



# Power Systems Engineering Research Center

## The Reliability Assessment Project

**George Gross and Teoman Guler**  
University of Illinois at Urbana-Champaign

**Research Tele-seminar**  
**March 6, 2007**  
**2:00-3:00 p.m. Eastern Time (11:00-12:00 Pacific)**

### **Seminar Description**

This seminar summarizes the key aspects of the recently completed *Reliability Assessment Incorporating Operational Considerations and Economic Aspects for Large Interconnected Grids* Project. This project was conceived as an undertaking to bridge the developments in PSERC's Markets and the Systems Research Stems, and focus on some of the pressing needs of the industry in the reliability arena in the restructured environment. The aim was to construct models with appropriate level of detail of the operational procedures and economic aspects, and use them to develop effective tools for evaluating the reliability and the associated economics of large bulk systems such as those of the *RTO/ISOs*. The project research team met this aim, and brought about advances in the modeling and the development of tools for reliability evaluation. Furthermore, the project established a solid basis for linking economics, reliability and security.

Within the scope of this project, we advanced the state of the art in congestion modeling for reliability and security evaluation. We developed new detailed models with the explicit representation suitable for the large networks in the restructured environment, constructed new tools for security and reliability assessment, and established a concrete basis for the linkage of reliability and economics. The presentation summarizes key developments in four key areas:

- development of models incorporating operational considerations for reliability and security assessment;
- the economic dimensions of reliability and security evaluation;
- short-term resource adequacy; and
- system planning: reliability considerations.

In addition, we will highlight the developments in a key part of the project in the quantification of the market performance dependence on system security. A general approach was proposed to quantify the monetary impacts of complying with a specified security criterion when the deployment of appropriate preventive and/or corrective security control actions is fully taken into account. The application of the proposed approach is illustrated on the large-scale ISO-NE system to quantify the dollar impacts of changing from the current security criterion to two other ones using the actual 2005-2006 day-ahead data – the historical system model and the bids/offers submitted – with the actual market clearing methodology. An important finding of this study is that the economic efficiency of electricity markets need not decrease when the system is operated under a stricter criterion.

## Biographies

**George Gross** is Professor of Electrical and Computer Engineering and Professor, Institute of Government and Public Affairs, at the University of Illinois at Urbana-Champaign. His research and teaching activities are in the areas of power system analysis, economics and operations, utility regulatory policy and industry restructuring. He was formerly with the Pacific Gas and Electric Company, where, Dr. Gross founded the company's Management Science Department and held other key management, technical and policy positions. During 1992-93, Dr. Gross was at the Electric Research Power Institute to develop research directions on open access transmission. A Fellow of IEEE, Dr. Gross was awarded the *Franz Edelman Management Science Achievement Award* by the Institute of Management Science. Dr. Gross is the author of a large number of publications and book chapters. He was a Visiting Professor at the Politecnico di Milano, University of Pavia and the Politecnico di Torino during the academic year 1999 - 2000. George Gross received his undergraduate degree at McGill University in Montreal and he did his graduate studies at the University of California, Berkeley. Dr. Gross has consulted on electricity issues with utilities, government organizations and research institutions in North America, Europe, South America, Australia and Asia. He has lectured widely and has given numerous invited presentations at leading universities and research institutions throughout the world. His numerous publications have appeared in the leading journals in the field and have been presented at a wide array of international conferences.

**Teoman Guler** received a B.S. degree in Electrical Engineering from Bogazici University, Istanbul, Turkey in 1999, and an M.S. degree in Electrical Power Engineering from Rensselaer Polytechnic Institute, Troy, New York, in 2001. Currently, he is a Research Assistant at the University of Illinois at Urbana-Champaign. His research interests include power system operations, control, optimization, and economics.

**Participation:** Live audio will be provided via teleconference. The presentation slides can be downloaded from the PSERC website on March 6. An audio-slide production will be available for viewing by web streaming a day after the tele-seminar.

**Registration:** To indicate that your organization would like to have an access line, send an email to [pserc@asu.edu](mailto:pserc@asu.edu) with the subject "Reliability Seminar". To use our limited phone bridge capacity efficiently, we ask that people in an organization meet together to participate rather than calling in separately, if at all possible. Connection information will be sent before the seminar. There is no charge for participating!

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

**Seminar Logistics and Assistance:** Connection information will be emailed to you after you submit your request. If you have any questions, please contact Brianna Reed, PSERC's administrative assistant, at 480-965-1643 or [pserc@asu.edu](mailto:pserc@asu.edu). You can also contact Dennis Ray, PSERC Executive Director, at 608-265-3808 or [djay@engr.wisc.edu](mailto:djay@engr.wisc.edu).

### PSERC's Seminar Coordinator

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