Grid operations with 100% inverter-based resources and the role of flexible resources

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LECTURE ABSTRACT

The electric power system, once dominated by traditional synchronous generation, is experiencing a shift toward an increased share of power electronically interfaced generation. This shift is mainly due to increased integration of variable renewable energy resources, such as wind and solar photovoltaic, which use power electronic based inverters. Several R&D efforts in the industry are presently investigating the challenges of grid operation with high levels of renewable resources, however it still remains as an open question whether a bulk power system can operate and how it could operate with 100% generation from converter interfaced supply resources, i.e. without any synchronous generation. This presentation will focus on the steady state and balancing operation of a 100% inverter-based resource system. Production cost simulations for operating scenarios with 100% energy provided by inverter-based generation have been performed, and the impact of curtailment and reserve determination strategies is analyzed. The applicability of traditional unit commitment and economic dispatch frameworks is discussed. Models and simulation results on flexible resources such as demand response and concentrated-solar power are also investigated.

SPEAKER BIOSKETCH

Dr. Qin Wang is a technical leader at the Electric Power Research Institute in Palo Alto, California. His previous industry experiences include positions at ISO New England, Midcontinent ISO and National Renewable Energy Laboratory. His research interests include power system reliability and online security analysis, smart distribution systems, transactive energy, transmission planning, and electricity markets.