Title: **Wind Generation Development and Incentive for Thermal Generation Investment**

Speaker:
Professor C.K. Woo
Senior Partner
Energy and Environmental Economics, Inc.

Date: Thursday, 15 September 2011
Time: 4:00 pm - 5:30 pm
Venue: Room 603, Chow Yei Ching Building

Abstract:
Could rising wind generation destroy the incentive for investment in dispatchable generation units (e.g., combined-cycle gas turbines and combustion turbines), especially when such units are required to integrate a vast amount of intermittent wind energy into an electric grid? This question is timely and relevant for China, a country planning to further restructure its electricity industry and expand its wind generation capacity.

The above question is motivated by two intersecting events in the last two decades that have transformed the electricity industry. The first event is market restructuring, designed to introduce wholesale competition in Europe, parts of North America, Australia, New Zealand and Asia. The second event is the large-scale development of wind generation due to its abundance and government policies in Europe, parts of North America, and Asia. Since wind generation has zero fuel cost, it is economically dispatched to displace high fuel cost marginal generation, unless curtailed to resolve grid congestion and instability. Hence, rising wind generation tends to reduce wholesale spot electricity prices.

The incentive to invest in a generation unit can be measured by the expected payoff of a tolling agreement, with the payoff being the positive difference between the wholesale spot electricity price and the unit's per MWH fuel cost. When rising wind generation suppresses the wholesale spot electricity price, it also suppresses the tolling agreement's expected payoff for the generation unit.

I apply a regression-based approach to a large sample of 15-minute market data to directly estimate the agreement's payoffs for natural gas-fired generation in Texas. While a 20% increase in Texas' wind generation may not have a statistically significant effect, a 40% increase can reduce the agreement's expected payoff by 8% to 13%. Even though our 8-13% estimates are based on an econometric analysis of historical data for Texas, they corroborate the 12-33% estimates based on a market simulation for a 100% increase in wind generation in Germany. Both sets of estimates offer similar insight into the policy debate on capacity adequacy and system reliability. In particular, should long-term capacity contracts be used in a restructured electricity market that will see large scale wind-generation development?

Biography of the speaker:

C.K. Woo (Ph.D., Economics, UC Davis)
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Senior Partner, Energy and Environmental Economics, Inc., San Francisco, California

With 30 years of industry experience, Dr. Woo has published over 100 refereed articles on applied microeconomics, applied finance, and energy economics. Recognized by Who's Who in America, Who's Who in Finance and Business, and Who's Who in Science and Engineering, Dr. Woo is (a) an associate editor of Energy and guest editor of a 2006 special issue on electricity market reform and deregulation as well as a 2010 special issue on demand response resources; (b) a member of the editorial board of The Energy Journal and guest editor of a 1988 special issue on electricity reliability; and (c) guest editor of a 2011 special issue on renewable energy for Energy Policy.

Organizer: Dr. J. Zhong