PSERC Power Systems Engineering Research Center

PSERC WEBINAR

Market Participation of Energy Storage and DER Aggregators: Energy Arbitrage, Retail Market Design, and Electricity Price Forecasting

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Utility-scale battery energy storage systems (BESSs) and distributed energy resources (DERs) bring significant challenges to wholesale market operations, while offering profitable opportunities to storage owners and DER aggregators. The first part of this talk discusses energy arbitrage behavior of BESSs in real-time energy, spinning reserve, and pas-as-performance regulation markets. A bi-level optimization problem is formulated with BESS bidding strategies and market clearing details. The second part of this talk proposes a retail market design which optimally coordinates DER aggregators' participation in both wholesale and retail markets. A distribution system operator (DSO) is proposed to operate the retail energy market and, in the meantime, gather offers from DER aggregators for wholesale energy and regulation markets participation. The third part of this talk proposes a learning-based approach to forecast system-wide locational marginal prices (LMPs) with only public market data. The real-time LMP forecasting problem is formulated as a video prediction problem and solved using conditional generative adversarial networks (GAN).

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Meng Wu is an Assistant Professor in the School of Electrical, Computer and Energy Engineering at Arizona State University. She received her B.E. Degree from Tianjin University, Tianjin, China, in 2010; M.Eng. Degree from Cornell University, Ithaca, NY, USA, in 2011, and Ph.D. Degree from Texas A&M University, College Station, TX, USA, in 2017. She worked as a research engineer at China Electric Power Research Institute from 2011 to 2012, and Beijing Sifang Automation Co. Ltd. from 2012 to 2013. She worked as a research intern at ISO New England in 2016. Her research interests include optimal planning and market participation of utility-scale battery energy storage systems; modeling, voltage stability enhancement, and retail market design for distributed energy resources; machine learning and data-driven approaches for electricity price forecasting, PMU data quality monitoring, and power plant model validation.