Siemens PTI Smart Grid Services Consulting: an Answer to the New Distribution Planning Needs

“In the 21st Century, we know that the future of our economy and national security is inextricably linked to one challenge: Energy.” – President-Elect Barack Obama, Chicago Press Conference, Dec. 16, 2008.

Today’s U.S. electrical power grid was designed a century ago and its inefficiency is expensive; electrical losses on the transmission and distribution systems cost the consumer roughly $25 billion annually. The aging infrastructure and increasing peak demand both challenge grid reliability, U.S. market demands for increased security of energy supply and reliable service. Due to these issues, electrical utilities started the journey of grid modernization and automation several decades ago. In recent years, this endeavor is fueled by the tide of Smart Grid, which empowers electrical utilities with better system awareness and capability of optimal control, through advanced communication and information technologies. With the federal and state governments’ attention on clean energy and sustainable development, comes the adoption of advanced energy conversion technologies, such as wind and solar, onto the transmission and distribution systems. Renewable energy is now beginning to add a new flavor to the power system planning and operation routines, and electrical utility companies are facing challenges like never before.

As U.S. distribution power systems have traditionally been designed with one-way power flow, operators can easily estimate line currents/voltages through limited line measurement points. All distribution protection devices and volt/var equipment are configured in this nature. Distributed generation introduces two-way power flow to distribution feeders; this may cause complications and prevent operators from maintaining reliable system conditions. Current protection settings may not be suitable during these conditions and inappropriate switching may take place during faults. Due to economic constraints, there are usually not enough line measurements upon which operators can rely in a situation like this.

Facing this dilemma, many power companies are attracted to the idea of extending the reach of their current remote terminal units (RTUs), for example, either through developing a new distribution management system (DMS) with smart meters or simply extending SCADA with end of line (EOL) measurements. Although the cost of such systems can be a hurdle, the benefits for operating and planning can be remarkable. Advanced Smart Grid applications can be implemented on platforms, such as integrated volt/var control (IVVC) or fault location, isolation and system restoration (FLISR). With these applications, operators have more control of reactive power on the feeder and can be more effective in outage management. New FDIR/FLISR systems for instance, can reduce outage duration from hours to minutes, and sometimes to seconds, with tremendous impact on reliability.

Even though operators have powerful tools to assist in operating their systems under the tide of Smart Grid, operation is not as easy as one might think. The biggest challenge is the necessary change of mindset. Experienced operators have to adapt to the new distribution systems which have many new generation sources as well as many new loads, such as electric vehicles. These all play an important role in both planning and operating on a daily basis. There are also many new hardware and software
components that can assist, such as energy storage technologies. However, they are often from different manufacturers and potentially operate with different communication protocols, and, interoperability can determine the ultimate success of the whole project. Power companies have to understand the variations they face and drive for the new adaption.

Despite this great challenge, power companies don’t have to fight alone. Many experienced and passionate Smart Grid consultants, engineers and researchers are working hand in hand with them. Proudly among this group, Siemens PTI Smart Grid Services stands out with extensive experience on the following topics:

- Harmonic measurements (as per IEC 61400-21 and IEEE 519 standards) and modeling studies
- Medium-voltage (MV) and low voltage (LV) protection coordination studies with integration of photovoltaics (PV) and/or wind generation
- Distribution planning: a wide range of studies such as generation interconnection assessment, distribution automation schemes, protection and control, energy storage solutions
- Microgrid analysis
- Dynamic modeling and studies
- Transient system studies
- Wind generation studies for developers: electrical system studies from LV terminals of wind turbine to point of interconnection.
- Industrial power, control and protection studies
- Earthing and grounding studies
- PSS®SINCAL support

The points of contacts for the Siemens PTI Smart Grid Services Consulting group include Hugo Bashualdo, Bo Yang, David Lovelady and more than 44 highly specialized professionals supporting this group from Siemens PTI in the U.S. and Germany.

Our staff in Schenectady includes: Hugo R. Bashualdo, Senior Manager Smart Grid Services Consulting, Siemens PTI, Schenectady, New York. He is an accredited Professional Engineer in British Columbia, Canada, has an MBA and has completed a Project Management Post Graduate, with Honors, from Humber College, Toronto, Ontario, Canada. He led various technical areas at Northern Lima Hydro (Edelnor) (1994-2004), Peru. He worked as Senior Engineer (T&D Engineering) with British Columbia Hydro (BC Hydro) (2006-2012). Now at Siemens PTI, he focuses on improving distribution system performance, cutting edge technology/practices implementation, losses reduction, reliability enhancement, generation interconnection studies, and volt/var optimization and their economical impact.

Bo Yang, PhD, Staff Consultant, Smart Grid Services Consulting, Siemens PTI, Schenectady, New York. Dr. Yang received her PhD in Electrical Engineering from Arizona State University, Tempe, Arizona in 2007. She is proficient in Smart Grid technology integration, distribution planning, automation, power quality, reliability and protection coordination. Dr. Yang has managed a wide breadth of projects in the following topics: Smart Grid technologies/applications, energy efficiency, volt/var optimization, utility PV interconnection, new load impacts, dynamic model development/validation, PMU applications and islanding studies. She has actively participated in a variety of projects as primary supporter, technical lead and project manager. The customers she has had the pleasure to work with range from power companies, system independent operators, equipment vendors as well as research institutes. Dr. Yang is experienced with CYMDIST, OpenDSS, GridLAB-D™, PSLF and DigSilent.

David Lovelady, Senior Consultant, Smart Grid Services Consulting, Siemens PTI, Schenectady, New York. He comes from a practical industrial electrical engineering background and joined Siemens Transmission and Distribution business as a graduate engineer in Manchester, UK, following completion of a Bachelors Degree with Honors from the University of Manchester in 2007. Since joining Siemens PTI
in New York in 2009, David has participated in multiple steady state and transient stability studies, using PSS®E and PSS®MUST, for independent system operators in New England and New York and for transmission developers. For the past several years, David has been researching the potential impacts of the Smart Grid on the transmission and distribution system and has been focusing on distribution automation, energy storage, distributed generation, demand response, MicroGrids, economics and the optimization of the distribution network.