PSERC Power Systems Engineering Research Center

PSERC WEBINAR

Modeling and control of multi-energy dynamical systems: Hidden paths to decarbonization

Marija Ilic

MIT Laboratory

This talk will point out some key drawbacks of today's modeling and control underlying hierarchical electric power system operations and planning as the hidden roadblocks on the way to decarbonization. They could be overcome by enhancing today's information exchange and control. This can be done by revealing and utilizing inherent structure-preserving features of complex physical systems, and based on this, by establishing multi-layered energy modeling. Each module (component, control area, non-utility-owned entities) can be characterized in terms of its interaction variable, and higher-level models can be used to understand the interaction dynamics between different modules. Once the structure is understood, we propose nonlinear energy control for these modules which supports feed-forward self-adaptation to ensure feasible interconnected system. Based on these technology agnostic structures it becomes possible to expand today's Balancing Authorities (BA) to multi-layered interactive intelligent Balancing Authorities (iBAs) and to introduce protocols for flexible utilization of diverse technologies over broad ranges of temporal and spatial conditions.

APRIL 19, 2022

LINK TO WEBINAR

2:00-3:00 P.M. EDT

(11:00-12:00 P.M. PDT)

Marija Ilić is a Senior Research Scientist at the MIT Laboratory for Information and Decision Systems (LIDS) and a Professor Emerita at Carnegie Mellon University (CMU). She is an IEEE Life Fellow and an elected member of the US National Academy of Engineering, and the Academia Europaea. She was the first recipient of the NSF Presidential Young Investigator Award for Power Systems in the US. She has co-authored several books on the subject of large-scale electric power systems and has co-organized an annual multidisciplinary Electricity Industry conference series at Carnegie Mellon) with participants from academia, government, and industry. She was the founder and co-director of the Electric Energy Systems Group (EESG) at Carnegie Mellon University (http://www.eesg.ece.cmu.edu).