The U.S. Perspective on Electric Grid Modernization
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Smart Grids – Projects of the Future

George W. Arnold, Eng.Sc.D.
National Coordinator for Smart Grid Interoperability
National Institute of Standards and Technology
U.S. Department of Commerce

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Good afternoon, thank you for the opportunity to discuss the U.S. perspective on electric grid modernization and a path to realizing a secure and interoperable nationwide Smart Grid. Although the National Academy of Engineering has described today's electric grid as the greatest engineering achievement of the 20th century, it has not changed much over the past 100 years. The electrical grid needs to be modernized to meet the energy needs of the 21st century. To give you a better idea of the current state, I will describe the U.S. electrical grid and electric market.

The North American Electric Grid

The U.S. uses roughly 22 percent of the world electricity consumption. The electric market in the U.S. is very different from Russian since we have about 3,200 electric utility companies that operate within the country. There are 17,000 power plants and the peak demand is at 800 gigawatt. We have 165,000 miles of high-voltage lines, six million miles of distribution lines, and 140 million meters. Utility companies have $1 trillion in assets and $350 billion in annual revenues. The infrastructures are aging and as they are being upgraded, they are transitioned to Smart Grid technologies.

Smart Grid is a U.S. National Policy

The Smart Grid is central to the U.S.'s efforts to increase the reliability, efficiency and security of the electric delivery system and also to increase America's use of renewable and

distributed clean energy. The Smart Grid is also an important piece of the U.S. Administration's overall goal of fostering innovation and creating millions of jobs in a green energy economy. The 2007 Energy Independence and Security Act (EISA) lays out a national policy for the Smart Grid in the U.S. One of its key provisions is the identification of an open standards-based interoperability framework as a foundation. The act tasked NIST to coordinate the development of this standards framework, working closely with Department of Energy, Federal Energy Regulatory Commission (FERC), other federal and state regulators, and of course the private sector which owns and operates 80% of the grid. This task represents an enormous challenge and a tremendous opportunity.

I would like to provide some background on the utility regulation in the U.S. The Federal Energy Regulatory Commission or FERC regulates the interstate transmission, whole sales, and reliability standards. State and Local Commissions regulate local distribution, retail market, retail rates, and generation investments. NIST's work on interoperability standards provides inputs to FERC and State and Local Commissions in their rulemaking to adopt Smart Grid standards.

The White House National Science and Technology Council has established a Smart Grid Subcommittee that is co-chaired by Department of Energy Assistant Secretary Patricia Hoffman and I. The Subcommittee is working on a report that will lay out a comprehensive Administration's policy on Smart Grid. This report will be released in the near future.

Key Federal policy recommendations for Smart Grid include: 1) Enabling cost-effective smart grid investments, 2) Unlocking innovation, 3) Empowering and informing consumers, and 4) Securing the grid. First, Smart Grid investments could be more cost effective through the use of incentives, research and development, and information sharing on best practices. In addition, standards and open markets could further enhance innovation. Further, consumers need to be educated on Smart Grid capabilities and functionalities so that they adopt the technologies and take full advantage of the potential benefits. Finally, cyber-security is crucial to securing the grid.

Goals of U.S. Grid Modernization

There are several key goals that the U.S. is trying to achieve through Smart Grid. The first goal is to increase system efficiency and cost effectiveness. Smart grid helps utilities reduce

delivery losses and customers reduce both peak and average consumption – thus reducing investment otherwise required. The second goal is to improve reliability, resiliency and power quality. Smart Grid sensors and automated controls will improve reliability and will reduce the current cost of power outages which is about $80 billion a year to U.S. economy. The next goal is to provide customers tools to manage energy use. This will enable customer to make wiser choices on their energy usage and can contribute to reducing energy consumption and peak demand. The final goal is to enable use of innovative technologies including renewables, storage and electric vehicles (EVs). Smart Grid will allow large scale integration of renewable sources of energy to the Grid. Further, the use of EVs could reduce CO2 by 20% and urban air pollutants by 40%-90%. In addition, batteries in EVs could provide power during peak demand.

U.S. Smart Grid Investment Grants

The American Recovery and Reinvestment Act (Recovery Act) of 2009 provided funding for Smart Grid deployments through the U.S. Department of Energy Smart Grid Investment Grants. The funding supports deployments of a variety of Smart Grid equipment including 18 million smart meters, 1.2 million in-home display units, 206,000 smart transformers, 177,000 load control devices, 170,000 smart thermostats, 877 networked phasor measurement units, 671automated substations, and 100 PEV charging stations.

U.S. Smart Grid Examples

I would like to highlight some specific examples of Smart Grid demonstration and deployment that are funded by the Recovery Act. First, the Premium Power Corporation Smart Grid Storage Demonstration Project seeks to demonstrate a multi-hour, zinc bromide battery-based energy storage system (ESS) for load shifting, peak shaving, renewable system integration, and support for micro-grid operations. Next, Recovery Act funding supports deployment of nearly 1000 phasor measurement units (PMUs) in the U.S. over the next several years. This will enable grid operators to collect data for real-time situational awareness. Finally, the City of Tallahassee Smart Grid Project seeks to implement a comprehensive demand response program, including smart thermostats and advanced load control systems that will target residential and commercial customers for reducing peak power. More information on these deployments and

other projects are available at the Smart Grid Information Clearing House website that can be accessed at: www.sgiclearinghouse.org.

Global Collaboration is Key to Success

In order to realize the most benefits for the most people, we believe that international standards should be developed and adopted. International standards can yield very significant benefits. For example, many manufacturers of equipment and systems for the Smart Grid have a global presence, and they will need to address markets around the world. International standards can reduce the needs for customization to meet different national/regional standards, thereby reducing the cost of development and providing savings that can be passed on to consumers. International standards can also promote supplier competition, stimulate product and service innovations, and expand the range of options available for consumers at reduced costs. There are several forums available for global collaboration. NIST established the Smart Grid Interoperability Panel (SGIP) in late 2009 as a public-private partnership dedicated to the interoperability of Smart Grid devices and systems. Membership in the SGIP is free and open to all organizations interested in achieving the Smart Grid vision. The International Smart Grid Action Network (ISGAN) is a multilateral cooperation to advance the development and deployment of smart grid technologies and systems globally. Russia, and many other countries, are members of ISGAN. Finally, the Asia-Pacific Economic Cooperation (APEC) Committee on Trade Investment (CTI) recently held a Smart Grid Dialogue that focused on broadening the understanding of the relationship between smart grid interoperability standards and trade and investment flows in the Asia-Pacific region. Since Russia is a part of APEC, this is another possible venue for collaboration.

Thank you and I look forward to participating in the discussion.