Optimization and Equilibrium Modeling for Energy Markets

Nov. 3, 2014 | 1:00 PM | DeWalt Seminar Room, 2164 Martin Hall

**Abstract:** In this talk, we describe some state-of-the-art approaches for modeling both fossil fuel and renewable energy aspects of energy markets. In the first part of the talk, we present a large-scale, Nash-Cournot equilibrium model for global gas markets funded by NSF, the U.S. Dept. of Energy, Électricité de France, and Research Council of Norway. Illustrative results are given from a recent case study on the influence of the Panama Canal on global liquefied natural gas (LNG) markets and energy security. In the second part of the talk, we present a two-level optimization model, funded by the District of Columbia Water and Sewer Authority (DC Water) concerning wastewater-to-energy. The DC Water facility is depicted as a Stackelberg Leader affecting the following local markets: electric power, compressed natural gas for buses, residential natural gas, and high-end fertilizer while taking advantage of carbon credits and other important engineering and market considerations.

**Bio:** Dr. Steven Gabriel is a Full Professor in the Department of Civil & Environmental Engineering as well as in the Applied Mathematics & Statistics, and Scientific Computation Program at the University of Maryland-College Park (UMCP). He has also been a Co-Director then Director of the Master of Engineering and Public Policy Program which is now absorbed into the School of Public Policy. In addition, he is a Research Professor at DIW (German Institute for Economic Research) in Berlin and an Adjunct Professor at the Norwegian University of Science and Technology (NTNU) in Trondheim in the Department of Industrial Economics and Technology Management. Lastly, as part of his 2014-2015 sabbatical, he is working on power markets as a visiting researcher at the Federal Energy Regulatory Commission (FERC), hydrocarbon modeling at the U.S. Dept. of Energy, and is the Senior Visiting Professor at the Trotter Energy Institute based in Montréal. He has been an active participant in modeling energy, the environment, and other infrastructure issues for over 30 years. Dr. Gabriel has an M.S. in Operations Research from Stanford University (1984), and an M.A. (1989) and Ph.D. (1992) in Mathematical Sciences from the Johns Hopkins University. Prior to joining the University of Maryland in 2000, he was a project manager for energy modeling at ICF Consulting, a postdoctoral researcher at Argonne National Laboratory, an Operations Research Analyst at Arthur D. Little, Inc., a Systems Analyst with Technology Systems, and a Market Analyst for Kero-Sun, a kerosene heater company.