EPACT 1252 Webinar

Dan Delurey

Demand Response and Advanced Metering Coalition (DRAM)

www.dramcoalition.org

July 21, 2006

Demand Response and Advanced Metering Coalition (DRAM)

Founded in 2001

Mission is to provide information to all parties on demand response and its enabling technologies and services

Comprised of the leading companies providing demand response technologies and services:

- Advanced Metering
- Communications and Controls
- Data Management
- Energy and load management
- Demand response delivery to customers and load serving entities

www.dramcoalition.org

DRAM Members

Cellnet

- www.cellnet.com

Comverge

- www.comverge.com

Echelon

- www.echelon.com

Elster Electricity

- www.elsterelectricity.com

eMeter

- www.emeter.com

EnerNOC

- www.enernoc.com

EnergySolve

- www.energysolve.com

ESCO Technologies

- www.escotechnologies.com

Hunt Technologies

- www.hunttechnologies.com

Itron

- www.itron.com

Landis + Gyr

- **www.landisgyr.us**

Sensus Metering Systems

- www.sensus.com

SmartSynch

- www.smartsynch.com

Silver Spring Networks

- www.silverspringnetworks.com

Answers to the Top 10 Questions Being Asked in an EPACT 1252 Proceeding

Chris King

President

eMeter Strategic Consulting

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eMeter Overview

Company Background & Qualifications

- Founded in Silicon Valley in 1999 by original executive group from CellNet
  - Team pioneered fixed network AMR now serving over 10 M meters
- Develop and sell ***Advanced Meter Information Systems*** (AMIS) software
  1. Advanced Metering Business Process Management (BPM)
  2. Meter Data Management
  3. AMI Integration Platform
- Vendor neutral
- Experience in all aspects of AMI implementation
  - AMI technologies,
  - Software implementation,
  - Data collection and management,
  - Deployment & operations,
  - Business and regulatory strategy

Business Focus on Software & Services

- Software
- Professional services
- Strategic consulting on AMI issues

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Agenda

1. What does Section 1252 require regarding demand response and advanced metering?
2. What is an advanced meter, and do advanced meters differ between residential and commercial customers?
3. What technology standards are needed?
4. How can technology obsolescence be avoided?
5. What are the main costs and benefits in the advanced metering business case?
6. Do demand response and advanced metering investments make sense in regulated and unregulated markets, especially when prices are rising?
7. Do customers respond to time-of-use prices, critical peak prices, and critical peak rebates, and how do customers like these options?
8. Does demand response benefit the environment?
9. Is there a need to do pilots?
10. What are various utilities, states, and others doing?

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What Does EPACT Require?

National Policy: establishes demand response as a preferred resource

Time-based Rates

- Utilities
  - –Must offer time-based rates to all customers by February of 2007 ***or***
  - –Demonstrate why compliance cannot be achieved
- State regulators may determine if this requirement is "appropriate"

State Investigations

- Conduct proceeding start by August 6, 2006 and complete by August 6, 2007
- Determine if it is appropriate to deploy "advanced meters" to all customers
- Review business case and find cost-effective if:
  - –Metering: "if the long-run benefits of such rate to the electric utility and its electric consumers in the class concerned are likely to exceed the metering costs and other costs associated with the use of such rates."
  - –Demand response: "if (1) such technique is likely to reduce maximum kilowatt demand on the electric utility, and (2) the long-run cost-savings to the utility of such reduction are likely to exceed the long-run costs to the utility associated with implementation of such technique."

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What is an Advanced Meter?

EPACT Section 1252

- Metering must be:
  - –Time-based
  - –Capable of supporting TOU, CPP, RTP (hourly), and credits for demand reduction
  - –Have communications

Section 103

- Standard for Federal agencies
- Requires advanced meter for all “buildings”
- Metering must:
  - –Record usage “at least hourly”
  - –Retrieve data “at least daily”

FERC Report (presented to FERC July 20, 2006)

- A metering system that records customer consumption [and possibly other parameters] hourly or more frequently and that provides for daily or more frequent transmittal of measurements over a communication network to a central collection point.

In sum: “hourly data collected daily via a fixed communications network”

- The communications makes possible many other functions, such as appliance load control, smart thermostats, and outage detection

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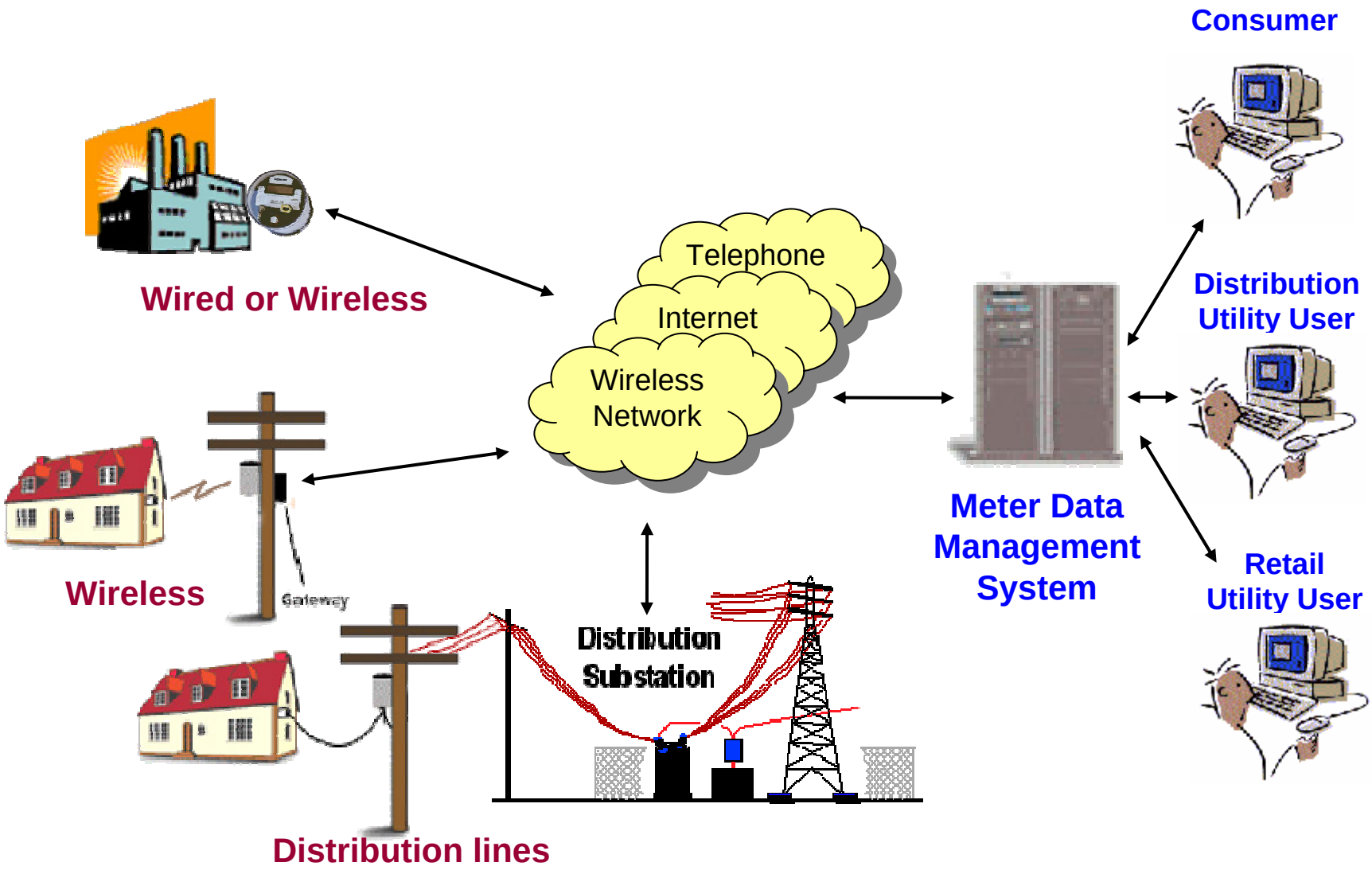
AMI Communication Networks



What about Residential vs. Commercial Customers?

Commercial customers

- Larger customers usually seen as having 15-minute interval data
- Delineation usually between 100 and 500 kW maximum demand
- Sometimes all commercial customers seen as having 15-minute data

Residential customers

- Usually seen as having hourly or varying time-of-use block pricing such as critical peak pricing

Does it matter?

- There is a fairly small cost difference between 15-minute and hourly data
  - –Some technologies have higher costs for handling more data
- The key difference is caused by polyphase vs. single-phase service
  - –Largest 5% of customers typically have polyphase service
  - –Polyphase meters typically cost more ($100-$150 per site)

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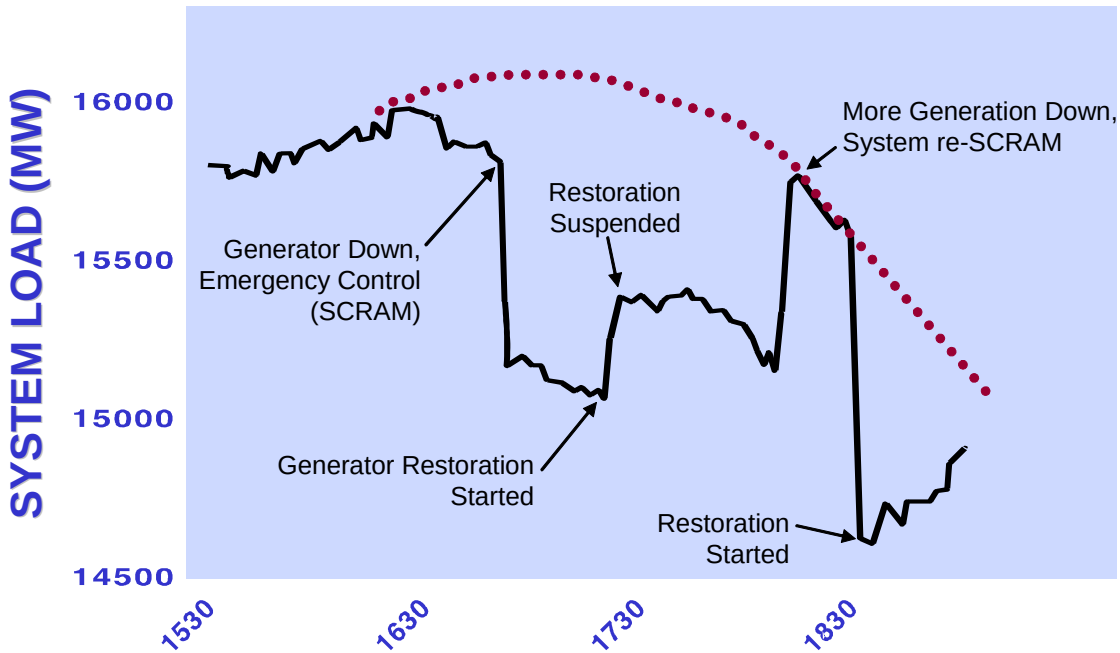
What about non-price-based demand response?

Just as important as price-based

- Dispatched for emergencies and when wholesale prices spike up

Customers

- Large commercial customers provide large reductions and are more accessible
  - –Program example: demand bidding
- Mass market customers offer large aggregate opportunity
  - –Program example: air conditioner load control



Over 975 MW shed in 60 seconds

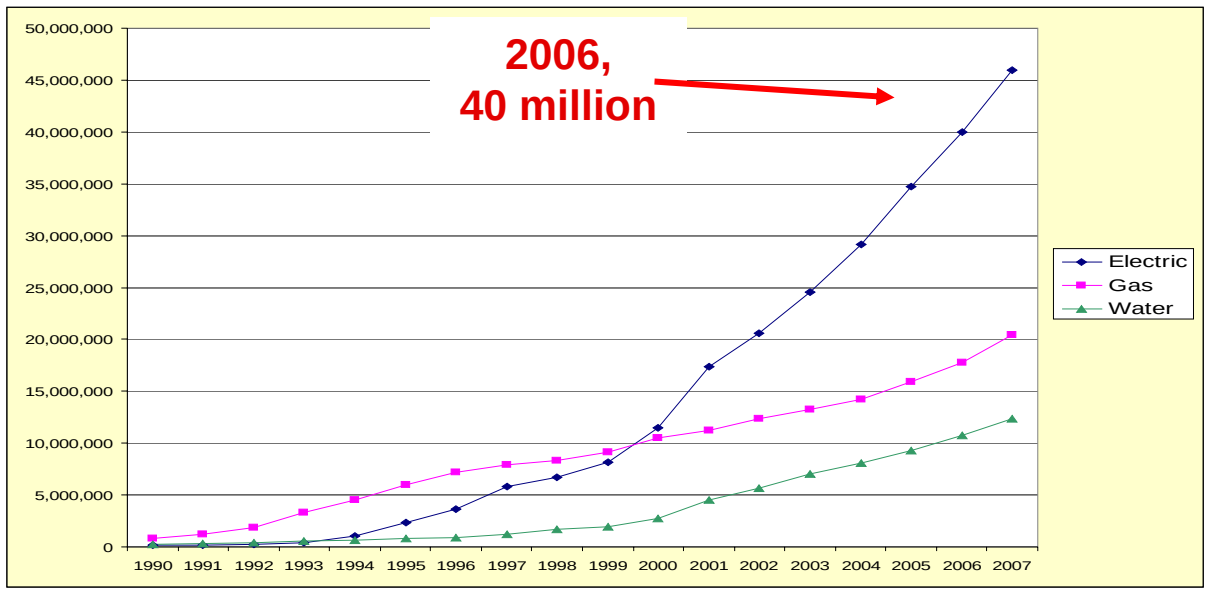
What technology standards are needed?

AMR and AMI are being deployed in the absence of standards

- There are 250 million U.S. electric, gas & water meters (115 Electric)
- About 1/3 are automated (2/3 Drive-by and 1/3 Fixed)

AMI from the first instance should include system-level data standards that allow competing technologies to be utilized on the same system, and also includes a strategy to extend standards to the device level at the earliest possible date

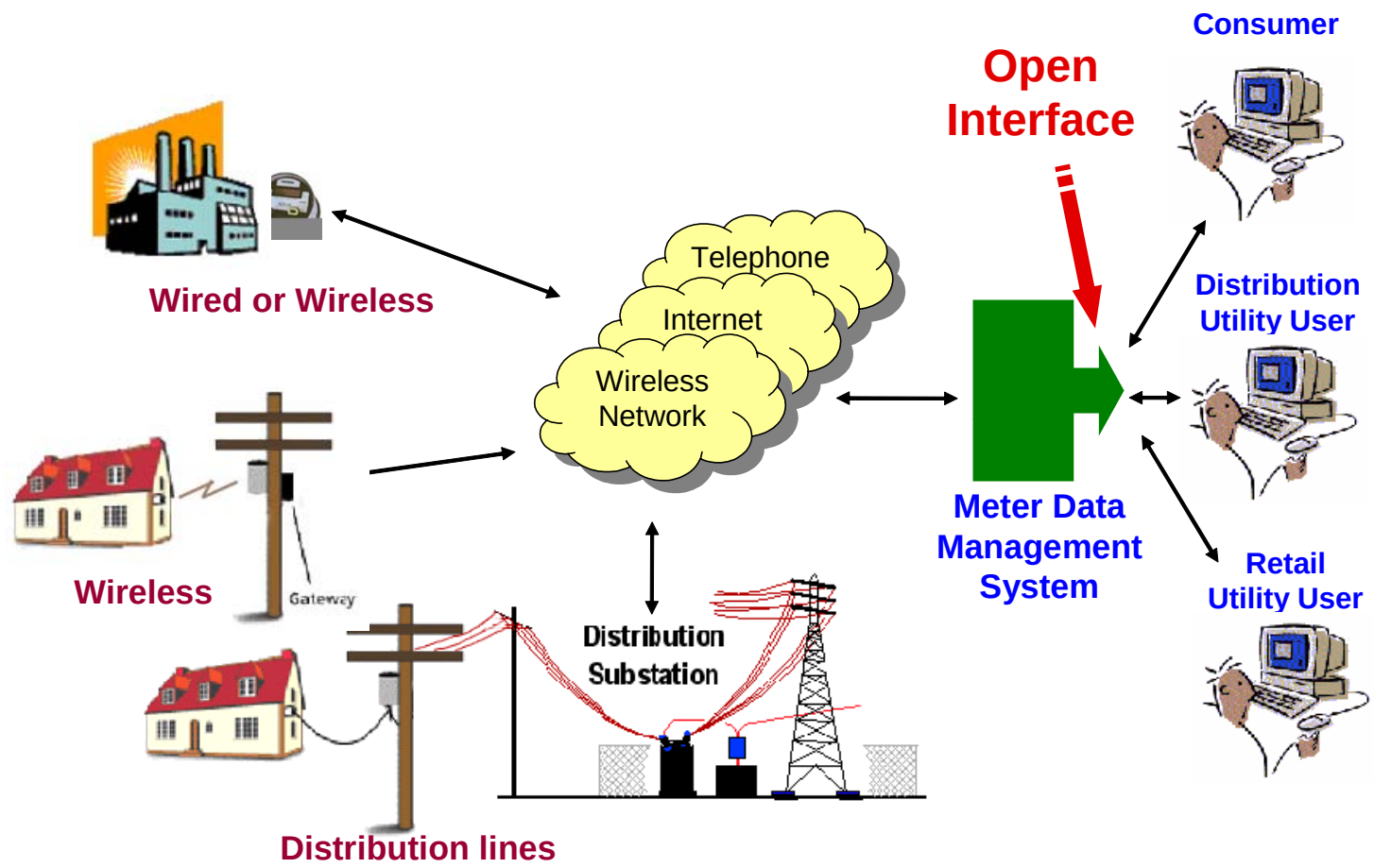
U.S. Market Shipments, Cumulative



What about data standards?

Primary need is access to data by customers

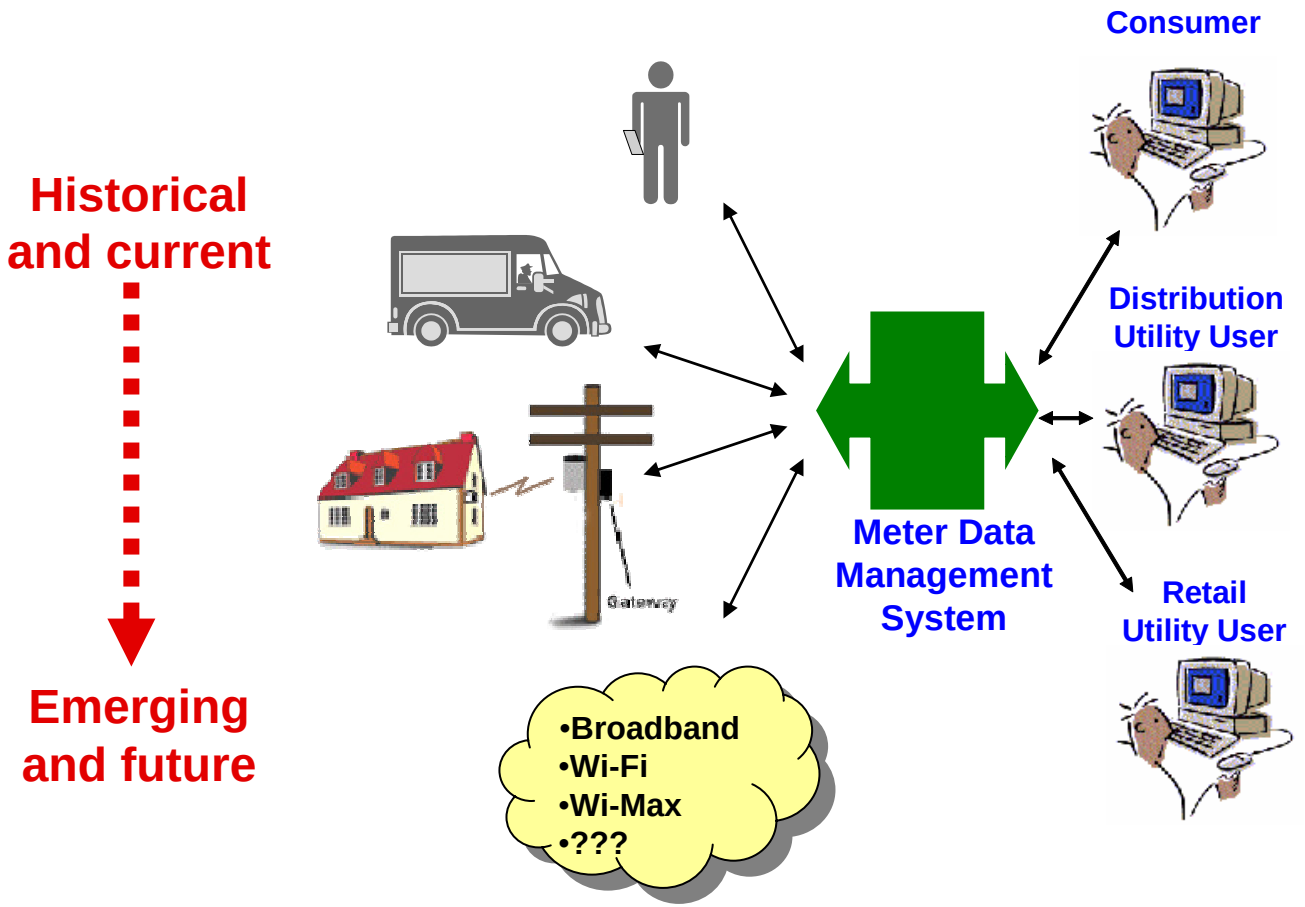
Easily done at system level – like other industries



How Can Technology Obsolescence Be Avoided?

System architecture must allow for the adoption of new and enhanced technologies

Flexible support of technologies at the MDMS interface ensures ability to adopt and benefit from them



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What should regulators specify?

Should specify:

- High-level goals such as:
  - More demand response
  - More energy efficiency
  - Better customer service
  - Greater reliability (outage prevention and management)
  - Flexibility to adopt technology enhancements over time
- Minimum high-level functionality such as ability to:
  - Record daily at least hourly according to ANSI standards
  - Retrieve data at least daily
  - Make data available to customers through an automated, published and public interface – with requisite customer privacy protection

Should *NOT* specify (and instead rely on utilities' expertise) for:

- Detailed functionality or *maximum* functionality
- Specific technology
- Specific programs

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Advanced Metering Business Case: Costs and Benefits

Benefits

- Utility operations
  - –Meter reading
  - –Move-in/move-out
  - –Call center/customer service
  - –Outage response, including restoration verification
- Demand response
  - –Reduced kW demand during critical peak times
  - –Value of cost avoided by not building the next “peaker” power plant

Costs

- Equipment
- Installation
- Operation and maintenance
- Total: $100-150 per customer in mass deployment

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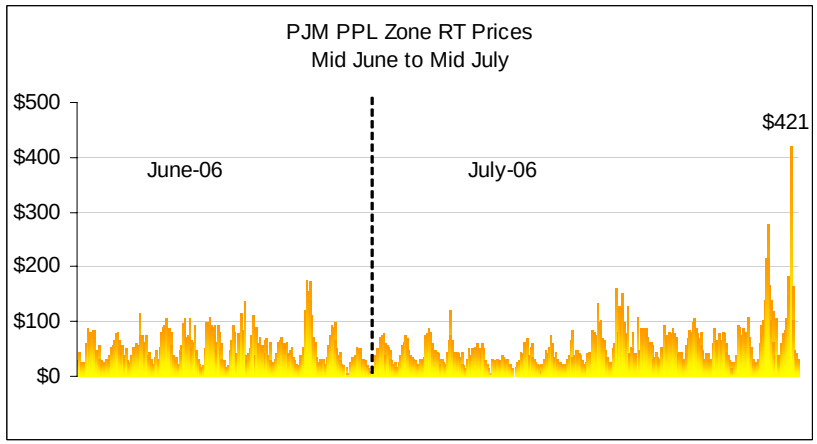
What is the Value of Demand Response?

Deregulated Wholesale Markets

- Market price sets value
- This occurs during price "spikes"
- Varies greatly from year to year
- Problem: all U.S. markets remain regulated
  - Price caps, capacity obligations, etc.

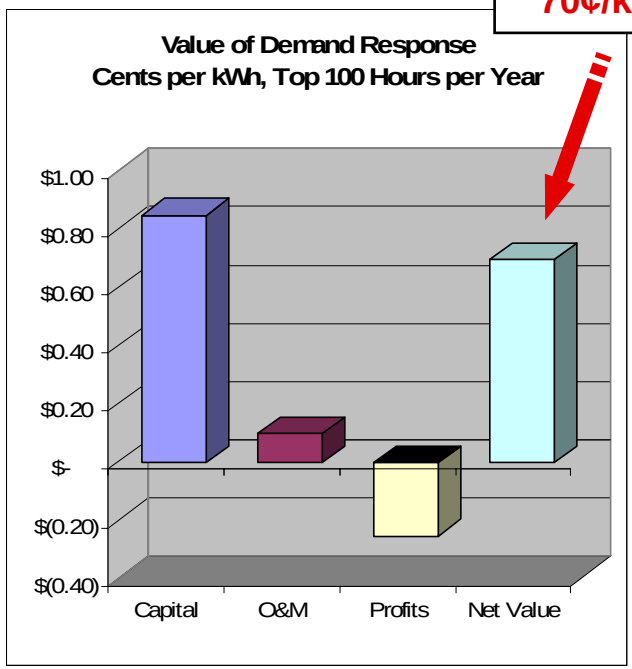


- Result: current market prices understate the value (and are resulting in inadequate capacity investment)

Engineering Analysis of Avoided Cost

- Use cost of the "marginal" unit: combustine turbine gas peaker
- Capital cost levelized over the life
- Operating costs for the 100 critical peak hours
- Subtract profits from sales during other hours
- Net = $0.70 per kWh ($700 per MWh)

DR Value: 70¢/kWh



Business Cases

Numerous examples of positive business cases

- Some are based only on utility operations
- Others include customer benefits (demand response)
  - –Total customer benefits tend to exceed utility benefits and flow to customers
  - –Cases below do not include customer benefits beyond demand response

Utility	Location	Number of Customers (millions)	Installation Status
AmerenUE	Missouri	1.7	100%
ENEL	Italy	30.0	80%
Exelon-PECO	Pennsylvania	2.2	100%
IPL	Indiana	0.4	100%
JEA	Florida	0.7	80%
KCPL	Missouri	0.5	100%
PG&E	California	9.0	<5%
PREPA	Puerto Rico	1	70%
Puget Sound Energy	Washington	1.5	100%
SDG&E	California	2.1	Planned
TXU ED	Texas	3.0	<5%
We Energies	Wisconsin	1.7	60%
WPS	Wisconsin	0.9	100%
Xcel-NSP	Minnesota	1.7	80%
All	Ontario, Canada	4.5	5%
All	Victoria, Australia	2.4	<5%
TOTAL		63.3	55%

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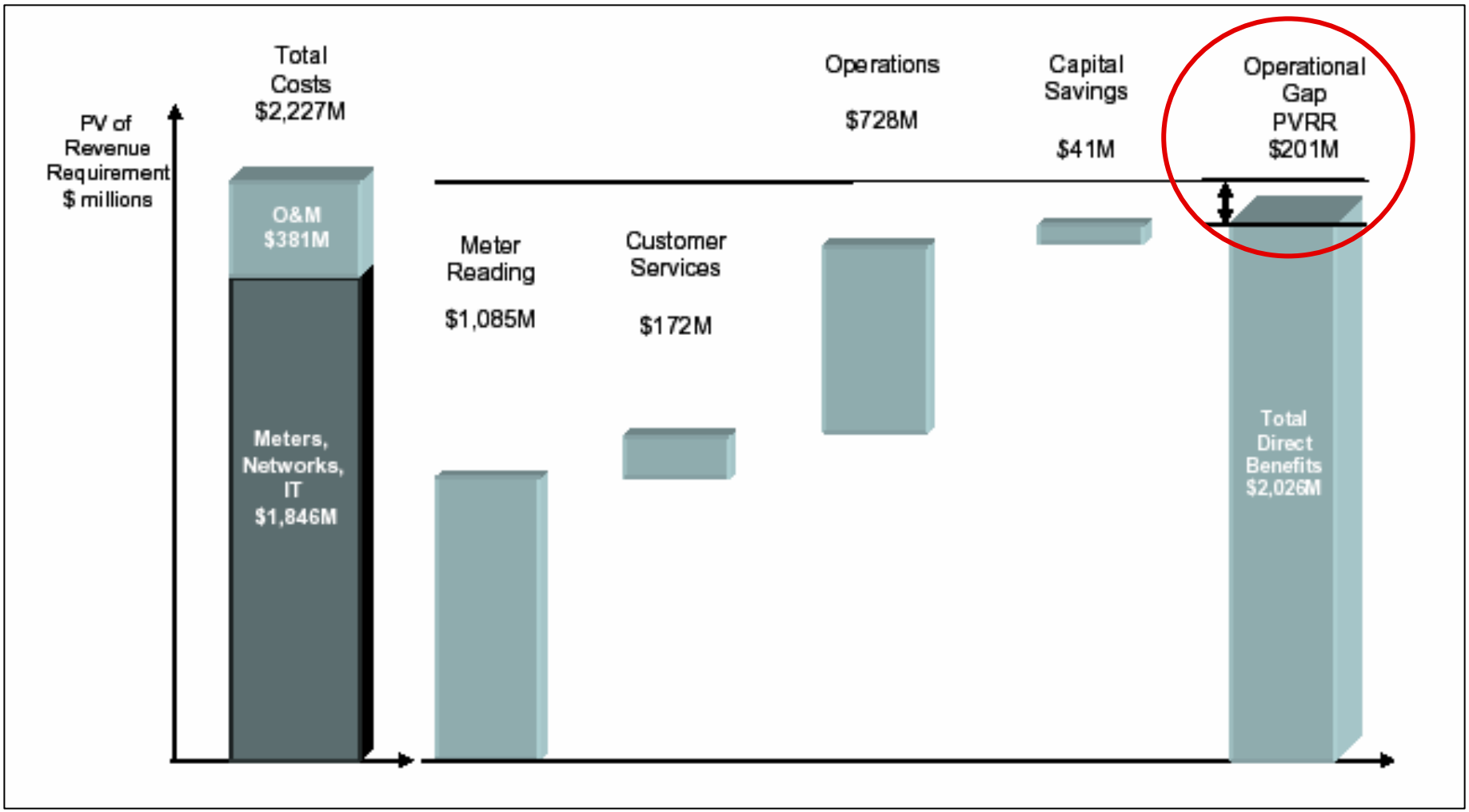
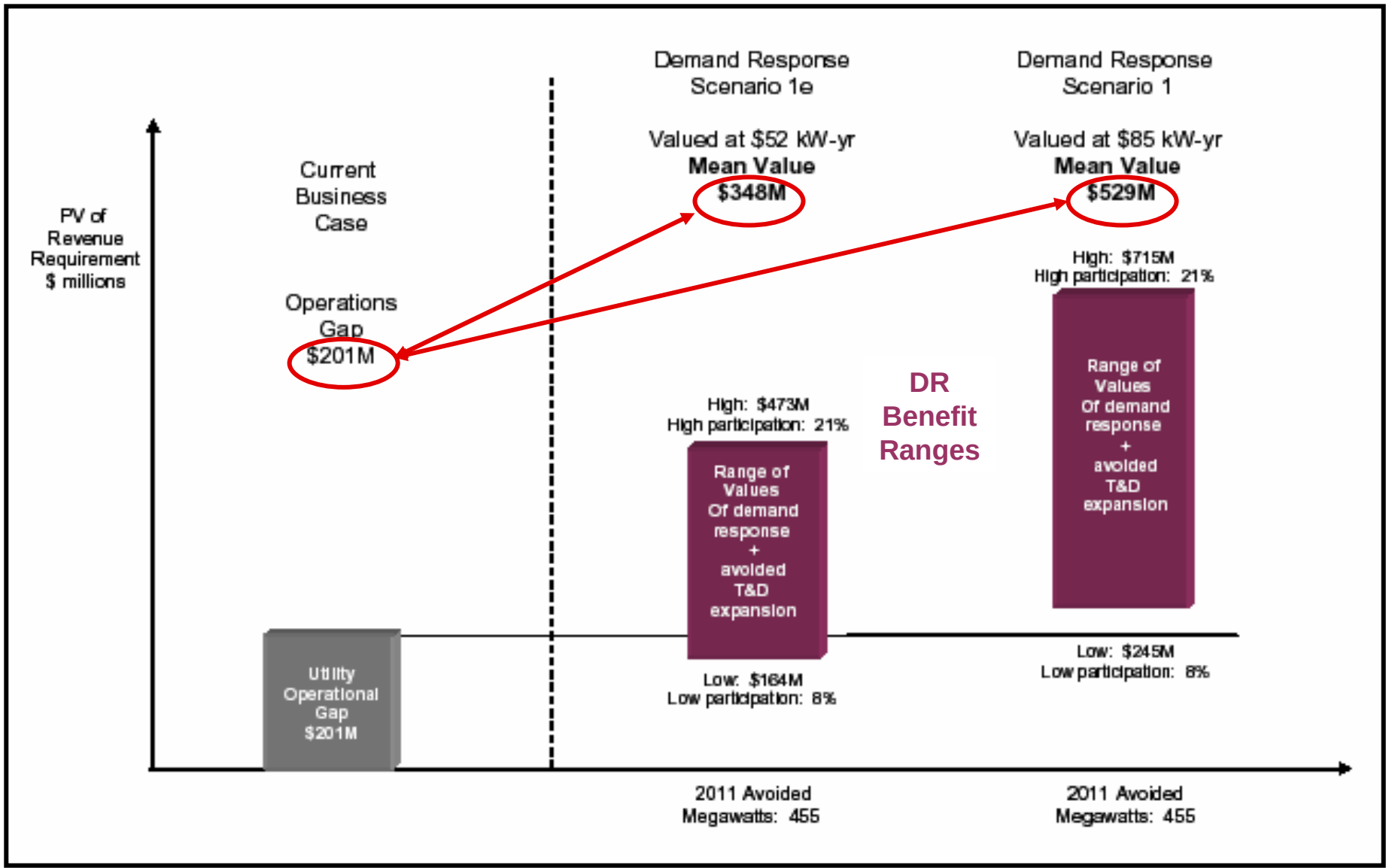
Example: Pacific Gas & Electric

Total costs less utility operating savings



Pacific Gas & Electric – cont.

Business case including Demand Response benefits



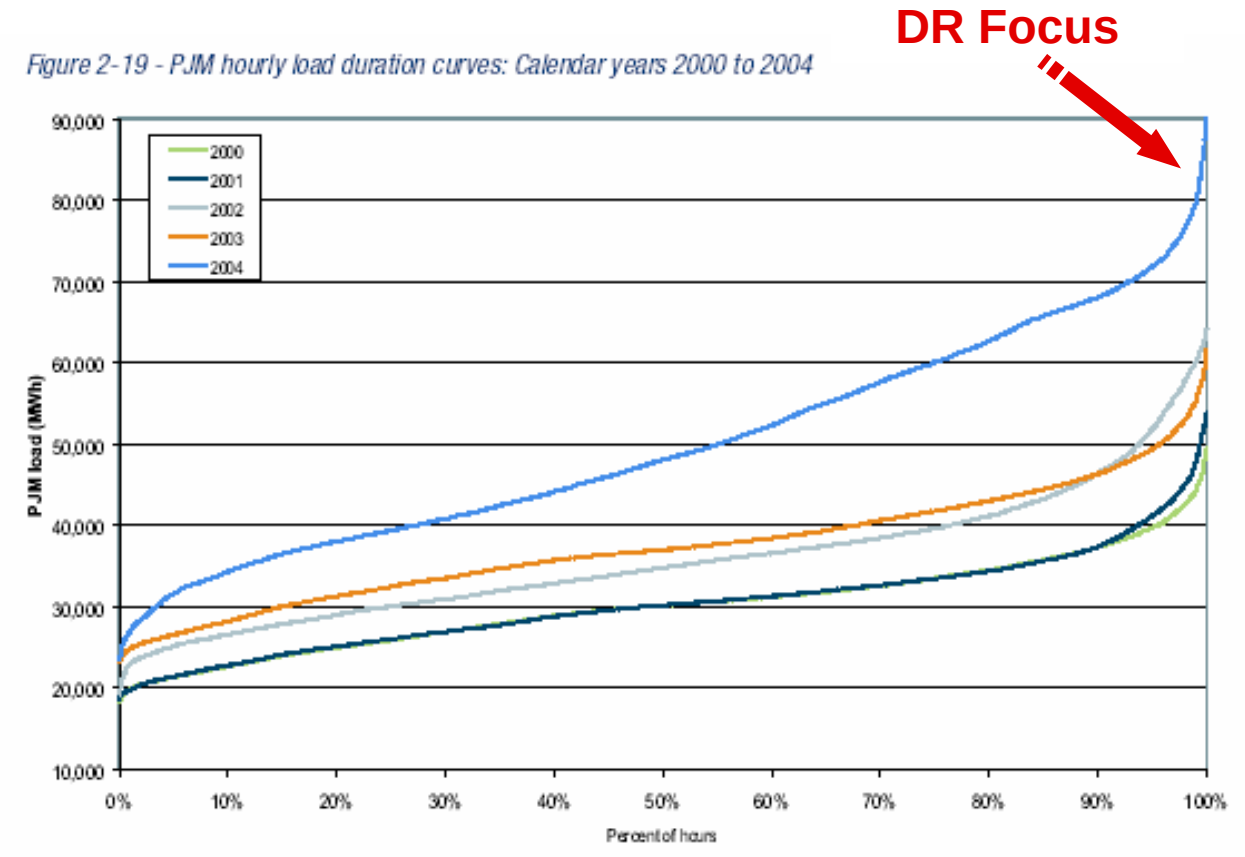
How Does Demand Response Help Markets?

Focus on top 100 hours per year

- Reduced need for peakers
- 15% or so of total capacity
- Avoid rolling blackouts
- Same benefits in regulated markets

Consumer benefits

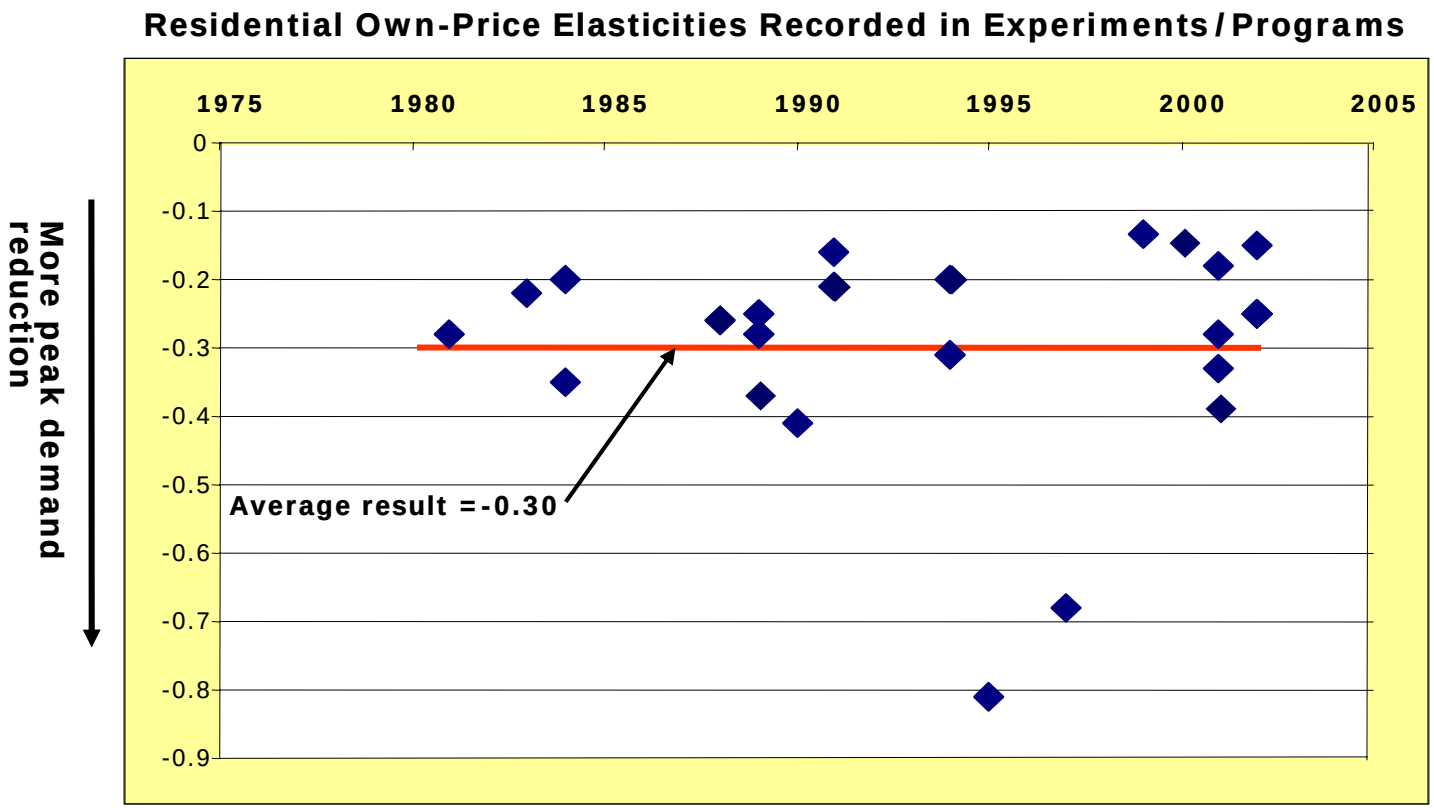
- Energy information and awareness
- Conservation
- Ability to manage bills



Source: PJM State of the Market Report

Do Customers Respond to Time-Based Pricing?

- Results of comprehensive literature review
- Fifty-six analyses and projects in the past 25 years
- Own-price elasticity: amount of peak reduction compared to on-peak price
  - –.30 = 30 percent reduction when peak price is double the off-peak price\



Source: King and Chatterjee, *Public Utilities Fortnightly*, July 1, 2003

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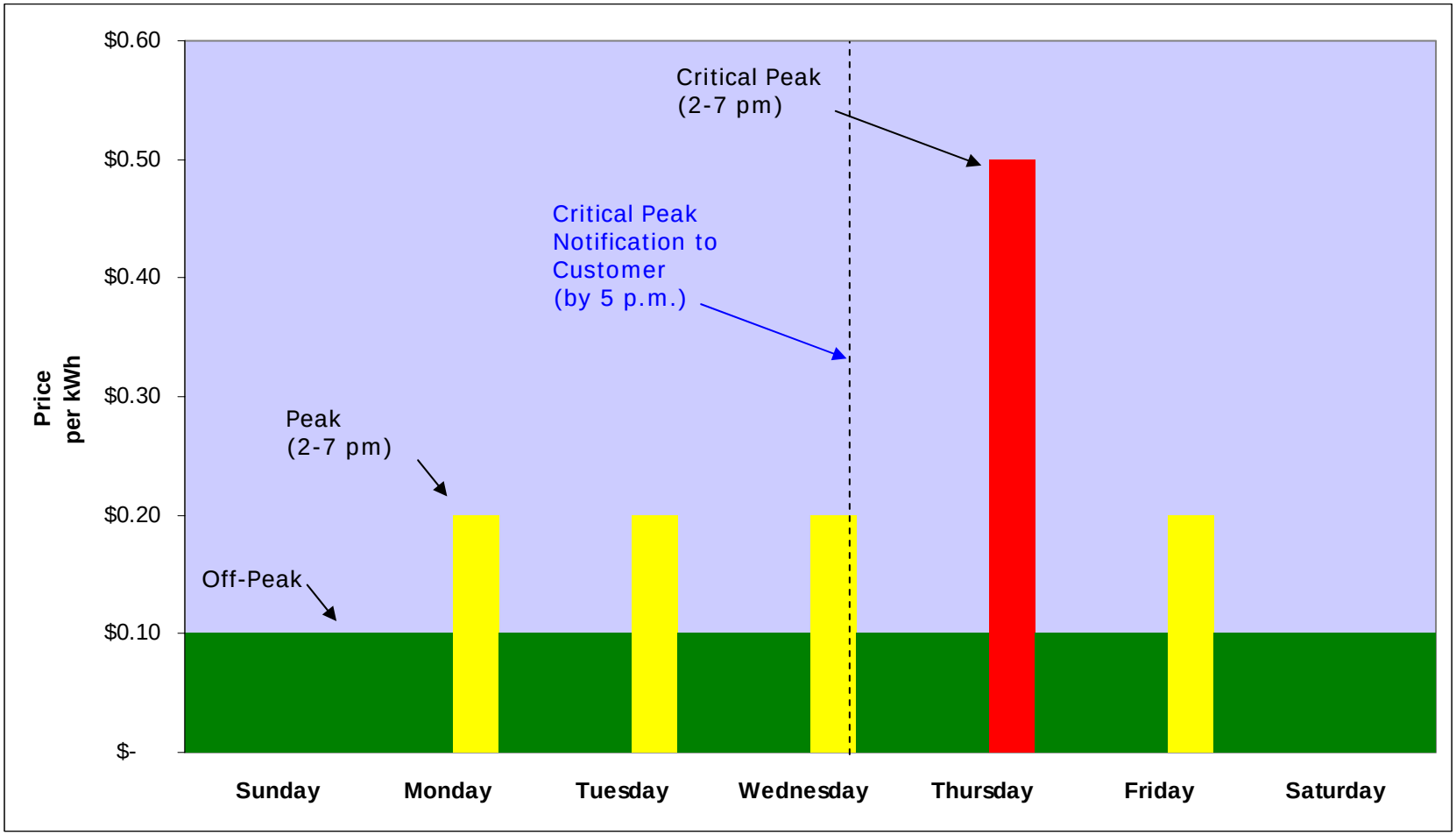
Critical Peak Pricing Structure



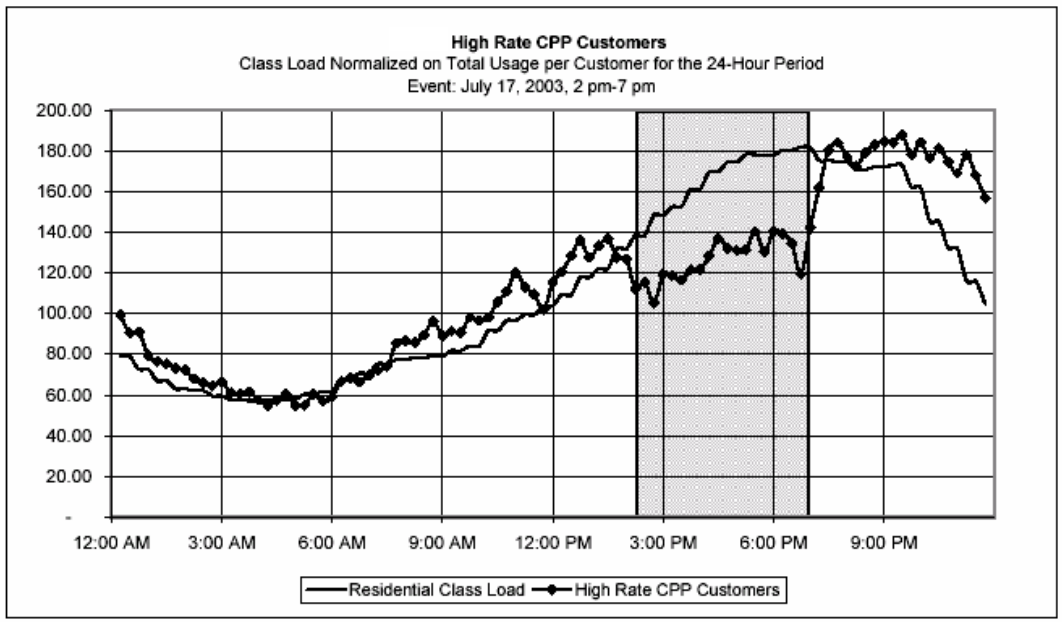
Recent pilot results

Critical peak pricing

- California Statewide Pricing Pilot; AmerenUE
- Average 13% peak demand reduction
- 90% of participants say the programs should be offered to other customers

Critical peak rebates

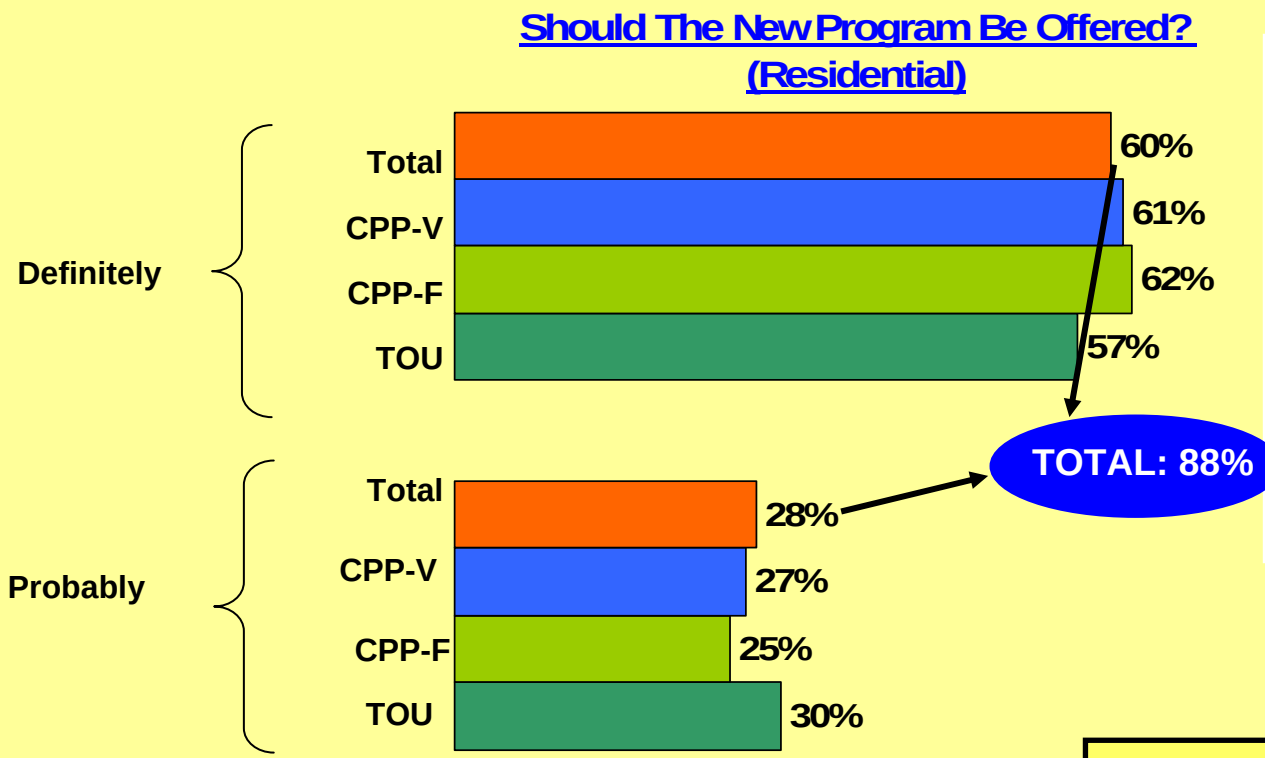
- Anaheim Public Utilities
- "Carrot" approach
- Reduction of 13%
- Over 60% volunteer rate



Do Customers Like Time-Based Pricing?

California survey

88% of participants say dynamic pricing should be offered to other customers



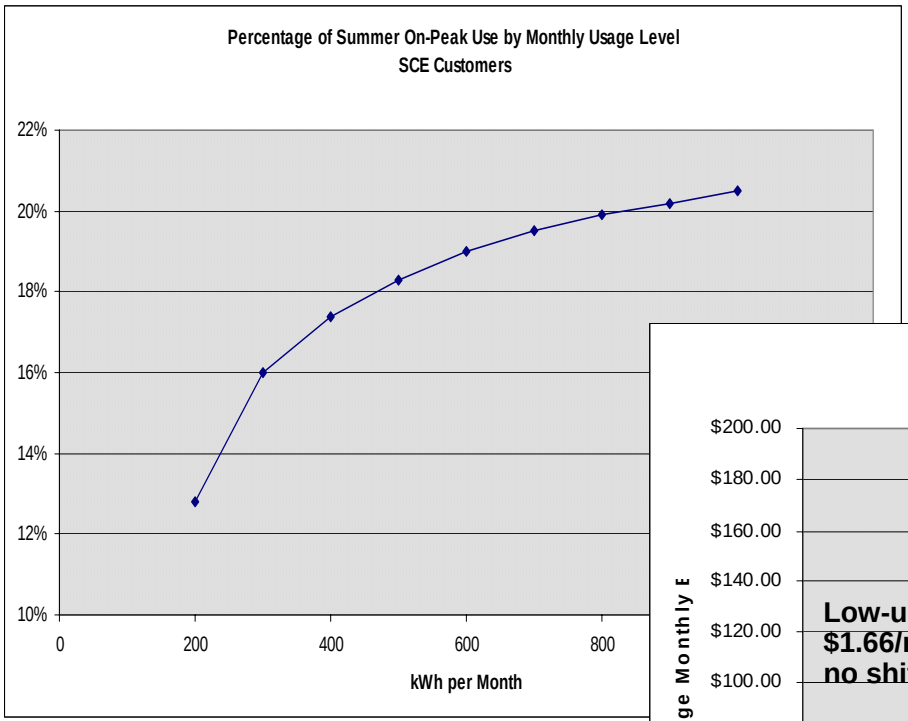
Why do you feel that way?

You save energy	19%
You save money	17%
It's good/we like it	15%
It makes people aware of energy conservation	13%
Everyone should have a chance to participate	12%
You can be in control/ manage your energy use	5%

Business customers have similar views with 55% of TOU and 69% of CPP-V customers saying the program should "definitely" be offered

Source: Momentum Research

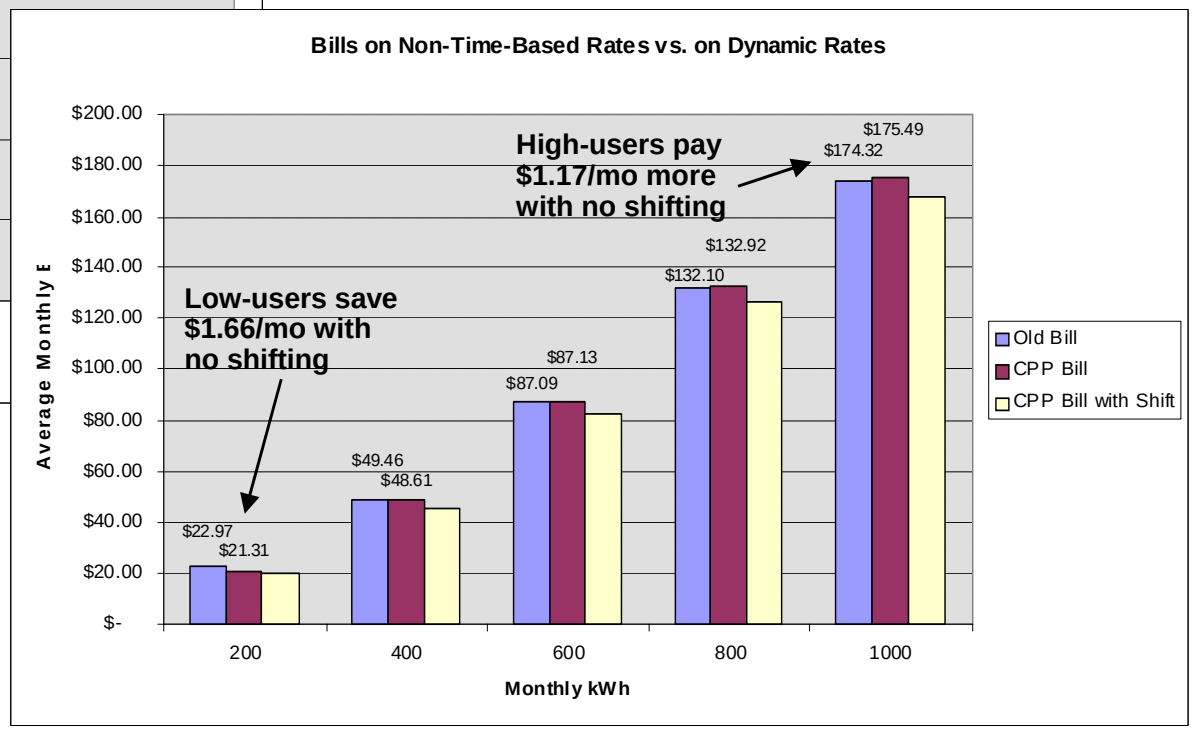
Can Low-Income Customers Benefit from Demand Response?



Source: TURN Testimony in SCE General Rate Case, August 2003

Use less on-peak to start with

More price elastic than high-income users



Sources: TURN Comments, 02-12-30 and PG&E CPP rates, Tariff 3A

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New Pilot Example: SmartPowerDC™

Pricing

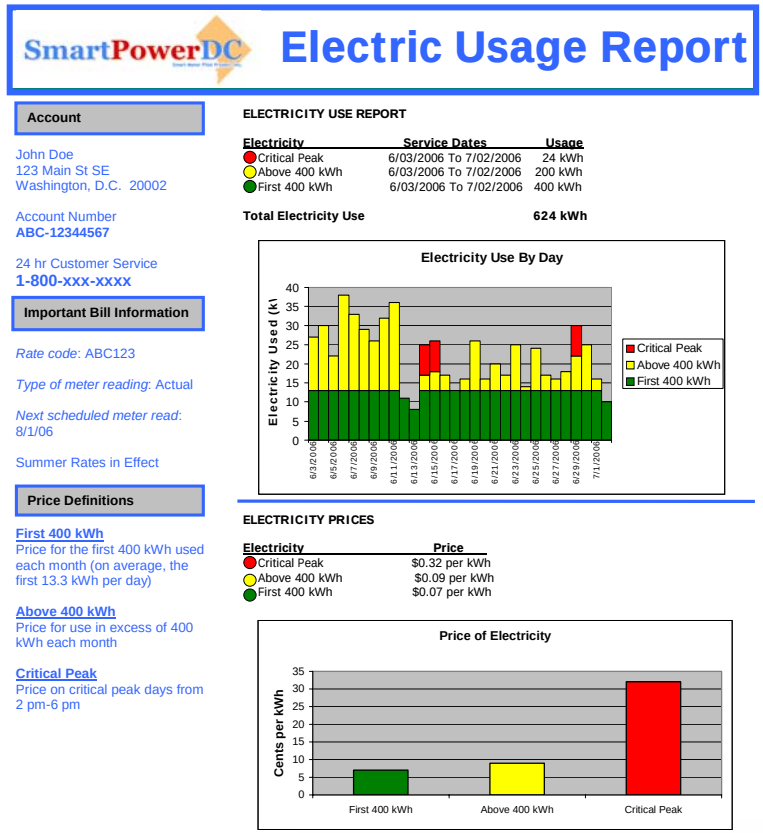
- Hourly pricing option
- Critical peak pricing
- Critical peak rebate

Feedback

- Monthly energy use summary in bill
- Monthly bill to date
- Current electricity price

Technologies

- Advanced meters
- Smart thermostats
- email
- Automated phone calls



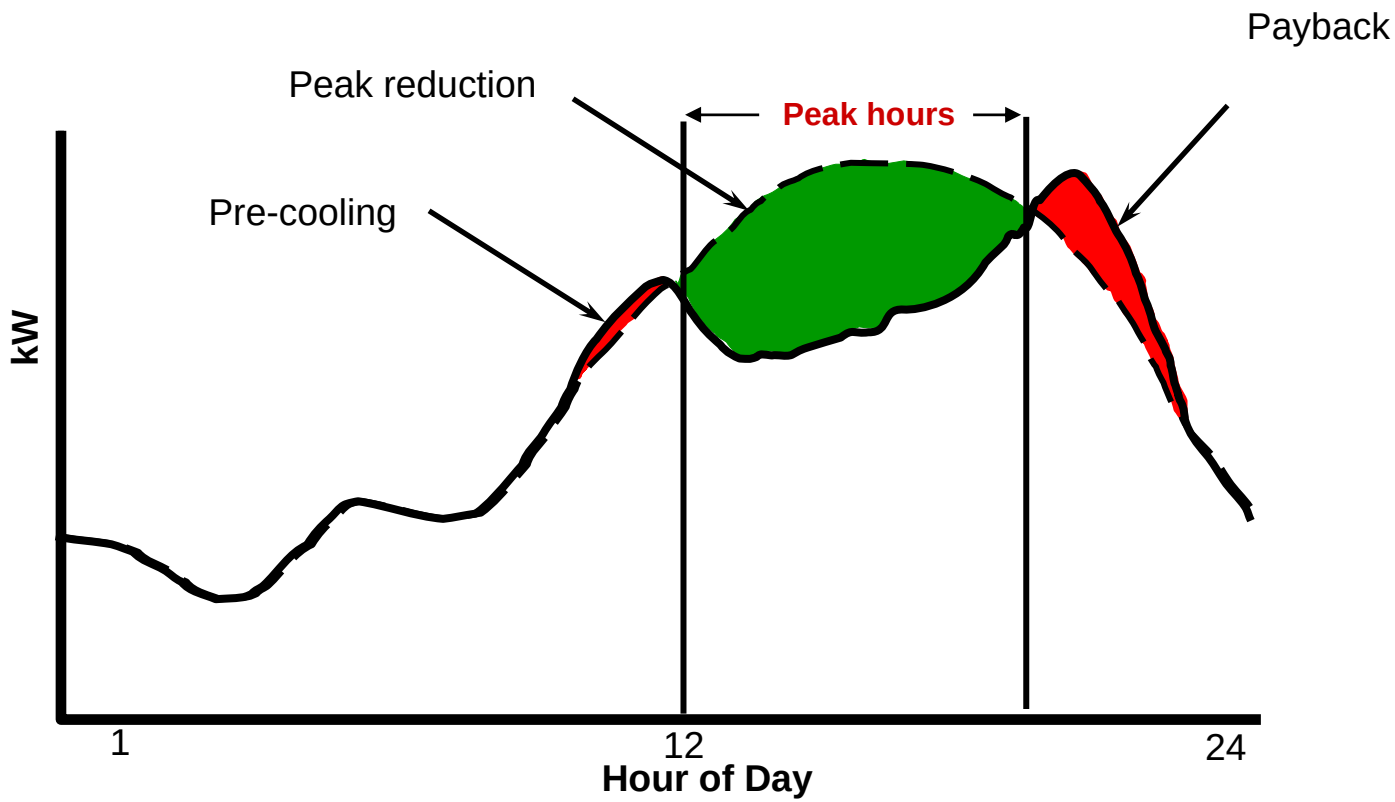
Does Demand Response Help the Environment?

Conservation effect of demand response

- Payback or pre-cooling occurs for some curtailed end uses, such as air conditioning
- No payback for other end uses, such as turning off lights

Literature results

- Range of estimates from 0 to 10 percent
- Average reported net conservation is **4 percent**

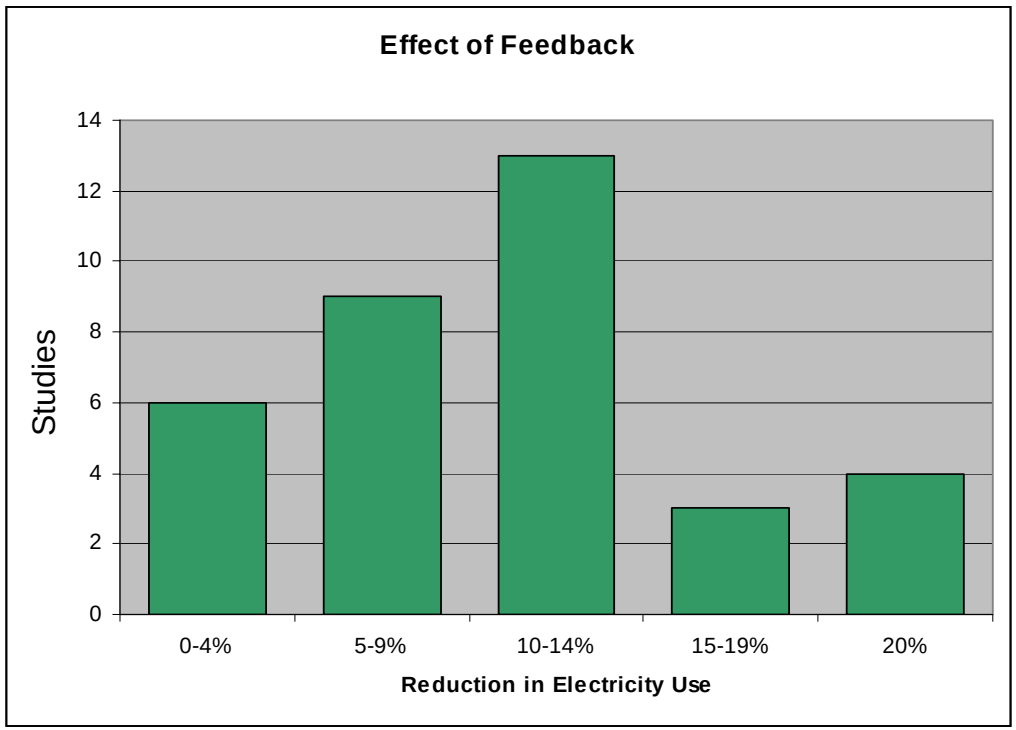


Does Information Feedback Reduce Consumption?

Literature results

- 38 pilot programs
- Tested more *frequent* data, more *detailed* data, or both
- Type varies from more data on monthly bill to real-time displays

Average reported conservation of 11 percent



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How about others: Texas

Context

- AMI legislation passed last year
- Provides cost recovery to utilities for “advanced metering” provided to mass market customers

Meters must:

- Be on a “meter information network”

PUC

- Current proceeding regarding details

California

Context

- State proceeding to develop state policies on advanced metering and demand response
- Working group process from June 2002 through today
- Functional requirements set in ruling in February 2004
- PG&E and SDG&E have submitted applications to deploy AMI to all customers
  - –PG&E to begin this year
  - –SDG&E to begin in 2008
- SCE is working on project to integrate additional functions into a meter beyond the minimum
  - –If targets are hit, SCE will roll out AMI beginning in 2009

California

Meters must:

- Support TOU, CPP, RTP (hourly), and flat rates
- Collect hourly data

System must:

- Be able to change frequency of data collection without changing hardware
- Be compatible with providing customers with detailed usage data and other functions
- Be compatible with utility operations applications
- Be capable of interfacing to load control

PUC

- Approved PG&E application July 20, 2006
  - Includes requirement that PG&E's vendor license the AMI meter interface to other vendors
- Reviewing SDG&E application for decision February 2007

Victoria (Australia)

Context

- Mandate to deploy advanced meters to all customers over the next six to eight years

Meters must:

- Record usage at least half hourly
  - Because Australian wholesale market is half-hourly, unlike U.S. markets, which are hourly
- Be equipped with communications to enable remote retrieval at any time

ESB

- Current proceeding regarding details

Ontario (Canada)

Context

- Mandate to deploy advanced meters to all customers by end of 2010
- Requirements specification issued by Ministry of Energy (very detailed)
- All customers to go on time-of-use rates with ability to switch retailers

Meters must:

- Be capable of delivering hourly meter reads to the system head end and MDM system
  - "Capable" means being able to do so "without requiring a physical field visit"
- Provide outage and restoration flags

Energy Ministry and OEB

- Defining centralized "Smart Meter Entity" to perform meter data management

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Conclusion/Summary

- What does Section 1252 require regarding demand response and advanced metering?
  - Conduct state investigation of AMI business case
- What is an advanced meter, and do advanced meters differ between residential and commercial customers?
  - Records data hourly and retrieves it daily; meters support similar time-based pricing, but are more costly and offer complex functions for large commercial customers
- What technology standards are needed?
  - Encouragement, not mandates; focus on system-level interface first
- How can technology obsolescence be avoided?
  - Have a flexible IT structure with flexible Meter Data Management
- What are the main costs and benefits in the advanced metering business case?
  - Costs: capital and operating; benefits: utility operations and demand response
- Do demand response and advanced metering investments make sense in regulated and unregulated markets, especially when prices are rising?
  - Demand response helps all electricity markets, regulated or deregulated
- Do customers respond to time-of-use prices, critical peak prices, and critical peak rebates, and how do customers like these options?
  - Yes, customers consistently reduce peak loads and consistently like the programs
- Does demand response benefit the environment?
  - It reduces the need for peaker plants and has a small positive benefit in encouraging consumption reductions
- What are various utilities, states, and others doing?
  - EPACT proceedings; developing/implementing advanced metering, demand response policies

Questions?

Thank you for participating!

Contacts

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Additional information

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