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## ENERGY SYSTEM MODELLING – ADVANCES, CHALLENGES, AND FUTURE DIRECTIONS

### ORGANIZED BY

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The growing complexity of modern energy systems—driven by the rapid integration of renewable energy sources, digitalization, and evolving consumption patterns—necessitates sophisticated modelling approaches to ensure reliability, efficiency, and sustainability. Energy system modelling has gained significant attention as a critical tool for researchers, policymakers, and industry professionals to assess techno-economic trade-offs and support informed decision-making.

This special session will explore recent advances in energy system modelling, covering methodological innovations, real-world applications, and the challenges associated with modelling complex, multi-layered energy systems and networks. We welcome contributions on state-of-the-art modelling and optimization techniques, including those leveraging artificial intelligence and data-driven methods, as well as studies on integrated multi-energy systems, flexibility modelling, and strategies to address uncertainties in energy planning and operation.

By bringing contributions from multidisciplinary aspects, this session seeks to foster knowledge exchange on how cutting-edge modelling techniques can support the transition to a low-carbon, resilient, and efficient energy future. We invite contributions presenting novel modelling approaches, case studies, or theoretical insights that push the boundaries of current energy system analysis and provide actionable insights for the energy transition.

