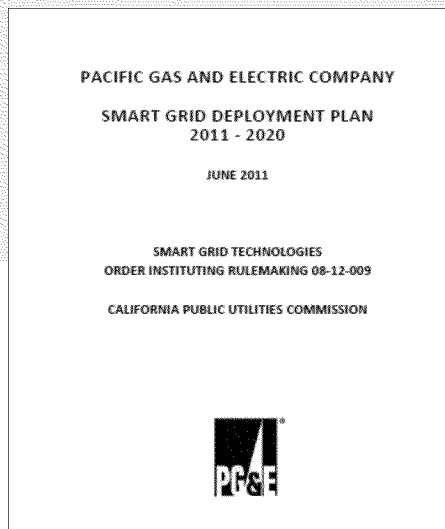


# Smart Grid Pilot Deployment Application Overview

November 15, 2011

- Smart Grid Deployment Plan Background
- PG&E's Smart Grid Approach
- Proposed Projects in the Application
- Estimated Potential Benefits
- Project Costs

- PG&E's Smart Grid Deployment Plan (SGDP) was filed with the CPUC along with the plans of other California IOUs
- The Plan outlines PG&E's Smart Grid strategy, vision, and specific projects & programs that comprise the "Smart Grid"
  - In-Flight Projects – PG&E's *Deployment Baseline*
  - Future Projects – *PG&E's Roadmap*
- Roadmap consists of 21 projects categorized across *Engaged Consumer*, *Smart Energy Markets*, *Smart Utility*, and *Cross-Cutting & Foundational*



- Six of the 21 roadmap projects have been identified for further business case & technology evaluation to:
  - **Analyze, evaluate & test** vendor technologies and their **compatibility** to PG&E's operations in a **cost-effective, pilot** environment
  - Verify **safety & reliability** prior to full scale production deployment
  - Thoroughly identify full deployment **costs** and assess against full deployment **benefits**

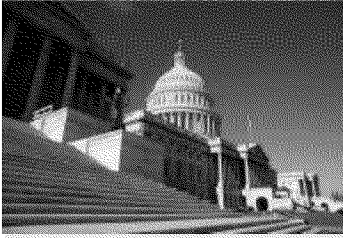
### Rationale for the Application:

- PG&E believes it should begin testing and piloting work to advance California's policy goals as described in Senate Bill 17
- The Commission's decision in the Smart Grid OIR identified separate applications or GRCs as the vehicles for project approval
- PG&E's GRC timing would result in delays in potentially promising projects

- Final CPUC Decision in Smart Grid Plan OIR July 1, 2012
- PG&E's 2014 General Rate Case NOI August 1, 2012
- Smart Grid Pilot Demonstration Project Start January 1, 2013  
(or earlier)
- Pilot Demonstration Project Completion December 31, 2016  
(or earlier)
- Deployment Projects Start (if pilots are successful) January 1, 2017

By filing in November 2011, PG&E can start promising pilots quickly

- No lag for 2014 GRC
- Pilot results will inform PG&E's 2017 GRC
- Customer benefits arrive sooner



## Standards Definition

- Shape and validate the standards that will underlie future smart-grid implementations



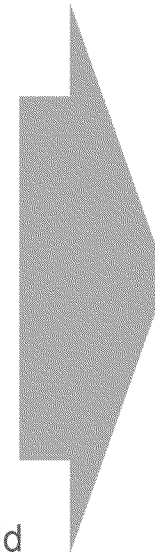
## Testing

- Prototyping and testing of smart-grid technologies before piloting
- Accelerate technology development and ensures standards compliance early on
- Develop preliminary customer communications to support pilots



## Controlled Pilots

- Implement tested technologies in a real-world but controlled setting to demonstrate value
- Work with customers to prepare for the new technologies and services



**PG&E Service Area in Northern & Central California**



## Targeted Deployment

- Extend pilots to targeted roll-outs based on benefits
- Insights used to feed the next cycle of technology deployment

# Smart Grid Pilot Deployment Projects

Smart Grid Pilot Deployment Project Descriptions	Project Costs (2013-2016)
<b>1. Smart Grid Line Sensors</b> <ul style="list-style-type: none"> <li>PG&amp;E will perform product analysis and field tests of new line sensors to improve reliability and system analysis on up to 30 distribution circuits with a high number of momentary (outage durations of less than five minutes) or sustained outages (outage durations of five minutes or greater).</li> </ul>	\$16.9 M
<b>2. Volt/VAR Optimization</b> <ul style="list-style-type: none"> <li>PG&amp;E will test voltage and reactive power (VAR) optimization algorithms and control systems on up to 12 circuits with high peak demands and high solar photovoltaic (solar PV) generation levels installed to control voltage and reactive power regulating devices on PG&amp;E's distribution system to achieve electricity demand and energy use reductions, voltage profile improvements and power system loss reductions and to reliably integrate more distributed solar generation.</li> </ul>	\$38.8 M
<b>3. Detect &amp; Locate Line Faults</b> <ul style="list-style-type: none"> <li>PG&amp;E will test decision analysis tools to pinpoint the location of outages and hazardous circuit conditions caused by damaged equipment using input from a variety of sensors including digital protective relays, fault current sensors, Smart Meter voltage measurements and Smart Grid line sensors.</li> </ul>	\$13.0 M
<b>4. Short-Term Forecasting Improvement</b> <ul style="list-style-type: none"> <li>PG&amp;E will test the integration of new and expanded data sources including Smart Meters, more granular weather forecasts and measurements, and distribution automation equipment and into forecasting tools to create more accurate demand and energy forecasts to support PG&amp;E's bundled customer energy procurement obligations. The enhanced forecasting tools will be used to guide the dispatch of PG&amp;E controlled generation and to participate in wholesale energy and ancillary services markets for PG&amp;E's bundled customers.</li> </ul>	\$14.1 M
<b>5. Technology Evaluation, Standards Development and Testing</b> <ul style="list-style-type: none"> <li>PG&amp;E proposes to create Smart Grid technology development capabilities to integrate and test new technologies, evaluate and develop standards, and improve PG&amp;E's understanding of new technologies through benchmarking experiences of others.</li> </ul>	\$12.5 M
<b>6. Smart Grid Customer Outreach</b> <ul style="list-style-type: none"> <li>Perform outreach pilots to customers to engage them in understanding benefits at the individual and societal level that the Smart Grid seeks to achieve. Support customers in using Smart Grid enabled tools, making informed energy choices and participating in energy markets.</li> </ul>	\$13.5 M
<b>Total for years 2013- 2016</b>	\$108.8 M
<b>Estimated 4-Year Revenue Requirement: \$39M</b>	

Potential Incremental Benefits at Full Deployment (20 Year Study Period)	
Economic Benefits	<p>Avoided Energy Procurement Costs: \$550M - \$1.1B</p> <p>Avoided O&amp;M Costs: \$80 - \$100M</p>
Reliability Benefits	Outage Duration (SAIDI): 5-9% reduction
Environmental Benefits	CO <sub>2</sub> Emissions Reduction: 1.6M – 2.2M Tons
Non-Quantifiable Benefits	<p>Improved Electric System Safety</p> <p>Reduced Environmental footprint</p> <p>Increased Renewable Resources and Distributed Generation</p>

# Smart Grid Pilot Demonstration Costs

## Project Costs (Capital and O&M Combined)

	2013	2014	2015	2016	Total
Total Project Costs	\$16,052,887	\$45,838,203	\$24,067,641	\$22,901,406	\$108,860,137

## Project Revenue Requirements\*

	2013	2014	2015	2016	Total
Revenue Requirements	\$5,992,115	\$7,667,293	\$107,619	\$25,200,767	\$38,967,795

\* Revenue Requirements are still being finalized and may vary slightly in the application