

Policy, Regulation and Implementation of Smart Grids in the US

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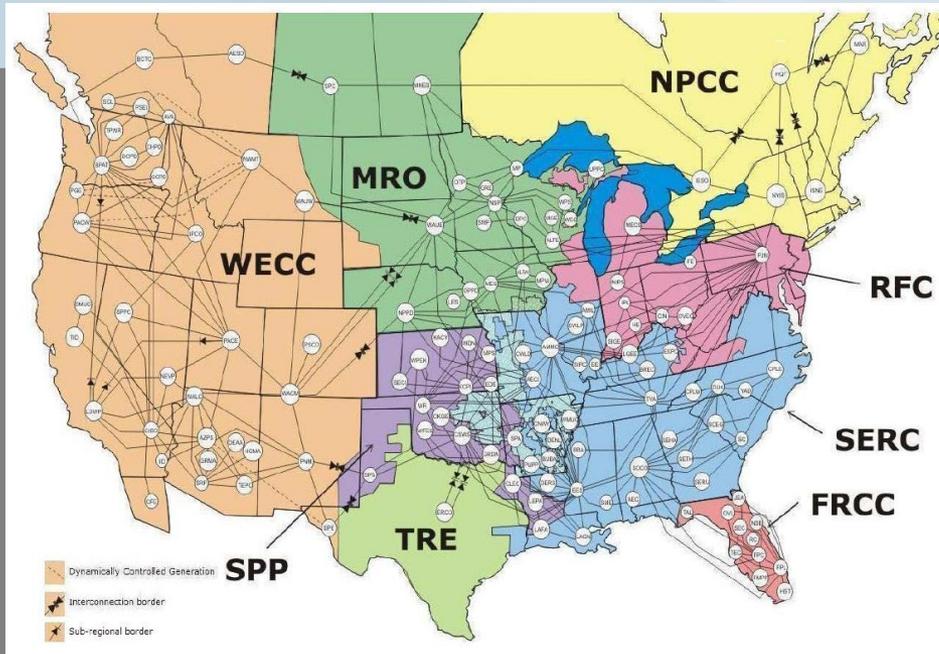
Smart Grid International Plenary
Brussels, Belgium
18 June 2012



Large, Fragmented, Complex System

US figures:

- 22% of world consumption



- 3,200 electric utility companies
- 17,000 power plants
- 800 gigawatt peak demand
- 165,000 miles of high-voltage lines
- 6 million miles of distribution lines
- 140 million meters
- \$1 trillion in assets
- \$350 billion annual revenues

Goals for Smart Grid in the U.S.



Greater efficiency > reduced need for asset replacement and system expansion

- Half of US coal plants (50% of generation fleet) >40 years old
- Average substation transformer age > 40 years
- Projected capital investment in replacement and expansion \$1.5-\$2 trillion by 2030
- Smart Grid achieves greater efficiency by measurement and control to reduce delivery losses, peak-shaving to increase system utilization, and providing new tools for customers to reduce energy use



Increased reliability

- US power outages average 2 hours/year per customer, vs. 16 minutes in Japan
- Power outages cost the US economy \$80 billion/year
- Smart Grid increases reliability by applying sensors and controls to detect imminent failures before they occur, speed fault isolation and service restoration, and support distributed microgrids that can operate during grid disruptions



Sustainability

- 29 states have introduced renewable portfolio standards
- Smart Grid enables dynamic grid operation to accommodate greater penetration of wind and solar, and management of EV charging to use idle capacity in generation and transmission while preventing overload of distribution systems

2011 EPRI study:

Smart Grid will cost in the range of \$338 - \$476 billion over 20 years

Resulting benefit estimated at \$1.6 - \$2 trillion

Government Roles in Smart Grid

Federal



Office of Science & Technology
Policy; National Economic Council;
& Council on Environmental Quality



National Science &
Technology Council
Smart Grid IAWG
& Smart Grid Task Force

Other Federal
Agencies



State

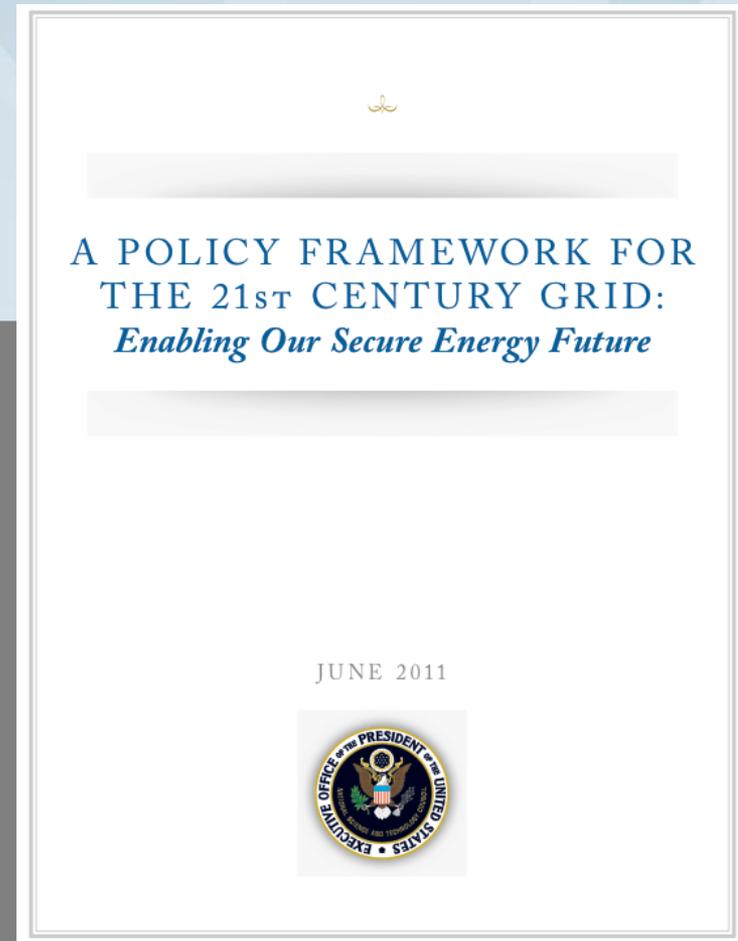
FERC – NARUC
Smart Response Collaborative



Public Utility Commissions

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.”
- *Congress, Energy Independence and Security Act of 2007*



<http://www.whitehouse.gov/ostp>



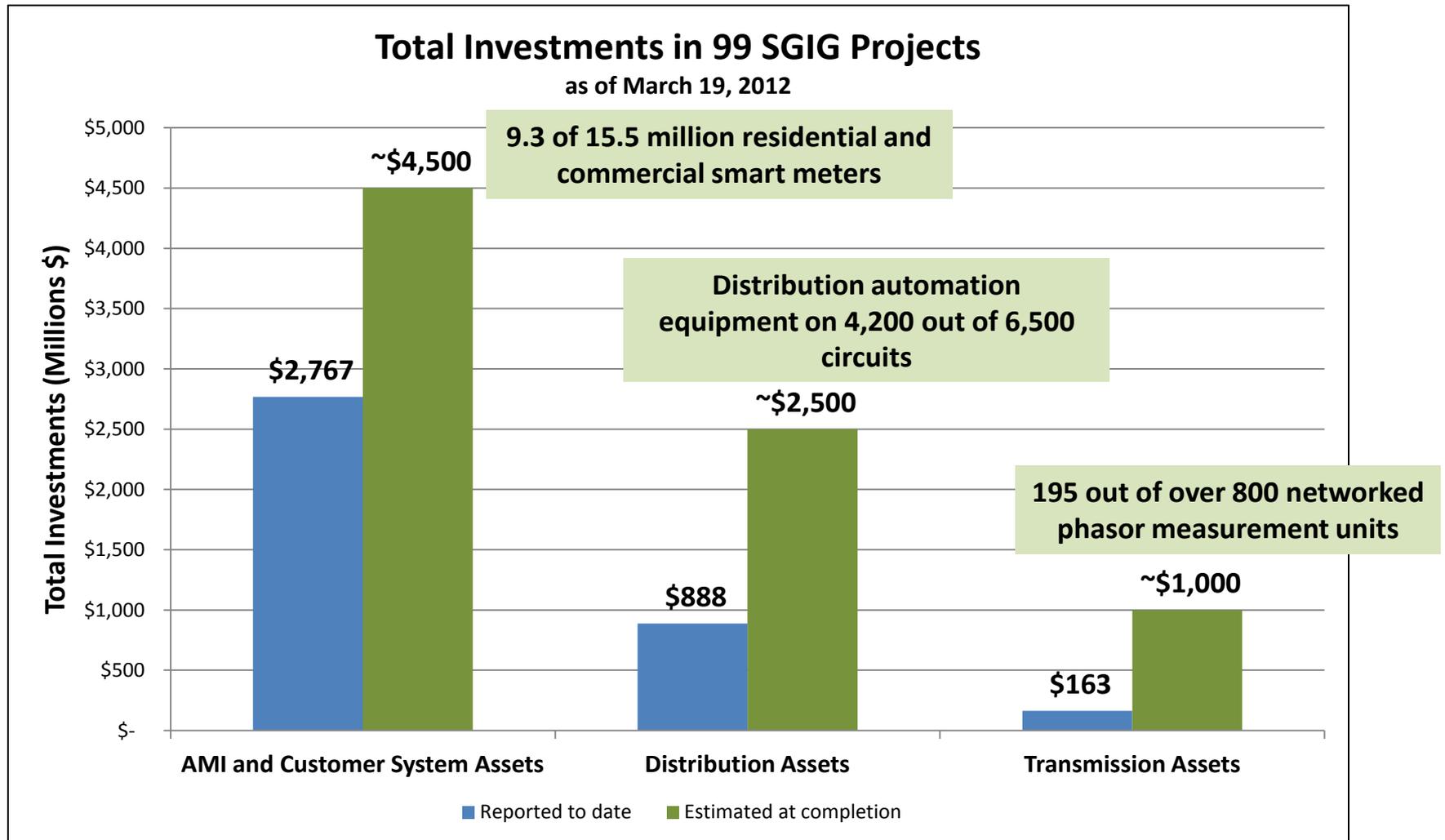
Technology Deployment

SGIG/SGDP Areas of Smart Grid Technology Deployment

Customer Systems	Advance Metering Infrastructure	Electric Distribution Systems	Electric Transmission Systems	Equipment Manufacturing
				
<ul style="list-style-type: none"> • Displays • Portals • Energy management • Direct load controls 	<ul style="list-style-type: none"> • Smart meters • Data management • Back office integration 	<ul style="list-style-type: none"> • Switches • Feeder optimization • Equipment monitoring • Energy Storage 	<ul style="list-style-type: none"> • Wide area monitoring and visualization • Synchrophasor Technology • Energy Storage 	<ul style="list-style-type: none"> • Energy devices • Software • Appliances



SGIG Deployment Status





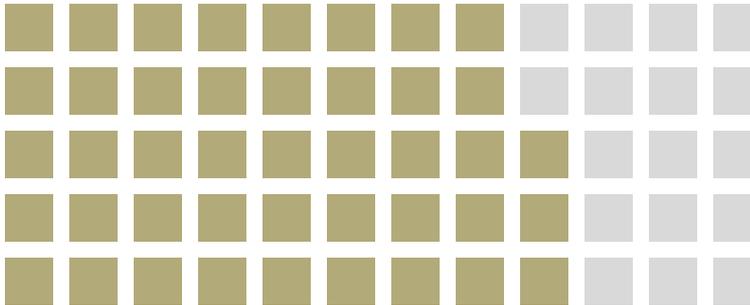
Scope and Challenges

Adoption Rate Factors:

- Economy
- Policy
- Technology
- Consumer Acceptance
- Reliability Needs

SGIG Spending  \$7.9 billion with cost share to be spent through 2015

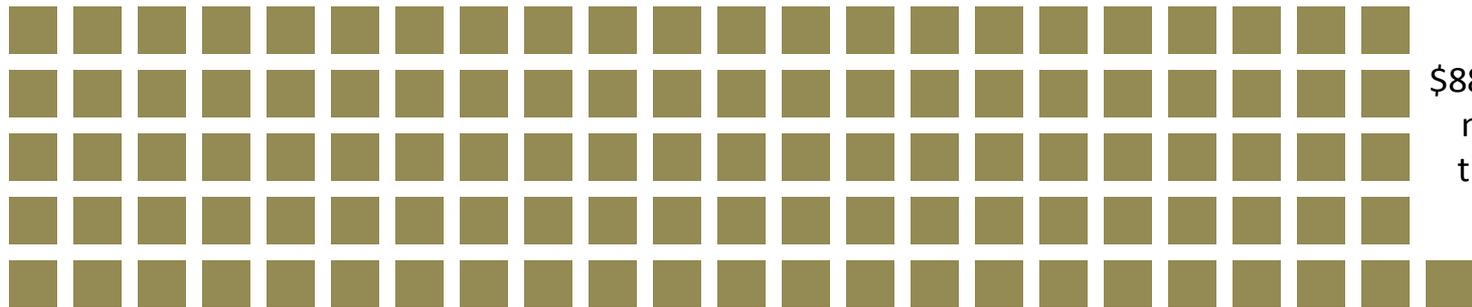
EPRI Estimate



\$338 - \$476 billion needed through 2030

EPRI. Estimating the costs and benefits of the smart grid: A preliminary estimate of the investment requirements and the resultant benefits of a fully functioning smart grid. EPRI, Palo Alto, CA; 2011.

Brattle Group Estimate



\$880 billion needed through 2030

Chupka, M.W. Earle, R., Fox-Penner, P., Hledik, R. Transforming America's power industry: The investment challenge 2010 - 2030. Edison Electric Institute, Washington D.C.; 2008.

Standards – Key Aspect of US Policy

The Energy Independence and Security Act gives NIST

“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...”

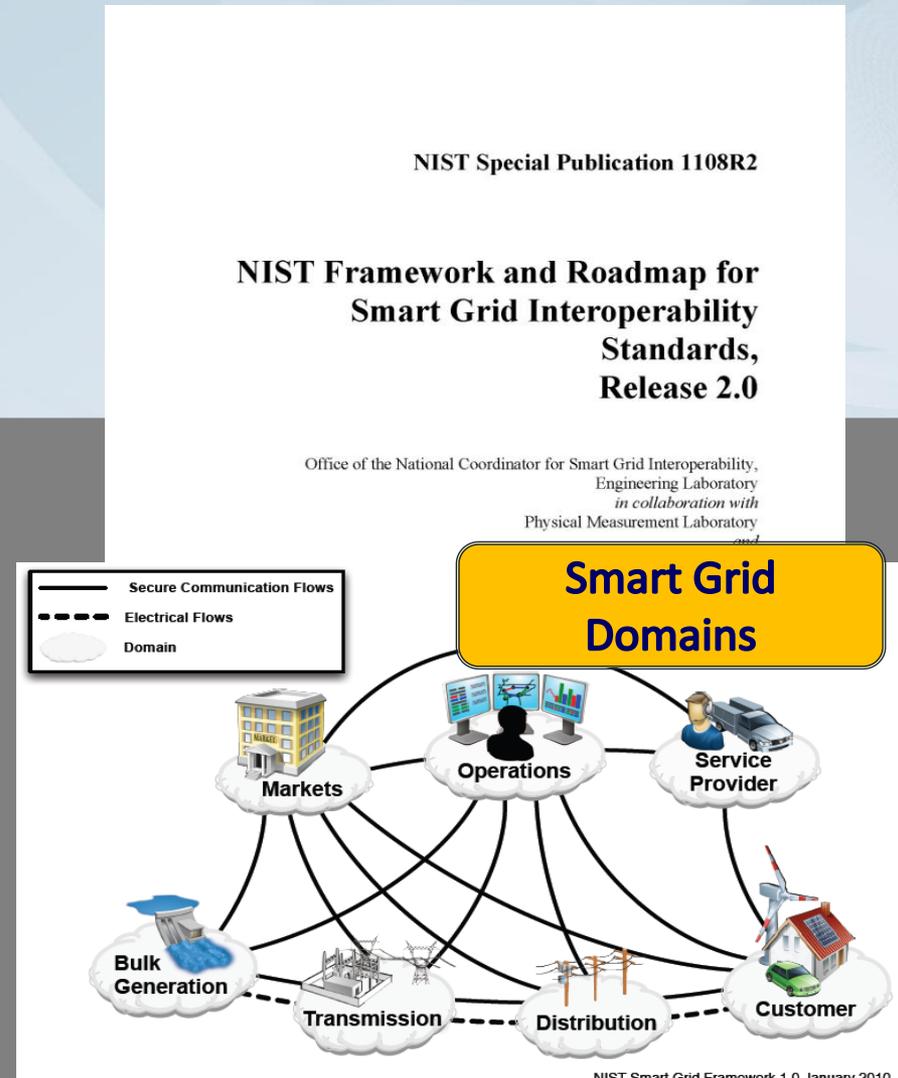


- Congress directed that the framework be “flexible, uniform, and technology neutral”
- Use of these standards is a criteria for federal Smart Grid Investment Grants
- Input to federal and state regulators

NIST Smart Grid Framework and Roadmap

- Published January 2010, Release 2.0 February 2012
 - Extensive public input and review
- Smart Grid Vision & Reference Model
- Identifies 100 standards
- Priority Action Plan projects to fill key gaps
- Testing & certification framework
- Companion cyber security strategy
- Smart Grid Interoperability Panel

<http://www.nist.gov/smartgrid/>





NIST Smart Grid Interoperability Panel

- Public-private partnership created in Nov. 2009
- Approx. 750 member organizations, 1900+ participants
- Open, public process with international participation
- Coordinates standards development
 - Identifies Requirements
 - Prioritizes standards development programs
 - Works with over 20 SDOs including IEC, ISO, ITU, IEEE, ...
- Web-based participation



SGIP Twiki:

<http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/SGIP>

White House NSTC Report

- Federal government will continue to catalyze development and adoption of open standards
 - Standards help ensure that today's investments will be valuable in the future
 - Standards help catalyze innovation
 - Standards support consumer choice
 - Standards help lower prices
 - Standards highlight best practices as utilities face difficult choices
 - Standards help open markets



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

JUNE 2011



White House NSTC Report



A POLICY FRAMEWORK FOR
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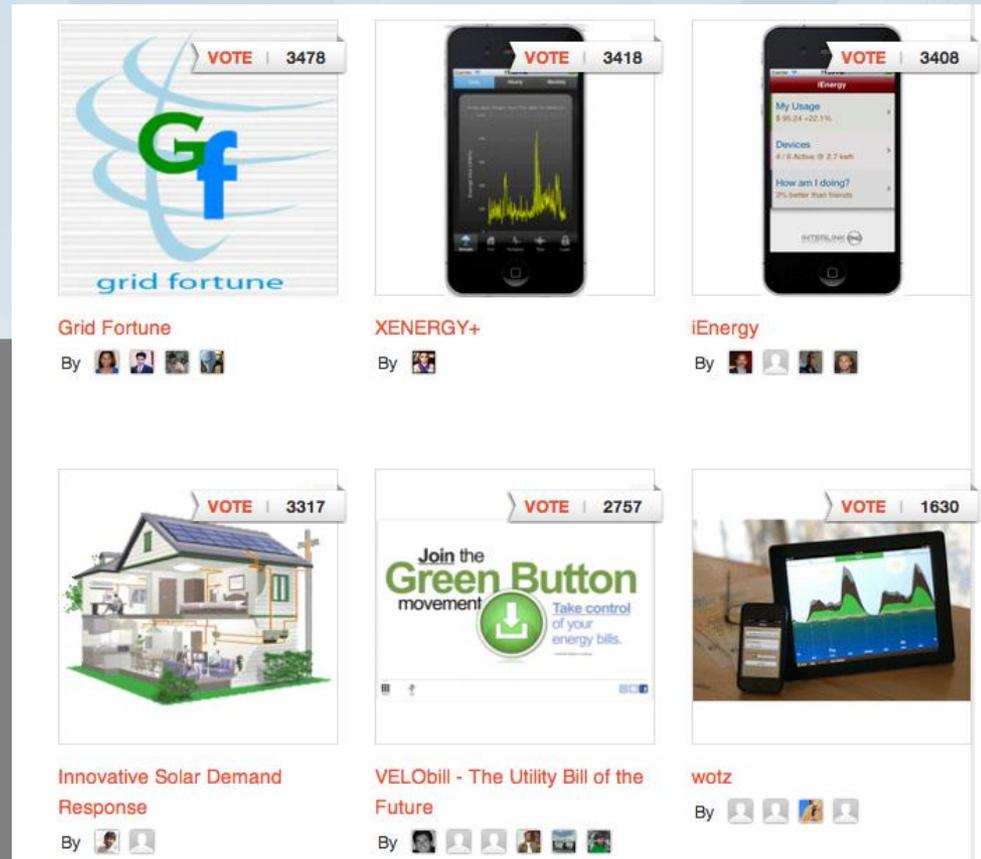
- Regulators should publicly embrace the interoperability standards with the understanding that they will continue to develop with ongoing evolution of technology
- Federal and state regulators should take appropriate action regarding development and implementation of smart grid standards
- Encourage utility companies to rely on the [NIST] Framework for guidance, but avoid mandates

FERC Order RM 11-2-000 (2011)

- Declined to institute rulemaking to adopt five initial interoperability standards at that time
- Encouraged utilities, smart grid product manufacturers, regulators, and other smart grid stakeholders to actively participate in the NIST interoperability framework process to work on the development of interoperability standards and to refer to that process for guidance on smart grid standards

Green Button Demonstrates the Power of a Good Standard

- Enables electronic consumer access to energy data and app developers
- Available to 28 million households by end of 2012
- Result of collaboration among White House, DOE, NIST, state regulators, utilities, vendors, SGIP, and North American Energy Standards Board



Thank You!

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