Developing the Smart Grid – An Approach for California

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1. What is the current status of the Smart Grid?
2. New technologies that will be part of the smart grid
3. How to achieve interoperability and integrate with legacy systems
4. Fostering open access and California energy efficiency goals.
5. Smart Grid infrastructure priorities
6. Recommended approach and roles
Smart Grid applications at all levels
The benefits of the smart grid derive from the applications

- Reliability
- Efficiency
- Demand Management
- Managing the utility infrastructure investment
- New Energy Services

Key new drivers:

- Integration of renewables (intermittent resources)
- Distributed resources, microgrids
- Facilitating customer participation in markets
- New technologies (PHEV, new batteries, smart loads)
Use a consistent methodology to develop requirements (based on the applications)
Combine the requirements from important applications to determine the requirements for the INFRASTRUCTURE.
Collaborate

- DOE
- EPRI
- Other states (Texas, Ohio, Michigan, Massachusetts, New York)
- European SmartGrids
- Others (Korea, Singapore, China, Taiwan)

- IEEE Intelligent Grid Standards Coordinating Committee
  - Opportunity to consolidate use cases and requirements derived from the use cases in a use case and requirements library
  - Leads to better consensus and actual use of the information for technology and standards development
  - California Use Cases can be a subset of the total library
Many utilities are somewhere in the process of developing a roadmap for implementation of a communications, control, and data management architecture that can facilitate monitoring, control, and automation functions at all levels of the power system. This “smart grid” will provide opportunities for improving reliability, energy efficiency, management of assets, customer services, and demand management.

One of the keys to success in implementation of a smart grid that can enable a wide range of intelligent applications well into the future is to use a standards-based approach and focus on interoperability of technologies. Requirements for technologies and systems are being developed through the characterization of advanced applications that will use the technologies – use cases. There is an opportunity for the industry to enhance the interoperability of technologies and the development of appropriate standards through the sharing of use cases and common requirements that are developed from these use cases.
Applications at all levels will be enabled

Transmission

Phasor Measurement

Substation

Condition Monitoring

Distribution

Distribution Automation

Consumer

“Prices to Devices” (Demand Response)

Communication Enabled Power Infrastructure

Architecture Enables the Smart Grid
Information architecture just as important as the communications architecture

R&D Needed: Integrate Across Standards=> Information Models

IEC 61970/61968 Common Information Model (CIM)
Enterprise Application Integration

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<th>AM/FM/GIS</th>
<th>OMS</th>
<th>Distribution Automation</th>
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"Service Oriented Architecture"

- Proprietary Metering B
- Proprietary Metering A
- Meter Data Management

ANSI/IEC
Metering “Field Operations”

Meter Master Station

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Development of Requirements - involve all stakeholders

• Distribution companies
• Transmission operator
• Generation companies
• Renewable energy technology suppliers
• Storage technology suppliers
• Communication systems
• Consumers
• Commercial and Industrial customers
• Advanced metering systems
• Automation systems
• Software and information systems
• Research organizations and government
Approach for California –
California Smart Grid Requirements Development

California Smart Grid Use Cases

Transmission Applications

Distribution Applications

End User Applications

Demand Response and Market Applications

Smart Grid Infrastructure Requirements/
Architecture Definition

Smart Grid Technology Requirements

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