

Minitrack Introduction: Integrating Distributed or Renewable Generation

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The electric power industry is experiencing continued growth in the integration of intermittent renewable energy technologies, responsive load resources, storage technologies, microgrids and intelligent devices. This evolution requires continued development of tools for system planning and operations, control strategies, and the ability to facilitate market integration for all participants. This mini-track has evolved from previous HICSS meetings in the early 2000s which included individual papers that analyzed renewable and distributed technologies, but not a full mini-track devoted to this topic. HICSS-43 in 2010 included a mini-track on the integration of “non-conventional” resources. As these resources are increasingly accepted as integral components of the electric power system, this change is reflected in dropping the term “non-conventional” and devoting a full minitrack to the development, integration, and management, of distributed and renewable resources.

In the coming years, research and development projects are anticipated to continue embracing distributed resources and demand-side flexibility, including implementation along with both high- and low-voltage integration of variable renewable energy technologies. Demand resources are expected to play a more prominent role in the power system through their ability to balance the variable generation from wind and solar technologies as well as lower consumer costs. While the

industry continues to pursue breakthroughs in the economic barriers to the broader area of storage technologies. Overarching all these advances is the need for continued progress in protecting and maintaining the privacy of data and information, as well as the security of individual devices and the system as a whole. These technologies and trends are discussed in this mini-track. The papers address modeling, simulation and hardware developments relating to planning, operations and control, as well as economic and market issues, and include system analyses and case studies.

The first session, entitled “Coordination of Distributed Energy Resources” will focus on the decentralized behavior of microgrids and distribution systems with renewable resources. The first paper in this session considers optimization-based load shedding in microgrids for the purpose of managing unintended islanding events. This is followed by two papers focusing on decentralized approaches for frequency control in microgrids and voltage regulation distribution systems. The second session titled “Renewable Resources and Demand Response” focuses on the leveraging of consumer-side flexibility. The session will open with a paper considering strategic consumer behavior in the context of demand response, while subsequent papers will address autonomous grids, and the impact of resource inertia on power system oscillations.