EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

How Can We Use Optimization to Design Electric Power Markets to Support Socially Optimal Decisions

ABSTRACT –Restructuring of the power industry was intended to provide incentives for more efficient operation and investment. By "efficiency", I mean full accounting of all social benefits and costs, so that private incentives and social net benefits. Designers of markets have to balance the desire for "supporting prices" and "incentive compatibility" with needs for transparency and computational practicality, as well as political objectives, such as to provide support for certain favored technologies. This talk will review some specific circumstances in which there have been difficult tradeoffs in market design, and the insights that optimization can bring to defining prices. I focus on applying mixed integer programming and complementarity models. One example is day-ahead "spot" markets, in which strong non-convexities in start-up costs and other features mean that socially optimal schedules might be money losing for power providers. How do we keep such providers in the market without greatly distorting consumer costs and luring in producers whose costs are too high? Another is carbon markets; under the Obama Administration's Clean Power Plan, different states could have different systems for capping power market emissions, leading to higher costs and emissions than a consistent national system would. A third is long-run capacity markets, where the marginal contribution of a resource to system reliability is not always what is rewarded. Graduates who are well-versed in both optimization and economics are sorely needed by the industry to help with such issues!

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SPEAKER BIO – Dr. Benjamin Hobbs earned a Ph.D. (Environmental Systems Engineering) in 1983 from Cornell University. He holds the Theodore M. and Kay W. Schad Chair of Environmental Management at the Johns Hopkins University, where he has been in the Department of Geography & Environmental Engineering (now Environmental Health & Engineering) since 1995. He also holds a joint appointment in the Department of Applied Mathematics & Statistics, and is founding director of the JHU Environment, Energy, Sustainability & Health Institute. Previously, he was at Brookhaven and Oak Ridge National Laboratories and a member of the Systems Engineering and Civil Engineering faculty at Case Western Reserve University. His research and teaching concerns the application of systems analysis and economics to electric utility regulation, planning, and operations, as well as environmental and water resources systems. Dr. Hobbs has previously held visiting appointments at the Helsinki University of Technology, University of Washington, Netherlands Energy Research Center, and Cambridge University. He chairs the Market Surveillance Committee of the California Independent System Operator. Dr. Hobbs is a Fellow of the IEEE and INFORMS.

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