

**Testimony of Commissioner Suedeen G. Kelly  
Federal Energy Regulatory Commission  
Before the Energy and Environment Subcommittee of the Committee on  
Science and Technology  
United States House of Representatives  
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**Introduction and Summary**

Mr. Chairman and members of the Subcommittee, 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 uses 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. While we are moving forward expeditiously on smart grid, its implementation will take time.

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 the FERC. DOE’s tasks include funding research and development; awarding grants for smart grid projects; managing the Smart Grid Task Force, discussed below; 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. The FERC is then responsible for adopting 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.

The FERC can use its existing authority to facilitate implementation of smart grid. For example, through its recent final smart grid Policy Statement (Policy Statement), the Commission has specified criteria for recovery of costs of investing in jurisdictional smart grid facilities.

A critical issue as smart grid is deployed is the need to ensure grid reliability and cybersecurity. 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 that everyone must comply with the smart grid standards adopted by the Commission under the Energy Independence and Security Act of 2007 (EISA), additional legislation would need to be considered.

### **What is the Smart Grid?**

“Smart grid” refers to the effort to modernize the electric grid to improve the way we deliver and use power. The smart grid takes the existing electricity delivery system and makes it smarter by linking seamless communications systems to the electrical transmission and distribution system between any point of generation and any point of consumption. It can monitor, protect and automatically optimize the operation of the interconnected elements. The smart grid will provide a two-way flow of electricity and information to create a more automated and efficient energy delivery network.

The smart grid concept encompasses all levels of the electric system, and, therefore, a comprehensive list of applications and technologies could be quite long. Two key examples, however, include: (1) smart thermostats capable of receiving and responding to electricity price or dispatch signals to lower or raise demand as necessary to balance available supply at the device level; and (2) advanced sensor networks on the distribution and transmission grids to improve awareness of actual system conditions and, thus, permit more advanced control and use of those grids.

### **How do Technology and Regulation Interact?**

Existing retail and wholesale regulatory frameworks generally assume that load (i.e., customer consumption; also called demand) is an uncontrollable variable that can only be addressed with controllable generation. Accordingly, load pays to consume the energy it needs, and generation is paid to meet that need no matter how variable and unpredictable it may be. This mutes any incentive for load to shift its usage in grid-favorable ways and increases the challenge and cost

of accommodating such load with generation. The smart grid concept seeks to move away from this framework by making all aspects of the electric system, including the load side, more transparent, interactive, and responsive.

This interplay between technology and regulation is visible in the Commission's examination of its rate policies in light of the new Congressional directive in the EISA to initiate rulemakings on smart grid interoperability standards. As explained in more detail below, the Commission recently issued a smart grid Policy Statement that adopts an interim rate policy to help encourage investment in smart grid systems.

At the consumer level, a smart grid could include smart devices, such as smart thermostats capable of receiving and responding to electricity price or dispatch signals to lower or raise demand as necessary to balance available supply at the device level. State regulators have the authority and ability to provide pricing and dispatch signals at retail. If signals reflect real-time costs, consumers are likely to buy and install smart devices. For example, consumers might install smart thermostats if regulators provide real-time price signals.

### **What Federal Regulation Applies?**

Federal regulation relevant to smart grid is found in the following statutes: EISA; the Energy Policy Act of 2005; and the American Recovery and Reinvestment Act of 2009. The provisions of the FPA can also be used to advance smart grid technologies. These are discussed below.

Section 1301 of the 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 the 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 the 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 and security. (See GridWise Architecture Council, “Interoperability Path Forward Whitepaper,” [www.gridwiseac.org](http://www.gridwiseac.org))

Pursuant to EISA section 1305(d), once the Commission is satisfied that NIST’s work has led to “sufficient consensus” on interoperability standards, it 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.

The Commission’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.

Recently, 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 directed 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](http://www.gridwiseac.org).)

The Commission’s interest and authority in the area of smart grid derives not only from the EISA but also from its authority under the Federal Power Act (FPA) over the rates, terms and conditions of transmission and wholesale sales in interstate commerce and its responsibility for reliability standards for the bulk-power system. Specifically, the Commission has jurisdiction over transmission and sales for resale of electric energy in interstate commerce by public utilities pursuant to FPA section 201 and over the approval and enforcement of reliability standards for the bulk-power system under FPA section 215.

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 FPA, requires the Commission to promulgate standards, but does not provide that the standards are mandatory or provide any authority or procedures for enforcing such standards. If the Commission were to seek to use the full scope of its existing FPA authority to require compliance with smart grid standards, most of its authorities apply 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). The Commission also has asserted jurisdiction in certain circumstances over demand response programs involving both wholesale and eligible retail customers. However, The Commission’s authority under the FPA excludes local distribution facilities unless specifically provided; its rate authority under sections 205 and 206 applies only to public utilities; and its section 215 reliability authority does not authorize it to mandate standards but rather only to refer a matter to NERC’s standard-setting process. Further, its section 215 reliability authority excludes Alaska and Hawaii. If the intent of Congress is that everyone must comply with the smart grid standards

adopted by the Commission under the EISA, additional legislation should be considered.

While FERC, by itself, may be able to take steps 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, 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.” On another front, DOE’s authority to support up to 50 percent of the cost of a smart grid project must be matched with regulatory approvals allowing utilities to recover the rest of their costs in rates. Similarly, the concurrent jurisdiction of the FERC and state commissions over many utilities will require regulators to adopt complementary policies to avoid 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 the North American Energy Standards Board, and the industry and government agencies should support the work needed to evaluate and develop those changes.

### **How are the FERC, NIST and DOE Collaborating?**

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 of the smart grid efforts of other participants as well as the efforts outside the federal government. FERC has designated two employees (one from the Office of Energy Policy and Innovation and one from the Office of Electric Reliability) to the Task Force. These employees bring a policy, rates, reliability and cybersecurity perspective to the Task Force. The FERC routinely updates the Task Force on the FERC/NARUC smart grid Collaborative, discussed below, and other FERC orders regarding smart grid policy.

Independent of the Smart Grid Task Force, the Commission has coordinated closely with NIST and DOE on the development of interoperability standards for the smart grid. Several FERC commissioners and staff have participated in relevant meetings and conferences as speakers and/or session chairs. FERC staff also confers regularly with NIST and DOE staff on

interoperability standards, discussing matters such as accelerating the timeline, strategies to achieve consensus, and setting priorities.

### **How is FERC Collaborating with the States?**

In February 2008, 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. Initiation of a collaborative effort 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 accompany 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. In keeping with the Stimulus Bill, DOE is working 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. Funding is being sought 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, once the clearinghouse information becomes available. DOE recently selected a contractor to set up the clearinghouse.

The Collaborative also developed criteria to apply to projects seeking smart grid grants. The Collaborative members focused on criteria that could help them fulfill their legal responsibilities as to smart grid projects they would be asked to approve. DOE has adopted many of the Collaborative's suggested funding criteria

regarding data disclosures, cybersecurity, interoperability and requirements related to the identification of project benefits.

In addition, the Collaborative has met with DOE staff to discuss possible funding for technical assistance to the Collaborative and state regulators as they engage with NIST and other stakeholders in the development of smart grid interoperability standards and protocols.

The Commission and NARUC also have a Demand Response Collaborative headed up by FERC Chairman Jon Wellinghoff, Commissioner Phyllis Reha of the Minnesota Public Utilities Commission, and Commissioner Katrina McMurrin of the Florida Service Commission. The Demand Response Collaborative often focuses on smart grid issues because demand response will play an integral role in the smart grid. Smart grid technologies have considerable potential to facilitate demand response, and demand response can help address bulk-power system challenges, including reliably integrating unprecedented amounts of renewable resources into the grid.

### **How is the FERC Reaching Out to Industry?**

The Commission performs continuing outreach within the electric power industry to ensure that regulated entities are aware of NIST's process for the development of the framework for interoperability standards and to encourage participation in this process. Numerous discussions have occurred with regional transmission organizations, the ISO-RTO Council (a coordinating entity comprised of ten independent system operators and regional transmission organizations in North America), and public utilities that have been actively involved in smart grid projects, including Xcel, AEP, SoCal Edison, PG&E, Oncor, Consumers Energy, and Duke. The Commission has also followed the efforts of the GridWise Architecture Council in order to get a better understanding of smart grid interoperability standards from an information technology point of view. The GridWise Architecture Council was formed by DOE to promote and enable interoperability among the many entities that interact with the nation's electric power system.

### **The FERC's Policy Statement**

Last week, the Commission approved its smart grid Policy Statement. This action was preceded by the issuance of a proposed policy statement on March 19, 2009. Over 70 comments were received in response to the proposed policy statement.



The Policy Statement prioritizes the development of key interoperability standards. This prioritization will facilitate progress on the smart grid technologies that will provide the largest benefits to a broad group of market participants.

The Policy Statement establishes two cross-cutting and four functional priorities for interoperability standards. The cross-cutting priorities are cybersecurity and standardized communication across intersystem interfaces. To insure the integrity and reliability of the underlying bulk-power system, the Commission has required a demonstration of sufficient cybersecurity protections in all proposed smart grid standards to be considered in the FERC rulemaking process directed by the EISA, including, where appropriate, a proposed smart grid standard applicable to local distribution-related components of smart grid. The Commission has also recognized that development of a common semantic framework and software models to enable effective communication and coordination across the inter-system interfaces is critical to supporting all of the smart grid goals, such as system self-healing, integration of diversified resources and improved system efficiency and reliability.

The four functional priorities are wide-area situational analysis, demand response, electric storage, and electric transportation. First, wide-area situational analysis awareness is imperative for enhancing reliability of the bulk-power system because it allows for greater knowledge of the current state of available resources, load requirements and transmission capabilities. Second, smart grid technologies have considerable potential to promote demand response, which can reduce wholesale prices and wholesale price volatility and reduce potential generator market power. Third, as the technology advances, electricity storage will become a valuable resource providing a variety of services to the bulk-power system, including helping to address large-scale changes in generation mix. Finally, to the extent that new electric transportation options become more widely adopted in the near future, maintaining the reliable operation of the bulk-power system will require some level of control over when and how electric vehicles draw electricity off the electric system. Therefore, the Commission has urged the early development of standards that can permit distribution utilities to facilitate electric vehicle charging during off-peak load periods.

In the Policy Statement, the Commission also adopted an interim rate treatment to encourage the near-term deployment of smart grid systems capable of helping to address challenges to the operation of the bulk-power system, if certain conditions are met. Those conditions include showing that (1) the smart grid facilities will advance the smart grid concept, (2) reliability and cybersecurity of the bulk-power system will not be adversely affected, (3) the applicant has minimized the possibility of stranded investment in smart grid equipment, and (4)

the applicant must share feedback useful to the interoperability standards development process with the Department of Energy Smart Grid Clearinghouse. The conditions that FERC has put in place for FERC-jurisdictional costs may serve as a model for retail regulators.

### **Conclusion**

A 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. The dynamic nature of smart grid technologies and practices are, in some cases, creating challenges in government oversight of the power industry. There is a great need for continued collaboration between state and federal regulators and between industry and government in general. The 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 attempt to answer any questions you may have.