NIST SMART GRID ADVISORY COMMITTEE (SGAC)

MINUTES OF JULY 30, 2015, VIRTUAL MEETING

ATTENDANCE

Smart Grid Advisory Committee Members
Owens, David (Chair)
Gaddis, Evan (Vice Chair)
Ball, William
Centolella, Paul
Jones, Lawrence
Mohn, Terry
Nolan, Kevin
Sanders, William
Tobin, Thomas

NIST Staff
Boynton, Paul
Burns, Martin
Eustis, Allan
Greer, Christopher
Griffor, Edward
Hefner, Allen
Holmberg, David
Nguyen, Cuong
Pillitteri, Victoria
Rhee, Sokwoo
Wollman, David

Others
Anand, Dhananjay, NIST Contractor
Curran, John, Telecommunications Reports
Kuo, Andrew
Wedin, Randy, Wedin Communications

Call to Order and Establishing Quorum – *Dr. Chris Greer, Senior Executive for Cyber-Physical Systems, NIST*

Dr. Greer called the meeting to order at 9:00 a.m. and established a quorum. He welcomed Mr. Paul Centollela, new committee member, and thanked Mr. Evan Gaddis, who will be stepping down as Vice Chair after this meeting. He briefly went over the meeting agenda.

Opening Remarks – *Mr. David Owens, Chair, Smart Grid Advisory Committee, and Mr. Evan Gaddis, Vice Chair, Smart Grid Advisory Committee*

Mr. Owens started by thanking Mr. Gaddis for his service and for his valuable contributions to addressing the many big issues facing the electricity sector. Mr. Owens reviewed some examples of changes in the distribution system including the installation of 55 million smart meters, the increased use of distributed energy resources (DER), the focus on microgrids, and the variety of regulatory models being explored at the state level in New York, California, Massachusetts, Minnesota, Hawaii, and Illinois. Three key goals for the industry are increased resiliency and reliability, increased integration of DER, and the transition from analog to digital. The evolving role of utilities will require answers to questions about planning, design, and management of the grid. He believes that the distribution system operator should be the utility.

Mr. Gaddis agreed with Mr. Owens' comments, from the perspective of the manufacturers' side of the industry. He expressed his hope that manufacturers will continue to be represented on the committee. He also expressed his support for the Grid 3.0 planning activity under way, and he mentioned the growing interest in smart cities and smart lighting. He raised a question about how rural needs are being met by the Department of Agriculture and others.

Cyber-Physical Systems (CPS) and Smart Grid Programs Overview – *Dr. Chris Greer, Senior Executive for Cyber-Physical Systems, NIST*

Dr. Greer provided an overview of the program, including a definition of cyber-physical systems, two key principles (i.e., scalability and compositionality), the mission of the program, and the program portfolio.

For more details, see the presentation. *(Pages 1-5)*

CPS Public Working Group - *Dr. David Wollman, Deputy Director, Smart Grid and Cyber-Physical Systems Program Office; Ms. Victoria Pillitteri, Program Analyst, Program Coordination Office*

Dr. Wollman provided an overview of the CPS Public Working Group, including its structure, leadership, meetings, working documents, and next steps. He introduced the framework that the group is using to organize thinking (i.e., matrix with two dimensions – "facets" and "aspects or viewpoints"). Ms. Pillitteri discussed the concept of "trustworthiness" as it applies to issues of cybersecurity and privacy.

In the discussion following the presentation, Mr. Owens raised the question of who is involved in regulations and monitoring in this arena. Dr. Wollman described NIST's role as non-regulatory; instead, NIST provides tools and framework for others to use in setting policy. Dr. Greer stressed the importance of transparent processes. Mr. Jones pointed out that it will be important to find ways to communicate with stakeholders and ratepayers on these subjects, which are complex and may require simplification.

For more details, see the presentation. *(Pages 6-13)*

Smart Grid Interoperability Panel (SGIP) Update – *Dr. David Wollman, Deputy Director, Smart Grid and Cyber-Physical Systems Program Office*

Dr. Wollman updated the committee on the current organization and staffing of SGIP, and he listed the group's three focus areas for 2015. He commented that President and CEO Sharon Allan is bringing new energy to the organization. In the discussion that followed, Mr. Gaddis said that he has seen dwindling interest from the manufacturers and that continued financial support from the government is necessary.

For more details, see the presentation. *(Pages 14-17)*

Smart Grid and CPS Testbeds Update – *Mr. Paul Boynton, Testbed Manager, Smart Grid and Cyber-Physical Systems Program Office*

Mr. Boynton provided an update on the Smart Grid Testbed, including a progress report on construction, the testbed launch, and three of the experiments planned over the next three years. He also provided an update on the CPS Testbed, including its goals, key elements, architecture, and design.

In the discussion following the update, there were a number of questions:

- Mr. Centolella asked if there was a catalog of testbeds. Mr. Boynton replied that the SGIP is working on a catalog of testbeds.
- Mr. Nolan asked if NIST was working with any of the Department of Energy (DOE) labs. Mr. Boynton replied that discussions are ongoing with several DOE labs, and that two testbed workshops held at NIST in the past two years have included a goal of building a community of researchers in industry, academia, and government.
- Mr. Tobin requested additional information on the three planned experiments.
- Dr. Sanders commented that testbeds are major programs and inquired about the budget, costs, and staffing for the testbeds. Mr. Boynton replied that the modular design of the testbeds allows for NIST to be efficient in its use of the "adequate (but not large) budget." Dr. Wollman pointed out that the testbeds leverage existing NIST expertise and research capabilities.
- Mr. Jones inquired how CPS issues and concerns will be addressed by the testbed. Mr. Boynton replied that the testbed's emphasis on federation with other labs will help extend its ability to be involved with a range of issues.

For more details, see the presentation. *(Pages 18-25)*

Green Button Update - *Dr. Marty Burns, Smart Grid and Cyber-Physical Systems Program Office*

Dr. Burns gave an update on the Green Button initiative, including its mission, its acceptance to date (i.e., available to 100+ million people in the U.S.), its impact throughout the federal government, the strategy to "inspire an industry" through the creation of a Green Button Ecosystem, and next steps.

For more details, see the presentation. *(Pages 26-32)*

Transactive Energy Challenge Update – *Dr. David Holmberg, Mechanical Engineer, Energy and Environment Division, Mechanical Systems and Controls Group*

Dr. Holmberg updated the committee on Transactive Energy, including the foundational work being undertaken by NIST, SGIP, and others. He discussed the upcoming Transactive Energy Challenge, including its purpose, participants, potential projects, and timeline.

In the discussion that followed, Mr. Owens pointed out that Transactive Energy is a very complex topic, and discussions will need to be simplified for regulators. Dr. Greer described the NIST communication strategy as building a community and facilitating fact-based discussions.

For more details, see the presentation. *(Pages 33-37)*

Grid 3.0 Update - *Dr. David Wollman, Deputy Director, Smart Grid and Cyber-Physical Systems Program Office*

Dr. Wolllman updated the committee on the Grid 3.0 Strategic Planning Process. The membership of the organizing committee continues to grow; two workshops have been held at NIST; "future states" have been described and are being prioritized; and participating organizations are beginning to take ownership of particular issue areas, such as interoperability and architecture.

For more details, see the presentation. *(Pages 38-41)*

Global City Teams Challenge (GCTC) Update, *Dr. Sokwoo Rhee, Associate Director of Cyber-Physical Systems Program*

Dr. Rhee summarized the goals and participants in the GCTC, reviewed highlights of the June 1 GCTC Expo at the National Building Museum, and previewed the upcoming GCTC 2016 program.

Mr. Jones commented that utilities could serve as important drivers for cities' participation and asked about the level of utility participation and plans for outreach. Dr. Rhee mentioned that although the municipal utility in Austin, Texas, has been an active participant, there wasn't a major effort in 2015 to reach out to utilities. Dr. Greer asked the committee for advice on how best to promote the program to utilities. Mr. Ball suggested that groups like the Edison Electric Institute (EEI) and the National Rural Electric Cooperative Association (NRECA) could be helpful, and Mr. Owens commented that EEI wants to be more involved. Mr. Centolella said that large utilities often have extensive networks of contacts within a community.

Dr. Griffor pointed out that another important partner could be state governments. For example, the organization responsible for economic development in the State of Michigan works closely with the City of Detroit. Mr. Eustis mentioned that the President of Wayne State University

(Detroit, Michigan) had visited NIST earlier in the week.

For more details, see the presentation. *(Pages 42-48)*

Discussion – Energy and Smart Cities – *All Committee Members*

- **Electric Grid as Key Infrastructure**
- **Energy Nexus with Other Infrastructure**

In a general discussion, the committee members presented their perspectives on the issue of energy and smart cities, with a focus on what NIST can do in this area.

Mr. Owens said that private spending on infrastructure now approaches $23 billion per year. The distribution systems, as it evolves, will be more complex and more vulnerable, with an emphasis on resiliency and automation. The challenge will be to work more with states and regulators so that there is a greater understanding from society, including an understanding of cybersecurity risks. Industry must find ways to bridge the gap by translating our understanding for policy leaders.

Mr. Gaddis said that he was extremely pleased with the direction that NIST programs are heading, and he remarked that NIST is very progressive.

Mr. Ball noted that it is a very interesting time for NIST, as more and more of NIST's work gets pulled into policy and regulatory discussions. He encouraged NIST to continue working with EEI, NRECA, and others, including on issues such as cyber-risk and the supply chain.

Mr. Centolella identified a number of emerging issues that merit attention from NIST attention, including the following:

- New regulatory models are needed as we move toward a more market-based environment. It will be especially important to follow the development of Track 2 of New York's "REV: Reforming the Energy Vision" proceeding. (Track 2 will examine changes in current regulatory, tariff, and market designs and incentive structures to better align utility interests with achieving the Commission's policy objectives.).
- Resilience—both cyber and physical—is very important.
- Economic benefits are possible in a number of areas, such as the Internet of Things, increased use of thermal insulation in buildings as storage, optimization of voltage across distribution systems, the emergence of new players as Transactive Energy and platforms become more important, and the move from wholesale markets to distributed markets.
- To address climate challenge, we will need much stronger R&D across a broad range of areas.

Mr. Jones said that the overall NIST program is great. He listed a number of areas deserving attention in the future, including the following:

- Metrics for CPS (how to measure phenomena in CPS?)
- Metrics for resilience
- A catalog of testbeds with different types that include role and focus
- Criteria for transactions that fit into transactive energy at both transmission and

distribution levels
- International collaboration
- Distribution market Locational Marginal Pricing (LMP) including pricing model for interconnected system such as CPS

Mr. Mohn discussed the potential for U.S. technology to be exported to help India achieve its goal of 100 Smart Cities. In India, energy theft is an important problem, so efforts are under way to bury overhead cables and improve revenue. Mr. Mohn also talked about microgrids and the concept of "smart energy districts." These districts do not necessarily overlap with distribution boundaries, and can include consideration of a range of technologies, such as smart water and sewage, electric cars, underground batteries, light-emitting diode (LED) lighting, and virtual grids.

Mr. Nolan stressed the importance of consumer education—doing it right so that a backlash is avoided. Depending on consumers' adoption rate of new technologies, there is a potential for disruption.

Dr. Sanders said that the complexity of the system and systems will grow dramatically, bringing a diverse array of requirements.
- The term "Smart City" is used for many different activities. Singapore is pursuing a powerful and integrated approach, with a wide array of sensors being brought together to create a "nation operating system" or "city operating system."
- The concept of "trustworthiness" is even more important for Smart Cities, and it will require metrics.
- Resilience, response, and control are important.

Mr. Tobin discussed the following three issues:
- He appreciates NIST's efforts on testbeds, which are important for demonstrating theory.
- There is a need to standardize information coming from edge-of-grid devices.
- It will be a challenge to do DER in cities, where there is high density of people and load, yet very limited space.

Public Comments

Members of the public in attendance did not provide any comments.

Planning for Next Meeting

Dr. Greer said that the next meeting of the committee will be a face-to-face meeting, which will allow for more in-depth discussions and interactions. Committee members will be contacted to determine available dates.

Close

The meeting was adjourned at 11:40 a.m.