

SMART GRID ADVISORY COMMITTEE (SGAC)

**MINUTES OF SEPTEMBER 29, 2010, MEETING
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY**

GAITHERSBURG, MD

ATTENDANCE

Smart Grid Advisory Committee Members Attending

Arnold, Jon
Ellyn, Lynne
Jones, Lawrence
Kelly, Suedeen
Miller, Susan
Mohn, Terry
Nolan, Kevin
Owens, David
Sanders, William
Sheflin, Dan
Tobin, Thomas
Vieau, David

NIST Staff

Arnold, George
Boynton, Paul
Bushby, Steve
Eustis, Allan
Gallagher, Patrick
Barbara Goldstein
Hefner, Allen
Holmberg, David
Nguyen, Cuong
Prochaska, Dean
Seymour, Desmond
St. Pierre, James
Su, David
Wollman, David

Others

Bart, Dan, ValleyViewCorp
Camm, Larry, Schweitzer Engineering
Camp, Ward, Landis + Gyr
Caskey, John, National Electrical Manufacturers Association (NEMA)
Chiang, Amy, Honeywell
Eisenbrey, Chris, Edison Electric Institute (EEI)

Hsieh, Eric, A123 Systems
Rahman, Saifur, VA Tech
Spaulding, Sharon, OmniTech

Call to Order – Dr. George Arnold, National Coordinator for Smart Grid Interoperability

Dr. Arnold called the meeting to order at 8:40 am and welcomed Dr. Patrick Gallagher, Director of NIST, as the opening speaker.

Intro and Welcome to NIST – Dr. Patrick Gallagher, Director, NIST

Dr. Gallagher welcomed Committee members to NIST. He noted that the idea of a Smart Grid Federal Advisory Committee was baked into the initial planning of the NIST Smart Grid Program. The Committee provides a public, private partnership beyond the Smart Grid Interoperability Panel (SGIP). The smart grid effort is a large scale undertaking with complex interactions between federal agencies and private sectors. The Committee serves as a means to provide direct inputs to the agency from the public-private side. Dr. Gallagher stressed the importance of the Committee and that NIST would not take the inputs lightly.

Dr. Gallagher provided a brief history of NIST and its current status. NIST is one of the nation's oldest laboratories that was founded in 1901 as the National Bureau of Standards (NBS). Its mission since the beginning has been to support industry in an innovation-based economy. NBS was renamed to NIST in the late 1980's and three extramural programs were added to the agency in addition to the laboratory programs including the Baldrige Performance Excellence Program, Advance Technology Program (ATP), and Hollings Manufacturing Extension Partnership. This was prompted by the potential competition from Japan during that time. More recently, NIST has been reorganized for the first time in over 20 years. The reorganization changes NIST's laboratory structure from activity based, similar to a university, to mission based. The new structure focuses on three mission areas – Metrology, Technology, and User Facilities (Nanotechnology and Neutron Research). The changes are effective October 1, 2010.

Discussion – The group discussed the following topics:

- NIST ATP funding for smart grid.
 - ATP was terminated in 2007.
 - The Technology Innovation Program (TIP) was established as a replacement.
 - TIP focuses on the pre-competitive technologies that are of critical national needs and does not support commercialization.
 - There will be a call for proposals in the near future.
- NIST's role in standards coordination with respect to other federal agencies.
 - Congress assigned the standards coordination role to NIST but did not specify how.
 - NIST tries to strike a balance with the interactions with other federal agencies and the private sector by determining how much federal involvement is needed.
 - In some special cases such as cybersecurity standards for the federal government, NIST actually writes these standards.

- In other special cases, NIST works with relevant stakeholders and coordinates the effort in a public private partnership.
- Most commonly, NIST is a participant in private sector-led voluntary standards activities.
- The nature of the interactions and involvements depends heavily on type of standard and its intended purpose.
- Measuring success of a standard.
 - It is too early to say that smart grid is successful.
 - Smart grid has received a lot of attention because of the pace of the activities and urgency.
 - It dispelled the notion that government involvement delays progress.
 - Smart grid is interesting because it is a case where standards can play a role of aligning efforts of federal and state regulators.
 - If the above is achieved, it would mean that smart grid is successful.

Member Introductions

Committee members introduced themselves followed by NIST staff and other attendees.

Charge and Agenda Review – Dr. George Arnold, National Coordinator for Smart Grid Interoperability

Presentation Summary – Dr. Arnold discussed the Committee’s charter and charge. His goals for the Committee include: 1) Seeking inputs on current activities; 2) Formulating short-term Smart Grid Program and Research Planning; 3) Developing long-term future directions; 4) Developing performance assessment tool for the smart grid Program; 5) Producing a Committee report for the NIST Director; 6) Maximizing the impact of the Committee; and 7) Respecting the valuable time of Committee members. Dr. Arnold reviewed the meeting agenda for the rest of the day. Further, he provided a preview of the list of questions that NIST would like the Committee to address. The questions are grouped into two categories – 1) Are we doing the right things and 2) Are we doing things right. These questions would be revisited in more detail and members would have a chance to discuss them at the latter part of the meeting.

Discussion – The group discussed the following topics:

- NIST’s role in Smart Grid with respect to the White House effort.
 - NIST has close relationship with Department of Energy (DOE) especially the Office of Electricity (OE).
 - DOE provided NIST with \$12 million in ARRA funding to support its effort.
 - NIST also works closely with the Federal Energy Regulatory Commission (FERC) and its role in adopting standards.
 - As required by the Energy Independence and Security Act (EISA), DOE has established a Federal Smart Grid Task Force that is chaired by Mr. Eric Lightner of DOE.
 - The role of the Task Force is to provide interagency coordination and it focuses on a tactical level and not at a policy level.
 - The White House realized the need for a coordinated Federal effort that focuses on policy issues.

- In June 2010, the NSTC established a Smart Grid Subcommittee under the Committee on Technology that is chaired by DOE Assistant Secretary Patricia Hoffman and Dr. Arnold serves as the vice chair.
- The Subcommittee has been actively engaged with various stakeholders including associations, companies, state commissions, etc.
- The outreach is important because of the concern from public backlash over smart meter deployments in areas such as California and Texas.
- The Subcommittee is working on a report that should be released in 2011.
- Committee's inputs to policy standards.
 - Inputs need to align to the areas that are within NIST purview.
 - There will be some standards that have policy implication such as security and privacy.
- Timeframe and authors for the Committee report.
 - The report will be due in a year.
 - Committee members will write the report with staff support from NIST.
- Engagement with the states and strategies to harmonize standards.
 - Work with SGIP through Commissioner Paul Centolella.
 - The telecommunication sector has some experience in this regard.
- Common definition of Smart Grid.
 - Definition in the Energy Independence and Security Act (EISA).
 - NSTC Smart Grid Subcommittee will provide additional material.

For more details, see Dr. Arnold's [presentation](#).

Ethics Briefing – Jeffrey Harrington, Senior Counsel, DOC

Mr. Harrington briefed the Committee on ethics rules for Special Government Employees (SGE). Committee members are appointed as SGEs.

For more details, see [Summary of Ethics Rules for Special Government Employees 2010](#).

NIST Smart Grid Overview – Dr. George Arnold, National Coordinator for Smart Grid Interoperability

Presentation Summary – Dr. Arnold provided a brief overview of the NIST Smart Grid Interoperability Program that focused on the standards effort. The research aspect was covered by Dr. Dave Wollman in the next presentation. Smart grid is a national priority and we do have a smart grid policy that is in the EISA legislation. The basic concept of the Smart Grid is to modernize the electrical grid with a focus on introducing information management and communications technologies to facilitate increased use of renewable and distributed energy sources, improved reliability, increased efficiency, and support for electric vehicles. Standards play a critical role in making this possible.

The definition of interoperability in this context is the ability of two or more networks, systems, devices, and etc. to communicate and operate together effectively, securely, without significant user intervention. Interoperability standards are important because they provides many benefits

such as preventing premature obsolescence, providing backward compatibility, expanding product markets, and etc. Standards are urgently needed because there have been rollouts of devices that do not have firm standards such as smart meters. Further, the appliance industry is planning to launch smart appliances in 2011 and standards are needed for data communication, price information, demand response signals, etc. Standards for the smart grid are complex and must fit together at the system level. As an example, electric vehicles will require many standards from connector to electric safety code. There are 27 standards body that are involved with smart grid standards including international organizations, global consortia, and regional and national organizations.

NIST's role in smart grid includes coordinating the development of an interoperability framework that is flexible, uniform, and technology neutral and providing input to FERC and state PUCs for rulemaking. In early 2009, NIST developed a three-phase plan – 1) Identify an initial set of existing consensus standards and develop a roadmap to fill gaps; 2) Establish a public/private Interoperability Panel to provide ongoing recommendations for new/revised standards; and 3) Develop a testing and certification framework. A meeting was held at the White House chaired by Secretaries of Energy and Commerce with CEOs and senior executives, federal and state regulators to obtain high level commitments to this effort.

Phase one was completed in January 2010 with the publication of the Smart Grid Framework and Roadmap, Release 1.0. The Framework document was completed in nine months through an open process that involved three public workshops with more than 1500 participants. It includes a Smart Grid Vision and Reference Model and identifies 75 existing standards and 16 Priority Action Plans (PAPs) projects to fill key gaps. The standards address: 1) Demand response and consumer energy efficiency; 2) Wide area situational awareness; 3) Electric storage; 4) Electric transportation; 5) Advanced metering infrastructure; 6) Distribution grid management; 7) Cybersecurity; and 8) Network communications. They are mostly international standards (77%).

Phase two was completed with the launch of the Smart Grid Interoperability Panel (SGIP) in November 2009. At the time, there were nearly 600 member organizations (over 50 international) and over 1700 individual participants from 22 stakeholder categories. The role of the SGIP is not to develop standards but to establish requirements for the standards and coordinate their development by Standards Development Organizations (SDOs). The SGIP has an organizational structure including a Governing Board, Officers, NIST (as an observer), Administrator, Committees and Working Groups, Priority Action Plan Teams, and Domain Expert Working Groups. It has standing committees and working groups including the Smart Grid Architecture Committee, Testing and Certification Committee, and Cyber Security Working Group. 18 PAPs are currently underway in the SGIP.

NIST had many bilateral exchanges on smart grid standards with various countries in Asia, Europe, and the Americas. The NIST Smart Grid Team has a small Coordination Office and other members come from different laboratories and offices within NIST. The Smart Grid Program Funding in fiscal year 2010 comes from different sources including NIST appropriation, ARRA from DOE, and ARRA from NIST. Future funding would likely be from the appropriation.

Discussion – The group discussed the following topics:

- Evaluating the SGIP.
 - Committee should interact with SGIP to assess its effort.
 - SGIP has not done a self-assessment.
- Process for identifying new PAPs.
 - Bottom up approach – someone comes up with a need and present it to the Governing Board for approval.
 - Top down approach – a task group of the Governing Board is working on the Vision, Mission, and Roadmap and could potentially identify new gaps.
- Compliance enforcement for cybersecurity.
 - No clear mechanism at the moment – Cybersecurity document has high level guidelines.
 - Committee could provide recommendations in this area.
- Maturity model for smart grid.
 - Could be used as a metric to measure success.
 - May serve as a tool for overall program evaluation.
- Interactions with Europe and the European Union.
 - The roles of CEN, CENELEC and ETSI are unclear and should be explored.
- Funding for the SGIP from other sources.
 - Could be set up to collect participation fees.
 - Other co-funding.
- DOE taking on additional role.
 - NIST should continue to lead the standards effort.
 - No changes necessary at the moment.

For more details, see Dr. Arnold's [presentation](#).

Smart Grid Research and Gaps – Dr. David Wollman, Leader, Electrical Metrology Groups

Presentation Summary – Dr. Wollman provided an overview of smart grid research and gaps. He began by discussing the NIST culture. NIST traditionally views itself as a measurement expert and focuses on the measurement aspect of standards. More recently, NIST has shifted toward an increasing involvement in documentary standards. This enhances NIST's community engagement and understanding of industry's needs. In the case of smart grid, NIST stretched from its comfort zone to fully participate in the documentary standards space in order to meet a national need. NIST is playing a central coordination role on a national and international scale standardization effort. In doing so, NIST has engaged the community and brought together different communities.

Dr. Wollman reviewed the NIST three-phase plan with a focus on research needs. The SGIP has a stakeholder category that includes research & development organizations and academia that could be leveraged. But, research does not have a visible home within the SGIP structure. One possibility is to add research into the Vision, Mission, and Roadmap of the SGIP.

The NIST Smart Grid Program Plan includes for major categories – Program Management, Architecture and Standards, Testing and Certification, and Supporting Research. Dr. Wollman

provided more detail for the Supporting Research category and to highlight some of the ongoing NIST research. The research fits into five broad areas – Power systems, building interfaces, industrial interfaces, cybersecurity, and communications. One area research is in advanced metering. NIST maintains the national standards for electrical metering and has new metering test beds including integration with security work. Another area of research is in the phasor measurement unit (PMU). NIST has PMU calibration test service and provide assistance to manufacturers and utilities on design, test and use of PMU. The third example is the building automation control. The research is addressing the role of the building in the smart grid including a net-zero residential building test bed. The final example is in the area of high penetration of renewables and plug-in electric vehicle. The research includes power conditioning systems and energy storage technologies. Further, Dr. Wollman highlighted possible smart grid research opportunities including metering (bidirectional), sensors and automated control, smart grid architecture and operations, power electronics, and etc.

Dr. Wollman briefly covered NIST's outreach and engagement with other organizations including DOE, other federal agencies, academia, industry, and international organizations.

Discussion – The group discussed the following topics:

- NIST is more involved in community engagement by working in documentary standards.
- Testing and Certification at the system level.
 - There is a need to accelerate testing and certification.
 - Effort is underway in the IT laboratory for meter security testing.
 - NIST could play a role in this area but looks primarily to private sector organizations to operate testing and certification programs.
- A mature smart grid program and NIST's role in that vision.
- The differences between SGIP Architecture Committee and the Gridwise Architecture Council (GWAC).
- DOE Smart Grid clearing house website.
- Smartgrid.gov portal for federal Smart Grid activities.

For more details, see Dr. Wollman's [presentation](#).

Smart Grid Research Needs – Dr. Saifur Rahman, Professor & Director, Virginia Tech Advanced Res. Inst.

Presentation Summary – Dr. Rahman provided an overview of Smart Grid Research Needs based on his research activities. The NIST Smart Grid conceptual model shows the basic components of the smart grid. Dr. Rahman viewed the smart grid as a continuum from generation to end-use appliance (from generator to refrigerator). He reiterated the point that the smart grid must have bi-directional flow of electricity and information. Dr. Rahman discussed the role of the customer in peak load reduction, load control, and a smooth load shape. The typical load curves in Virginia have two peaks for the winter load due to heating and one peak for the summer load due to cooling. Peak load reduction or load control could lead to a smoother load curves and enable the utilities to operate at optimized efficiency. Dr. Rahman defined demand response as a customer action to control load to meet a certain target.

Dr. Rahman viewed technology, standards, cybersecurity & privacy, rates & regulations, and consumer awareness & education as the building blocks of the smart grid. He discussed the research needs within some of the five areas. For technology, he believed that research is needed in the power system such as demand response and ancillary services. The other aspect is related to sensing and communication such as home area network and two-way communication. In the cybersecurity & privacy area, examples of research needs include secure communication solutions and protection of customer data. Under rate & regulation, research is needed on the dynamic and time-of-use rates and voluntary programs from third party providers such as Microsoft Hohm Network and Google Power Meter. Dr. Rahman put strong emphasis on consumer awareness & education because he believed that it is the critical piece to the success of the smart grid. Consumer needs to know how smart grid could reduce their electric bill and that it brings value added benefits. Further, public education is needed to show consumer that electricity is a commodity and a community resource and it is possible to optimize electric usage without sacrificing comfort.

Discussion – The group discussed the following topics:

- Small scale pilot deployment of demand response to understand consumer behavior.
- Broader view for research needs.
- Rate & regulation are also crucial to the success of smart grid.
- Negative attitude on dynamic pricing.
- Pilot data funded through ARRA will be made available at the smartgrid.gov site and link to the smart grid clearing house site.
- Dynamic pricing is not a prerequisite for smart grid.
- Automation could provide real value for utility and consumer.
- Consumer needs to see and understand the value of smart grid.
- Opportunity for technology innovation.
- Potential new business and regulatory models.
 - Renewable sources.
 - Distributed generation.
 - Plug-in vehicle as storage.
 - Green technology.
 - Price on carbon.
 - Renewable portfolio.
- Potential for utility control and communication within the home.

For more details, see Dr. Rahman's [presentation](#).

Questions for the Committee – Dr. George Arnold, National Coordinator for Smart Grid Interoperability

Dr. Arnold reviewed the list of NIST Questions for the Committee.

For more details, see [NIST Questions for the Smart Grid Advisory Committee](#).

Plans and Organization of Committee Going Forward – Discussion by Committee Members

The Committee discussed plans for producing the report. The Chair compiled a chart with inputs from members that include four major topics area that will serve as the basis for subcommittees' formation. The topics include short term, medium term, long term, and research direction-gaps.

For more details, see [Summary Chart](#).

Public Comments

The following comments were provided by members of the public in attendance:

- Appreciation for the opportunity to attend the meeting and learn about the Committee's activity.
- Use existing documents including maturity model, metrics, and etc. from different sources such as DOE rather than recreating.
- General comments to the Committee and NIST:
 - Confident in NIST's long term roadmap.
 - Some opposition on the modernization of the electrical grid.
 - EISA may extend federal reach into distribution or other areas that are within state's jurisdiction.
 - Standards process could add uncertainty for utilities and regulators.
 - Barrier to implementation of demand response is the delaying of smart metering infrastructure.
 - Innovation may be hampered by uncertainties.

Wrap-Up

The meeting was adjourned at 3:45 pm on Wednesday, September 29, 2010.

I hereby certify that, to the best of my knowledge, the foregoing minutes are accurate and complete.

Dr. George Arnold
National Coordinator for Smart Grid Interoperability

Dan Sheflin, Chair
NIST Smart Grid Advisory Committee