

**Opening Remarks by**  
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**Introduction**

Chairman Wellinghoff, Commissioners and staff, I would like to thank the Commission for organizing this conference and giving me the opportunity to describe NIST's and our partners efforts to develop standards for an interoperable smart grid.

To provide context for today's discussion I would like to briefly review:

1. The overall process used by NIST in coordinating the development of the smart grid interoperability framework, and how the process is evolving,
2. How the five IEC standards fit within that process, and
3. Discuss the terms "consensus" and "adoption" and their relation to EISA.

**The NIST process**

Congress, the Administration, and industry executives have repeatedly stressed the urgent need to establish protocols and standards for the smart grid. Achieving EISA's vision of a smart grid in which the electric grid, smart appliances, electric vehicles, distributed renewables and other elements can interwork cannot be accomplished without moving away from the legacy proprietary, customized systems that characterize today's system to a framework based on open, interoperable standards. Without standards, there is the potential for technologies now being implemented with sizable public and private investments to become prematurely obsolete or be implemented without adequate security. The urgency became even more pronounced with the announcement of plans to use American Recovery and Reinvestment Act (ARRA) funding to invest in smart grid deployments.

Recognizing the urgency, in April 2009, NIST announced a three-phase plan to carry out its EISA responsibilities.<sup>i</sup> In May 2009, U.S. Secretary of Commerce Gary Locke and U.S. Secretary of Energy Steven Chu convened a meeting of nearly 70 top executives from the power, information technology, and other industries. The executives expressed their organizations' commitment to support the process established by NIST.<sup>ii</sup>

The process had three phases:

- Phase 1, which took place from April 2009 to January 2010 engaged stakeholders in a participatory public process to identify applicable standards and requirements, and gaps in currently available standards, and priorities for additional standardization activities.
- Phase 2, which began in November 2009 and is ongoing, established a public/private partnership called the Smart Grid Interoperability Panel (SGIP) to continue development of interoperability standards and drive longer-term progress.<sup>iii</sup>
- Phase 3, which is also ongoing, is developing a testing and certification framework for the smart grid standards.

The NIST Release 1.0 Framework, published in January 2010, was the output of Phase 1. This document describes a high-level reference model, and identifies 25 protocols and standards that are relevant and important to support interoperability of the smart grid. An additional 50 standards were identified for future consideration. The five IEC standards which are the subject of today's conference were among the 25 standards.

This document was drafted through an open public process that engaged the broad spectrum of Smart Grid stakeholder communities and the general public. Input was provided through three public workshops, in April, May and August 2009, in which more than 1500 individuals representing hundreds of companies participated.<sup>iv</sup> In June 2009 an initial list of 16 standards was published, which included the five IEC standards.<sup>v</sup>

NIST employed two additional means to seek broader stakeholder input. Public comments were sought on the listed standards through three separate federal register notices, on June 9<sup>vi</sup>, June 30<sup>vii</sup>, and October 9, 2009.<sup>viii</sup> NIST is also using a web-based collaboration site (called a wiki) on which all information developed through this process is publicly available and anyone can post comments. All comments received on the standards were considered and addressed in finalizing the NIST Release 1 Framework. The initial list of 16 standards was expanded to 25 on the basis of the comments received throughout the process. During the nine months in which comments were sought through the federal register notices and the wiki, the preponderance of comments on the standards was positive and no comments were received proposing deletion of any of the 25 standards identified in the NIST Release 1 Framework.

The development of standards is an ongoing process. All standards undergo periodic revision to correct shortcomings, address new requirements, and incorporate new technologies. During Phase 1, gaps in the identified standards were noted as well as the need to develop additional standards. Sixteen Priority Action Plans were established coordinate development of revisions to the identified standards and accelerate the development of needed new standards.

To provide a more institutionalized process for the ongoing evolution of the standards and create a testing and certification framework, NIST established the Smart Grid Interoperability Panel. The panel's formation marked the beginning of Phase 2 of the NIST process and it has been in operation for a little over a year.

During its first year of operation the SGIP has focused its effort on establishing processes and procedures for its work; overseeing and expediting the completion of the Priority Action Plans established in the NIST Release 1 Framework; creating additional action plans as needed; developing the Cyber Security Guidelines for the Smart Grid including a methodology for reviewing the cyber security aspects of standards; and developing a testing and certification framework.

The SGIP is also developing a process to maintain a Catalog of Standards that will contain descriptive information about the smart grid standards that will be helpful to regulators and the broader smart grid community. The process for developing and maintaining this catalog is still under development within the SGIP, and it is expected to be finalized by March.

There are many standards needed for the smart grid and they are in varying stages of maturity. Some have been in existence for years and are already realized in products that are being used by industry; others are more recent and are appearing in products but not yet widely deployed; and yet others are still in draft form and will be used in future products when they are finalized. Some standards have well-established testing and certification programs; others do not and these have yet to be developed. Some standards have reference implementations that can aid implementers in ensuring interoperability. It is important for all stakeholders in the process to understand the applicability of each standard, where it is in its lifecycle, limitations and issues with its use, the availability of testing programs and tools to support implementation, and any intellectual property issues that may affect its use.

The SGIP's vision for its catalog is not merely to list standards, but to provide descriptive information that will provide a more complete understanding of these and other attributes of the standards. It will provide factual information, vetted through a consensus process, that will be helpful to the smart grid community, including FERC and other regulators. The SGIP catalog of standards will be an important element of the NIST process going forward, when it is in place.

Another critical aspect of the ongoing process is cyber security. The SGIP process requires each of the standards in the NIST Release 1 Framework to be assessed by the SGIP Cyber Security Working Group, using criteria described in the NISTIR 7628, Cyber Security Guidelines for the Smart Grid. CSWG assessments of the five IEC standards had been completed when we posted them in October and recommended updates to the standards were documented in the assessments. Since October, assessments of 7 additional standards have been completed. The cyber security assessment process will evolve as we obtain feedback on the standards we have reviewed; understand the boundaries or cyber security scope that the review must

be based on; document and take into consideration the implementation assumptions; and broaden the base of cyber security experts willing to volunteer to assist in these assessments.

I would like to make one additional comment about the SGIP process, in relation to the representation of various stakeholder categories. In designing the SGIP, NIST has sought to ensure broad representation by all categories of stakeholders in the smart grid community, under a governance structure that ensures appropriate balance of interests. Ensuring balance is critical, and NIST regards its neutral role as critical to achieving this. A fundamental difference between the smart grid and the legacy grid is that the smart grid involves two-way interaction and information exchange between the utility systems and systems and devices on the customer side of the meter. Thus the smart grid impacts everyone – the various categories of electric utilities, grid suppliers from many different industries, consumers both residential and industrial, the electric vehicle industry, appliance manufacturers and building automation providers to name a few.

In designing the SGIP Governance structure, NIST listened carefully to the views of the electric utility industry that its critical mission required that it should play a super ordinate role in decision-making in the SGIP. NIST also heard the views of other industrial sectors, including the electrical equipment manufacturers, information technology industry, communications equipment and service providers, appliance manufacturers, building automation suppliers, electric vehicle manufacturers and others, that their sectors needed greater influence in the process and that the utilities lacked necessary expertise that their sectors brought to the table. NIST designed a governance structure in which seven different sectors of the electric utility industry - IOUs, municipals, rural cooperatives, transmission operators, independent power producers, energy traders, and renewable generation providers, each had an individual seat on the governing board, as well as the opportunity to run candidates for the three at large seats on the board. This gives the electric utility industry a minimum of 7 and potentially as many as 10 seats on the 25 person governing board. We continue to hear concerns from the electric utility industry that they are underrepresented on the governing board, as well as concerns by the other sectors that the governing board is dominated by the utilities. This is probably an indication that we have struck a reasonable balance.

The SGIP Governing Board has established well-defined mechanisms to introduce improvements to the structure and processes of the SGIP as it gains experience. Continuing improvement is an essential part of the process and suggestions from stakeholders are critical to our progress.

### **The Five Standards**

The development and adoption of standards for the Smart Grid is a daunting undertaking and nothing like this has ever been done before. There are no relevant historical parallels and no “cookbook” on which NIST and FERC can draw to tell us

how to implement the respective responsibilities that Congress assigned our agencies.

Few, if any, interoperability standards have ever been adopted in regulation for national infrastructures such as the legacy electric grid, the telecommunications system, or the internet. Considering the adoption of smart grid standards will involve significant and complex policy questions. Since deployment of smart grid technologies is already underway with significant investment of public funds, it is urgent to begin consideration of these policy questions now. NIST's intent in identifying the the five standards as ready for consideration was to allow FERC to begin the process of considering how to move from the development of smart grid standards into adoption through the regulatory process, as directed by EISA.

A practical issue that FERC faces is that the development of standards for the smart grid will be an ongoing process spanning many years and eventually result in hundreds of standards. How should FERC deal with this? The five IEC standards provide a good starting point to understand the complex issues involved. NIST picked these particular standards because they are important to interoperability, are mature, had strong consensus for inclusion in the NIST Framework, are being used in deployments either in whole or in their constituent parts, and had undergone a cyber security assessment by the CSWG. As I explained in my presentation at the November technical conference, interoperability in the smart grid requires a "common language" of data models and identifiers to enable communication across systems and applications, and these standards play an important, although not exclusive role, in filling this need. I refer to the presentation made by George Bjelovuk, Secretary of the SGIP and an executive at American Electric Power, at the November technical conference, in which he stated:

"AEP selected the well-established IEC standards as the basis for many of its system deployments - NIST's selection of five IEC standards are among the most mature in the industry."

There are two other suites of standards (DNP3 and Multispeak) included in the NIST Release 1 Framework that provide alternatives to some of the functionality in the five IEC standards and are widely used. DNP3 is a legacy standard that is widely deployed and will continue to be supported. Multispeak is a simpler standard better suited to the needs of the rural cooperatives. The NIST Framework allows these standards to coexist, serving different marketplace needs, and established Priority Action Plans to develop mappings between the standards so they can interoperate. NIST did not include DNP3 and Multispeak in the initial set of standards for FERC consideration because the CSWG had not yet done cyber security assessments on these standards. These assessments are scheduled.

### **Consensus, Adoption and Relation to EISA**

EISA directed NIST 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, soliciting input and cooperation from private entities” and other stakeholders. EISA further directs FERC to “institute a rulemaking to adopt such standards and protocols as may be necessary to insure smart-grid functionality and interoperability” at any time after NIST’s work has led to “sufficient consensus” in the Commission’s judgment.

Consensus in NIST’s work needs to be determined at two levels: consensus on what standards should be included in the NIST framework, and consensus on the technical content of individual standards,

Consensus about the standards that should be included in the Release 1 NIST framework - because they are relevant and important to achieving smart grid interoperability - was clearly established through the process I described earlier. The ongoing work of the SGIP will establish consensus on additional standards to be added to future releases of the framework.

Consensus on the technical content of the individual standards in the framework is determined by the standard development organization that produces them. NIST requires that all standards included in the NIST Framework be produced by SDOs with a robust consensus process, consistent with the principles of OMB Circular A119 and the National Technology Transfer and Advancement Act (P.L. 104 -113). This does not mean that the standards are perfect – all standards can be improved. That is why standards undergo periodic revision. The SGIP processes have been established to provide requirements to the ongoing evolution of the standards.

A more difficult question to answer is whether the Commission should adopt some of these standards because their adoption “may be necessary to insure smart grid functionality and interoperability.” The consensus standards process cannot answer this question – only the Commission’s process can. Although this question is not the subject for today’s conference, it is really the question everyone has in mind and is difficult to separate from the subjects we will be discussing today.

Industry has legitimate concerns that if standards are adopted in regulation, the resulting regulation may not allow enough flexibility in applying the standards to accommodate legacy equipment, timeframes for transition and other important considerations and this may have costly unintended consequences. In general, industry has a strong preference not to see standards adopted in regulation. This concern will naturally motivate many industry participants to cite various reasons why FERC should not consider adopting these or other standards - even though these participants participated in and supported the NIST-coordinated process and already use these standards on a voluntary basis.

United States standards policy and practice generally acknowledge and reflect this industry concern. In the US, the vast majority of standards are accepted by the market on a purely voluntary basis without any regulatory action or consideration. However, standards are sometimes adopted through regulation when policy makers decide this is necessary to accomplish some policy objective, for example safety, security, or promotion of competition.

The provision in EISA that directs FERC to consider adoption of smart grid standards clearly indicates that Congress believed that implementation of smart grid standards might not occur if left entirely to the market and therefore might need some regulatory support. This reflects a very significant policy choice for the smart grid, because if we look at other infrastructures such as the telephone system or the internet there are few if any interoperability standards that have been adopted in regulation.

What is different about the smart grid? For one thing, the electric grid has a tradition of using many proprietary customized systems, and there has never been a need for information systems on the utility side of the meter to interact with systems and devices on the customer side of the meter. Implementing the smart grid requires a movement away from proprietary systems to interoperable systems based on open standards. Cyber security considerations also mean that the grid needs to move away from past practice of “security by obscurity” to systems incorporating best current practices in cyber security. With 3200 electric utilities, and hundreds of suppliers from industries that have never before had to work together, provisions in EISA reflect a desire by policy makers that this transition take place in a timely manner, which may not happen if left entirely to market choice, and that regulation might need to play a role in making it happen.

In considering whether it is necessary to adopt standards for the smart grid, it will be important for the Commission to keep in view this overarching policy issue and not become bogged down in the weeds. An important question the Commission should seek to understand is whether the smart grid standards will be adopted by industry in a timely way, or whether it is necessary for the Commission to use its regulatory authority to encourage their use. The Commission has clearly stated on a number of occasions that it does not believe EISA gives it the authority to mandate or enforce smart grid standards, so I infer that the Commission’s intent is not to micromanage decisions best left to industry or to enforce compliance with individual standards. I infer that the Commission’s goal is to provide forward-looking guidance to insure realization of smart grid functionality and interoperability as envisioned in EISA.

A procedural question the Commission must decide is whether to do rulemaking on individual smart grid standards or families of standards, as it does today with NERC and NAESB standards. This may not be the right approach for the smart grid. By the time the Commission adopts rules on the many individual standards in the NIST Framework, which could take years, significant investments in grid modernization

will already have occurred, and there is the danger that a lot of investment will continue to be made in proprietary systems that do not support smart grid interoperability.

I recommend that the Commission consider taking a different approach that focuses on the question of whether regulatory adoption is needed to insure use of the standards by industry to achieve smart grid interoperability. For example, the Commission might request information on industry's roadmaps and plans for implementation of the standards in the NIST framework. Based on the information received, the Commission could ascertain whether industry use of the standards will naturally occur in a timely way, or whether regulatory adoption and encouragement is needed. The Commission might consider adopting the interoperability standards at a more "macro" level and adopt policies that provide motivations for their use. If encouragement is needed, it must be provided soon if it is to influence the significant investments in grid modernization that will occur over the next several years.

Thank you for the opportunity to provide opening remarks for this conference and I look forward to the discussion.

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<sup>i</sup> [http://www.nist.gov/smartgrid/smartgrid\\_041309.cfm](http://www.nist.gov/smartgrid/smartgrid_041309.cfm)

<sup>ii</sup> <http://www.commerce.gov/news/press-releases/2009/05/18/locke-chu-announce-significant-steps-smart-grid-development>

<sup>iii</sup> [http://www.nist.gov/public\\_affairs/releases/smartgrid\\_111909.cfm](http://www.nist.gov/public_affairs/releases/smartgrid_111909.cfm)

<sup>iv</sup> [http://www.nist.gov/smartgrid/smartgrid\\_wksp\\_072409.cfm](http://www.nist.gov/smartgrid/smartgrid_wksp_072409.cfm)

<sup>v</sup> <http://edocket.access.gpo.gov/2009/E9-13514.htm>

<sup>vi</sup> <http://edocket.access.gpo.gov/2009/E9-13514.htm>

<sup>vii</sup> <http://edocket.access.gpo.gov/2009/E9-15467.htm>

<sup>viii</sup> <http://edocket.access.gpo.gov/2009/E9-24429.htm>