



SCE's Phasor Measurement and Grid Stability System

A Discussion of
SCE's General Rate Case Testimony
for
The NASPI Executive Steering Group
By
John M. Minnicucci

Main Themes of SCE's Argument

- **Managing modern electricity systems is becoming more complex**
 - *Operations before and after restructuring*
 - *Market and environmental issues*
- **Existing operational tools are inadequate**
- **Increasing cost and potential for failure**
- **Synchronized phasor measurement systems basics**
- **Funding requirements and project management**
- **Industry and policy support for SPMS**

SCE Prior to Industry Restructuring

- For nearly a century, SCE planned and operated its system as a vertically-integrated electric utility
- Integrated planning (generation, transmission and distribution) provided for future capacity margin and safe, reliable power delivery
- Integrated operations provided ample means to act quickly and decisively to mitigate system events and economically maintain assets

SCE After Industry Restructuring

- SCE no longer operates a majority of the interconnected generation resources
- Disintegrated planning places decision-making in the hands of many market participants with differing goals and objectives
- Various market participants make operating decisions, based upon entity specific needs

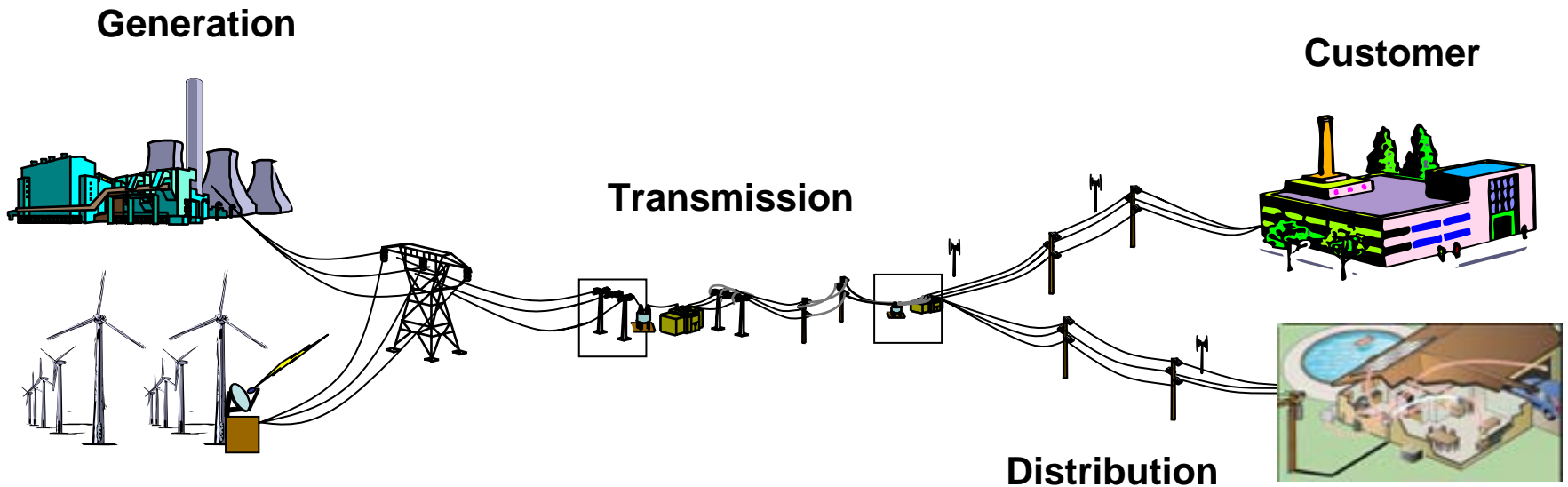


Market and Environmental Realities

- **Decreasing capacity margins due to load growth and lack of new transmission infrastructure**
- **Increasing demand for electricity, reliability and power quality**
- **Historic difficulty in funding, permitting and siting transmission and distribution facilities**
- **Certain generating assets are preferable to others**



Interoperability from the Generator to the Customer





Existing Operational Tools Are Inadequate

- Operators do not have tools to determine system stress and proximity to instability or potential collapse
 - *Cite the U.S. – Canada Power System outage Task Force Final Report on the August, 14, 2003 Blackout*
- Operators do not have wide area visibility beyond their service territory boundaries
 - *Cite the U.S. – Canada Power System outage Task Force Final Report on the August, 14, 2003 Blackout*



Existing Operational Tools Are Inadequate

- Many entities are collaborating in conducting extensive RD&D into phasor measurement capabilities with positive results
 - *Cite the creation of EIPP and NASPI, DOE- and CEC-funded efforts*
- Deploying base phasor infrastructure and systems may already have a positive NPV for electric service provider customers
 - *Cite the California Energy Commission Phasor Measurement Application Study*

Increasing Cost and Potential for Failure

- The Northeast Blackout impacted over 50 million people, costing about \$1 billion per day
 - *Cite FERC Staff Preliminary Assessment of NERC's Proposed Mandatory Reliability Standards*
- Florida blackout causes approximately 3 million people to lose power
- From 1960 to 1996, North America had experienced two system wide outages. From 1996 to 2004, the number has increased to five
 - *Cite SCE General Rate Case*

Additional and Future Benefits

- Operation closer to the margin with exact measurements
- Improvements in power transfer capabilities and contingency response options
- Real-time automation of system reliability and enhancement assets (e.g. SVC and RMR capacitor banks)
- Improved study capabilities for planning and operations



Phasor Measurement System Basics

- SPMS's function by continuously collecting measurements on voltage, current, frequency and phase angle from many points on a system
- Measurements are time-stamped with GPS or other precise time information
- Data is compiled and stored in a computer system for continuous analysis and future study
- Information is displayed for system operators for decision-making



Funding Request and Project Management

- Hardware costs for PMU's, PDC's and support equipment - \$5 million
- Software costs, including integration with the energy-management system - \$15.5 million
- Infrastructure upgrades for hardware installations and communications - \$9 million
- Other labor costs - \$4.5 million
- *Estimates based upon recent EMS Project costs*

Documents and Entities Supporting the Integration of Phasor Technologies

- Energy Independence and Security Act of 2007
- Energy Policy Act of 2005
- The U.S. Department of Energy (DOE)
- Federal Energy Regulatory Commission (FERC)
- National Electric Reliability Council (NERC)
- California Independent System Operator (CAISO)
- California Energy Commission (CEC)
- Western Electricity Coordinating Council (WECC)
- NASPI and EIPP



2008 NASPI Task Team Deliverables

- **Research Information Task Team database documenting all RD&D activities and publications**
- **Business Management Task Team white paper on arguments supporting phasor deployment in funding proceedings**

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