



## Power Systems Engineering Research Center

# Tools for Assessment of Bidding into Electricity Auctions

### Ross Baldick

Professor  
Dept. of Electrical and Computer Engrg.  
University of Texas at Austin

### Steve Puller

Associate Professor  
Department of Economics  
Texas A&M University

February 17, 2009

2:00-3:00 p.m. Eastern Time (11:00-12:00 p.m. Pacific)

This tele-seminar is based on PSERC Project M-15.  
([Executive Summary](#) | [Public Report \(08-24\)](#))

Webcast Available in Room 1721 Engineering Hall

**Description:** In many restructured electricity markets, transactions occur through frequently-repeated uniform-price auctions. Such market mechanisms are justified, in part, by theoretical models that suggest these auctions facilitate efficient dispatch and send “correct” signals for future investment. However, empirical analyses of offers into electricity spot auctions have uncovered evidence that actual offers by some market players can deviate significantly from theoretical models of profit-maximizing offers. This leads to inefficiencies in both balancing and bilateral markets. This project developed a computational tool for analyzing offers into auctions.

The tool has two major applications. First, market monitors can employ it to assess the competitiveness and efficiency of offers by comparing the actual offer of a market participant to a hypothetical perfectly competitive offer and to an ex post profit maximizing offer. Such analysis can be useful to market monitors who seek to evaluate the behavior of a particular market participant. Second, the tool can assist market participants, especially the smaller ones, in the formulation of offers in the face of the strategic complexity facing them. The tool and associated graphical user interface allows the ex post profit maximizing offer for a firm to be constructed on the basis of information about the aggregate offers of other market participants, the firm’s own cost function, and zonal transmission constraints. This project brings together work from both the economics and electrical engineering literatures. The tool operationalizes some of the recent theoretical developments in auction theory in a prototype tool that is available in the public domain to analyze offers. Moreover, the tool incorporates the effects of transmission constraints, providing a unique combination of economic and engineering analyses that is not available elsewhere. Finally, we sought to make the tool “user friendly” so an analyst or market participant can exploit the insights of recent academic analysis in the “real-time” time horizon that such analysts typically make decisions.

**Biography: Ross Baldick.** Ross Baldick is a professor of electrical and computer engineering at The University of Texas at Austin. He received his B.Sc. and B.E. degrees from the University of Sydney, Australia and his M.S. and Ph.D. from the University of California, Berkeley. From 1991-1992 he was a post-doctoral fellow at the Lawrence Berkeley Laboratory. In 1992 and

1993 he was an assistant professor at Worcester Polytechnic Institute. His current research involves optimization and economic theory applied to electric power system operations, the public policy and technical issues associated with electric transmission under deregulation, and the robustness of the electricity system to terrorist interdiction. He has recently completed a textbook based on a graduate class, "Optimization of Engineering Systems" that he teaches in the electrical and computer engineering department at The University of Texas. He also teaches a three-day short-course "Introduction to Electric Power for Legal, Accounting, and Regulatory Professionals" and a one-day short-course "Locational Marginal Pricing" for non-technical professionals in the electricity industry. He is an editor of *IEEE Transactions on Power Systems* and the chairman of the System Economics Sub-Committee of the IEEE Power Engineering Society Power Systems Analysis, Computation, and Economics Committee. Dr. Baldick is a Fellow of the IEEE.

**Steve Puller.** Steve Puller is an Associate Professor in the Department of Economics at Texas A&M University. He received a BA degree in economics from the University of Chicago and a PhD in economics from UC Berkeley. He has served as a visiting research associate at the University of California Energy Institute and an advisor to the Public Utility Commission of Texas. His primary field of research is empirical industrial organization, with an emphasis on the competitiveness of pricing behavior. His research includes studies of electricity pricing during the California electricity crisis, the optimality of bidding behavior in electricity auctions, and the efficiency of market design in auctions. He co-edited the volume *Electricity Deregulation: Choices and Challenges* published by University of Chicago Press.

#### **Speaker Contact Information**

Ross Baldick  
Phone: 512-471-5879  
Email: baldick@ece.utexas.edu

Steve Puller  
Phone: 979-845-7349  
Email: puller@econmail.tamu.edu

**Participation by Webcast:** You can participate in PSERC tele-seminars via webcast. Before the tele-seminar, [click here](#) and then on 3/17/09 when the status is "In Progress." Note that the web page at that address does not automatically refresh. The webcast will include the audio and the slides so you will not have to download the slides in advance. If you want to ask questions, you should register for participation by phone.

**Registration for Webcast Participation:** None required. There is no charge for participating!

**Professional Development Hour Certification:** PDH certification is available for PSERC members (only). Send an email requesting PDH certification to [Theresa.Herr@asu.edu](mailto:Theresa.Herr@asu.edu) with the subject "PDH" after the seminar. *Include the name and title of each participant.*

#### **Tele-Seminar Logistics and Assistance**

Connection information will be emailed to you about three business days before the tele-seminar. If you have any questions, please contact Theresa Herr, PSERC's administrative assistant, at 480-965-1643 or [Theresa.Herr@asu.edu](mailto:Theresa.Herr@asu.edu). You can also contact Dennis Ray, PSERC Executive Director, at 608-265-3808 or [djray@engr.wisc.edu](mailto:djray@engr.wisc.edu).

#### **PSERC's Tele-Seminar Coordinator**

Shmuel Oren, University of California at Berkeley  
Email: [oren@ieor.berkeley.edu](mailto:oren@ieor.berkeley.edu)

Shmuel welcomes feedback on the tele-seminars and suggestions for future ones.