Section One: Short- to Mid-term Challenges and Recommendations

Introduction

This section of the report represents the combined work of SGFAC Subcommittees One and Two focused on the short- and mid-term challenges and recommendation. This section incorporates the overall perspectives aggregated from 21 interviews of stakeholders across the Smart Grid regarding the Smart Grid Interoperability Panel (SGIP) process. Specific gaps and areas of concern, along with proposed recommendations, are discussed below.

Overview

The following are the overarching themes that emerged from the interviews. In general, these themes are consistent with what stakeholders have stated in various industry forums and filings with NIST and the Federal Energy Regulatory Commission (FERC).

- *Interoperability standards greatly impact utility business models with respect to operations, reliability and cost effectiveness; thus, utilities should be appropriately represented in the SGIP process due to significant smart grid investments, cost recovery, legacy systems/obsolescence, stranded costs and involvement/responsibilities in almost all aspects of the grid.*

- *Greater satisfaction was expressed with the current SGIP process along with appreciation of NIST's increased openness to utility concerns post-FERC technical conference in January 2011. Outreach and dialogue with policy-makers needs to continue at all levels.*

- *Need to position interoperability standards "on the radar screen" of utilities and regulators to get them more engaged in the SGIP process because interoperability standards may change and because keeping the standards voluntary is critical; there is still risk of future compliance requirements and enforcement guidelines.*

- *There is an urgent need for a formal communication, outreach and education program to solicit greater participation of key stakeholders; the SGIP's Communication, Marketing and Education (CME) Working Group should be encouraged to expand its role and to develop a comprehensive marketing plan.*

- *Prioritization of standards work and the consolidation of competing industry forums for utility engagement are even more critical due to limited resources—for instance, there is a need to prioritize priority action plans (PAPs), and focus on those that best suit established utility value propositions first. The current pace of PAP activity is unfocused and overwhelming for the stakeholders—both utilities and regulators—responsible for investing in them.*

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- *NIST should ensure that the pace of standards identification, development, and stakeholder acceptance allows utilities and regulators to make a measured and thoughtful analysis of the impact of these standards; the focus should be on quality and not on getting the job done as quickly as possible.*

- *Reliability and implementation reviews are critical; there is a need for the establishment of a standing Implementation and Reliability Committee (IRC) in the SGIP process that would operate in the same manner as the existing SGIP standing committees, consisting of the appropriate utility and regulator representatives with the opportunity to provide direct transmission and distribution expertise into the SGIP process.*

- *There is a need to consolidate industry cyber activities along with a clearer definition and understanding of the cybersecurity standards and goals for utilities to engage more fully.*

- *An uneven state regulatory landscape re Smart Grid is a barrier, and utilities and their public policy and advocacy representatives need to perform outreach to the states for support through the National Association of Regulatory Utility Commissioners (NARUC); FERC-NARUC Collaborative considered a good forum for this.*

- *Many stakeholders strongly approved of FERC's decision terminating the standards docket and encouraging participation in the SGIP process; they agree that FERC's role should continue to be minimal and limited to guidance to industry, NIST and NARUC and/or regulatory action only "if necessary" while deferring to the marketplace for standards development.*

Interoperability Standards: The Value Proposition

The benefits of Smart Grid are well-articulated in the White House report, "A Policy Framework for the 21st Century Grid: Enabling Our Secure Energy Future." Standards ensure today's investment will be valuable tomorrow, act as a catalyst for innovation, enable consumer choice, keep prices low, highlight best practices, and help to open markets. During the interviews, these themes were echoed by the participants. They empathized that standards directly and indirectly promote economies of scale among manufacturers, determine how to implement policy directives, establish metrics for the testing and certification of products, and establish minimum quality specifications. In addition, standards facilitate the use of multiple technologies and the interchangeability of products developed by different manufacturers. In order to implement the Smart Grid efficiently and effectively, it is important that products be tested by manufacturers, independent laboratories and utilities to ensure that they are interoperable and cyber secure.

In dealing with Interoperability standards, the electric power industry has been confronted with unique challenges. In its simplest form, the Smart Grid is the merging of the traditional systems

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(generation, transmission, distribution, and metering), advanced communication systems (internet, wireless, fiber optics, cell phones) and information technology systems (Advanced Meter Infrastructure (AMI), Outage Management Systems (OMS), Distribution Automation (DA)).

Smart Grid = Utility Systems + Advanced Communications and Information Technology Systems

The implementation of the Smart Grid requires that utilities take a more active role in the identification and development of interoperability standards while at the same time evaluating the impact of potential Smart Grid technologies on their systems and performing the necessary due diligence required by their respective regulatory bodies.

It is imperative that the utility industry be involved in the identification and development of interoperability standards in order to minimize the impact of stranded costs and to manage how they deal with the potential for equipment obsolescence. Interoperability standards must be flexible in dealing with existing technologies in order to prevent systems or equipment purchased today from unnecessarily becoming obsolete tomorrow. It is important that interoperability standards remain flexible as well as focused on the appropriate layer of the electric power system. For example, the information model layer standards need to define the "what" or define the functionality, and the technology layer standards need to define "how" the technology is used. Keeping the standards flexible and appropriately focused will ensure that only the most cost-effective technologies are utilized to implement the Smart Grid.

Challenges: Stakeholder Participation in the SGIP Process

Prioritization of Standards, Processes and Forums are Necessary

The most predominant finding of this committee is that utilities and regulators are not adequately participating in the SGIP process. The major roadblock keeping utilities and regulators from participating more fully in the SGIP process is lack of resources. The utility industry has been and is still involved in the identification and development process of standards that directly impact their business operations. The interview participants felt that there was a lack of prioritization with respect to the interoperability standards in the SGIP process along with a lack of delineation of roles of various stakeholder groups. The overall pace of standards development is overwhelming for utilities and regulators. Equipment vendors, on the other hand, can focus on one specific business area in the development of standards. Thus, while the utilities are engaged, they are spread thin and do not have the resources or personnel to engage and/or sustain their engagement in multiple standard processes and forums across the industry. Therefore, it was universally felt that there was a need to leverage the existing information along with streamlining and consolidating existing processes. PAP activities should be prioritized and standards releases should be scheduled based on the value propositions deemed most important by utilities and regulators.

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Need for Consistent State Regulatory Support for Smart Grid Standards Development

State commissions may not fully appreciate the value of utility participation in the standards identification and development process. On the other hand, lack of support from local public utility commissions (PUCs) to participate in interoperability standards identification and development is considered a concern by many utilities. The utilities have to submit their plans for deployment of smart grid technology to their state PUCs for approval and demonstrate to PUCs how the smart grid will realize measurable improvements in service and eventual operating cost savings. Lack of PUC understanding of the Smart Grid issues is a substantial hurdle for any utilities that choose to participate in the process because of concerns of stranded investments and cost recovery. The dialogue between the utilities and the state regulators needs to increase along with collaboration between the utilities and state regulators to ensure cost recovery for these beneficial/needed investments.

Reliability and Implementation Review of Interoperability Standards is Critical

There is a gap in terms of reliability and implementation reviews within the SGIP. The implementation of the Smart Grid investments and the development of interoperability standards require that the implication of the standards be evaluated and measured from a holistic perspective. There needs to be a formal review of these interoperability standards with respect to the reliability and implementation readiness by industry representatives who have the primary responsibility for safety, operation and reliability of the grid. It should be noted that by reliability, the interviewees are referring to the ability to keep the lights on and the electrons flowing, the utility definition of reliability, and not the systems architecture definition (information communication technology systems to systems). Implementation refers to the due diligence in evaluating the impact of changes to utility operation and the economic impact including stranded costs and obsolescence of equipment.

The focus of these reviews should be on reliability considerations, implementation readiness, cyber impacts, stranded costs and impacts on legacy systems of the utilities. This gap in terms of reliability and utility-implementation reviews and associated documentation of their conclusions and analyses needs to be addressed by strategically modifying the SGIP process by the addition of a single, explicitly populated standing committee which would provide critical stakeholders charged with maintaining and promoting the reliable and efficient operation of the electric grid—electric power system owners, operators, and regulators—with a means to identify and address concerns regarding the potential impacts to reliability and business operations.

Need for Balanced Voting in the SGIP Process

A major issue raised by the utility interviewees as well as other stakeholders outside of the utility sector is the need for more balanced voting within the SGIP process. Utility interviewees generally expressed that the SGIP process has a problem with regards to an imbalanced voting process. It was felt that while there is diversity in participation in the SGIP, stakeholder voting is not properly balanced because investor-owned and publicly-owned utilities, as well as state and local regulators, are particularly underrepresented in the process. For example, investor-

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owned and publicly owned utilities collectively are only designated one of the 25 SGIP Governing Board seats. Similarly, state and local regulators are also only designated one SGIP Governing Board seat—the same number, for example, as provided to venture capitalists. Under current SGIP/Program Management Office ("PMO") rules, SGIP approval may be based solely on a 75% (or 50% depending on the topic) affirmative vote of the SGIP. Furthermore, participants from vendor and vendor-related categories constitute approximately 50% of the SGIP participating members. However, if every investor-owned and publicly owned utility and state and local regulator who is a participating member in the SGIP voted against approval, consensus could still be achieved by the SGIP by virtue of the fact that investor-owned and publicly owned utilities and state and local regulators collectively only constitute approximately 10% of the SGIP participating membership. In general, it was felt that the utility voice needs to be proportional with respect to the market exposure, large investment and impact that the utility industry will bear.

Need to Continue the Focus on Transparency, Roles and Responsibilities

The interviewees believe there has been a proactive effort to make the SGIP process accessible to all interested participants through web technologies and remote meeting access. Along with increasing inclusiveness, there is a need for continued focus on better transparency and definition of the roles and responsibilities of the various groups within the SGIP.

Overall, the SGIP needs to clearly define the roles and responsibilities of various groups within the SGIP as well as better explain to participants involved in those activities what is expected of them. It is extremely difficult for industry representatives to justify participation in an activity without understanding what is expected of them. For instance, although NIST created the Domain Expert Working Groups (DEWGs) prior to the creation of the SGIP, the function of the DEWGs is still widely unknown by SGIP participants.

In addition, NIST and the SGIP need to better clarify what each perceives the role of the newly created Catalog of Standards (CoS) to be. While NIST has statutory obligation, pursuant to the EISA 2007, to develop the Smart Grid Framework and Roadmap, it is not clear how the CoS integrates with this statutory obligation. This should be clearly, simply and visually articulated in future releases of the NIST Smart Grid Interoperability Framework and Roadmap documents. NIST should ensure that it continues to select only standards that have been added to the CoS, thereby assuring they have completed the SGIP process life cycle, and they have fully documented stakeholder support. Transparency and inclusion must extend all the way through the NIST/SGIP process.

Consolidation of Cybersecurity Activities

Another critical aspect of the ongoing process is cybersecurity. It was observed that there are far too many cybersecurity activities. The following graphic (Figure 1) illustrates the extent of the cybersecurity and critical infrastructure activities that are competing for stakeholder representation. It should be noted that cybersecurity and critical infrastructure protection are

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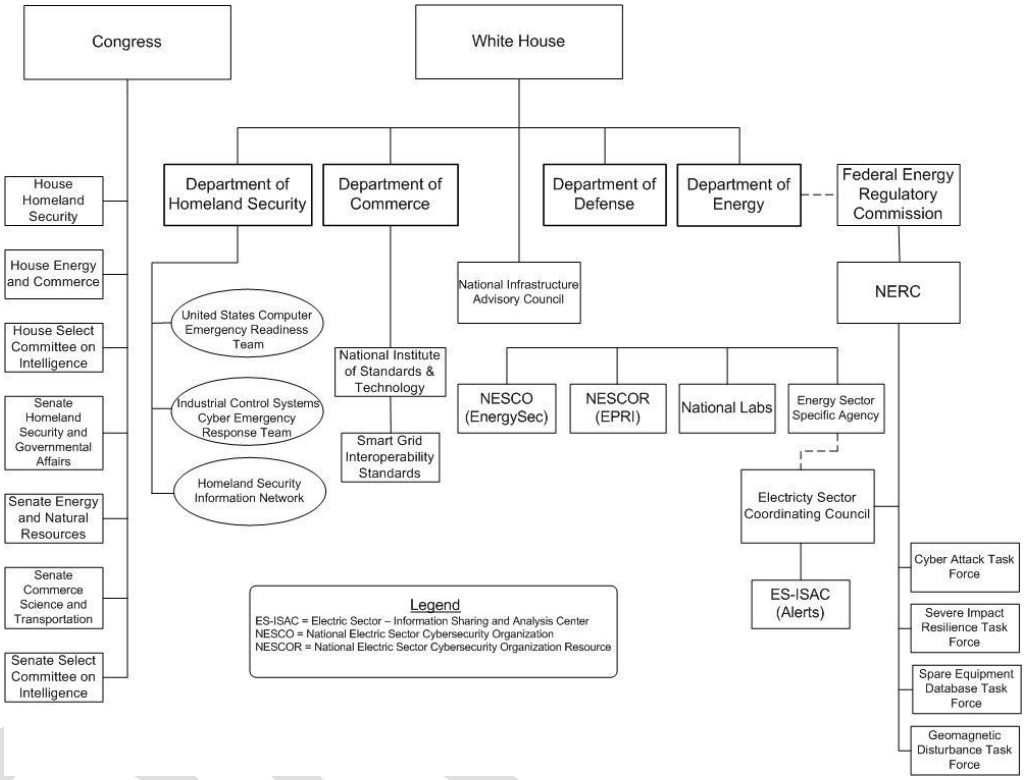
different activities but both draw upon the same skill set from equipment vendors, utilities and regulators.

Figure 1. Federal Cybersecurity Structure



Though engaged at all levels of activities related to cybersecurity, stakeholders simply do not have the resources or "bandwidth" to more fully engage in all these activities to the extent that they need to be covered and to give them the level of effort that is required of them. Stakeholders are struggling to find the cybersecurity activities that provide the biggest return on investment. It was mentioned by the interview participants that a cybersecurity approach that is overly burdensome and academic will stifle innovation and will be counterproductive.

Urgent Need for a Communication Plan, Education and Outreach

The interview participants were very concerned about the threat of standards becoming mandatory. The lack of direction from FERC on what the adoption of the standards would mean, combined with the lack of state regulatory guidance and participation in the SGIP process, remains a major roadblock.

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The importance of Smart Grid standards needs to be impressed upon the utilities, regulators, and consumers through a major communication and educational outreach so that they can understand the risk of non-engagement and non-compliance and understand the value of changes in pricing and delivery models.

There is a concern among the utility industry that the current voluntary nature of the interoperability standards could well change to a more prescriptive and mandatory compliance regime along with enforcement guidelines and large financial penalties in much the same way that the North American Electric Reliability Corporation (NERC) changed by federal legislation from an informal, voluntary industry organization to facilitate coordination of the bulk power system in the United States and Canada to an Electric Reliability Organization (ERO).

Conclusion and Recommendations

Creation of an Implementation and Reliability Committee is Essential

The existing SGIP process and structure should be extended by creating a standing Implementation and Reliability Committee (IRC) with a defined number of voting members representing regulators as well as municipal, cooperative, and investor-owned utilities. The IRC would reside as a standing committee within the SGIP in addition to the current Smart Grid Architecture Committee (SGAC)**,** Smart Grid Testing and Certification Committee (SGTCC), and Cybersecurity Working Group (CSWG). The IRC would endeavor to provide a transparent and well-documented point of interoperability standards review from the regulatory and asset owner/operator perspective (regulators and those regulated) for identified and agreed upon work products. The IRC would serve to inform the SGIP Governing Board and the SGIP, as well as industry and its regulators, of potential impacts of any standards/protocols under consideration. However, this review process would not stand as a prerequisite to the inclusion of any interoperability standard or protocol in the SGIP CoS; rather, it would serve to inform the SGIP Governing Board and the SGIP, as well as industry and its regulators of potential impacts of any standards/protocols under consideration. The documentation developed by the IRC would be noted in the CoS, and the information would serve as a valuable tool and could be referenced by any of the CoS users. Accordingly, this single standing committee leveraging and extending existing mechanisms would be an effective and efficient means of addressing the concerns of entities with direct involvement in the regulatory and operational environments.

Balanced Voting

The weight of the utilities' vote must be more proportional to the magnitude of the investment and market exposure that the implementation of the Smart Grid has on their business operations. There are several means by which a more balanced voting process can be achieved to avoid the disproportionate influence of any particular stakeholder group and its related interests and to prevent minority interests from being essentially ignored. For example, the SGIP approval requirements could be revised to include not only the currently required 75% (or 50%) approval of the SGIP members, but to also adopt a requirement—similar to that used by

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the North American Energy Standards Board (NAESB)—that approval also requires a meaningful level of consensus by each or within each of the various industry segments, such as also requiring a majority favorable vote from each of the 22 SGIP industry stakeholder categories. Utilities have indicated and strongly advocated a voting process similar to that of existing standards development organizations (SDOs), for incorporation into the SGIP process. The NAESB process was repeatedly cited as an example of a more balanced process and one that enables the utility industry voice to be more proportional to the market exposure than what currently exists in the SGIP process. As an alternative, each of the existing 22 SGIP stakeholder categories could be mapped into broader segments (such as Governmental and Consumers, Power Producers/Traders, Technology, Utilities, and Vendors) and approval would require a majority favorable vote from each of the segments.

Greater State Participation

It is generally recognized that state regulatory agencies have significant resource challenges with respect to participation in the SGIP process; however, continued encouragement of the state regulatory agencies to participate in the SGIP is needed. In addition, the SGIP and NIST should strive to strengthen relationships and participation in the NARUC and the FERC-NARUC Smart Response Collaborative. State Public Utility Commissions should be encouraged to be actively involved with NARUC and the NARUC Smart Grid activities. In addition, the work and perspective of those activities needs to be incorporated into the SGIP. The utilities should also keep their states informed of Smart Grid developments and implementation issues and engage in a regular dialogue.

Consolidation of Cybersecurity Activities

The high-level goals and objectives of the CSWG need to be understood by the participants and then communicated to all potential participants. While an enormous task, the NIST and the CSWG should attempt to coordinate and consolidate the cybersecurity activities of the various government and regulatory entities. There are numerous competing cybersecurity activities, and stakeholders do not have the resources to cover all of them. For this reason, it is recommended that NIST and the CSWG along with other cybersecurity state, federal, and private sector entities/bodies work to consolidate activities into a more manageable number. In conjunction with the consolidation efforts, the CSWG needs to better educate utility representatives about the goals and objectives of the CSWG and to advertise the need for more distribution system expertise into the CSWG.

Prioritize, Streamline and Leverage Smart Grid Activities

NIST and the SGIP need to reach out to organizations in the Smart Grid ecosystem and work to prioritize and consolidate activities. There are too many organizations competing for the same stakeholder experts, and there are not enough resources to deploy sufficiently or effectively. The pace of PAP activity is especially burdensome and unmanageable for utilities and regulators who must cover ALL aspects of the SGIP PAP activity. The SGIP needs to continue to leverage the work of other groups' Smart Grid activities in much the same manner that NIST has previously done with utilizing the work of the Gridwise Alliance, Gridwise Architecture

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Committee and Electric Power Research Institute (EPRI) in development of the first NIST Interoperability standards Roadmap and Framework document. Essentially, there should be an attempt to combine/converge industry activities/groups/dialogues, and creating more groups/activities/layers should only be done if absolutely necessary. PAP activities should be prioritized and standards releases should be scheduled based on the value propositions deemed most important by utilities and regulators.

NIST Should Continue to Encourage SGIP Involvement

NIST should continue to champion the efforts and work of the SGIP to international organizations and other federal and state regulators and continue to do more outreach.

It is recommended that NIST encourage and/or work with the SGIP to:

- Develop a long-range funding mechanism for the SGIP
- Develop additional education material, including webinars that explain the organization and structure of the SGIP and what the inclusion of a standard into the CoS really means
- Focus on R&D related to cybersecurity and focus on the real world application of certification and conformance in the industry

Development of an Educational Campaign and Outreach for Utilities and State Participation

The purpose of this communication plan should be to get key stakeholders, including but not limited to utilities, regulators and consumers, involved in the standards process, and to recognize the value of new business models enabled by the SGIP and resulting standards. Suggestions from the interviewees included enhancing the role of SGIP's Communication, Marketing and Education (CME) Work Group and NIST in developing a marketing campaign. The marketing campaign needs to clarify and highlight the importance of these interoperability standards and the business and consumer value they bring. The SGIP process is complex and needs to be simplified to demonstrate how it impacts business models to deliver value. There are mixed reactions among the states about the Smart Grid. Not all of the public utility commissions (PUCs) understand the value of interoperability standards and participating in the SGIP. Obsolescence of legacy equipment and cost recovery is a very real concern for utilities and state regulators. How this issue is handled within the SGIP process with respect to the development of standards has the potential to impact utility bottom lines, so education and outreach is a must.

Finally, NIST should be commended for its efforts. The interviewees were virtually unanimous in stating that the SGIP process is going well and that earlier concerns, as expressed in the FERC January 31, 2011 Technical Conference, have been abated to a great extent. All were impressed with the willingness of George Arnold and his team at NIST to listen to the concerns of stakeholders and address them. The participants were very appreciative that NIST is actively working with the utility to refine the SGIP processes to facilitate increased stakeholder participation in addressing reliability, cybersecurity and implementation issues.

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