



# PG&E ARRA Synchronphasor Project

## Project Update

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October 2010

# Summary Update – 1

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## Project Scoping and Planning Stage

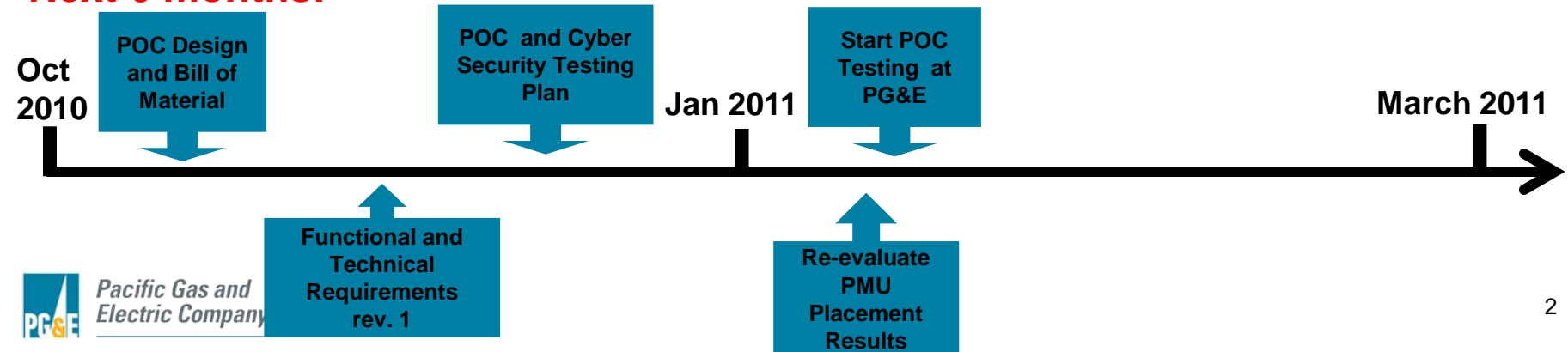
1. Project Scope document – Final stages
2. Project schedule – Current
  - Will continue with updates as part of the project management process.
3. Systematic PMU placement study – Final stages - subject to minor updates
  - Coordination with neighboring systems and ISO
  - DOE Research Project
  - Blackstart studies
4. EMS network applications – In Progress
  - More precise information for Grid Operations
5. Cognitive task and information processing– In progress
  - Transformation of “Data” to “Knowledge”
6. Functional and Technical Requirements Documents for the Applications to be deployed at PG&E – In review

# Summary Update – 2

## Project Scoping and Planning Stage - continued

7. Requirements Documents for PMUs, Aggregate PDC, and Super PDCS – In review
8. Requirements Document for Data Archiving System – In review
9. System architecture and design
  - Developing and documenting details such as data flow diagrams
10. Cyber Security Plan – Final stages
11. Project Execution Plan – Final stages
  - Will continue with updates as part of the project management process

### Next 6 months:



# Summary Update – 3

## Proof of Concept (POC) Stage

During this stage, a smaller scale synchrophasor system will be implemented in isolated environment to test, prove, and demonstrate various functions and details of the project before full field deployment. POC will also serve as troubleshooting, training, and preparation for the synchrophasor system throughout the project.

1. POC architecture and design – Final stages
2. POC Bill of Material – in final stages – includes at least:
  - Redundant EMS systems
    - Running in parallel with existing systems (with firewalls between networks)
  - 8 PMUs, 2 Substation PDCs, 2 Super PDCs
  - Network test bed with various access layers, path redundancy and diversity alternatives
  - Real Time Digital Simulation (RTDS) system and various other test equipment (analog and digital signal generators)
  - Communication routers, switches, delay line, as well as test equipment (e.g., traffic and bit error generators)
3. Cyber Security Test Plan Document – In review
4. POC test plan document – In review
5. POC facility
  - Location chosen
  - Construction plans – In review
6. POC facility is planned to be functional in early Q1 2011

# Applications and Functions in PG&E Project

1. Situational Awareness, Visualization and Alarming for Electric Transmission Operators
  - Unbalanced power applications
  - Abnormal angles
  - Abnormal voltages
  - Line overloads
  - Dynamics oscillations (small-signal oscillation) monitoring
  - System restoration
2. Enhanced Energy Management Systems and State Estimation for current EMS users
  - Add synchrophasor measurements to existing SE measurements.
  - Track dynamic state changes of a system during disturbances
  - EMS measurement support Volt-VAR Optimization
3. Post-Disturbance Event Analysis for Planners and Engineers
  - Substation level data analysis
  - System level event analysis
4. Operator and Engineering Training, Enhanced Dispatch Training Simulator (DTS)
5. Provide interfaces:
  - Provide interface with EMS
  - Interfaces with third parties

# Additional Applications and Functions

These additional functions will be deployed at a limited level

1. Adaptive/Automated Islanding and Load Shedding (only in Dispatcher Training Simulator – DTS)
2. Power System Restoration - Blackstart training simulator
3. Disturbance locator (training simulator)
4. Modeling tool for EMS, SuperPDC, and other applications
5. Substation Data Management System (at 2 substations only)
  - a) Substation state estimation
  - b) CVT/PT calibration and compensation
6. GIS Integrated Enhanced Fault Location (Technology Verification) and implementation for two lines only.