

Power System Planning and Operations Interest Group

New and recent developments are having major impacts on the electric power industry. The rapid development and growth of renewable energy resources such as wind and solar in response to a desire for a greener and more sustainable industry is affecting the structure and operation of the the power system. The smart grid focuses on customer choice and control over the consumption of electricity and has the potential for improved efficiencies but requires significant investments in new technologies. Meanwhile the requirement for a reliable transmission network continues to be a concern and becomes a public issue when things go wrong as a consequence of a wide-area blackout, a large natural disaster or a physical or cyber attack on transmission facilities. The impacts of all these developments affect electricity markets and the regulatory environment and they continue to evolve to meet the changes.

Among the solutions to meet the growth and development of the electricity industry in the midst of a changing environment are upgrades to and expansion of existing transmission systems, the application of equipment based on power electronics (FACTS), the introduction of energy storage devices, improved forecasting techniques, new methods for integrating and controlling renewable energy sources, and technological advances for the smart grid.

The Interest Group focuses on new technologies that enhance the use of existing transmission lines and facilities, adequately prepare for and meet the needs of the future and continue to maintain a high level of reliability.

Topics & Issues

Transmission System Adequacy

Planning and Operations Practices

Means to Increase Transmission Capacity and Security

Deregulation and Electricity Markets

Modern Tools and Techniques



Technology Advisor



Dr. George Gross is a professor of Electrical and Computer Engineering at the University of Illinois with an appointment as professor in the Institute of Government and Public Affairs. His major research activities are in power system analysis, economics and control and electric utility regulatory policy. His professional activities include work as an Expert for the United Nations Industrial Developing Organization Technical Missions. Prof. Gross has numerous publications in international refereed journals and has lectured at many universities around the world. Prior to his involvement at the University of Illinois, Prof. Gross held several management positions at Pacific Gas & Electric Company in San Francisco for nearly two decades. Mr. Gross received his B.Eng. (Honors) in Electrical Engineering at McGill University in 1969, and his M.S. and Ph.D. from University of California, Berkeley in 1971 and 1974 respectively



Projects

for a complete project listing, please visit: www.ceati.com/pspoig

- The physiological, psychological, and social effects of shift-work and the potential interventions for alleviating its ill-effects
- Prediction of Power System Instability Based on PMU: Utilizing the ROSE (Region of Stability Existence) Approach
- Tuning Guidelines for Power System Stabilizers
- Maximizing Transmission Capabilities of Existing Rights of Way,
- Wide Area Voltage Control
- Utility Design Practices & Operating Experience with Shunt Capacitor Banks
- Planning and Operation of Power Systems with Large Percentages of Renewable Energy Resources
- Transmission Planning Risk Indices
- Dynamic Loading and Life Management of Power Transformers
- Use of Lightning Arresters to Protect and Improve Outage Performance of Unshielded Lines
- Transmission System Planning and Operation under Uncertainties
- Crinoline - Electromagnetic Compatibility Simulation Program
- Commitment Techniques for Combined-Cycle Generating Units
- HV Line Arresters: Selection Based on Grounding Impedance of Towers and Position
- Fault Level Management

Topics & Issues

Transmission System Adequacy

- Development of tools and techniques to establish the degree of transmission system overloading under normal and contingent operating conditions

Planning and Operations Practices

- Review of the type and severity of contingencies to which the system is expected to experience, and their probability of occurrence, under current uncertain conditions
- Review of the principles on which load-shedding systems are implemented in terms of frequency settings, usage of frequency trend elements, size and location of the shed load, as well as the speed of the load-shedding system
- Review of frequency control systems and establishment of minimum percentages of generation equipment that will need to respond to frequency changes under governor action or automatic generation control (AGC)
- Development of schemes to activate load shedding and/or other control actions, based on voltage behavior

Means to Increase Transmission Capacity and Security

- Dynamic loading of transmission lines according to ambient conditions of temperature, wind and sun
- Methods of effective life management of network components over their lifetime
- Exploration of means to reduce line outages due to short circuit in order to improve system reliability
- Exploration of the development of FACTS-like devices using mechanically switched components

Deregulation and Electricity Markets

- Methods of regional optimization of electric production across multiple independently-operated control areas

Modern Tools and Techniques

- Development of tools and techniques to account for increased uncertainty in load generation patterns due to market schemes
- Development of dynamic models for new types of generation including gas turbines and combined-cycle units, as well as renewable resources such as wind and solar energies and fuel cells
- Development of the use of wide system monitoring to enhance the ability of operators in tracking system behavior

Annual Activities

2-3 Meetings

1-2 Workshops

5-7 Conference Calls

Weekly Information Exchange

Participation is open to:

Utilities

ISO, RTO, IMO

Government Agencies

Universities

Project Reports

Over the years more than 1300 projects have been completed and published in the fields of:

Generation; Transmission Distribution; Utilization

For a complete listing, please consult our website.

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