



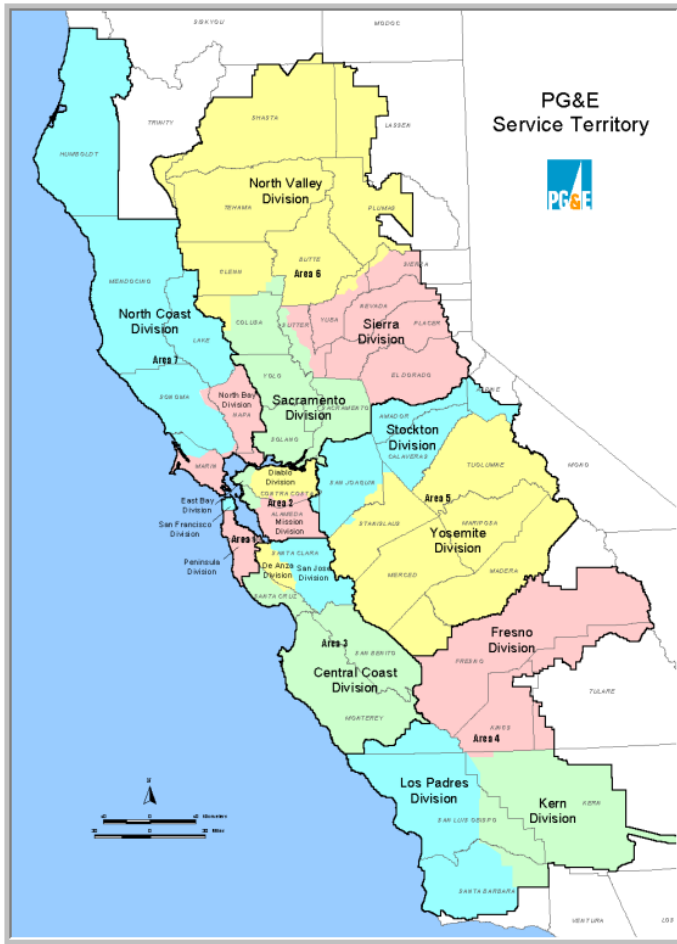
PG&E SmartMeter

SmartMeter Program Overview

December 2008



About Pacific Gas and Electric Company



- ▶ Energy Services to about 15 M People:
 - ▶ 5.0 M Electric Customer Accounts
 - ▶ 4.1 M Natural Gas Customer Accts
- ▶ 70,000 square miles with diverse topography
- ▶ ~20,000 Employees
- ▶ Regulated by the California Public Utilities Commission (CPUC)
- ▶ CA regulatory structure de-couples profits from energy sales revenue and provides incentives for demand reductions / energy efficiency

Smartmeter Program Acknowledged For Industry Leadership



**2008 AMR/AMI initiative of the year
in a North American IOU**

PG&E's Evolving Customer Commitment

*“Doing a good job for our customers will always mean delivering safe, reliable energy supplies. But it also will increasingly mean providing clean energy and giving them the **tools and the know-how to be smarter energy consumers** in a world where we all will be more aware of and engaged in our energy choices.”*

Peter Darbee, CEO

March 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 meters
 - ▶ IT systems to manage and store reads, and to make reads available both to PG&E's back-end systems (e.g. billing) and to customers

- ▶ Frequent meter reads - daily for gas, hourly or 15 minute interval for electric – that enable electric prices that vary by time of day

- ▶ Enhanced capabilities over time



SmartMeter Program Benefits

Customer Service

Provide our customers more convenience and better, faster service

- ▶ Convenient meter reading
- ▶ Faster power restoration
- ▶ Faster problem resolution
- ▶ Better billing

Demand Response

Provide our customers greater choice and more control over their energy bills

- ▶ New rate options
- ▶ Energy usage data

Enable the Future

Put in place a platform for innovation

- ▶ Home area networks – home energy automation
- ▶ Remote connect / disconnect
- ▶ Distributed generation / storage
- ▶ Dual fuel vehicles (PHEV)



Enhance the value our customers receive from their energy expenditures

Demand Response: A Priority Resource

Energy Efficiency (including Demand Response)

Renewable Energy

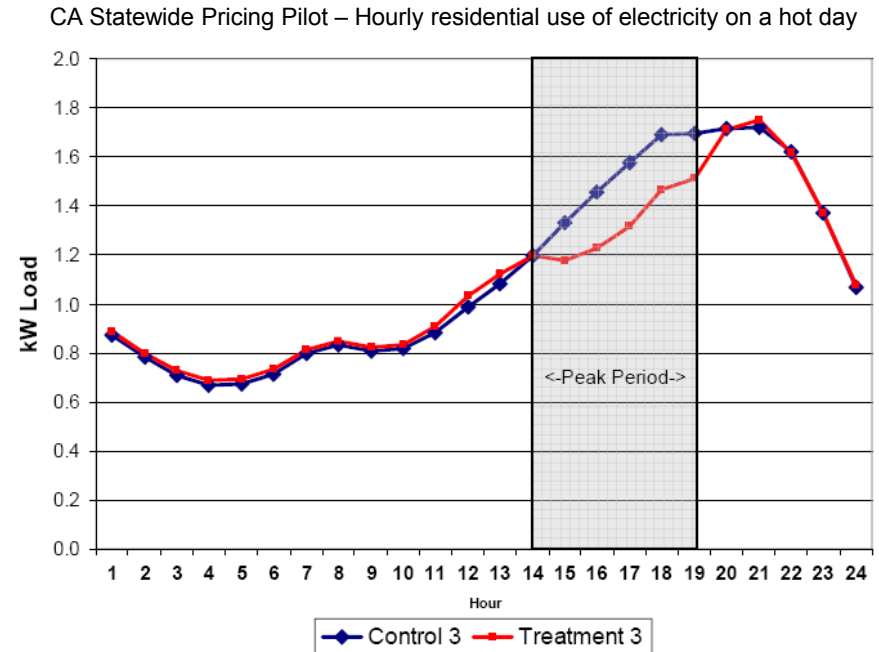
Conventional Generation and Transmission Infrastructure

*“The most important aspect of the Energy Action Plan was the concept of a ‘loading order’ for energy resource procurement. In that loading order, we defined **energy efficiency as our first priority. Implicit in that priority was also demand response or price-responsive demand.**”*

- CPUC Commissioner Peevey

Demand Response Programs

- ▶ SmartRate™ (Residential) / Critical Peak Pricing (CPP)
- ▶ Peak Time Rebate
- ▶ SmartAC™



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- ▶ Demand Bidding
 - ▶ Capacity Bidding
 - ▶ Base Interruptible Program



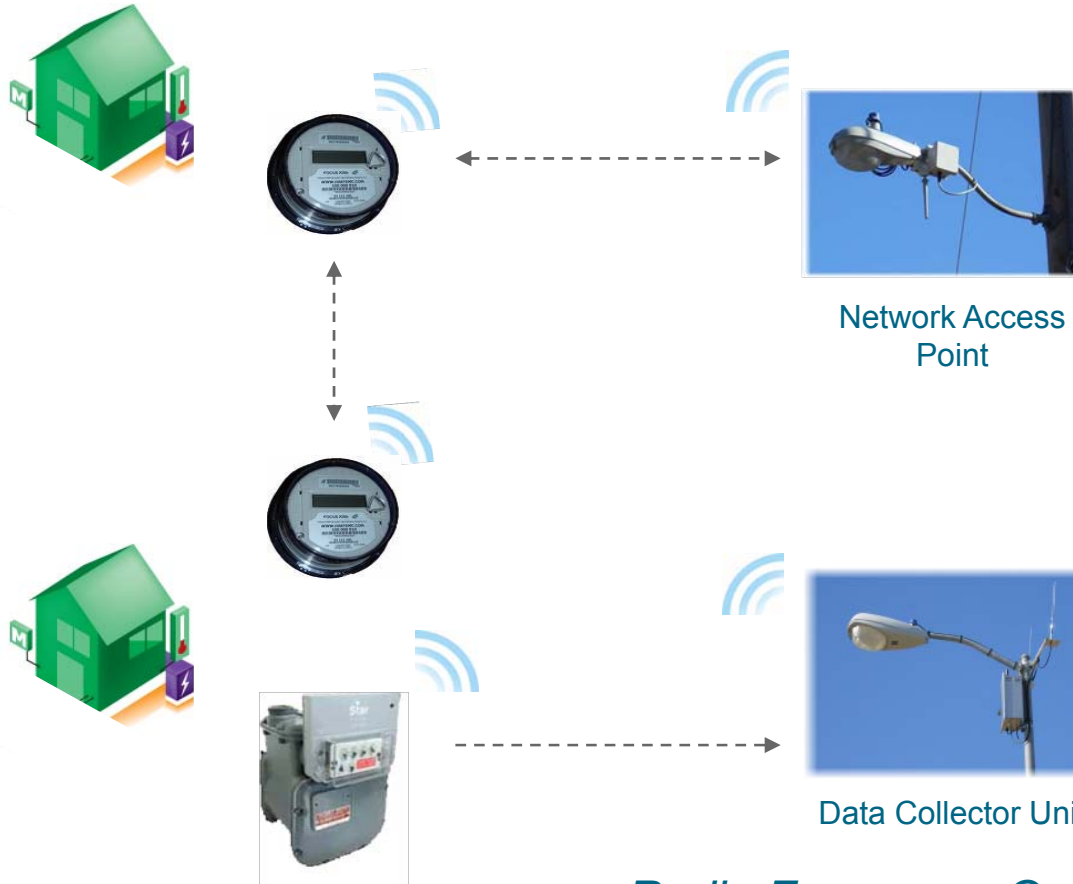
Demand response programs motivate customers to **shift energy use** from peak to non-peak hours and **conserve energy**



Demand response programs **reduce peak loads**, reducing the need to purchase expensive peak energy or build new generation facilities

SmartMeter Dual Network Architecture

Radio Frequency Mesh Electric Network



Radio Frequency Gas Network

SmartMeter Timeline – Vision in Action



Deployed Releases

2007

9/4 - Replatform IT systems for high data volumes

12/10 - Bill on automated reads

2008

5/17 - Bill on interval reads; SmartRate critical peak pricing

7/16 - Secure online access to interval usage data, basic functionality

7/21 - Integrate Aclara RF electric system

8/16 - Deploy, read and bill TOU/Demand meters

10/24 - Deploy and integrate Silver Spring Network (SSN) RF electric system

Releases In Progress

2008

12/18 - Enhanced functionality for online access to usage data, including gas and TOU meters

2009

1/30 - Remote connect/disconnect (basic), meter power status check, and enhanced billing operations efficiency

Future Releases

X Performance and scalability

Customer care & contact center support; enhanced on-line data

Outage management (on hold)

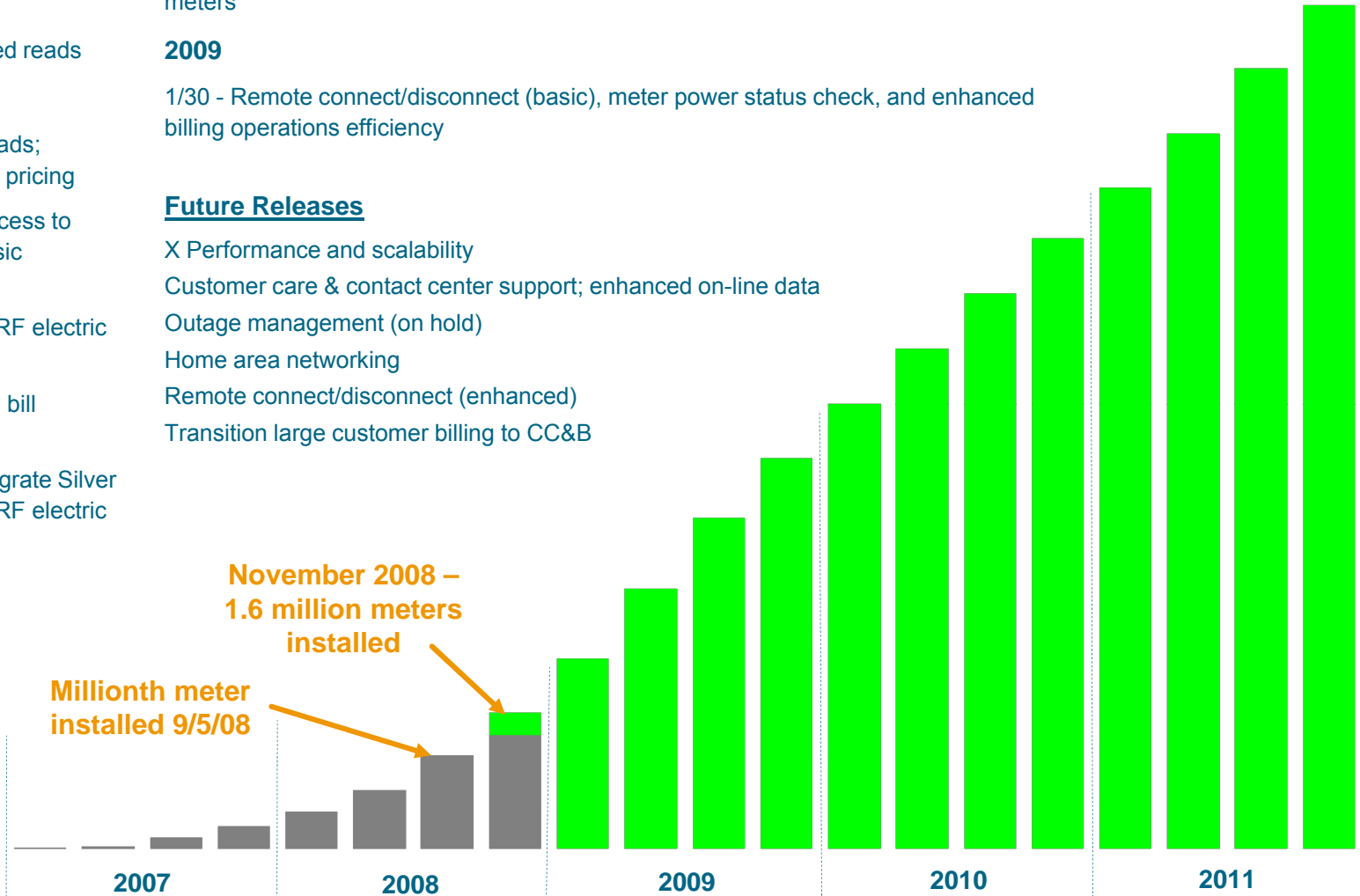
Home area networking

Remote connect/disconnect (enhanced)

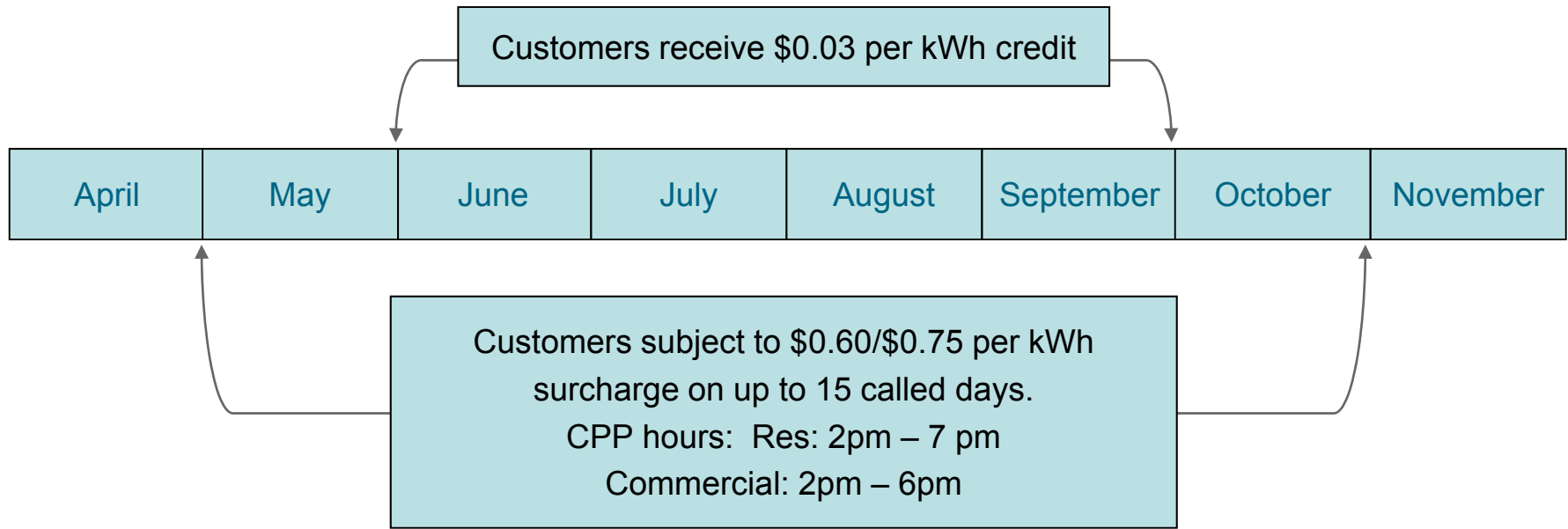
Transition large customer billing to CC&B

10.1 million meters installed

Project start - 2005; Vacaville Test – 2006; Launched fall 2006



SmartRate Pricing Plan (mass market CPP)



Note: bill protection offered in first complete summer of participation

Customer participation in first SmartDay™ events:

Event Day: July 8th

Participants: **3,629**

Temperature: **107 F**

Event Day: July 9th

Participants: **4,076**

Temperature: **107 F**

Event Day: July 10th

Participants: **4,422**

Temperature: **111 F**

Online Customer Access to Usage Information

- ▶ Displays energy usage by billing cycle, month, or week
- ▶ Displays hourly electric usage by day
- ▶ Ability to overlay temperature
- ▶ Customized text (or links) on top and bottom of graph
- ▶ SmartRate customers view usage “framed” by peak periods (summer only)
- ▶ Customer service reps able to view same graphs online

Address <https://www.pge.com/csdl>

Pacific Gas and Electric Company *Customer Service* GET HELP | LOGOUT

My Account

- Billing
 - View Bill
 - Pay Bill
 - Billing/Payment History
 - Usage History
- Financial Assistance
- Save Energy and Money
- Service Requests
- My Profile
- PGE.com Home

Michael Smith
Account #: 123456789-0

Service Address:
100 Main St., San Francisco, CA 94111

SmartMeter™ Usage
You can view your daily or hourly energy usage by selecting the type of graph and the date, then clicking "View/Update." Keep in mind you must change the time period of the graph at the bottom. You can also print the current chart or download graph data by clicking on the appropriate links.
Please note that SmartMeter™ usage for today will be available tomorrow between 3-10 pm.

Meter: Electric-1234VBS

Graph: Daily Energy With Temperature **Date:** Mar 2008 1

[View/Update Graph](#)

Daily Energy with Temperature

Choose a period: Billing cycle Month Week [Print](#) | [Download](#)

The data presented in this chart may slightly differ from the data reflected on your bill for several reasons. For example, data collected on your account may include some estimated usage, and this chart may round your energy usage differently.

Hot days bring about a cool way to shift energy and manage costs.
Introducing a voluntary electric pricing plan that allows you to shift your energy usage on up to 15 hottest days of the summer. A little means a lot. Click on the link below or call 1-866-743-0263 to learn more.

[SmartRate™ Program Info](#)
[SmartRate™ Events](#)
[Energy Efficiency Tips](#)

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Advances in AMI Technologies

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

CPUC, July 2006

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

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

- ▶ **SmartMeter Upgrade Filing in Progress**
 - ▶ \$572 million project cost increase
 - ▶ CPUC decision expected in late December 2008 or January 2009



SmartMeter Electric Information Flows

HAN, Home Energy Management



Customer Premise



Detailed electric usage
Diagnostic info, flags

Interval electric usage
Diagnostic info, flags
Price information
Load-control signals

Price information
Possible load-control signals for participating customers**
Remote connect / disconnect
Remote upgrades

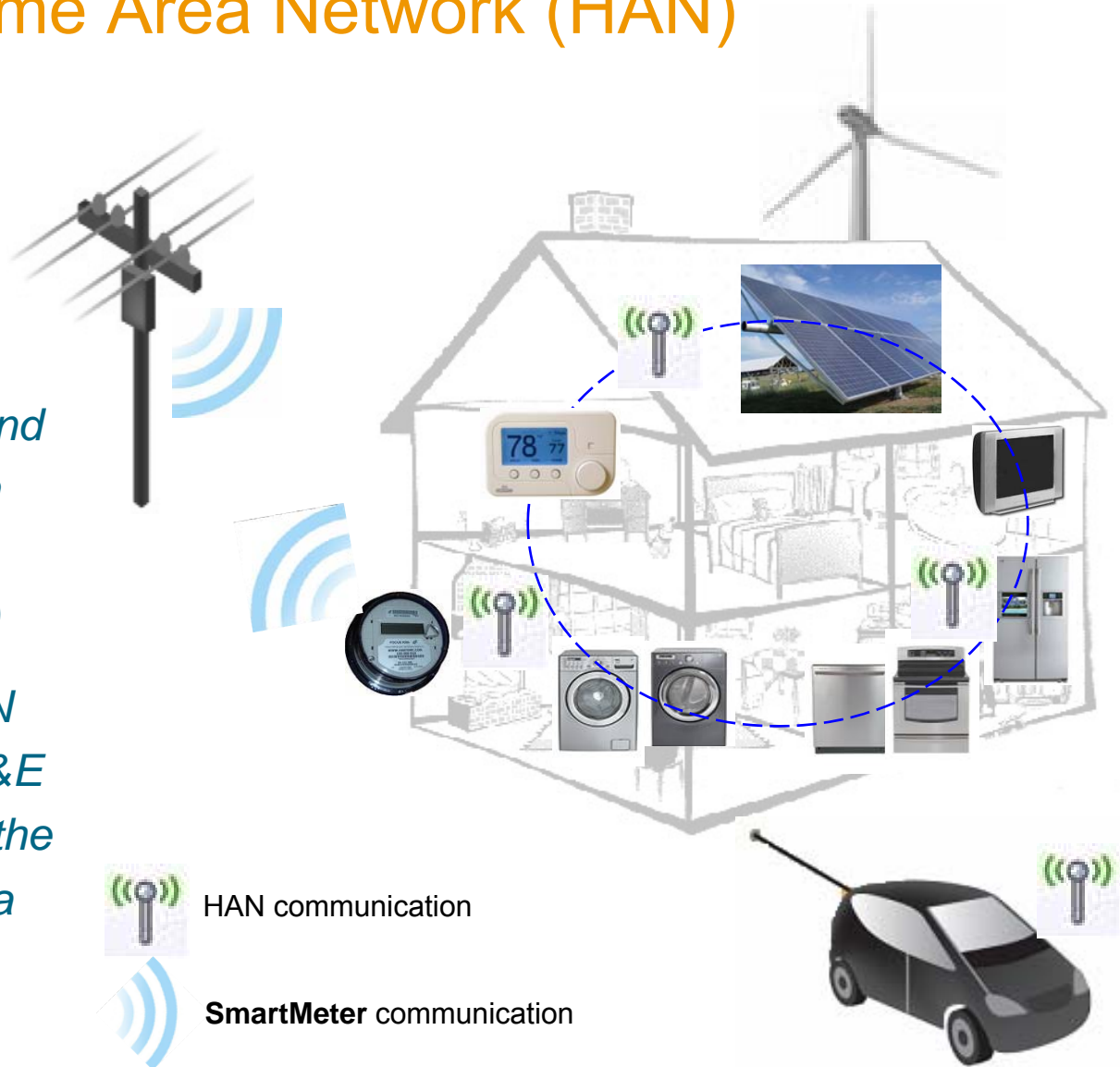
* Subject to CPUC approval of the **SmartMeter Program Upgrade Filing**

** Subject to development of such programs

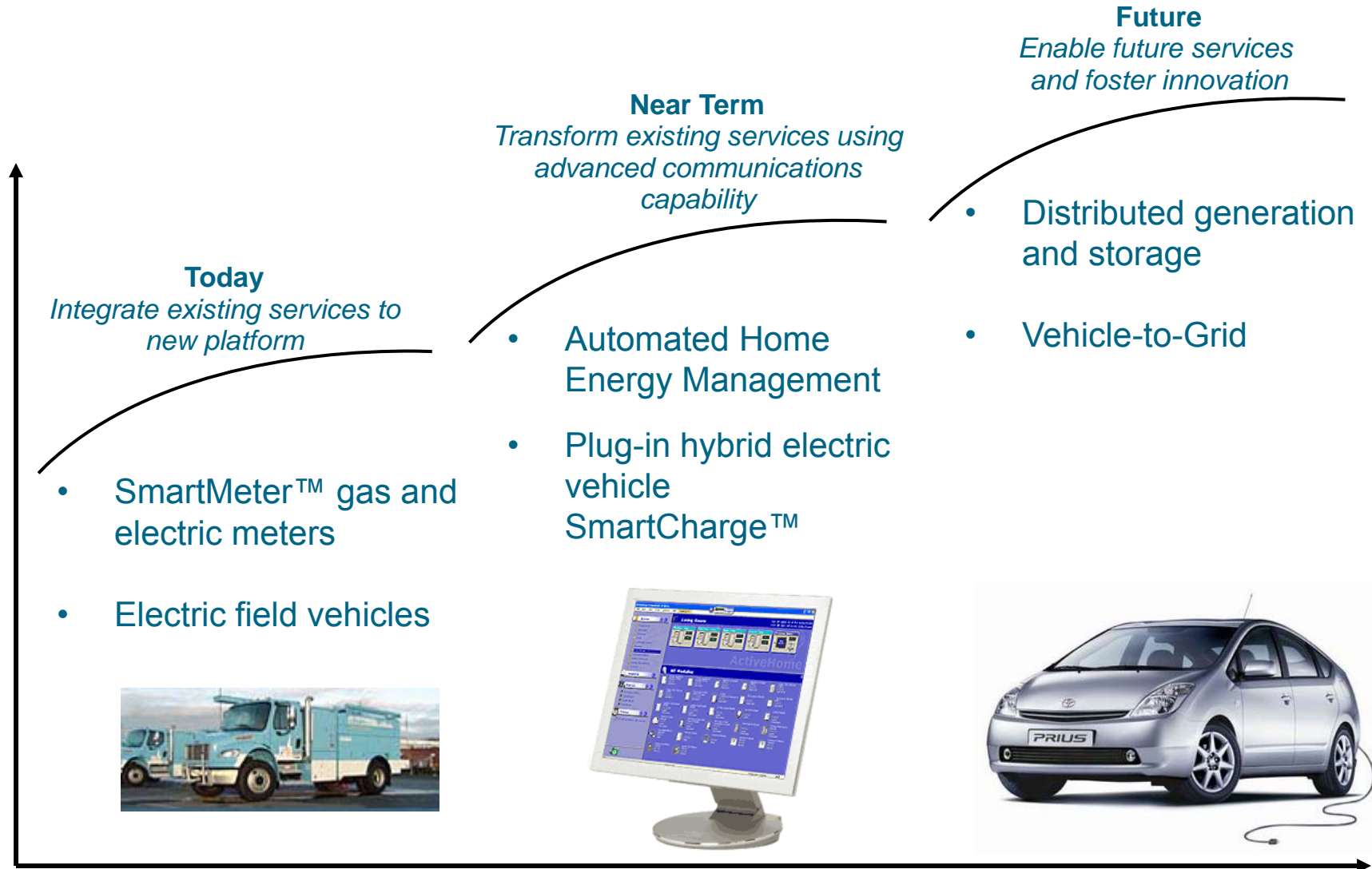
Customer Home Area Network (HAN)

Customers will use energy management systems (EMS) to tie together HVAC, IP-enabled appliances and distributed generation into integrated Home Area Networks (HAN)

*The **SmartMeter** HAN gateway enables PG&E to communicate with the customer's home area network*



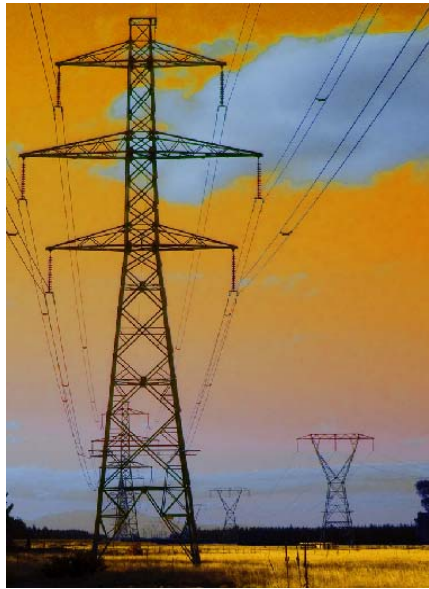
SmartMeter: Future Generations



The Future: A Smart Electric System



Renewable Electric
Generation



Efficient Electric
Delivery



Managed Electric
Demand



Balances cost, reliability, and sustainability

SmartMeter Program Highlights

- ▶ Largest implementation of AMI technology in the U.S. to date
 - ▶ 10 million meters
 - ▶ 5 year deployment: 2006 – 2011
 - ▶ Program will pay for itself over time
- ▶ Three drivers for **SmartMeter** program deployment
 - ▶ Improved, more cost-effective customer service
 - ▶ Broad-based demand response
 - ▶ A powerful platform for future innovation



PG&E SmartMeterⁱⁱⁱ

Pictures of Current *SmartMeter* Technology



SmartMeter Gas Meter Module

Gas meter with SmartMeter Module

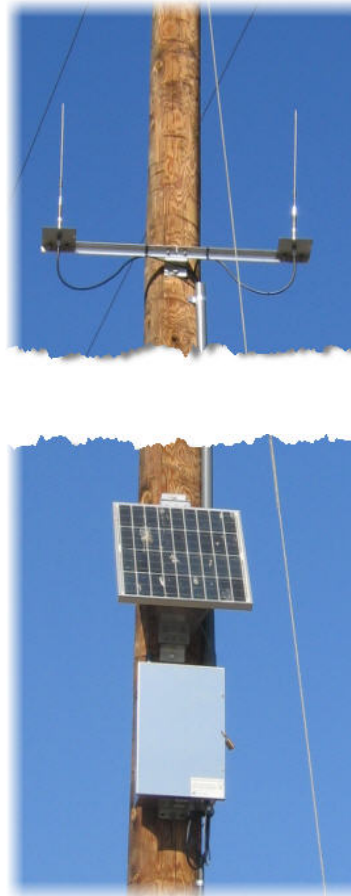
Meter Transmitter Unit (MTU)
(i.e., SmartMeter gas module)



SmartMeter Gas Network Equipment*

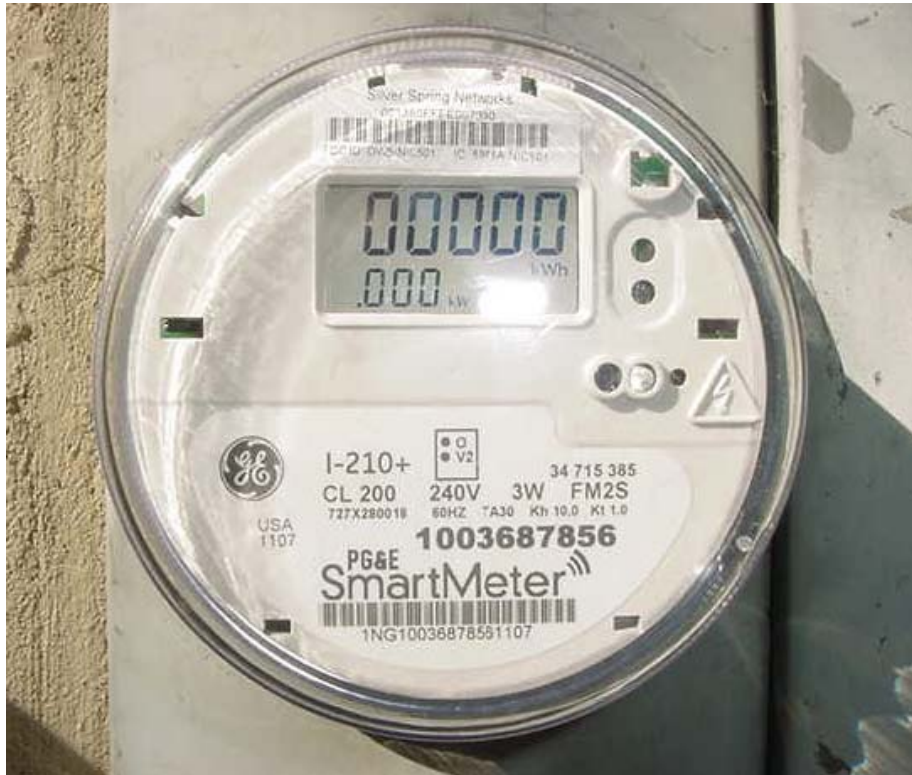


Data Collector Units (DCUs) are typically mounted to streetlights, distribution poles, and transmission towers



* Also used as the **SmartMeter** electric network in some areas

SmartMeter Electric Meter (Solid State)



Solid State Meter

Next Generation SmartMeter Electric Network Equipment

SmartMeter electric network Access Point (AP) mounted on a distribution pole and a streetlight



SmartMeter electric network Relay mounted on a distribution pole

