November 1, 2010

Ms. Patricia Hoffman
Assistant Secretary
United States Department of Energy
1000 Independence Avenue, SW, Room 8H033
Washington, DC 20585

RE: Smart Grid RFI

Dear Assistant Secretary Hoffman,

Thank you for the opportunity to provide information to the Department of Energy Federal Register Doc. 2010-23251 filed September 16, 2010. With our recent acquisition of Ventyx, ABB is one of the few companies in the smart grid space that can approach the entire smart grid value chain, from distributed generation at the residential level to distribution automation and real-time conditioned based maintenance of asset health. Our response will draw on multiple areas of expertise, focusing on the technology side of our industry as well as market direction.

Smart Grid Technologies considered in this response:

- Instrumenting and automating the transmission and generation system
- Distribution automation
- Consumer facing programs such as feedback, demand response, energy efficiency, and automation strategies
- Integrating new end user equipment like distributed generation and electric vehicles

Definition of Smart Grid:

There is a great deal of variation both within the power industry and outside it as to what exactly should be included under the idea of a smart grid. Ask a room full of utility professionals to define the term and you're likely to get a wide range of answers. Similarly, most consumers would likely associate smart meters or home automation with the concept of a smart grid, but there is much more to the picture.

ABB takes an expansive view of the smart grid, defining it by its capabilities and operational characteristics rather than by the use of any particular technology. Deployment of smart grid technologies will occur over a long period of time, adding successive layers of functionality and capability onto existing equipment and systems. Technology is the key, but it is only a means to an end—the smart grid can and should be defined by broader characteristics.

ABB believes that the Smart Grid should be:

- Adaptive, with less reliance on operators, particularly in responding rapidly to changing conditions.
- Predictive, in terms of applying operational data to equipment maintenance practices and even identifying potential outages before they occur.
- Integrated, in terms of real-time communications and control functions.
- Interactive between customers and markets.
- Optimized to maximize reliability, availability, efficiency and economic performance.
- Secure from attack and naturally occurring disruptions.

Assessing and Allocating Costs and Benefits
Investments should be evaluated based on opportunity for:

- Improved reliability – SAIDI, MAFI, SAIFI , Customer Outage Minutes
- Reduced peak demand
- Reduced energy losses
- Improved cost of services
- Improved customer satisfaction

In general, AMI investments can be justified based on improved utility operating efficiencies. Investments to improve reliability, lower losses, reduce peak demand, and support sustainability and green solutions are more difficult and require regulator support for consumer and societal benefits. Easier cost recovery mechanisms to allow utility investment in smart grid technologies to improve the grid infrastructure and drive capacity, reliability, efficiency, and sustainability are needed to enable faster deployment.

Utilities are driven by investments that provide favorable returns through cost recovery and operational efficiencies. Utilities that provide measurable improvements, for example SAIDI and SAIFI improvement, with their smart grid deployment should be given incentives.

Long Term Issues: Managing a Grid With High Penetration of New Technologies
For comments on high penetration of new technologies, specifically, distributed generation sources, see attached white paper on Virtual Power Plant technology, which can be used to allow a holistic view of the grid, mapping both large and small scale generation sources, along with creating virtual power plants for demand aggregation.

Reliability and Cyber-Security; Cyber Security of legacy systems
Legacy systems present a particular security challenge. In most cases, it simply is not practical to replace systems that are otherwise perfectly functional simply to apply the latest in security technology. However, depending on the age of the system in question, it's also conceivable that the security inherent to it is not at all adequate for current requirements. Fortunately, there are several approaches that can secure legacy systems without replacing them.

One option is to encapsulate the given system within a secure zone of cyber protection so that it is isolated from direct contact with other systems, both within the utility firewall and outside it. Communication channels can also be secured by upgrading to modern protocols that support encryption, authentication and authorization mechanisms. Access to the legacy system can also be controlled by bolting on a new user interface layer along with the application of appropriate procedures for authorization.

Finally, if remote access to the legacy system is required, that can be achieved using a secure virtual private network to connect to a terminal server rather than the operation system itself. As with any system, new or old, non-essential applications should be hosted from hardware that is physically separate from the main system.

Managing Transitions
ABB believes that the primary focus areas of Smart Grid deployment should be infrastructure capacity, reliability, efficiency, and sustainability. Surveys of utility executives as well as published smart grid utility roadmaps have shown that improving service reliability and operational efficiency are top priorities for smart grid deployments.

Many smart grid roadmaps have started with advanced metering infrastructure (AMI). AMI presents a business case for lowering metering costs, gives utilities better access to energy use data, and enables utilities to engage customers and offer new products and services. AMI also requires the availability of high-speed two-way communications.

With a robust communications system in place, the next stop on a smart grid roadmap should be the implementation of automatic fault detection, isolation, and restoration as well as increased efficiency via volt/VAr optimization. Investments in distribution grid management technologies like these provide benefits to the utility through more efficient use of existing infrastructure and personnel. They also deliver customer and societal benefits through improved reliability, lower losses, and reduced environmental impacts.

As we look toward the future, we expect significant advances in areas such as demand response, distributed generation, distributed energy storage, and plug-in electric vehicle charging. An optimized distribution grid will be essential to support these new resources and requirements. Distribution grid management therefore will be an essential tool for utilities to manage the next wave of smart grid applications.

On the transmission level, high-voltage direct current (HVDC) lines can be used to support interconnection of remote or off-shore renewable generation resources and to enable development of extended energy highways by connecting neighboring transmission systems. Flexible alternating current transmission systems (FACTS) can provide grid stability and increased transmission capacity on existing lines. The implementation of phasor measurement units and the integration of synchrophaser data into energy management systems will give transmission operators better tools for managing the grid.