting in historical buildings, and energy efficiency.

Since 2017, Erdem Atılgan has been serving as an Assistant Professor at the Department of Electrical Engineering at ITU. She also serves on the Advisory Committee for Fire Protection and Lighting at the Presidency of the Republic of Turkey National Palaces.

**Speaker: Yilu Liu, The University of Tennessee USA**  
**Topic:** Women in Power

**Speaker: Jessica Bian, IEEE PES President**  
**Topic:** Women in Power

**Speaker: Edvina Uzunovic, Worcester Polytechnic Institute**  
**Topic:** Women in Power

**Speaker: Merve Seval, Siemens Energy Grid Technology, Türkiye & Central Asi**  
**Topic:** Women in Power
Addressing the Challenges of Implementing OT Cybersecurity Solutions in Substations

**Moderator:** Jassim Al Hamad, Schweitzer Engineering Laboratories, Bahrain

**Topic:** Addressing the Challenges of Implementing OT Cybersecurity Solutions in Substations

**Speaker:** Melih Güneri, KRATİS Engineering, Türkiye

**Topic:** Addressing the Challenges of Implementing OT Cybersecurity Solutions in Substations

**Speaker:** Kerem Ozdemir, Koztek Türkiye

**Topic:** Addressing the Challenges of Implementing OT Cybersecurity Solutions in Substations

**Abstract:** The session discusses technologies and design concepts of implementing cybersecurity for substation systems. Substation control system hierarchy and network are explained with highlights of segmentation challenges and various approaches for segmenting the layers are addressed.

A new approach that applies software-defined networking (SDN) and its cybersecurity novel traffic allowlist capability will be explained.
Cybersecurity involves information from various devices and systems, including protection, SCADA, controllers, gateways, and networking systems. The session address this area and explains approaches to apply technologies to design a system with enhanced situational awareness for better visibility and rich forensic data for security monitoring and analysis as well as threat hunting.

Another discussion is the deployment challenges of IT/OT security software in the substation and how to mitigate the hardware and environmental requirement, life cycle management of the equipment, and other aspects to design a system where software is hardware agnostic.
Technologies enable featuring the power grid. Including digital grid, battery storage, and blue portfolio/decarbonization

**Moderator: Merve Seval**, Siemens Energy Grid Technology, Türkiye & Central Asia

**Topic:** Technologies enable futuring the power grid

**Speaker: Simon Sinsel**, Siemens Energy

**Topic:** Challenges and solution technologies for managing the energy transition

**Speaker: Marco Ehring**, Siemens Energy

**Topic:** Decarbonization/EU F-Gas regulation/Blue Portfolio

**Speaker: Yusuf Kaya**, Siemens Energy

**Topic:** Digitalized Power

**Abstract:** The first topic of discussion will be Power Grid Stabilization. Our panelists will delve into the challenges of maintaining a stable energy supply in the face of the renewable energy transition and the role of advanced technologies of HVDC and FACTS in ensuring the reliability of the grid. They will also discuss the challenges of integrating renewable energy into the grid, the importance of resiliency and disaster recovery planning in the face of extreme weather events and other disruptions.

Next, the panel will shift its focus to Energy Storage Systems. Our experts will explore the latest developments in storage technologies and their potential to transform the
energy landscape. They will discuss the challenges of integrating storage into the grid, the opportunities for reducing total life-cycle costs and increasing overall efficiency, as well as the implications for decarbonization.

The third topic of discussion will be Decarbonized Energy Solutions. Our panelists will explore the new EU F-Gas regulation, their impact on the high voltage products and switchgear technology, in terms of the potential to reduce greenhouse gas emissions and mitigate climate change. They will discuss the technical solutions of Siemens Energy’s high voltage technology, the opportunities for creating a more sustainable energy system, and the role of policy and regulation in driving the transition to a low-carbon future.

Finally, the panel will conclude with a discussion of Digitalized Power Grids. Our experts will explore the latest developments in edge technology, data analytics, and their potential to optimize energy transmission, reduce costs, and enhance the overall efficiency of the grid. They will discuss the challenges and opportunities of power grid digitalization, the implications for energy management, and the role of collaboration and innovation.
Paper Session 13: Renewable Integration & Operation 2

Room: Yıldız 1

Date: Thursday, 14:00-15:30
Chair: Ahmet Cansız

2023IEEPESGT&D047
Probabilistic Co-optimization of Hybrid Battery/Super-Capacitor Systems Integrated into Microgrids
Soheil Mohseni and Alan Brent

2023IEEPESGT&D049
DC Microgrid Applications and Their Control Techniques
Lejla Ahmethodžić, Senad Huseinbegović, Senad Smaka and Amer Smajkić

2023IEEPESGT&D064
Building-Integrated Microgrid with Zero Energy Export - Practical Approach to Sizing
Lejla Ahmethodžić, Senad Huseinbegović, Amer Smajkić and Senad Smaka

2023IEEPESGT&D081
PV/Fuel Cell/ Superconducting magnetic Energy Storage Coupled with VSG to Improve Frequency and Voltage Regulation of Power Grid
Alhassan Alsharif and Muhammad Khalid

2023IEEPESGT&D088
Regret Cost Analysis of the Generation Expansion Plans of Uruguay 2024-2033
Gonzalo Casaravilla and Ximena Caporale
Paper Session 14: T&D Monitoring, Control and Automation

Room: Yıldız 2

Date: Thursday, 14:00-15:30
Chair: İstemihan Genç

2023IEEEPESGT&D034
The Influence of Fragility Curves in Resilience Assessments Considering Windstorms: A Sensitivity Analysis
Zhiyu Liao, Alexandre Serrano-Fontova, Haiyu Li, and Magnus Rory Jamieson

2023IEEEPESGT&D059
Process Interface Units (PIU) and Their Advantages for Full Digital Substations
Adriano Pires, Hector Leon, Leandro Pintos, Patrick Montaner and Chee Pinp Teoh

2023IEEEPESGT&D098
A New Method for Determining the C-divider capacitances of a Capacitor Voltage Transformer with Frequency Measurements
Thomas Bischof, David Gopp and Dmitry Atlas

2023IEEEPESGT&D101
Assessment of Directional Elements for Power Networks Connected to Inverted Based Renewable Resources: Problems and Mitigation Approach
Aarthi V, Od Naidu and Alam Mahamad Nabab

2023IEEEPESGT&D124
Economical Setting-Free Double-Ended Fault Locator for Transmission Lines: Experiences from Recent Pilot Installations
Od Naidu, Sinisa Zubic, Avssr Sai, Praveen An, Patrick Cost and Hakan Eriksson
Paper Session 15: Microgrids Integration & Operation

Room: Yıldız 1

Date:  Thursday, 16:00-17:30
Chair:  Lale Erdem Atılgan

2023IEEEPESGT&D043  
**Optimal Energy Scheduling in Seaport Integrated Energy Systems**  
Chengzhi Xie, Jinshun Su, and Payman Dehghanian

2023IEEEPESGT&D087  
**Correlation Between Global and Local ROCOFs and Their Relevance for Robustness Requirements of Generation Units**  
Christoph Strunck, Christian Wagner, Marco Greve, René Suchantke, Johannes Weidner, Roland Becker, Tobias Hennig, Marvin Kaiser, Janek Maamann, Georg Deiml, Hans Abele and Joachim Lehner

2023IEEEPESGT&D105  
**Probabilistic Integration of Demand Flexibilities in a Renewable Energy-Assisted Community Network**  
Farhad Angizeh, Ammar Abulibdeh and Mohsen A. Jafari

2023IEEEPESGT&D122  
**A Review of Data-Driven Smart Energy Management Systems for Distribution Networks**  
Ehtisham Asghar, Martin Hill, and Conor Lynch

2023IEEEPESGT&D129  
**Grid Connected and Islanded Operation of Microgrids including SMES, SC, and Li/Ion Based PV Systems**  
Erdal Sehirli and Omer Usta
Paper Session 16: Forecasting for Grid Operation

Room: Yıldız 2

Date: Thursday, 16:00-17:30
Chair: Mehmet Bayrak

2023IEEEPESGT&D023
A Cost-Aware Predictive Analytics of Electricity Consumption Variables
Hammed Akinade, Abiodun Oladejo, Yusuf Aderemi, Emmanuel Ezeako, Stephen Ojo, Opeyemi Akanbi and Taiwo Olaleye

2023IEEEPESGT&D038
Comparing Short-Term Net Load Forecasting Methods for Solar Homes
Scott Watts and Iain MacGill

2023IEEEPESGT&D075
Smart Meter Customer Data Synchronization Technique by Kmean Clustering
Leonie Bule and Nirmal-Kumar C Nair

2023IEEEPESGT&D121
Exploring The Effect Of Different Load Models On System Reconfiguration
Rawdha Alkuwaiti, Hany Farag, Wael El-Sayed, Ahmed Al-Durra and Ehab El-Sadaany
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