

Special Session 17: Advanced Uncertainty Optimization Methods for Planning, Operation, and Analysis of Renewable Power Systems

Session Organizer:

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Brief Description of the Session Thematic:

The rapid deployment of renewable energy systems in the grid is reshaping the energy structure and significantly impacting the operational stability and reliability of power systems. Due to their inherent variability and intermittency, renewable energies such as solar and wind pose significant challenges to the continuity and stability of electricity supply. To tackle these challenges, uncertainty analysis and optimization techniques offer effective strategies to manage the uncertainty of renewable energy sources, improving the resilience and stability of power systems. Robust optimization techniques enhance the resilience and reliability of power systems by maintaining system performance under various uncertain conditions. Stochastic optimization techniques use probabilistic models to assess the variability and randomness of renewable energy supporting more precise scheduling decisions. Interval optimization techniques provide stable operational boundaries for systems by defining the potential range of uncertain parameters. Additionally, advanced uncertainty analysis techniques such as scenario analysis and probabilistic forecasting play a crucial role in identifying and mitigating the impacts of uncertainty. These technologies contribute to a deeper understanding of the behavior of renewable energy systems and optimize the planning and operation of power systems. Therefore, this special conference aims to explore cutting-edge technologies in uncertainty analysis and optimization, showcasing their potential to enhance the stability, reliability, and efficiency of renewable energy systems. The goal is to explore and propose innovative methods to enhance the adaptability and resilience of power systems in the context of renewable energy integration.

Topics and Keywords:

1. Advanced optimization methods for planning of renewable power systems
2. Uncertainty optimization techniques for operation of renewable energy systems
3. Operational risk assessment of power systems under extreme weather conditions
4. Uncertainty analysis and calculation methods of renewable energy systems
5. Energy storage optimization planning considering stability and economic efficiency