



## Smart Grid Interoperability Standards Project

Under the [Energy Independence and Security Act \(EISA\)](#) of 2007, the National Institute of Standards and Technology (NIST) has "primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems..."

As specified in the American Recovery and Reinvestment Act (ARRA), NIST will receive \$10 million through the [Department of Energy](#) (DOE) to carry out responsibilities assigned under EISA. In addition, NIST is allocating \$5 million in [ARRA funding](#) for this purpose. The funding supports collaborative efforts to develop a comprehensive framework for a nationwide, interoperable Smart Grid for the U.S. electric power system (as called for in EISA Title XIII, Section 1305).

The Smart Grid will be key to national efforts to further energy independence and curb greenhouse gas emissions, and NIST is carrying out its responsibilities with a sense of urgency. With industry, government, and consumer stakeholders, NIST is expediting identification and development of standards critical to achieving a reliable and robust Smart Grid.

NIST is well-suited for this role. The agency has earned a reputation as an "honest broker"—an impartial, technically knowledgeable third party with a long history of working collaboratively with industry and other government agencies. These partners include DOE and the [Federal Energy Regulatory Commission](#) (FERC).

NIST also has provided measurement technology and assistance to utilities, equipment manufacturers, and other power-system stakeholders. It participates in key international standards organizations, and NIST's measurement and testing expertise is recognized worldwide.

Interoperability—the ability of diverse systems and their components to work together—is vitally important to the performance of the Smart Grid at every level. It enables integration, effective cooperation, and two-way communication among the many interconnected elements of the electric power grid.

Effective interoperability is built on a unifying framework of interfaces, protocols, and the other consensus standards. These standards facilitate useful interactions so that, for example, "smart" appliances and meters will tell consumers how much power they are using and at what cost, providing them with more control over their power consumption and energy bills. Widely adopted standards also will help utilities to mix and manage varying supplies of solar, wind, and other renewable energy sources and better respond to changing demand.

The task is akin to developing standards for the next-generation telecommunications network. This effort has spanned many years, continues to evolve, and involves dozens of standards development organizations. Also, like the telecom network, the Smart Grid is almost entirely owned and operated by industry. Therefore, Smart Grid interoperability and cybersecurity standards must reflect industry consensus, with active participation, and where required, leadership and coordination by government.

NIST brings a diverse combination of skills and expertise to the challenge. Beyond the measurement and testing support it has long provided the electric utility industry, NIST is a recognized expert in advanced networking technology and in the cybersecurity countermeasures needed to detect and mitigate intrusions and network disruptions. In particular, NIST has extensive experience in establishing testing and certification programs in cybersecurity.

NIST also has collaborated with businesses and standards organizations on guidelines and standards to protect industrial supervisory control and data acquisition (SCADA) systems and to secure their interfaces to the power grid. NIST know-how extends to standards and measurements for building control systems and their links to the grid.

### Initial Steps

Over the past year, NIST launched the initial stages of a broad effort to build interoperability into the Smart Grid. Accomplishments to date include:

- In partnership with the DOE GridWise Architectural Council (GWAC), a DOE-formed body composed of users and suppliers of electric power, NIST created Domain Expert Working Groups (DEWGs) that involve more than 100 organizations. Areas of focus are:
  - [Transmission and Distribution](#),
  - [Building to Grid](#),
  - [Industry to Grid](#),
  - [Home to Grid](#), and
  - [Business and Policy](#).
- Formed a cross-cutting [Cyber Security Coordination Task Group](#) as well as other cross-domain task groups to address overlapping challenges.
- In collaboration with GWAC, NIST has reached out to stakeholders to communicate its plans to develop a framework, encourage their input, and help NIST to prioritize critical business objectives and barriers in Smart Grid domain areas. A necessary step in laying out a standards roadmap, NIST is in the process of assessing the current state of Smart Grid interoperability and of stakeholders' planned activities.
- In collaboration with power industry stakeholders, NIST is building an initial suite of business-use cases to help guide development of standards.
- Began development of an Interoperability Knowledge Base to promote shared understanding and to further consensus on standards, taxonomy, interfaces, and vocabulary for the Smart Grid.

### Expediting the Process

### Developments toward Smart Grid Interoperability

- [Sept. 24 Events to Present, Describe Proposed Smart Grid Framework](#)
- **Draft Reports**
  - [Cyber Security and Priority Action Plans - Post Workshop Versions](#)
  - [Report to NIST on the Smart Grid Interoperability Standards Roadmap - Post-comment-period version, August 10, 2009](#) (pdf)
    - [Consolidated comments on the Report to NIST, June 17, 2009](#) (pdf)
  - [NIST-Identified Standards for Inclusion in the Smart Grid Interoperability Standards Framework \(Release 1.0\)](#)
- [NIST Information Related to the American Recovery and Reinvestment Act of 2009](#) ([web page](#))
- [Congressional Testimony](#)
- **Press Releases**
  - [NIST Awards Contract to Sustain Fast Track Development of Smart Grid Standards](#)
  - [NIST Announces Third Smart Grid Public Workshop, Aug. 3-4, 2009](#)
  - [NIST Releases Report on Smart Grid Development, EPRI-Developed Report Discusses Priorities, Standards, Architecture](#)
  - [Locke, Chu Announce Significant Steps in Smart Grid Development](#)
  - [Archived Press Releases](#)
- [Federal Register Notices and Solicitations](#)
- **News from Other Agencies**
  - [Obama Administration Announces Billions in Lending Authority for Renewable Energy Projects and to Modernize the Grid](#)
  - [Federal Energy Regulation Commission Issues Smart Grid Policy Statement](#)
  - [Obama Administration Announces Availability of \\$3.9 Billion to Invest in Smart Grid Technologies and Electric Transmission Infrastructure](#)

### Office of the National Coordinator

- [George W. Arnold](#)

Accelerating development of the Smart Grid ranks among the Obama Administration's top priorities. Funding through the American Recovery and Reinvestment Act provides a tremendous opportunity to "jump start" implementation of the Smart Grid. NIST recognizes the urgency to accelerate the standards development process, and it is taking aggressive action to respond to this critical national need.

NIST's new National Coordinator for Smart Grid Interoperability Office provides visible leadership at the national level and focuses accountability for managing NIST Smart Grid resources to ensure success. In April 2009, the new office launched a [three-phase plan](#) to expedite development and promote widespread adoption of Smart Grid interoperability standards:

- **Engage stakeholders in a participatory public process to identify applicable standards, gaps in currently available standards and priorities for new standardization activities.** NIST awarded the Electric Power Research Institute (EPRI) a contract to engage Smart Grid stakeholders and to provide technical assistance in assessing standards needs and developing a draft interim standards roadmap. NIST is using this [report](#) as a starting point in developing a NIST interim "roadmap" for Smart Grid interoperability standards, as called for in EISA. EPRI technical experts compiled and distilled stakeholder inputs, including technical contributions made at two EPRI-facilitated, two-day, public workshops—one in [April](#) and the other in [May](#). Other inputs include the accomplishments of six domain expert working groups established by NIST in 2008, and the cybersecurity coordination task group established in 2009. To date, hundreds of people have participated in the roadmapping process.

By early fall, NIST expects to describe an initial Smart Grid architecture; priorities for interoperability standards, including cybersecurity; an initial set of standards to support implementation; and plans to meet remaining standards needs.

- **Establish a formal private-public partnership to drive longer-term progress.** While initial standards for the Smart Grid will be selected in 2009, further standards development will be needed to address gaps, harmonize standards, and incorporate evolving technology. Industry has made it clear that a representative, reliable, and responsive organizational structure is needed to support and sustain this evolutionary development. By the end of 2009, NIST plans to establish, through a contract, a public-private partnership entity—a Smart Grid Interoperability Standards Panel—to serve this function.
- **Develop and implement a framework for testing and certification.** Testing and certification of how standards are implemented in Smart Grid devices, systems, and processes are essential to ensure interoperability and security under realistic operating conditions. Industry has indicated that this is a high priority. NIST, in consultation with industry, government, and other stakeholders, will propose to develop an overall plan for a testing and certification framework by the end of 2009 and initiate steps toward implementation in 2010.

#### How to Participate

You also may wish to visit our Wiki collaboration site, where technical documents can be found: [SmartGrid TWiki Collaboration Site](#).

Anyone interested in contributing to the Smart Grid interoperability standards effort is welcome to join one of the Domain Expert Working Groups listed on the collaboration site. Send an email to: [smartgrid@nist.gov](mailto:smartgrid@nist.gov).

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