Capitol Graduate Research Summit

ANALYSING THE IMPACT OF DISTRIBUTED ENERGY RESOURCES ON BULK POWER SYSTEMS

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The transition from conventional generation to renewables is continuously speeding up in the state of Kansas given its higher potential for solar due to the larger reception of sunlight around the year. A considerable percentage of these renewables include Distributed Energy Resources (DER) which are distributed in smaller individual capacities throughout the network. Although these deployments of DERs bring out ample environmental and technological benefits, the planning, control and operation of power system are getting more complex due to their intermittency. So far, the most common practice of adding DERs to the system is embedding them within the distribution system as a passive load and analysing the impacts on the Bulk Power System (BPS). However, this practice can no longer be accepted due to the increasing integration of DERs and their capability to provide advanced support services as non-synchronous inverter-based resources. Hence, this work provides a novel approach to modelling and analysis of the impact of DERs on BPS performance using four different scenarios of the distribution system. The proposed models are tested in the IEEE 37-bus system along with the transmission-distribution (T-D) interface. The results of this work will be highly beneficial for power system planners and operators in appropriate decision-making to maintain a reliable power system.