
NIST Smart Grid Update

Dean Prochaska

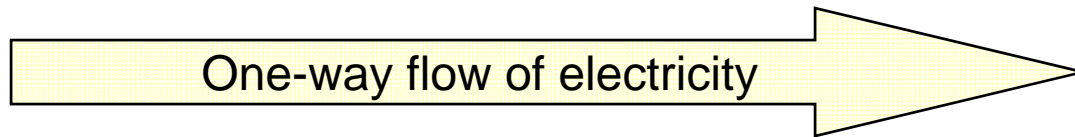
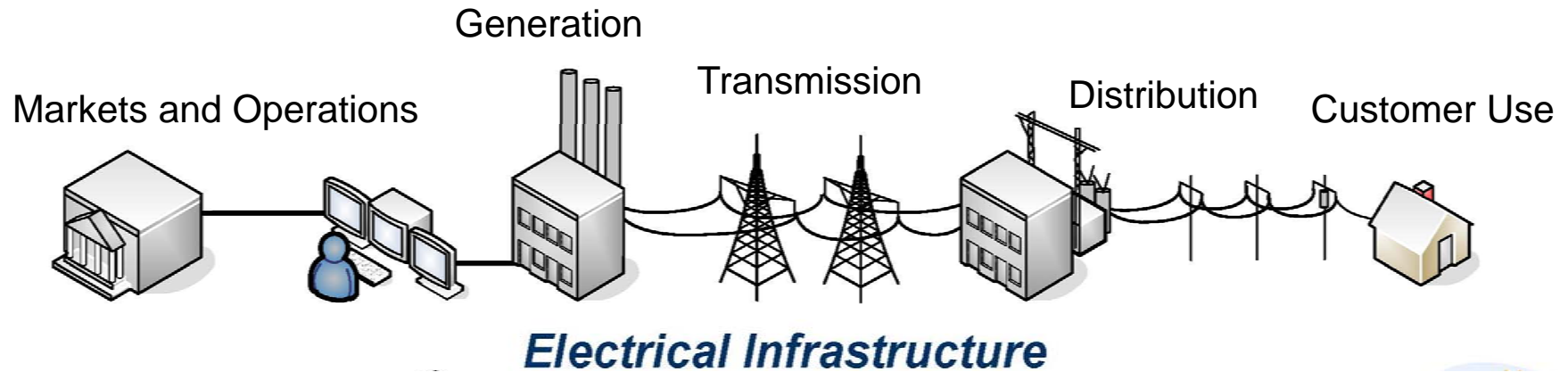
National Coordinator for Smart Grid Conformance

National Institute of Standards and Technology

September 16, 2009



Today's Electric Grid



Drivers for the Smart Grid

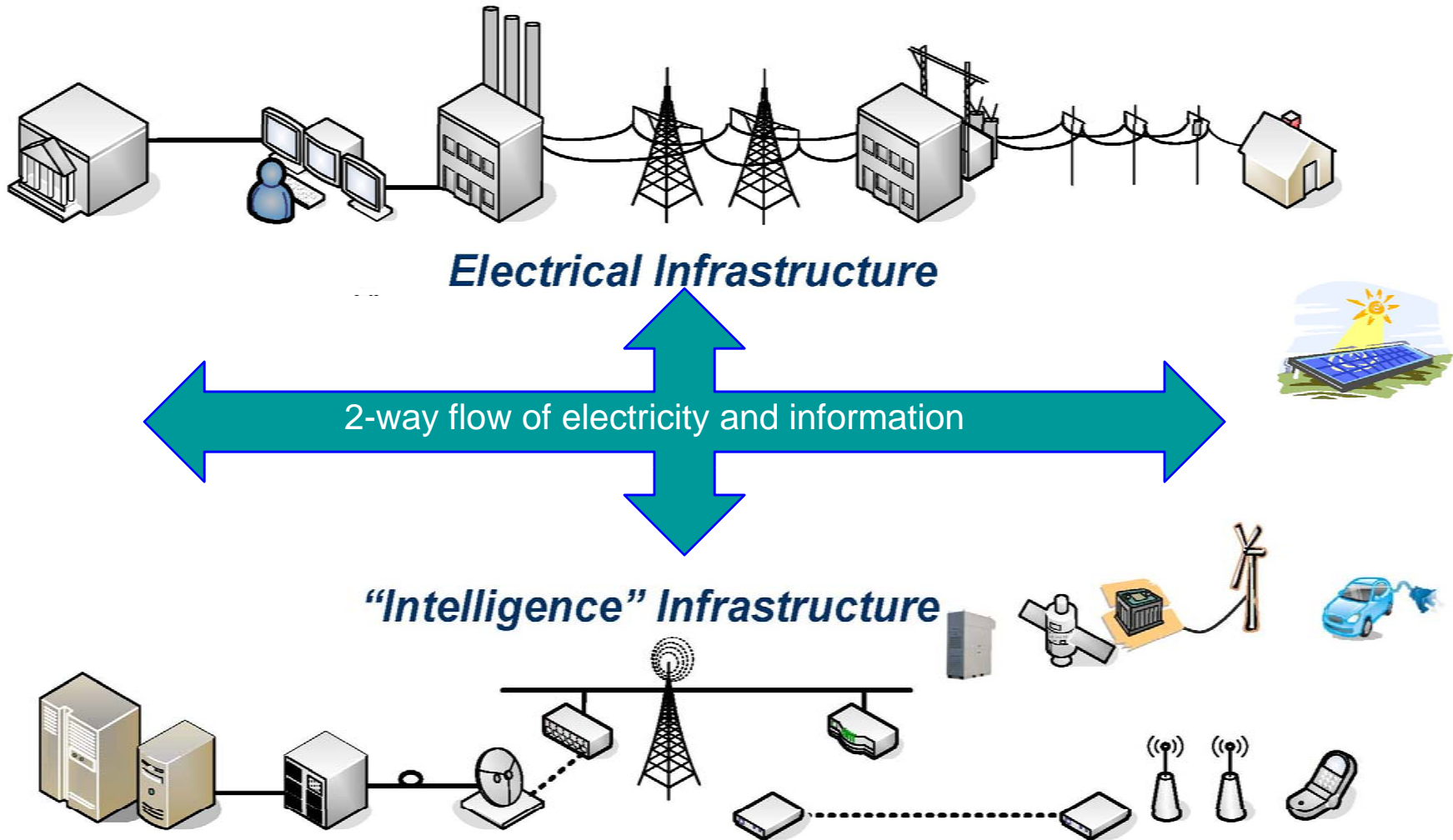
Achieving Changes in...

- Generation
 - Renewables
 - Variability
 - Storage
 - Distributed resources
- Load
 - Reduce peaking
 - Energy management
 - Plug in vehicles
- Reliability and Security
 - Improved measurement and control
 - Risk-based approach



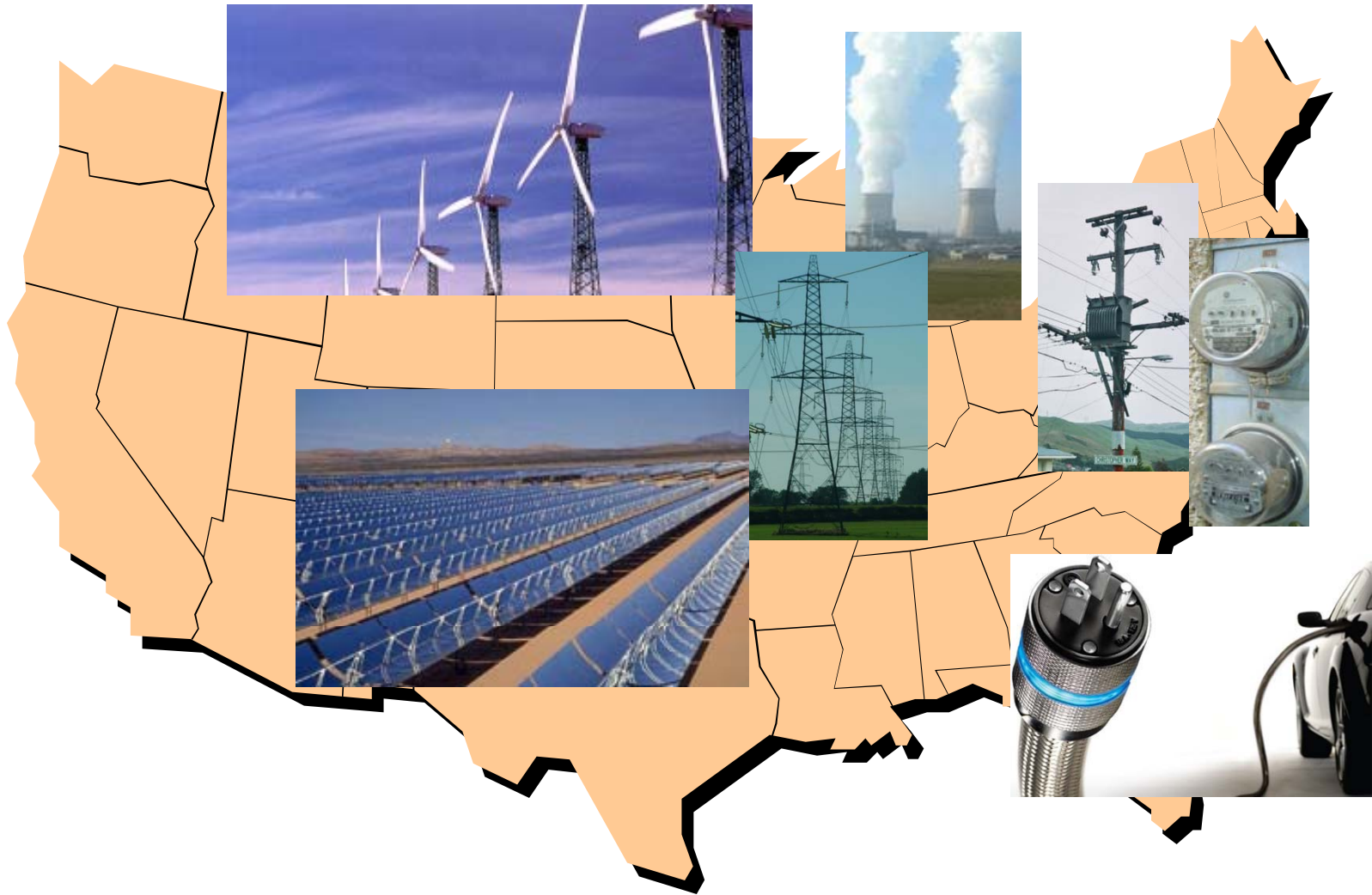
- Require
 - Automated management, operation, control
 - 2-way flow of power and information
 - Interoperability at many levels
 - Standards

“Smart Grid” = Electric Grid + Intelligence



Standards Are Essential

To Realizing a National Interoperable and Secure Smart Grid



Some Key Industry Players

Utilities

American Electric Power	PEPCO
CenterPoint Energy	Sempra Energy
Consolidated Edison	Southern California Edison
Constellation	Edison
Duke Energy	Southern Companies
Exelon	Xcel Energy
Florida Power & Light	Bonneville Power Admin.*
MidAmerican Energy	Tennessee Valley Authority*
National Grid USA	
Pacific Gas and Electric	

Electric Industry Suppliers

ABB	Itron
Beacon Power Systems	S&C
Eaton	Schneider Electric
Elster	Siemens
Emerson	SmartSync
GE	Southwire
Gridpoint	Thomas & Betts
Landis+Gyr	TIAX

Automation and Appliances

Echelon	Johnson Controls
Honeywell	Whirlpool

Industry Associations

American Public Power Association
Association of Edison Illuminating Companies
Edison Electric Institute
Electric Power Research Institute
Gridwise Alliance
National Electric Manufacturers Association
National Rural Electric Cooperative Association

Independent System Operators and Regional Transmission Organizations

California ISO	Midwest Independent
Electric Reliability Council of Texas	Transmission System Operator
Florida Reliability Coordinating Council	New York ISO
ISO New England	PJM Interconnection
	Southwest Power Pool

IT and Telecom

Accenture	Intel
Boeing	Microsoft
Cisco	Silver Spring
Google	AT&T
Hughes	Verizon
IBM	

Standards Organizations

American National Standards Institute
American Society of Heating, Refrigerating and Air-Conditioning Engineers
International Electrotechnical Commission
IEEE
International Society of Automation
National Electrical Manufacturers Association
National Fire Protection Association
North American Electric Reliability Corp.
North American Energy Standards Board
Organization for Advancement of Structured Information Systems
Society of Automotive Engineers
Underwriters Laboratories

* Federal entities

The NIST Role

***Energy Independence and Security Act (EISA) of 2007
Title XIII, Section 1305.
Smart Grid Interoperability Framework***

In cooperation with the DoE, NEMA, IEEE, GWAC, and other stakeholders, **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...**”

The Need for Standards is Urgent



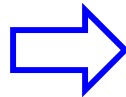
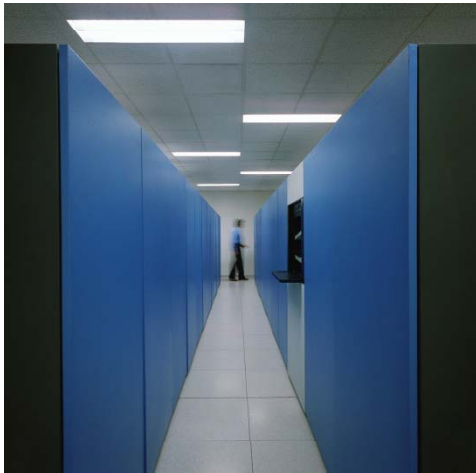
Example: Smart Meters

- \$40 - \$50 billion dollar deployment nationwide
- Underway now
- ARRA will accelerate
- Rapid technology evolution
- Absence of firm standards

Source: Congressional Research Service Report

Smart Grid Killer Apps Require Standards

Google PowerMeter



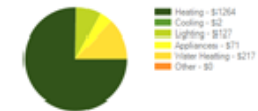
Summary of Potential Savings

Thank you for using our service. You can use the following energy report to guide you in your home energy upgrades and repairs. You may want to consult a professional before implementing some of the recommendations.

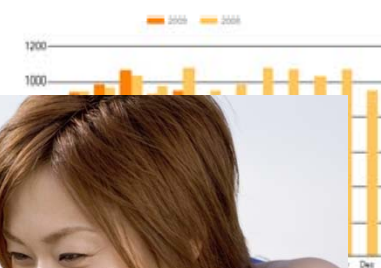
Your average annual energy costs are **\$1682**. This includes your electricity and gas consumption, but may not include auxiliary energy usage such as propane tanks and generators.

Where Your Energy Goes

Average Annual Energy Consumption



Annual Electricity Usage

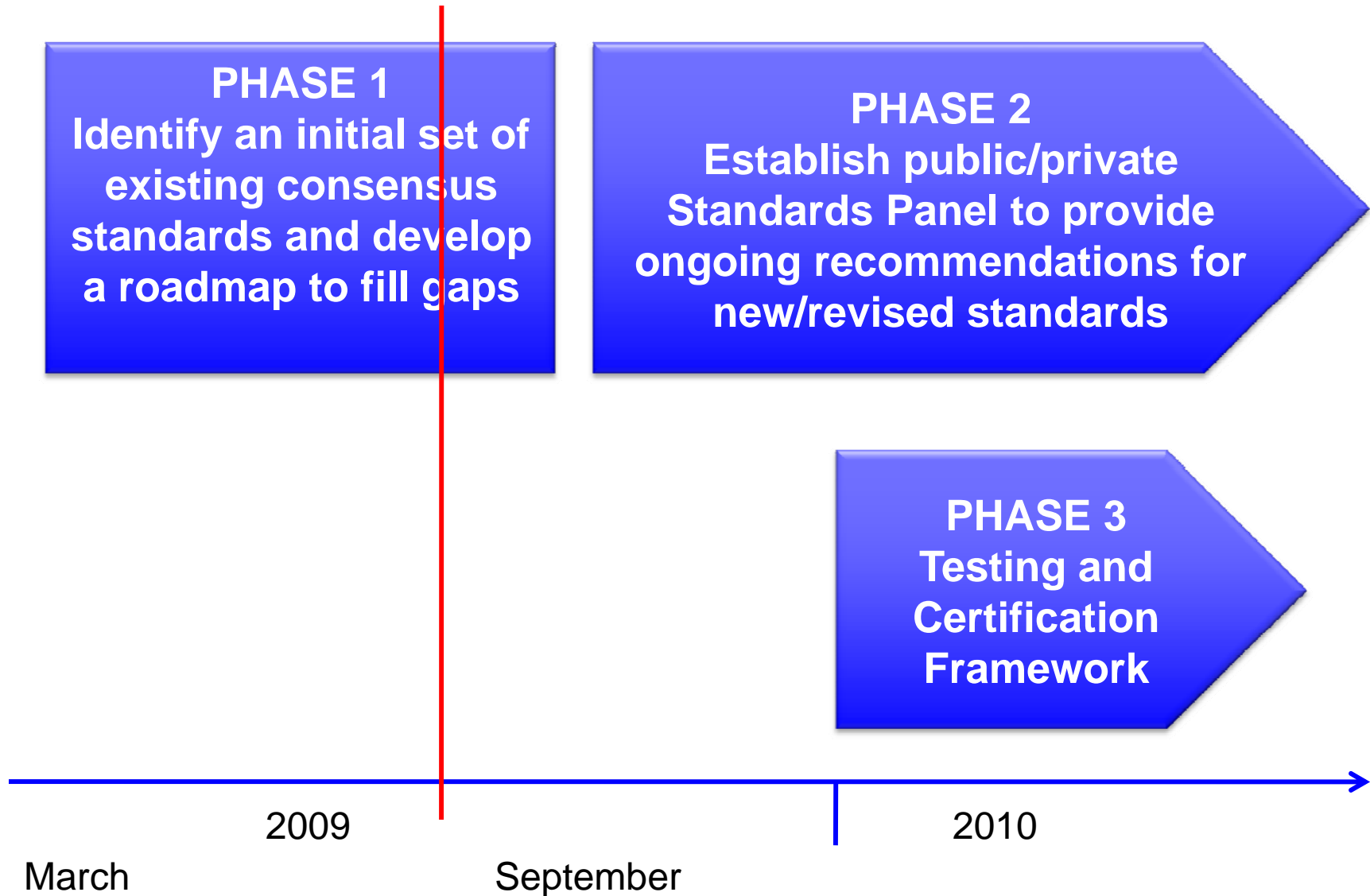


White House Meeting May 18



- Chaired by Secretaries Locke and Chu
- 66 CEOs and senior executives, federal and state regulators
- We need to move fast – it can be done!
- Consensus does not mean unanimity
- SG investments being made now cannot be ignored
- Standards need to allow for innovation
- One size does not fit all
- Open standards are essential
- Today's regulatory assumptions may have to evolve

NIST Three Phase Plan



We Need A Standards Roadmap

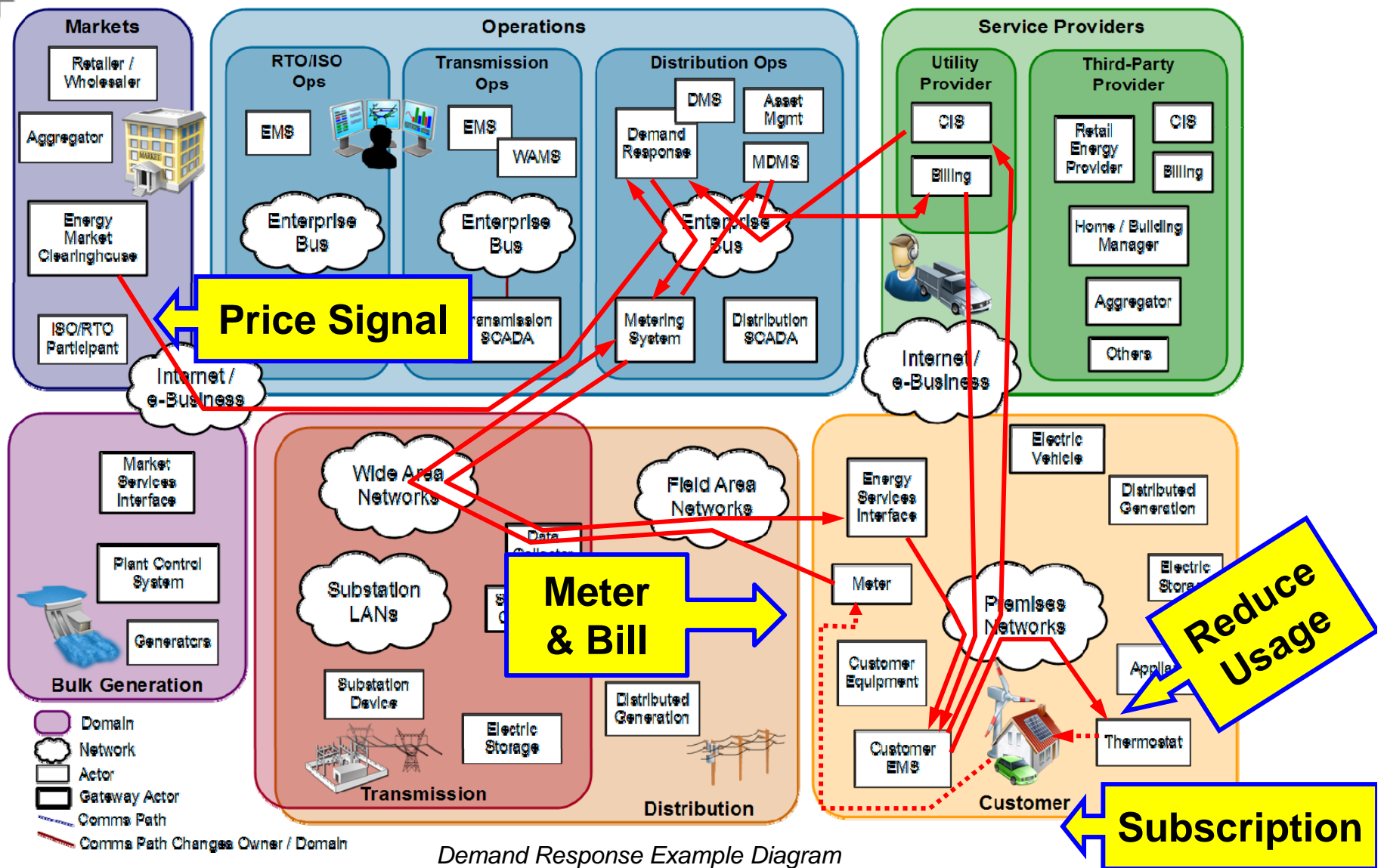
- Capabilities
- Priorities
- Reference Model
- Standards
- Release Plan
- Responsibilities
- Governance
- Testing and Certification



Roadmap Focus Areas

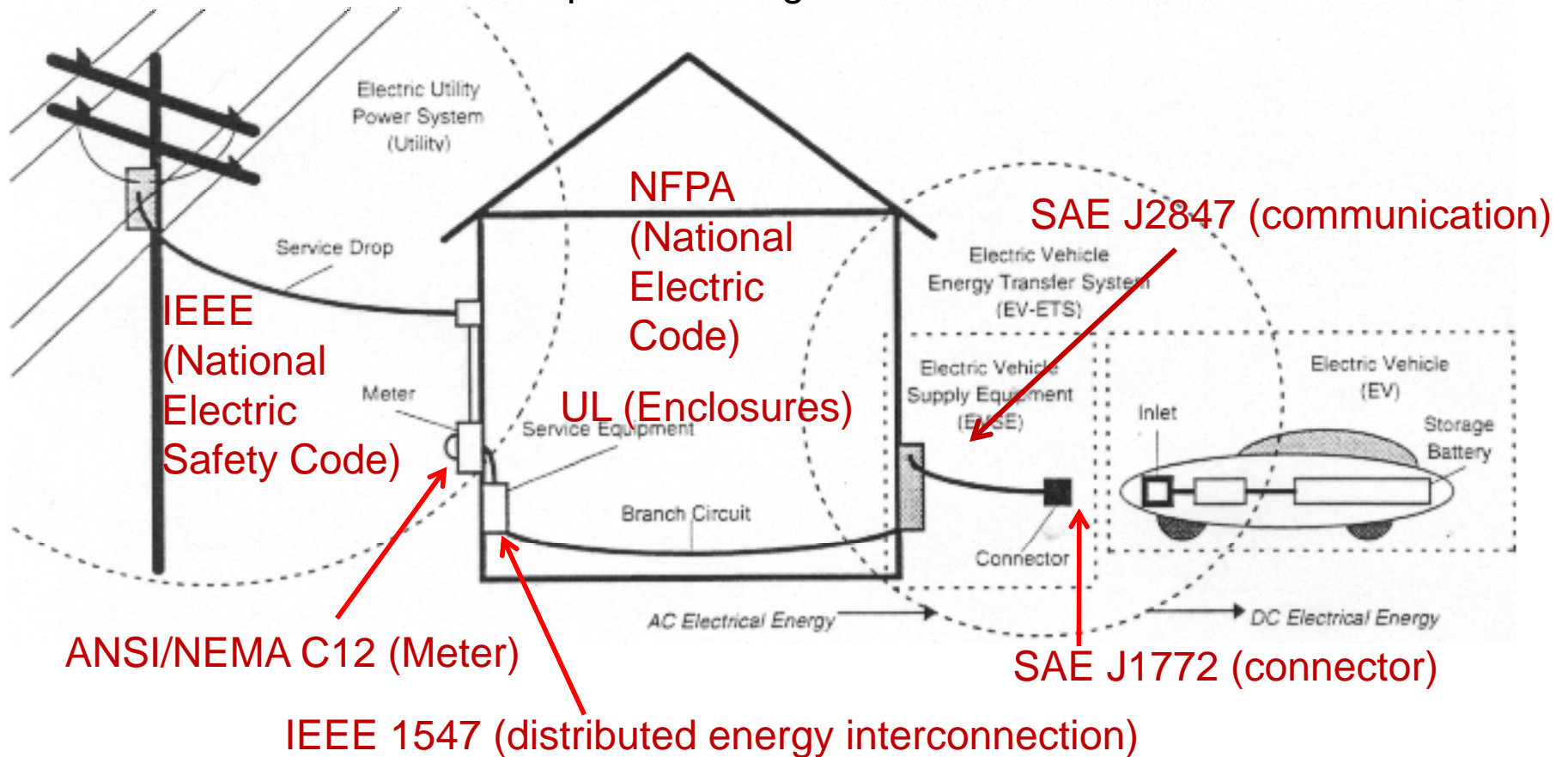
- FERC-identified priority applications:
 - Demand Response
 - Wide-Area Situational Awareness
 - Electric Storage
 - Electric Transportation
- Additional priority applications:
 - Advanced Metering Infrastructure
 - Distribution Grid, including Distributed Energy Resource Integration
- Cross-cutting priorities
 - Cybersecurity
 - Data networking

Smart Grid Use Case Example: Demand Response



Example: Plug-in Electric Vehicle – Grid Interface

Coordination is required among several standards bodies



Additional standards will be needed for: communications/Information protocols for charge management, power injection management, operations and maintenance, metering, roaming.

Progress to Date

- Three public workshops
- More than 1500 participants
- Initial report issued for comment
- 16 initial standards
- >80 candidates identified
- 70 gaps & issues identified
- 14 high priority items selected for action—SDO workshop held to begin driving closure



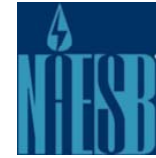
Gaps to be Filled

- There are already many applicable standards
- How do they fit together?
- How should they be applied to the Smart Grid?
- What additional standards are needed?
- Testing and certification program

Priority Action Plans

Breakout Session 1				
PAP	Priority Action Plan / Breakout Subject	NIST Lead	EPRI Lead	Scribe
1	Role of IP in the Smart Grid	David Su	Erich Gunther	Joe Hughes
3	Common Pricing Model	David Holmberg	Toby Considine	Bill Cox
4	Common Scheduling Mechanism			
6	Common Semantic Model for Meter Data Tables	Tom Nelson	Aaron Snyder	Brian Seal
5	Standard Meter Data Profiles Standard			
7	Electric Storage Interconnection Guidelines	Al Hefner	Mark McGranaghan	Frances Cleveland
10	Standard Energy Usage Information	Dave Wollman	Marty Burns	Stuart McCafferty
13	Time Synchronization, IEC 61850 Objects/IEEE C37.118 Harmonization	Jerry FitzPatrick	Christoph Brunner	Bruce Muschlitz
Breakout Session 2				
PAP	Priority Action Plan / Breakout Subject	NIST Lead	EPRI Lead	Scribe
2	Wireless Communications for the Smart Grid	David Su	Erich Gunther	Brian Seal
8	CIM for Distribution Grid Management	Jerry FitzPatrick	Christoph Brunner	Aaron Snyder
14	Transmission and Distribution Power Systems Model Mapping			
9	Standard DR Signals	David Holmberg	Bill Cox	Toby Considine
11	Common Object Models for Electric Transportation	Eric Simmon	Stuart McCafferty	Marty Burns
12	IEC 61850 Objects/DNP3 Mapping	Tom Nelson	Bruce Muschlitz	Joe Hughes
15	Cybersecurity	Annabelle Lee	Frances Cleveland	Bobby Brown

Next Step: Fill The Gaps



Priority Action Plans: What, Who, When

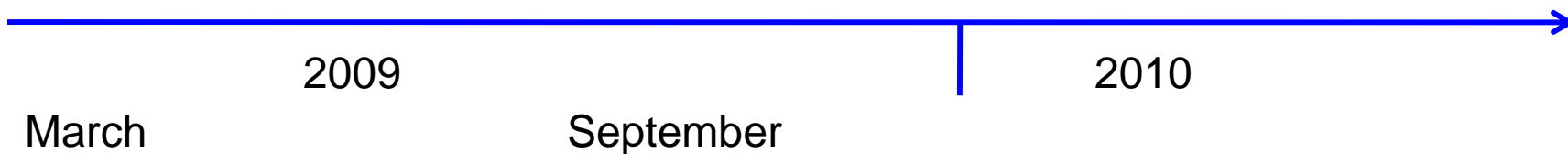
Smart Grid Standards: NIST Plan

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

PHASE 2
Establish public/private Standards Panel to provide ongoing recommendations for new/revised standards

**NIST Smart Grid
Cyber Security
Coordination Task Group
(CSCTG)**

PHASE 3
Testing and
Certification
Framework



Phase 2: Standards Panel

- Launch Smart Grid Interoperability Standards Panel by Year End 2009
- Representation from all stakeholder groups – including State Regulators
- Administered by private sector organization – will be selected by late August
- Functions:
 - Evolve Roadmap
 - Ongoing coordination
 - Recommend new or revised standards for NIST framework
 - Monitor implementation
 - Support testing/certification framework

Upcoming Milestones

- Rollout of NIST SG Interoperability Framework Document
 - Announcement and Posting September 21 at GridWeek
 - Mini-workshop on Roadmap September 24
- SG Standards Panel contract awarded in mid-August
 - Contract awarded to Enernex
 - Up to two years for \$8.5M ARA Funded
 - First meeting of SGP: November 17 at GridInterop '09 in Denver
- SG Testing and Certification Framework – initial steps by mid-December
- Beginning international outreach