



## Large scale wind power integration challenges

Rhodes Hall 310: February 29, 2012 @ 12:00PM



ISN Seminar Speaker:

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### Abstract

In the scenario of energy and environmental crises that we are facing today, integrating renewable sources of energy with the existing power grids is rapidly becoming the most obvious solution. Harnessing electricity from wind is a promising option that has lately attracted attention and research funding worldwide. However, increasing wind power penetration still remains a daunting problem starting from harvesting the energy to the delivery to consumers. At present in the US, wind power contributes only about 2% of the total electric power supply. To achieve 20% wind penetration into electric grids by 2030, a goal suggested and supported by the Department of Energy (DOE), the problems of large scale wind integration must be addressed in multiple stages starting from wind farm design at the planning stage to tackling the variability of the wind power at the operational stage.

The first part of the talk will be focused on the optimal design of a wind farm collector system, which is the single most important element of a wind farm after the wind turbines. Typical collector system designs are generated manually which is cumbersome and inefficient. This work will show how a graph theoretic approach can be used to automate the design process while generating optimal designs under certain constraints. Another critical challenge with the operation of wind farms is addressing output power variability due to wind variation. Reliable power supply requires integration of energy storage units with wind farms. Methodologies will be presented for optimal sizing of storage units as well as computing charge-discharge schedule for uninterrupted power supply.

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### Biography

Sudipta Dutta is a PhD candidate working with Professor Thomas Overbye in the Department of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign. She received her M.S and B.S. in Electrical Engineering from Institute of Technology, BHU, India and Jadavpur University, India, respectively. Sudipta's research interest is in the area of power systems with a focus on wind power planning and integration, smart grids, and application of graph theory and data mining techniques. Sudipta has received several honors and recognitions including an award at IEEE North American Power Symposium, Grainger award at the University of Illinois, and Lalit and Joan Bahl fellowship from the University of Illinois. Sudipta has been a director, co-organizer and mentor of IEEE Power and Energy Conference at Illinois since 2010.