EE 500E Energy & Environment Seminar

Title: *Centralized and Decentralized Control for Demand Response*

Speaker: *Shuai Lu, Senior Engineer, Pacific Northwest National Laboratory*

Location: *More 230, UW campus*


Time and Date: *3:30 pm - 4:20 pm, Thursday, October 28, 2010*

Abstract:

Demand response has been recognized as an essential element of the smart grid. Frequency response, regulation and contingency reserve functions performed traditionally by generators are now starting to involve demand side resources. Additional benefits from demand response include peak reduction and load shifting, which will defer new infrastructure investment and improve generator operation efficiency. Technical approaches designed to realize these functionalities can be categorized into centralized control and decentralized control, depending on where the response decision is made. This paper discusses these two control philosophies and compares their response performances in terms of delay time and predictability. A distribution system model with detailed household loads and controls is built to demonstrate the characteristics of the two approaches. The conclusion is that the promptness and reliability of decentralized control should be combined with the controllability and predictability of centralized control to achieve the best performance of the smart grid.

Biography:

*Shuai Lu* is a Senior Research Engineer and project manager at Pacific Northwest National Laboratory. He has led many R&D projects for the US Department of Energy and the electric power industry, advancing the technologies for a more reliable, efficient and sustainable power grid. His experience includes integration of renewable resources, power system dynamics modeling, power system operations, and demand response. Prior to joining PNNL in 2006, Dr. Lu conducted research on the design of an undersea power and communication network to be deployed in the northeast Pacific Ocean. He also designed digital controllers and models for static var compensators (SVC). He received his bachelor’s and master’s degrees from Tsinghua University, China, and doctorate from the University of Washington, all in Electrical Engineering.