



PG&E SmartMeter

SmartMeter Program Overview

CEC Load Management Standards

AMI Workshop

May 27, 2008



The PG&E SmartMeter Program

- ▶ Automated meter reading for all customers
- ▶ 10 Million meter upgrades
- ▶ A network to collect meter reads remotely and communicate with the meters
- ▶ IT systems to manage and store the reads, and make them available to PG&E business applications (e.g. CC&B)
- ▶ Frequent meter reads - daily for gas, hourly or 15 minute interval for electric
- ▶ Enables demand response rates
- ▶ Enhanced capabilities over time



Current SmartMeter Program Benefits



★ Customer Benefits

- ▶ **Greater convenience** - no need to unlock gates or secure dogs for monthly meter reads
- ▶ **Reduction in delayed, inaccurate and estimated bills**
- ▶ **Voluntary pricing plan options** that empower customers to shift or reduce energy usage when demand is at its highest
- ▶ Online access to energy **usage information that enables customers to better understand their usage and manage their bills**
- ▶ **Improved outage detection**



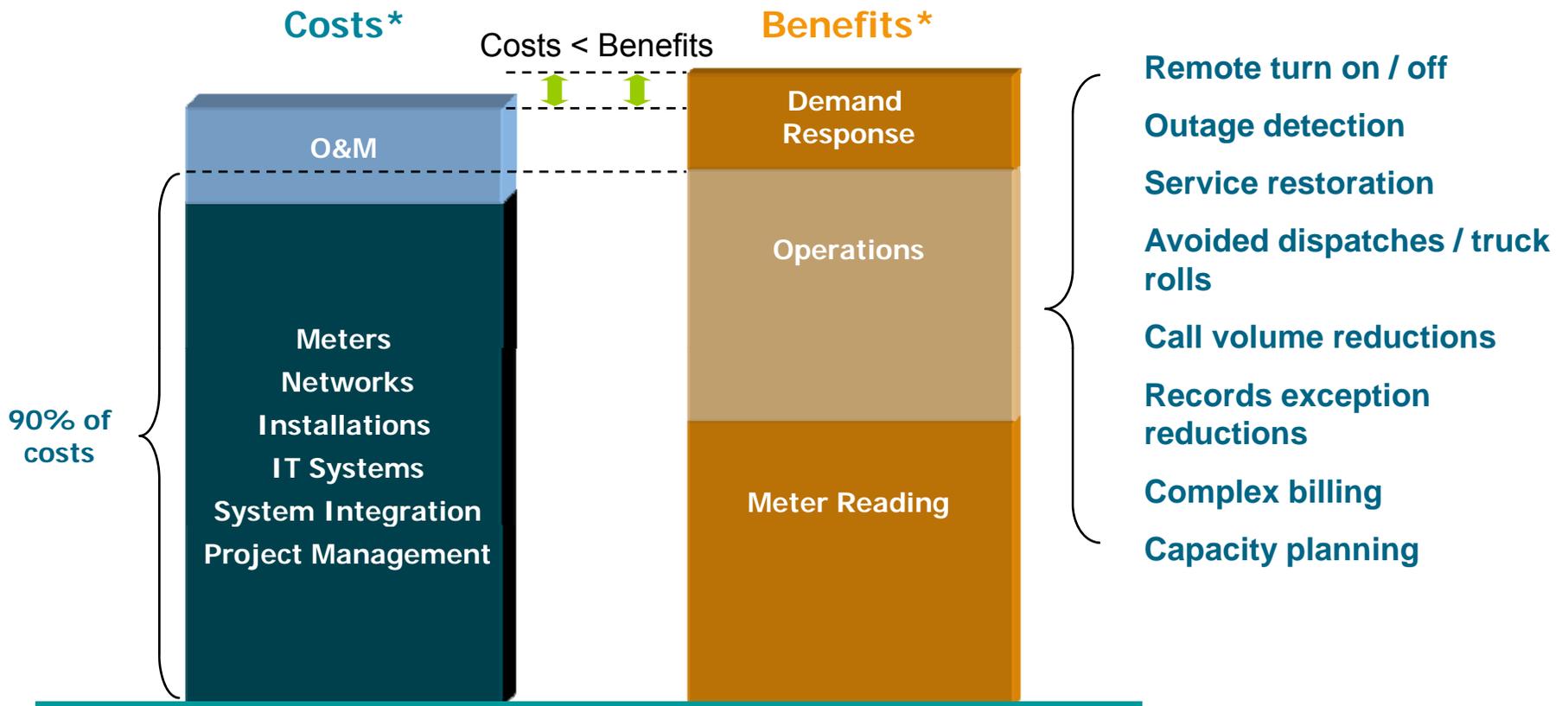
★ Operational Benefits (PG&E)

- ▶ **Reduced operating costs**
- ▶ **Lower power purchase costs** resulting from reduced peak loads
- ▶ **Improved billing efficiency**
- ▶ **Improved power outage restoration**

★ California Benefits

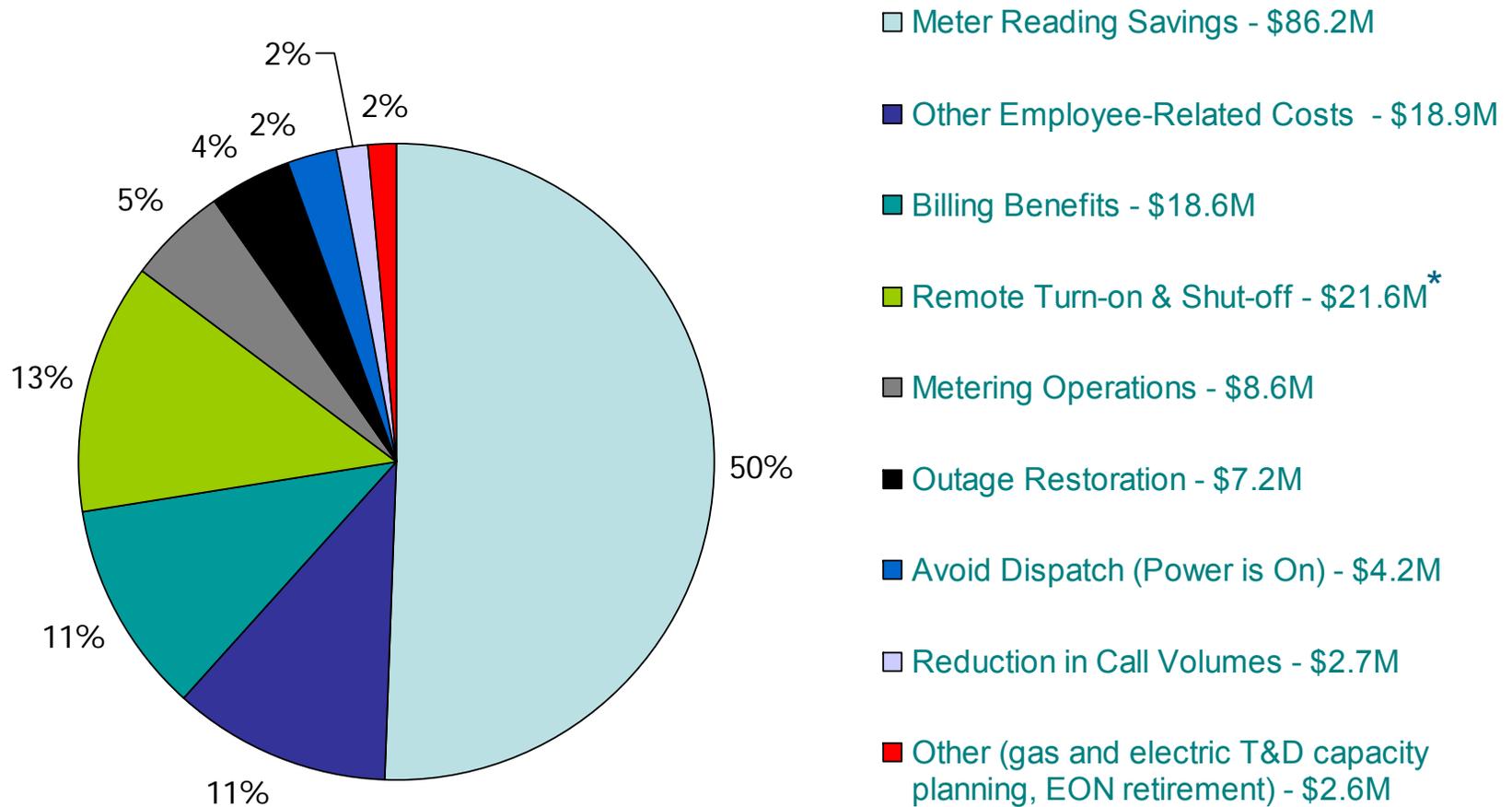
- ▶ **Enhanced grid reliability**
- ▶ **Avoided rotating outages**
- ▶ **Less reliance on older, less-efficient power plants to meet peak demand**

SmartMeter Program Will Pay For Itself



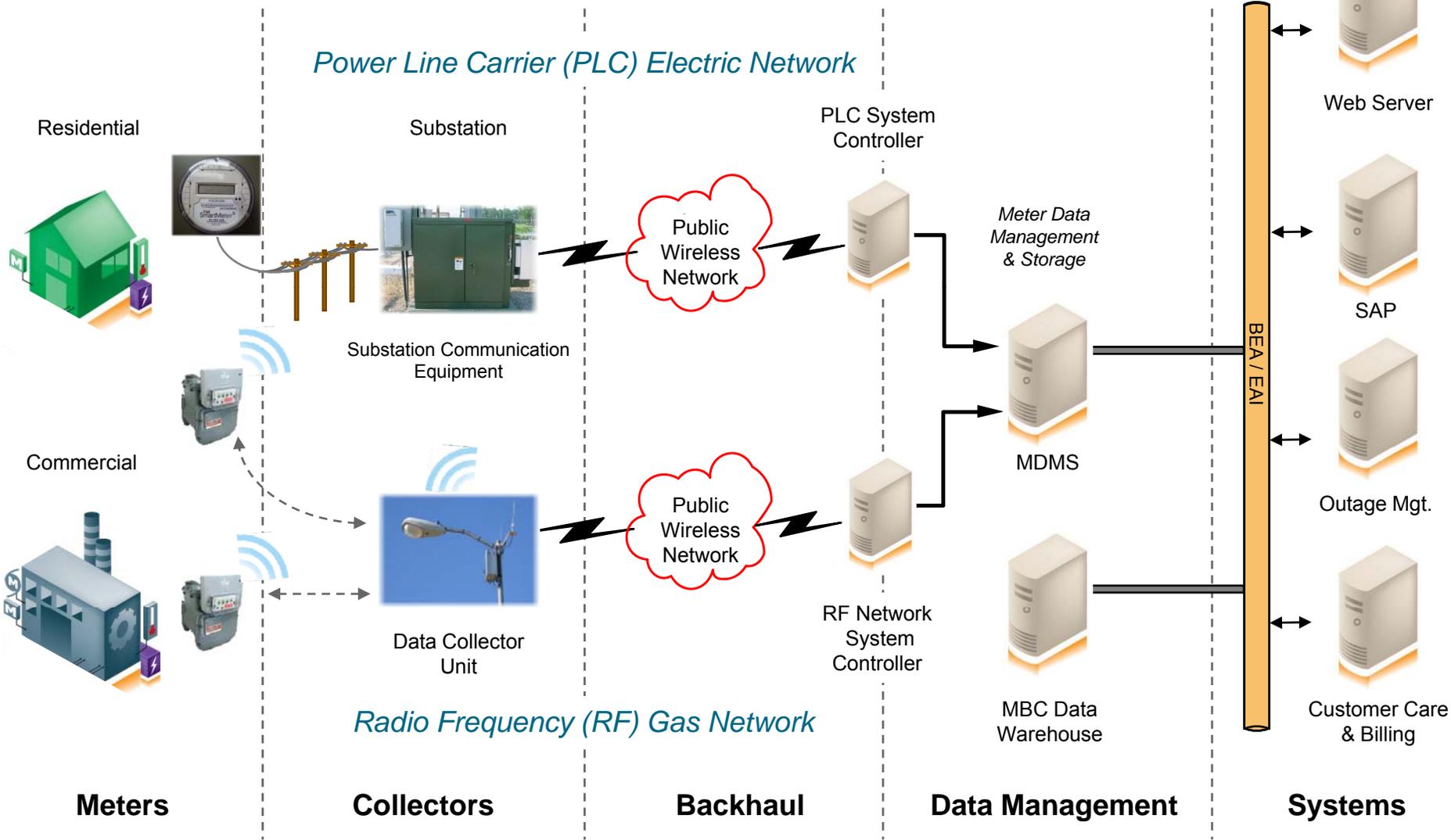
- ▶ The **SmartMeter** program has a **positive business case**: Projected benefits exceed projected costs over a 20 year program life
- ▶ **Operational efficiencies** (including meter reading savings) cover most program costs
- ▶ **Demand response benefits** (i.e. procurement cost savings) cover the remaining increment of program costs and promise to provide **additional benefits in excess of costs**

Annual SmartMeter Benefits from Operations (at full deployment)



Total annual benefit from operations = \$170.6 Million (*Upgrade includes additional benefits) 5

First Generation SmartMeter Technology



Projected Deployment Plan*

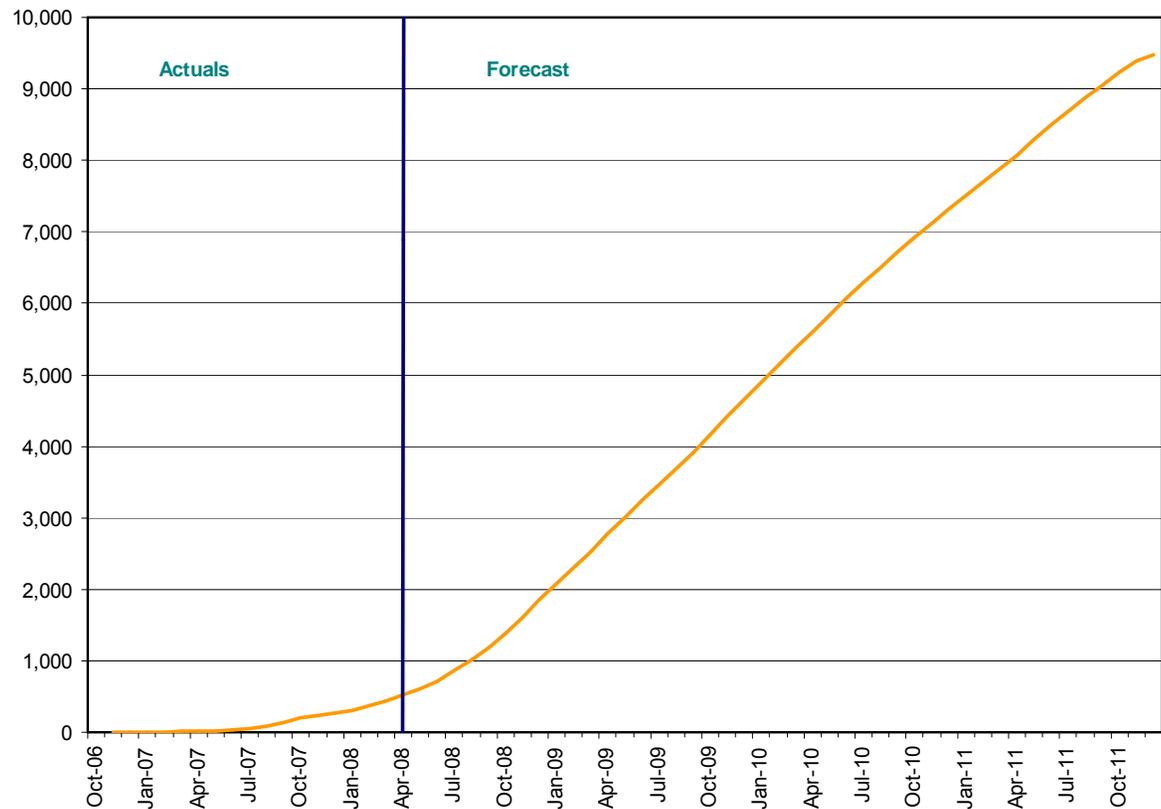
Key deployment decisions

- ▶ Internal installers or external contractor
- ▶ Benefits realization approach: incremental vs. batched
- ▶ Geographic sequencing approach

Key lessons learned

- ▶ Technology shapes deployment
- ▶ Planning lead time
- ▶ Network attachment rights
- ▶ Meter access and configuration challenges

Cumulative Meters Installed (000)



* Vendor Deployment Plan: Excludes growth in customer base through 2011 of roughly 1M

Advances In Automated Metering Technologies

- ▶ Advanced Meters
 - ▶ Solid-state
 - ▶ Integrated remote connect / disconnect switch

- ▶ Advanced Energy Communication Networks
 - ▶ Higher bandwidth
 - ▶ Open architecture
 - ▶ Mesh technology

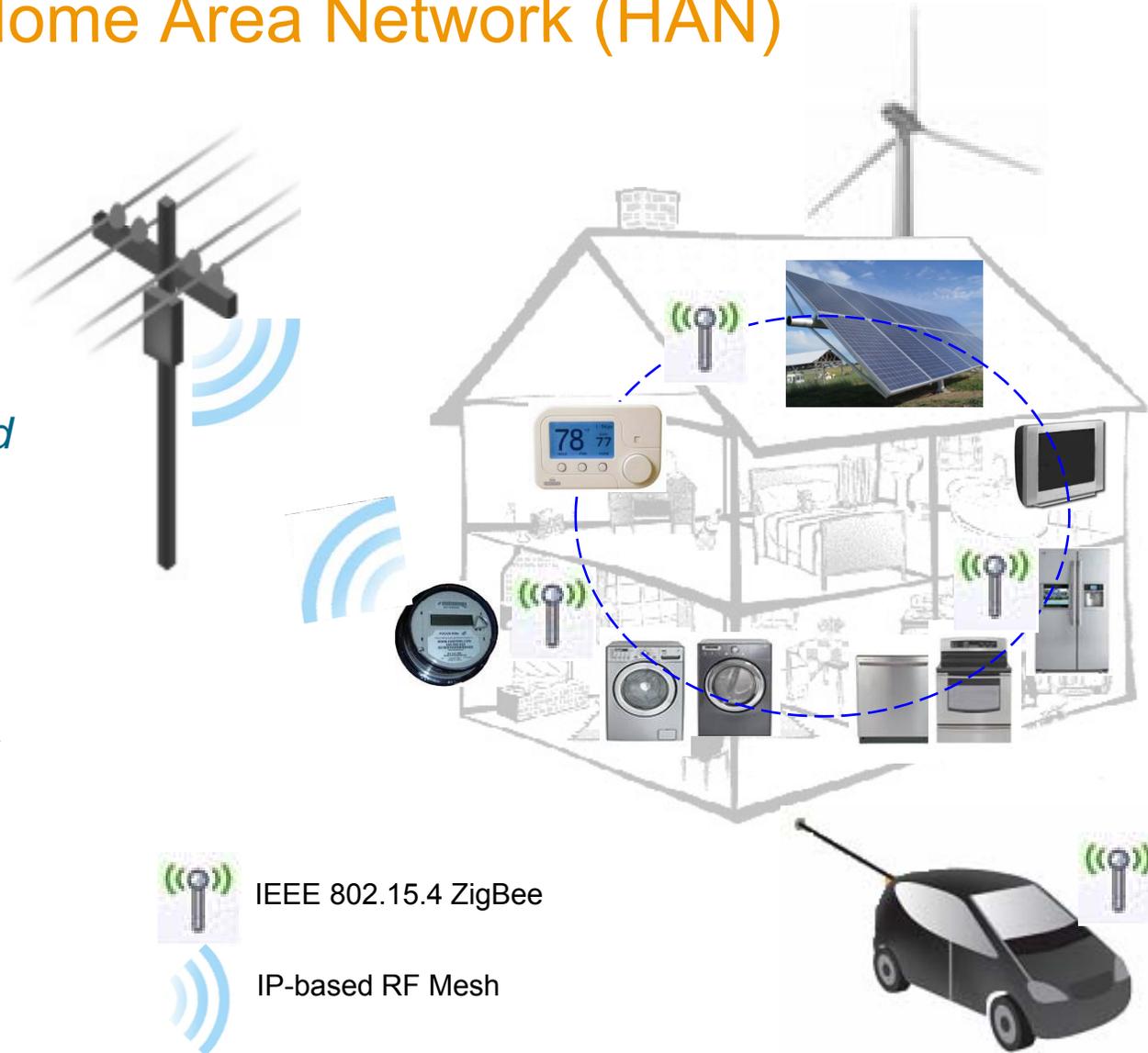
- ▶ Home Area Networks (HAN)
 - ▶ Emerging standards

“We expect PG&E to monitor market place developments so, whenever feasible, it can upgrade its AMI system and offer its customers technology upgrades.”

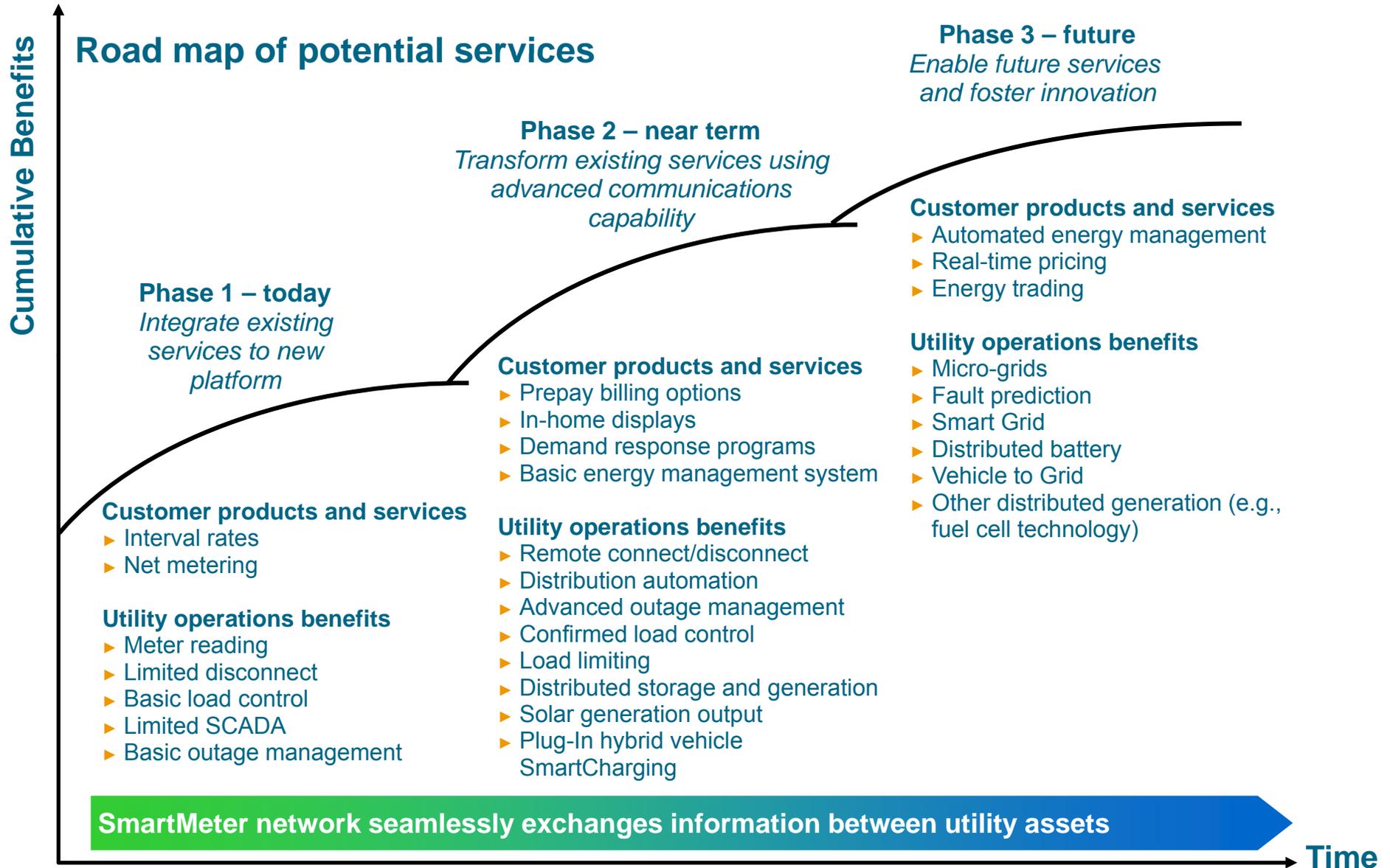
- CPUC, July 2006

Customer Home Area Network (HAN)

HVAC, IP-enabled appliances and distributed generation will all be tied together through an integrated energy management system (EMS)



SmartMeter to Smart Grid Vision



Potential Future SmartMeter Program Benefits

★ Customers

- ❑ Real time energy usage data to premise from meter
- ❑ Building automation
- ❑ Home energy/bill management tools and systems
- ❑ Smart thermostat (programmable communicating thermostat – PCT)
- ❑ Appliance control and monitoring
- ❑ In-home displays

★ PG&E

- ❑ Direct load control (air conditioner, water heater, pool pump, etc.)
- ❑ Critical Peak Pricing (CPP) and other demand response programs and rates
- ❑ Targeted regional/area Time of Use (TOU) programs
- ❑ Smart thermostat control (programmable communicating thermostat – PCT)
- ❑ Distribution planning
- ❑ Distribution voltage management
- ❑ Gas system planning
- ❑ Pre-pay metering
- ❑ Distribution fault detectors
- ❑ Capacitor bank controls
- ❑ Transformer load monitoring
- ❑ Meter health monitoring
- ❑ Preventive line maintenance data (momentary)
- ❑ Identification of facility performance or customer usage anomalies
- ❑ System load forecasting and settlement
- ❑ Enhanced outage data management
- ❑ Energy load research program flexibility
- ❑ Gas distribution maintenance (e.g. cathodic protection monitoring)

★ CPUC/State

- ❑ Energy resource planning
- ❑ Data for ISO system control
- ❑ Load control programs
- ❑ Demand response programs

SmartMeter Program Highlights

- ▶ Largest planned implementation of AMI technology in the U.S. to date – 10.3 million meters
 - ▶ \$1.7 B in funding (CPUC, July 2006); additional funding request pending before the CPUC
 - ▶ 5 year deployment: 2006 – 2011

- ▶ The program will pay for itself through operational savings, demand response, and energy efficiency
 - ▶ Among the first critical peak pricing programs for residential customers in the nation

- ▶ The **SmartMeter** project continues to take advantage of evolving technologies
 - ▶ We are moving toward our vision of the Smart Electric Grid

- ▶ Technologies deployed through the **SmartMeter** program establish a platform for future innovations that will benefit our customers, our operations, and the State of California