Testimony of Commissioner Suedeen G. Kelly
Federal Energy Regulatory Commission
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Introduction and Summary

Mr. Chairman and members of the Committee, thank you for the opportunity to speak here today. My name is Suedeen Kelly, and I am a Commissioner on the Federal Energy Regulatory Commission (FERC or Commission). My testimony addresses the efforts to develop and implement a range of technologies collectively known as the "Smart Grid."

Our nation's electric grid generally depends on decades-old technology, and has not incorporated new digital technologies extensively. Digital technologies have transformed other industries such as telecommunications. A similar change has not yet happened for the electric grid. As detailed below, a Smart Grid can provide a range of benefits to the electric industry and its customers, enhancing its efficiency and enabling its technological advancement while ensuring its reliability and security.

Smart Grid efforts involve a broad range of government agencies, at both the Federal and state levels. The Federal agencies include primarily the Department of Energy (DOE), the National Institute of Standards and Technology (NIST) and FERC. DOE's tasks include awarding grants for Smart Grid projects and developing a Smart Grid information clearinghouse. NIST has primary responsibility for coordinating development of an "interoperability framework" allowing Smart Grid technologies to

communicate and work together. FERC is then responsible for promulgating interoperability standards, once FERC is satisfied that NIST's work has led to sufficient consensus.

Development of the interoperability framework is a challenging task. Recent funding for NIST's efforts will help, but cooperation and coordination among government agencies and industry participants is just as important. DOE, NIST and FERC have been working with each other and with other Federal agencies to ensure progress, and those efforts will continue. FERC also has been coordinating with state regulators, to address common issues and concerns.

FERC can use its existing authority to facilitate implementation of Smart Grid. For example, FERC can provide rate incentives for appropriate Smart Grid projects, and can provide guidance on cost recovery for such projects.

A critical issue as Smart Grid is deployed is the need to ensure grid reliability and cyber security. The significant benefits of Smart Grid technologies must be achieved without taking reliability and security risks that could be exploited to cause great harm to our Nation's citizens and economy.

Finally, if the intent of Congress is for the Smart Grid standards to be mandatory beyond the scope of the Federal Power Act, additional legislation should be considered.

EISA

Section 1301 of the Energy Independence and Security Act of 2007 (EISA) states that "it is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure

electricity infrastructure that can meet future demand growth and to achieve" a number of benefits. Section 1301 specifies benefits such as: increased use of digital technology to improve the grid's reliability, security, and efficiency; "dynamic optimization of grid operations and resources, with full cyber-security;" facilitation of distributed generation, demand response, and energy efficiency resources; and integration of "smart" appliances and consumer devices, as well as advanced electricity storage and peak-shaving technologies (including plug-in hybrid electric vehicles).

Section 1305(a) of EISA gives NIST "primary responsibility to coordinate the development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems." NIST is required to solicit input from a range of others, including the GridWise Architecture Council and the National Electrical Manufacturers Association, as well as two international bodies, the Institute of Electrical and Electronics Engineers and the North American Electric Reliability Corporation (NERC). Many of the organizations working with NIST on this issue develop industry standards through extensive processes aimed at achieving consensus.

Although EISA does not define interoperability, definitions put forth by others often include many of the same elements. These include: (1) exchange of meaningful, actionable information between two or more systems across organizational boundaries; (2) a shared meaning of the exchanged information; (3) an agreed expectation for the response to the information exchange; and (4) requisite quality of service in information

exchange: reliability, accuracy, security. (See GridWise Architecture Council, "Interoperability Path Forward Whitepaper," www.gridwiseac.org)

Pursuant to EISA section 1305, once FERC is satisfied that NIST's work has led to "sufficient consensus" on interoperability standards, FERC must then "institute a rulemaking proceeding to adopt such standards and protocols as may be necessary to insure smart-grid functionality and interoperability in interstate transmission of electric power, and regional and wholesale electricity markets." Section 1305 does not specify any other prerequisites to Commission action, such as a filing by NIST with the Commission or unanimous support for individual standards or a comprehensive set of standards.

FERC's role under EISA section 1305 is consistent with its responsibility under section 1223 of the Energy Policy Act of 2005. Section 1223 directs FERC to encourage the deployment of advanced transmission technologies, and expressly includes technologies such as energy storage devices, controllable load, distributed generation, enhanced power device monitoring and direct system state sensors.

Smart Grid Task Force

As required by EISA section 1303, DOE has established the Smart Grid Task Force. The Task Force includes representatives from DOE, FERC, NIST, the Environmental Protection Agency and the Departments of Homeland Security, Agriculture and Defense. The Task Force seeks to ensure awareness, coordination and integration of Federal Government activities related to Smart Grid technologies, practices, and services. The Task Force meets on a regular basis, and has helped inform

the participating agencies on the Smart Grid efforts of other participants as well as the efforts outside the Federal Government.

Smart Grid Collaborative

A year ago, FERC and NARUC began the Smart Grid Collaborative. I and Commissioner Frederick F. Butler of the New Jersey Board of Public Utilities co-chair the collaborative. The collaborative was timely because state regulators were increasingly being asked to approve pilot or demonstration projects or in some cases widespread deployment in their states of advanced metering systems, one key component of a comprehensive Smart Grid system.

The Collaborative began by convening joint meetings to hear from a range of experts about the new technologies. A host of issues were explored. Key among them were the issues of interoperability, the types of technologies and communications protocols used in Smart Grid applications, the sequence and timing of Smart Grid deployments, and the type of rate structures that accompanied Smart Grid projects.

Through these meetings, Collaborative members learned of a range of Smart Grid projects already in place around the country. The Smart Grid programs in existence were varied in that they used a mix of differing technologies, communications protocols and rate designs. Collaborative members began discussing whether a Smart Grid information clearinghouse could be developed that would then allow an analysis of best practices. This information could help regulators make better decisions on proposed Smart Grid projects in their jurisdictions. As discussed below, recent legislation requires DOE to establish such a clearinghouse.

The Collaborative members have begun to look beyond the information clearinghouse to who could best analyze this information to identify best practices from Smart Grid applications. The Collaborative has met with staff from DOE to discuss possible funding for a project under the auspices of the Collaborative that could act as an analytical tool to evaluate Smart Grid pilot programs, using the information developed by the clearinghouse. This issue is still being explored.

The Stimulus Bill

The American Recovery and Reinvestment Act of 2009 (the "Stimulus Bill") appropriated $4.5 billion to DOE for "Electricity Delivery and Energy Reliability." The authorized purposes for these funds include, inter alia, implementation of programs authorized under Title XIII of EISA, which addresses Smart Grid. Smart Grid grants would provide funding for up to 50 percent of a project's documented costs. In many cases, state and/or Federal regulators could be asked to approve funding for the balance of project costs. The Secretary of Energy is required to develop procedures or criteria under which applicants can receive such grants. The Stimulus Bill also states that $10 million of the $4.5 billion is "to implement [EISA] section 1305," the provision giving NIST primary responsibility to coordinate the development of the interoperability framework.

The Stimulus Bill also directs the Secretary of Energy to establish a Smart Grid information clearinghouse. As a condition of receiving Smart Grid grants, recipients must provide such information to the clearinghouse as the Secretary requires.

As an additional condition, recipients must show that their projects use "open protocols and standards (including Internet-based protocols and standards) if available and appropriate." These open protocols and standards, sometimes also referred to as "open architecture," will facilitate interoperability by allowing multiple vendors to design and build many types of equipment and systems for the Smart Grid environment. As the GridWise Architecture Council stated, "An open architecture encourages multi-vendor competition because every vendor has the opportunity to build interchangeable hardware or software that works with other elements within the system." (See "Introduction to Interoperability and Decision-Maker's Checklist," page 4, www.gridwiseac.org.)

The Collaborative has begun discussing additional criteria that regulators would like to see applied to projects seeking Smart Grid grants. The Collaborative members are focusing on criteria that could help them fulfill their legal responsibilities as to Smart Grid projects they would be asked to approve. For example, cost-effectiveness could be a key criterion and could inform regulatory decisions on rate recovery issues. Upgradeability could be another criterion. Once the Collaborative reaches consensus on the criteria, the Collaborative intends to ask the Secretary of Energy to consider its recommended criteria.

Initial Deployments Are Still In Progress

Initial efforts to use Smart Grid technologies are still being implemented and analyzed. Even comprehensive pilot projects such as Xcel's project in Boulder, Colorado (which includes smart meters, in-home programmable control devices, smart substations

and integration of distributed generation), are in the early stages of development and data gathering. Thus, it is too early to assess the "lessons learned" from such efforts.

A particularly interesting project, however, is under development by Pepco Holdings, Inc. (PHI). At the transmission level, Smart Grid can be equated with wide-spread deployment of advanced sensors and controls and the high-speed communications and IT infrastructure needed to fully use the additional data and control options to improve the electric system's reliability and efficiency. PHI's proposal follows this model. In a filing with FERC seeking approval of incentive rates, PHI committed to promote interoperability through insistence "upon open architecture, open protocols and 'interoperability'" when dealing with potential vendors, and to adhere to "available standards which have been finalized, proven, and have achieved some levels of broad industry acceptance" as much as possible for its Smart Grid deployments. Furthermore, PHI committed to "provide a method of upgrading systems and firmware remotely (through the data network as opposed to local/site upgrades) and ensure that unforeseen problems or changes can be quickly and easily made by PHI engineers and system operators on short notice." Adherence to such principles, along with adequate consideration of cyber security concerns, is essential at this early stage of Smart Grid development. The Commission granted incentive rates for this project, and construction is expected to start in 2009.

Next Steps

As Congress recognized in enacting EISA, the development of an interoperability framework can accelerate the deployment of Smart Grid technologies. The process of

developing such a framework may take significant time. NIST has primary responsibility for this task, and must coordinate the efforts and views of many others. As a non-regulatory agency, NIST is used to serving as a neutral mediator to build consensus towards standards. Achieving consensus among the many, diverse entities involved in Smart Grid may be difficult. Coordinated leadership is needed to help minimize conflicting agendas and unnecessary delay. The Stimulus Bill's funding will help NIST's efforts, but may not guarantee quick achievement of the goals.

In the meantime, the Commission may be able to take steps to help hasten development and implementation of Smart Grid technology. For example, the Commission's day-to-day knowledge of the electric industry may allow it to suggest aspects of the interoperability framework that should be prioritized ahead of others. This prioritization may facilitate progress on the Smart Grid technologies that will provide the largest benefits for a broad group of participants.

An overarching approach for prioritization could focus initially on the fundamental standards needed to enable all of the functions and characteristics envisioned for the Smart Grid. This may include, for example, standards for cyber security, since the electric grid and all devices connected to it must be fully protected. This approach also may include standards that promote common software semantics throughout the industry, which would enable real-time coordination of information from both demand and supply resources.

The next set of targets for prioritization could be standards needed to enable key Smart Grid functionalities identified by relevant authorities including FERC. For

example, challenges associated with integrating variable renewable resources into the generation mix and reliably accommodating any new electric vehicle fleets could be addressed, at least in part, through certain capabilities envisioned for the Smart Grid. Accordingly, priority could be placed on the development of: (1) standards permitting system operators to rely on automated demand response resources to offset an unplanned loss of variable generation such as wind turbines or to shift load into off-peak hours with over-generation situations; (2) standards permitting system operators to rely on emerging electric storage technologies for similar purposes; (3) standards permitting transmission operators to rely on technologies such as phasor measurement units for wide-area system awareness and congestion management; and, (4) standards permitting some appropriate control over the charging of plug-in hybrid electric vehicles, particularly encouraging such charging to occur during off-peak hours.

Even before NIST's work has led to sufficient consensus, the Commission could provide rate incentives to jurisdictional public utilities for early implementation of certain Smart Grid technologies, if adequate steps are taken to ensure reliability and cyber security while minimizing the risk of rapid obsolescence and "stranded costs." The Commission also may be able to use its ratemaking authority, apart from incentives, to encourage expansion of Smart Grid technologies. Providing clear guidance on the types of Smart Grid costs recoverable in rates, and on the procedures for seeking rate recovery, may eliminate a major concern for utilities considering such investments.

While FERC, by itself, may be able to take steps such as these to foster Smart Grid technologies, achieving the full benefits of a Smart Grid will require coordination among

a broad group of entities, particularly DOE, NIST, FERC and state regulators. For example, DOE's authority to support up to 50 percent of the cost of a Smart Grid project may elicit little interest from utilities if they are uncertain of their ability to recover the rest of their costs. Similarly, Congress itself recognized, in EISA section 1305(a)(1), the need for NIST to seek input from FERC, the Smart Grid Task Force established by DOE and "other relevant Federal and state agencies." Also, the concurrent jurisdiction of FERC and state commissions over many utilities will require regulators to adopt complementary policies or risk sending conflicting regulatory "signals." More fundamentally, a Smart Grid will require substantial coordination between wholesale and retail markets and between the Federal and state rules governing those markets. Similarly, Smart Grid standards may require changes to business practice standards already used in the industry, such as those developed through NAESB, and the industry and government agencies should support the work needed to evaluate and develop those changes.

Concerns about access to, and security of, Smart Grid control systems and/or data also must be resolved. For example, data on how and when individual customers use electricity could be valuable to various commercial entities, but customers may have privacy concerns about unauthorized dissemination or marketing of this data. Similarly, generation owners and operators may be concerned about cyber access to control systems that operate their facilities. Access to information enabling the identification of critical energy infrastructure must also be limited. Issues about who owns Smart Grid-generated data and the security of some of its products are unresolved.

An additional issue involves enforcement of Smart Grid standards promulgated by the Commission under EISA section 1305. This section, which is a stand-alone provision instead of an amendment to the Federal Power Act (FPA), requires FERC to promulgate standards, but does not provide that the standards are mandatory or provide any authority and procedures for enforcing such standards. If FERC were to seek to use the full scope of its existing FPA authority to require compliance with Smart Grid standards, this authority applies only to certain entities (i.e., public utilities under its ratemaking authority in Sections 205 and 206, or users, owners and operators of the bulk power system under its reliability authority in Section 215). FERC also has asserted jurisdiction in certain circumstances over demand response programs involving both wholesale and eligible retail customers. However, FERC's authority under the FPA excludes local distribution facilities unless specifically provided, its authority under sections 205 and 206 applies only to public utilities, and its section 215 authority does not authorize it to mandate standards but rather only to refer a matter to NERC's standard-setting process. If the intent of Congress is for the Smart Grid standards to be mandatory beyond the scope of the Federal Power Act, additional legislation should be considered.

Finally, in developing and implementing Smart Grid technologies, the electric industry and vendors must meet the critical need, recognized by Congress in EISA section 1301, for grid reliability and "full cyber-security." An entity subject to FERC-approved reliability standards under FPA section 215 must maintain compliance with those standards during and after the installation of Smart Grid technologies. Also, the interoperability framework and the technology itself must leave no gaps in physical

security or cyber security. Reliability and security must be built into Smart Grid devices, and not added later, to avoid making the grid more vulnerable and to avoid costly replacement of equipment that cannot be upgraded. The significant benefits of Smart Grid technologies must be achieved without taking reliability and security risks that could be exploited to cause great harm to our Nation's citizens and economy.

Conclusion

A properly-coordinated and timely deployment of Smart Grid can provide many positive benefits to the Nation's electric industry and its customers, if we are careful to maintain and enhance grid security and reliability at the same time. Indeed, I would expect Smart Grid to evolve in many unanticipated but beneficial ways. Well-designed standards and protocols are needed to make Smart Grid a reality. They will eliminate concerns about technology obsolescence, allow system upgrades through software applications, and ultimately permit plug-and-play devices, regardless of vendor. FERC is committed to working closely with DOE, NIST and others to facilitate rapid deployment of innovative, secure Smart Grid technologies.

Thank you again for the opportunity to testify today. I would be happy to answer any questions you may have.