Wind Power Forecasting and Visualization

Speaker: Dr. Zhi Zhou
Affiliation: Center for Energy, Environmental, and Economic Systems Analysis, Energy Systems Division, Argonne National Laboratory
Date: April 10th, 2019 (Wednesday)
Time: 11:00am-12:00pm
Venue: Computer Science Room 330A Robinson Hall

Abstract:
Renewable energy is being rapidly introduced into existing energy supply portfolios because it is a renewable and clean source of energy as opposed to fossil fuels, whose price is prone to escalation and negative effect to environment gets more attention. However, several critical issues must be solved before we can achieve large-scale penetration. This talk focuses on the issues coming with supply uncertainty in wind power generation, which is inherently intermittent and variable, giving rise to new challenges for a reliable and cost-efficient operation of power systems.

This talk presents two major parts. The first part discusses a series of wind power forecasting algorithms and the implementation into ARGUS-PRIMA, a wind power forecasting tool developed at Argonne. This part specifically covers neural-network based methods for point forecasting and kernel-density estimator based methods for probabilistic forecasting. The second part introduces how forecasts are represented and visualized on a map-based platform integrated with ARGUS-PRIMA. The platform is a server-client system, with the capability to connect with any third-party forecaster. The whole package is designed to provide a situation awareness tool for wind farm operators, grid system operators to better utilize wind energy.

Brief Bio:
Dr. Zhi Zhou is a Principal Computational Scientist with the Center for Energy, Environmental, Economic Systems Analysis at Argonne National Laboratory. He received his Ph.D. degree in Decision Sciences and Engineering Systems from the Rensselaer Polytechnic Institute in 2010. He also received his M.E. and B.E. degrees in Computer Sciences from Wuhan University in 2001 and 2004, respectively. Dr. Zhou's research mainly focuses on the areas of operations research, modeling and analysis of complex systems with uncertainties, and the applications on power systems/markets, renewable energy integrations, smart grid, and the interdependency with other infrastructure, including transportation, water, climate, etc.