NIST Smart Grid Interoperability Panel as a Paradigm for “Smart” Water Standards

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National Institute of Standards and Technology

- Non-regulatory agency in the U.S. Department of Commerce
  - Originally National Bureau of Standards (established 1901)
  - NIST Laboratories measurement science research activities at two main campuses in Gaithersburg, Maryland and Boulder, Colorado

- $567M (USD) for Laboratories; ~3000 employees (3 Nobel Prizes), 2800 associates, U.S. National Metrology Institute
- Strong partnerships with industry, academia, government
- Research, calibrations, standard reference materials, data …
- Engineering, IT, Physical Measurement, Material Measurement Labs
Smart Grid Success Factors

- **Champions**: identification of smart grid as national priority by Congress and Administration
- **Active Coordination**: within Federal Government and with private sector, standards developing organizations, and regulatory community
- **Leadership and Visibility**: NIST Three-Phase Plan with White House kickoff
- **Planning, Organization and Governance**: NIST standards process including NIST Framework and Smart Grid Interoperability Panel
- **Funding**: ARRA plus appropriations (including DOE)
- **Federal Government convening function**: workshops, stakeholder input, targeted activities
- **Expertise**: leverage existing expertise, build new, address longer-term measurement science/R&D needs
Smart Grid – A U.S. National Policy

“It is the policy of the United States to support the modernization of the Nation's electricity [system]… to achieve…a Smart Grid.”


“We’ll fund a better, smarter electricity grid and train workers to build it…”

President Barack Obama

http://www.whitehouse.gov/ostp
The Energy Independence and Security Act of 2007 gives NIST “primary responsibility to coordinate development of a framework that includes … standards … to achieve interoperability of smart grid devices and systems…”

White House June 2011 Policy Framework includes 4 key Federal policy recommendations: enable cost-effective smart grid investments, unlock innovation, empower and inform consumers, and secure the grid.

Standards – Key Aspect of US Smart Grid Policy

A POLICY FRAMEWORK FOR THE 21st CENTURY GRID:
Enabling Our Secure Energy Future

JUNE 2011
US Government Roles in Smart Grid

- Public Consultation
- Industry Coordination
- Standards Developing Organizations
- Regulatory Structure
- Funding
- State Regulators
US Government Roles in Smart Grid

- **Public Consultation, Utility Engagement, Agency Coordination**
- **Industry Coordination, R&D**
- **Standards Developing Organizations**
- **$ R&D (and ARRA – stimulus funding), National Labs**
- **State Regulators**
  - NARUC – National Association of Regulatory Utility Commissioners
- **Regulatory Structure**
  - NERC – North American Electric Reliability Corporation
  - NAESB – North American Energy Standards Board
US Government Roles in Smart Grid

- Public Consultation, Utility Engagement, Agency Coordination
- Industry Coordination, R&D
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- State Regulators NARUC – National Association of Regulatory Utility Commissioners
Federal Smart Grid Task Force
EISA Title XIII, Section 1303

Purpose

- Coordinate inter-governmental smart grid activities
- Collaborate on interoperability framework
- Review biannual smart grid system report mandated by US Congress
- Ensure awareness of Federal smart grid activities
- Support the National Science and Technology Council / Interagency Working Group on Smart Grid

Member Organizations

- Department of Energy
- Federal Energy Regulatory Commission
- Department of Commerce
  - International Trade Administration
  - National Institute of Standards and Technology
  - National Telecommunications and Information Administration
- Environmental Protection Agency
- Department of Homeland Security
- Department of Agriculture
- Department of Defense
- Federal Communications Commission
- Department of State
- National Aeronautics and Space Administration
- National Oceanic and Atmospheric Administration
- United States Trade Representative
- U.S. Trade and Development Agency
- General Services Administration
- Council of Environmental Quality
- Office of Science and Technology Policy
- Federal Trade Commission
Coordination and Acceleration of Smart Grid Standardization: NIST Three Phase Plan

**PHASE 1**
Identify an initial set of existing consensus standards and develop a roadmap to fill gaps

- Summer 2009 Workshops
- Draft Framework Sept 2009
- Smart Grid Interoperability Panel
  - Established Nov 2009
- NIST Smart Grid Interoperability Framework 1.0
  - Released Jan 2010

**PHASE 2**
Establish Smart Grid Interoperability Panel (SGIP) public-private forum with governance for ongoing efforts

- NIST Framework 2.0
  - Released Feb 2012

**PHASE 3**
Conformity Framework (includes Testing and Certification)

- SGIP self-sustaining business plan

- NIST Smart Grid Interoperability Framework 1.0
  - Released Jan 2010
White House kickoff meeting

- Hosted by Secretaries of Energy and Commerce
- Many industry CEOs including utilities, federal officials, standards developing organizations, …
- Commitment to support NIST standards process, including industry staff participation in workshops, standards acceleration, …
NIST Smart Grid Framework and Roadmap

• Release 1 published January 2010
  – Extensive public input and review
  – Completed in less than 1 year
  – Smart Grid Vision and Reference Model
  – Identified existing standards
  – Priority Action Plan Projects
  – Companion Cyber Security Strategy NISTIR 7628

• Release 2 published January 2012
  – Extensive involvement of Smart Grid Interoperability Panel plus public input and review
  – Improvements include revised architecture, Interoperability Process Reference Manual, additional identified standards, completed and new Priority Action Plans, SGIP structure …

http://www.nist.gov/smartgrid/
NIST Smart Grid Reference Model (Release 2.0)
(Extended) Organization

“[NIST] shall seek input and cooperation of other relevant federal and state agencies...and private sector entities” – EISA 2007

NIST SG Federal Advisory Committee

- 15 high-level advisors

NIST SG Team

- 20 NIST team members

Smart Grid Interoperability Panel

- 750 organizations, 1900 people

- SGIP: Public-private partnership created in Nov. 2009
- Open, public process with international participation
- Coordinates standards development
- Web-based participation
- Transitioning to legal entity private-public partnership
## Stakeholders in the Process

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<thead>
<tr>
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<th>Stakeholder Category</th>
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<tbody>
<tr>
<td>1</td>
<td>Appliance and consumer electronics providers</td>
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<tr>
<td>2</td>
<td>Commercial and industrial equipment manufacturers and automation vendors</td>
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<tr>
<td>3</td>
<td>Consumers – Residential, commercial, and industrial</td>
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<td>4</td>
<td>Electric transportation industry Stakeholders</td>
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<td>5</td>
<td>Electric utility companies – Investor Owned Utilities (IOU)</td>
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<td>6</td>
<td>Electric utility companies - Municipal (MUNI)</td>
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<td>7</td>
<td>Electric utility companies - Rural Electric Association (REA)</td>
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<tr>
<td>8</td>
<td>Electricity and financial market traders (includes aggregators)</td>
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<tr>
<td>9</td>
<td>Independent power producers</td>
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<tr>
<td>10</td>
<td>Information and communication technologies (ICT) Infrastructure and Service Providers</td>
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<tr>
<td>11</td>
<td>Information technology (IT) application developers and integrators</td>
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<tr>
<td>12</td>
<td>Power equipment manufacturers and vendors</td>
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<tr>
<td>13</td>
<td>Professional societies, users groups, and industry consortia</td>
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<tr>
<td>14</td>
<td>R&amp;D organizations and academia</td>
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<td>15</td>
<td>Relevant Government Agencies</td>
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<tr>
<td>16</td>
<td>Renewable Power Producers</td>
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<td>17</td>
<td>Retail Service Providers</td>
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<td>18</td>
<td>Standard and specification development organizations (SDOs)</td>
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<td>19</td>
<td>State and local regulators</td>
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<td>20</td>
<td>Testing and Certification Vendors</td>
</tr>
<tr>
<td>21</td>
<td>Transmission Operators and Independent System Operators</td>
</tr>
<tr>
<td>22</td>
<td>Venture Capital</td>
</tr>
</tbody>
</table>
SGIP Structure Diagram

SGIP Membership

- Standing Committees & Work Groups
  - Architecture Committee (SGAC)
  - Implementation Methodology Committee (IMC)
  - Cyber Security Working Group (CSWG)
  - Test & Certification Committee (SGTCC)

- Governing Board Working Groups
  - Bylaws & Operating Procedures (BOPWG)
  - Communications, Marketing, Education (CMEWG)
  - International Task Force (GBTIF)

- Priority Action Plan Teams
  - PAP 1, PAP 2, PAP 3, PAP 4, PAP 5, PAP 6, PAP 7, PAP...

- Domain Expert Working Groups

NIST

SGIP Officers

Administrator
Smart Grid Data – Example of Innovation

Generate

Move and Store

Use
Smart Grid Data

Generate

Move and Store

Use

Data Standardization

Physical Infrastructure

Policy / Custodian
Smart Grid Data – Energy Usage Information

• Physical Infrastructure
  – Smart Meters
  – Meter Communications and Utility Back-end Systems

• Privacy / Custodian
  – US privacy blueprint and privacy efforts, state efforts
  – DOE-led smart grid privacy (with Smart Grid Task Force)
  – Third Party data access authorization by consumers
    • SGIP Cyber Security Working Group (CSWG)

• Standardization
  – Energy Usage Information (SGIP Priority Action Plan 10)
  – Green Button Initiative (SGIP Priority Action Plan 20)

Goal: Ecosystem of innovative smart grid products and services based on energy usage information
Green Button Initiative (OSTP CEQ DOE NIST)

- Common-sense idea that electricity customers should be able to download their own energy usage information in a consumer- and computer-friendly electronic format from their utility’s secure website.

- A common experience, from provider to provider, setting clear expectations that consumers’ information is theirs to have – and share.

10 million US consumers have access to Green Button data NOW, and 31+ million will by 2013

The ecosystem of companies and organizations supporting and using Green Button data...

- Utilities
- Utility software vendors
- Apps developers
- Device manufacturers
- Standards organizations
Green Button Apps and Competitions – DOE

DOE Smart Grid Data Access Funding Opportunity Announcement – DOE announced 7 winners on May 22, 2012
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Further information

- NIST smart grid program information: [www.nist.gov/smartgrid/](http://www.nist.gov/smartgrid/)
- NIST SGIP information: [http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/FactSheets](http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/FactSheets)

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