GE
Energy Consulting

Power Systems Operation & Planning (PSO&P)

The Power Systems Operation & Planning (PSO&P) team focuses on the planning, design, and operation of interconnected power systems. We understand the physical characteristics of generation, transmission and distribution equipment and their complex interaction characteristics when operated as part of a large integrated power grid, an industrial plant, or a commercial facility.

Systems protection and control

PSO&P provides a complete suite of protection system consulting services to help ensure compliance with industry standards and superior engineering practices:

- Generator/switchyard protection settings
- Transmission line protection
- Design verification
- Short-circuit analysis
- Protection coordination
- Design of dynamic end-to-end testing, settings development and file programming
- Support for protection system testing and energization

All protection system applications are designed by recognized experts with deep domain knowledge in power systems analysis, transient and voltage stability, switching transients and complex interactions.

Our team also has deep expertise in industrial protection. For example, we can develop the design and implementation details of a control system that detects an island condition in an industrial facility, creates the island if needed, and executes a multi-tier fast load shed based on the load-generation balance that existed prior to the island's creation.

Power system studies

The PSO&P team has comprehensive, global experience in power system studies and in-depth experience analyzing shunt and series compensation, SVCs, FACTS, HVDC, synchronous condensers, and power plant and transmission system dynamic controls. We have more than 500 person-years of professional experience with leading power system analysis software tools like GE's Positive Sequence Load Flow (PSLF*) software and Multi-Area Production Simulation (MAPS*) software, as well as Siemens PSS**/E, DigSILENT PowerFactory, Aspen, ETAP**, PSCAD, EMTP, other commercial applications, and many specialized in-house tools.

The PSO&P team also has deep experience with voltage control and reactive planning issues as well as the tools and procedures that are most effective in studying them. We perform detailed steady state, voltage and transient stability studies of regional transmission systems, generation interconnections, and renewable generation impacts, as well as specialized studies of sub-synchronous resonance and torsional interaction.

Equipment applications

Drawing on our expertise with greenfield and upgrade projects, we can evaluate all aspects of transmission equipment applications — from the planning and conceptual stage of a project down to writing functional specifications for individual equipment. The team is often engaged in performance simulations and engineering analysis to design and specify equipment for large projects such as series capacitors banks, wind and solar power plants, synchronous condensers, the Variable Frequency Transformer (VFT) and, recently, battery energy storage systems. Based on our detailed analytical work we then specify recommended power equipment such as transformers, switchgear, harmonic filters, series reactors, series capacitors, surge arresters and system grounding equipment, and we can recommend settings for equipment such as excitation systems, plant-level controls for wind plants, and coordinated controls for energy storage-assisted solar plants. Our team uses the insights from equipment application studies to define functional specifications of next-generation GE products and provides technical assistance to the engineering teams within product lines.

Distribution planning, engineering, and grid modernization

The core mission of the electric power system is to supply loads wherever they exist with adequate capacity, voltage, frequency and reliability. In the last two decades, automation devices, communications and controls have been progressively applied to improve reliability, operational efficiency and utilization. Recently there has been a wholesale push toward modernizing the grid to create a "smarter grid" with two-way high-speed communication, sensing and monitoring devices, and command and control technologies. The PSO&P team can perform engineering studies to facilitate the application of modern technology and assess the benefits for grid operation. We have considerable experience with smart meter integration, coordinated volt/var control, conservation voltage reduction, fault detection and location, and system reconfiguration strategies. We can analyze the business case, isolate drivers, develop strategies and roadmaps, and assess risk and rewards benefit for utilities, customers and other stakeholders.

Practical research and development on distribution systems is co-developed with utilities in our DSTAR program (www.dstar.org), which has existed for more than a quarter century. DSTAR projects and activities cover every facet of distribution engineering, including equipment application, system protection, reliability, power quality, and operational efficiency. The PSO&P team of distribution experts manages DSTAR, executes projects on behalf of the members, and develops engineered solutions.

For more information visit us online at
www.ge-energyconsulting.com

GEA30586 (04/2013)