Steering Committee Deep Dive: Technology Strategy Team

Deep Dive Document

10 April, 2008

AGENDA

- Smart Grid and the Technology Team's vision
- Results of DA vendor review
- Ops Center Ratings

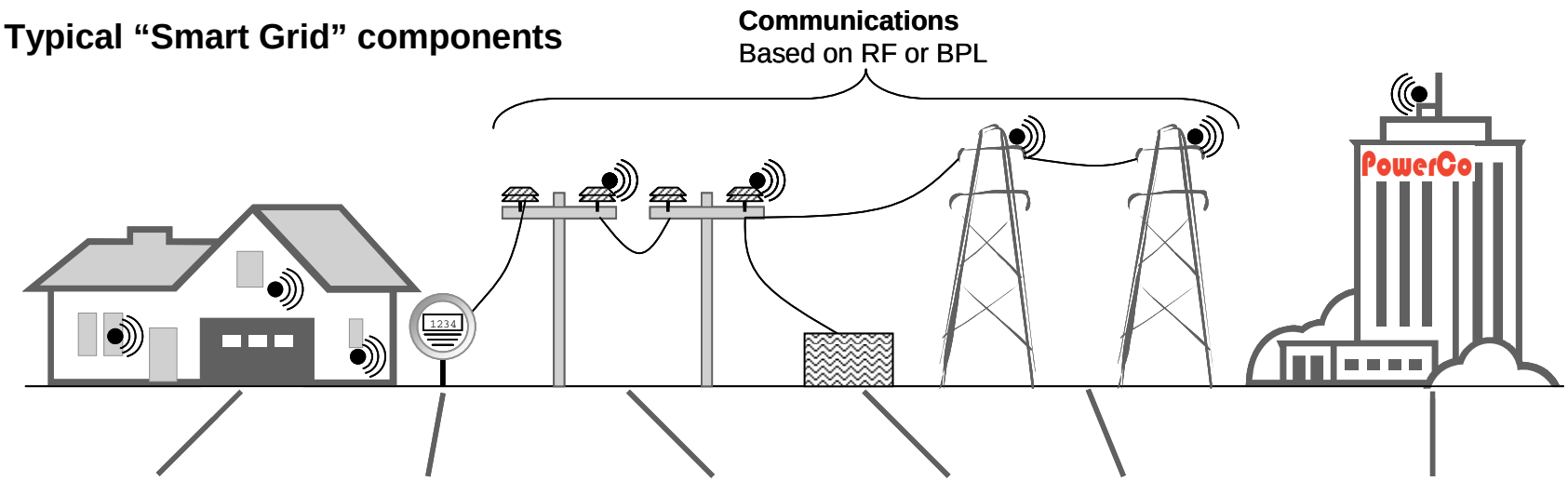
Redacted

- Next steps

WHAT IS SMART GRID – INDUSTRY PERSPECTIVE

ILLUSTRATIVE

Typical "Smart Grid" components



Home area network
- Real-time usage/ pricing statistics
- Usage-aware appliances
- Sub-Metering

Smart meter
- Report usage by time
- Report outages in real time
- Remote disconnect
- HAN gateway

"Delivery automation" sensors and controls
- Real- time reporting of status and outages
- Automated control of relays recluses

Distributed generation
- Mini gen., PV, and wind
- Net metering

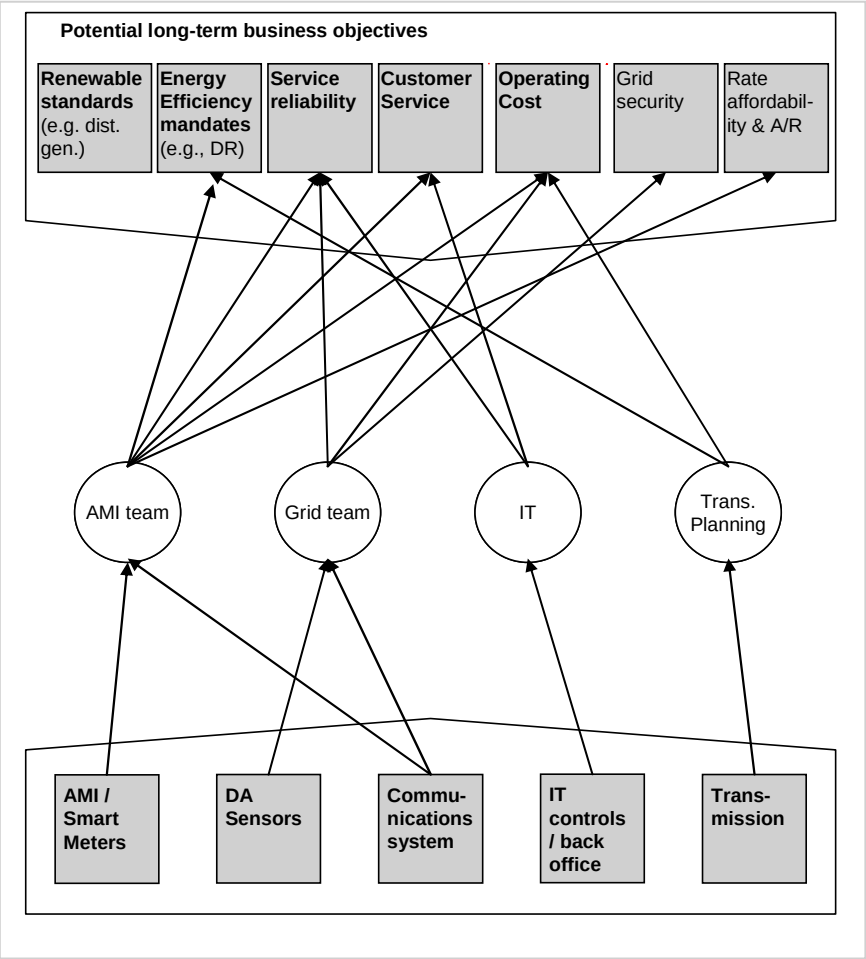
Transport sensors and automation
- Power factor monitoring
- Automation of cap banks

Data collection, processing, and back office
- Automated billing
- Disconnection of unoccupied/ unpaid
- Daily usage stats
- TOU pricing

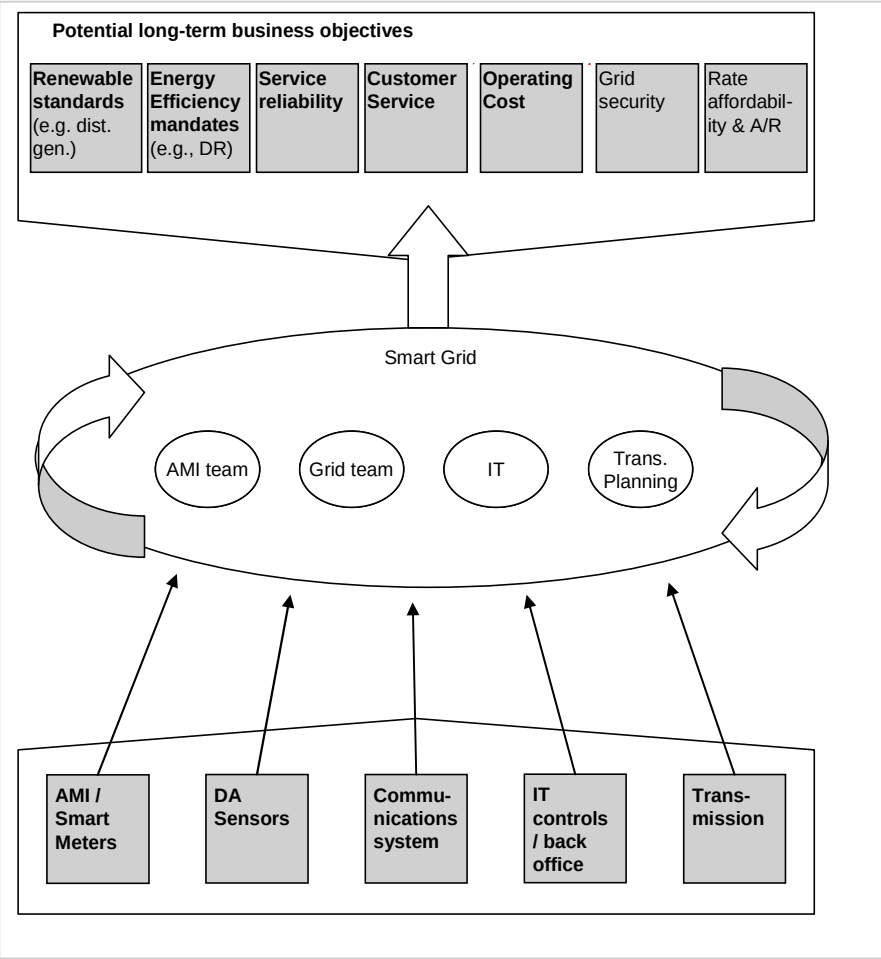
- "Smart Grid" is the popular name for the next generation of metering, sensing, and automation technologies
- These technologies are shaped by numerous industry stakeholders, including researchers, utilities, suppliers, regulators, customers
- Smart Grid is not a commodity product/system; there is no Smart Grid standard
- Smart Grid is not a chic "soup de jour"; it will not require abandoning existing technology/programs
- Core Smart Grid technologies will require significant financial investment

THE GOAL IS AN INTEGRATED APPROACH TO SMART GRID STRATEGY

From....



To…



TECHNOLOGY TEAM'S VISION

Improve Customer Service

- Reduce outage frequency and duration
- Keep customer informed
- Accelerate requests (billing, connects/disconnects)
- Enable time-of-use tracking

Improve Grid Efficiency

- Reduce system operating cost; enhance tariffs
- Reduce theft, I^2R losses, and losses from non-unity power factor
- Reduce carbon emissions
- Manage system load (peak shaving, curtailment communications)
- Automate protectors, and enable remote management of communications system and end devices

Prepare for Future Demands

- Handle demand from plug-in hybrid/electric cars
- Coordinate and control distributed resources
- Support photovoltaic and wind generation

The Technology Team believes that success is best achieved by focusing on achievable initiatives vs. attempting execution across many

THE INITIAL FOCUS HAS BEEN ON COMMUNICATION SYSTEMS

Redacted

DA SUBJECT MATTER EXPERTS HAVE SCORED SYSTEMS FROM 6 VENDORS

Redacted

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DISTRIBUTION AUTOMATION RFI ANALYSIS

5 = highest/best
1 = lowest/worst

Redacted

THIS CREATES AN INTEGRATED DA/AMI PERSPECTIVE ON VENDORS

Redacted

DA VENDORS WERE BASED ON 4 MAJOR PERFORMANCE DIMENSIONS

Redacted

* Not formally reviewed; placement is based on AMI team's input
** Includes bandwidth margin and application prioritization capability

PHASE 0 DEPLOYMENT SITES HAVE BEEN RATED

Redacted

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NEXT STEPS FOR TECHNOLOGY TEAM

Vendor review supporting Phase 0 deployment	**Timing**
– Update DA vendor scorecard and develop white paper	April
– Expand evaluation criteria and perform “due diligence” visits with vendors and their customers	April-May
– Prepare a draft of formal technical requirements and initiate RFI for a stand-alone DA communications infrastructure	April-May
– Discuss leading candidates for AMI and DA initiatives	May
Strategic Grid Modernization analysis	
– Review DA RFI responses to estimate synergies from an integrated AMI / DA system	June
– EPRI Intelligrid Team engaged for review of DA/AMI requirements and RFP support	May
– Investigate opportunity to become an EPRI Smart Grid Showcase Demonstration site for VAR management and/or IIT Perfect Power	TBD
– Study implications of future technology (e.g., plug-in cars, PV/wind generation) for Grid Modernization requirements	TBD

APPENDIX

SMART GRID TECHNOLOGY ENABLERS

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KEY SMART GRID INDUSTRY STAKEHOLDERS

Smart Grid is a collection of “visions” and “agendas” from various stakeholders, who collectively seek to modernize the electrical power grid by applying technology, economics, end-user involvement, process and paradigm changes, and renewed performance expectations…

Stakeholders may include:

OEM’s (GE, Siemens, ABB, SEL)	**Utility Consultants** (IBM, KEMA, Trademux)	**Regulatory Agencies** (ICC…)
Research Groups (EPRI…, Universities)	**DOE** (several National Labs)	**ISO’s** (Grid Operators, PJM, Cal-ISO…)
IPPs (wind power, solar, DG, nuke…)	**Meter Manufacturers** (AMR and AMI integrators)	**Telecommunication providers** (ATT, Sprint…)
Conservationist Groups (green effort)	**Public Interest Groups**	**Appliance Manufactures** (GE, LG, Whirlpool)
T&D Utilities (public, private, federal, and coop)	**EMS/SCADA/OMS providers**	**Customers**

LEGISLATIVE PRECEDENTS FOR SMART GRID

Directly applies to ComEd

Legislation	Geography	Effects
EISA Title 13	Federal	• Defines and encourage investment in Smart Grid technologies • Provides subsidies for qualifying Smart Grid investments • Creates precedent for depreciation of stranded costs
DR-AMI bill	Connecticut	• Requires utilities to install “Smart” meters capable of TOU pricing • Deploy AMI by January 1, 2009
NYSPSC order	New York State	• Requires utilities to conduct and file comprehensive cost-benefit analyses for AMI
PUC actions	Ohio	• Requires utilities to submit cost estimates of different AMI technologies • Requires utilities to offer differentiated on- and off-peak rates • Scheduled workshops to study cost-benefit of AMI and cost recovery options
PA PUC actions	Pennsylvania	• Tasked Demand Side Response Working Group to conduct a cost-benefit assessment of AMI for all utilities
TX House bill 3239	Texas	• Allows utilities to use surcharges to fund advanced meters
VPSB docket	Vermont	• Requires statewide and per-utility AMI cost-benefit studies

Source: FERC Demand Response & Advanced Metering Staff Report, 2007; EISA Title 13

THE ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

In 2007, Congress approved the Energy Independence and Security Act, and per “Title 13” of the act, dictates their support for, purpose of, and ten characterizations of what constitutes a “smart grid”:

- Increased use of digital information and controls technology to improve reliability, security, and efficiency of the electric grid .
- Dynamic optimization of grid operations and resources, with full cyber-security.
- Deployment and integration of distributed resources and generation, including renewable resources.
- Development and incorporation of demand response, demand-side resources, and energy-efficiency resources.
- Deployment of `smart' technologies (real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer devices) for metering, communications concerning grid operations and status, and distribution automation.
- Integration of `smart' appliances and consumer devices.
- Deployment and integration of advanced electricity storage and peak-shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning.
- Provision to consumers of timely information and control options.
- Development of standards for communication and interoperability of appliances and equipment connected to the electric grid , including the infrastructure serving the grid .
- Identification and lowering of unreasonable or unnecessary barriers to adoption of smart grid technologies, practices, and services.