

Residential Electricity Pricing Pilots

**Reducing Peak Demand with a Bonus:
Lower Greenhouse Gases**

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ESC Experience Examples

- **Anaheim Public Utilities** - Implemented turn-key Spare the Power Days critical peak rebate program
- **PG&E** - Implemented smart meters for PG&E's customers above 200 kW representing \$3B annual revenue
- **California Large IOUs** - Data management for the California Statewide Pricing Pilot
- **SmartPowerDC** – Project design, implementation and operation for Washington D.C. smart meter/thermostat pilot
- **Ontario Smart Price** – Project design, implementation, and operation for time-of-use and critical peak pricing pilot

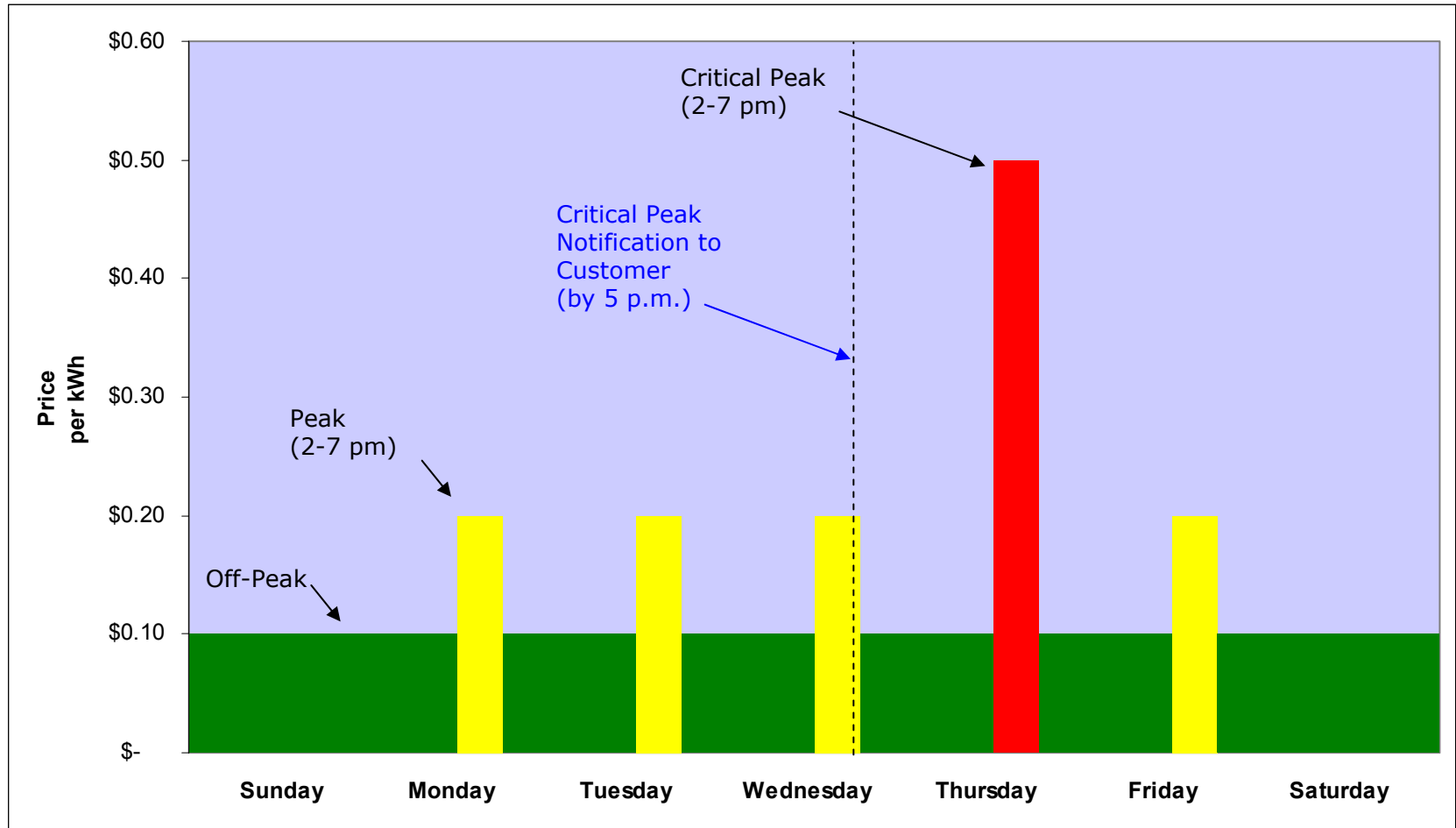


Topline View

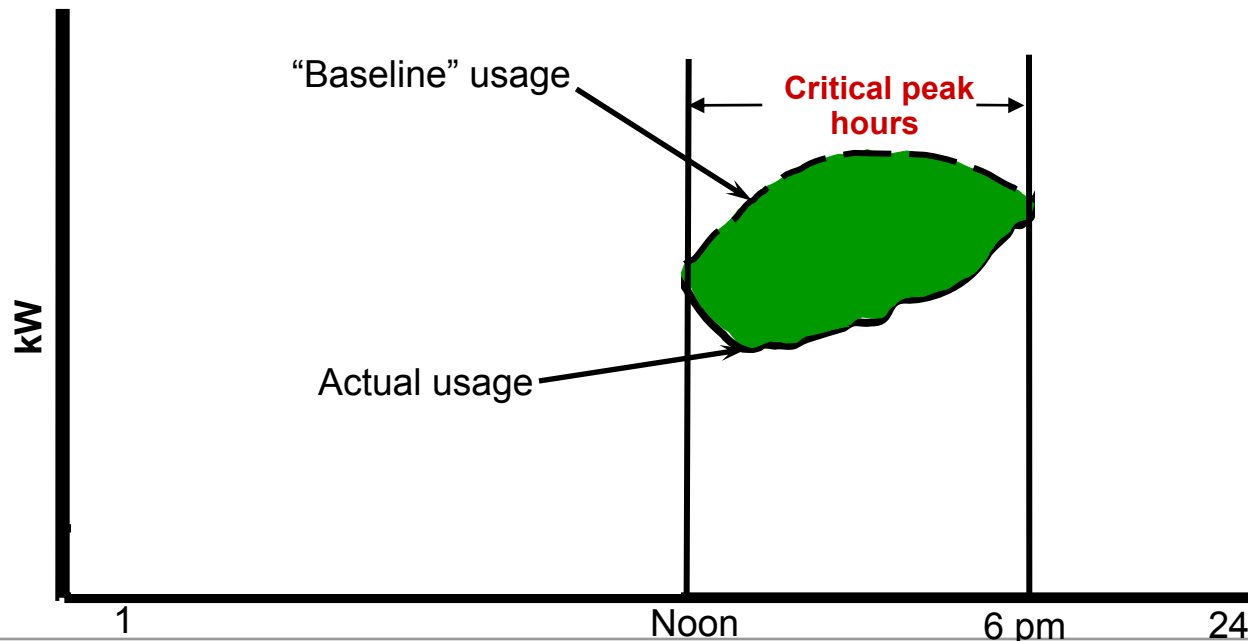
- Consumers respond to electricity price information
 - Over 30 years of pilots and programs
 - Rule of thumb: reduce peak demand 10-20%
- Consumers respond to electricity usage feedback
 - Pilots range from better monthly data to real-time updates
 - Average conservation effect of 11%
 - Reduction in total consumption
- Information and control work together
 - Most prevalent and most effective: smart thermostat
 - Peak demand reductions doubled via automation
- Conclusions:
 - Price and use information plus control = consumer empowerment
 - Demand response plus conservation = average residential annual bill savings of \$72

California Statewide Pricing Pilot - 2004

- This example combines time-of-use and critical peak

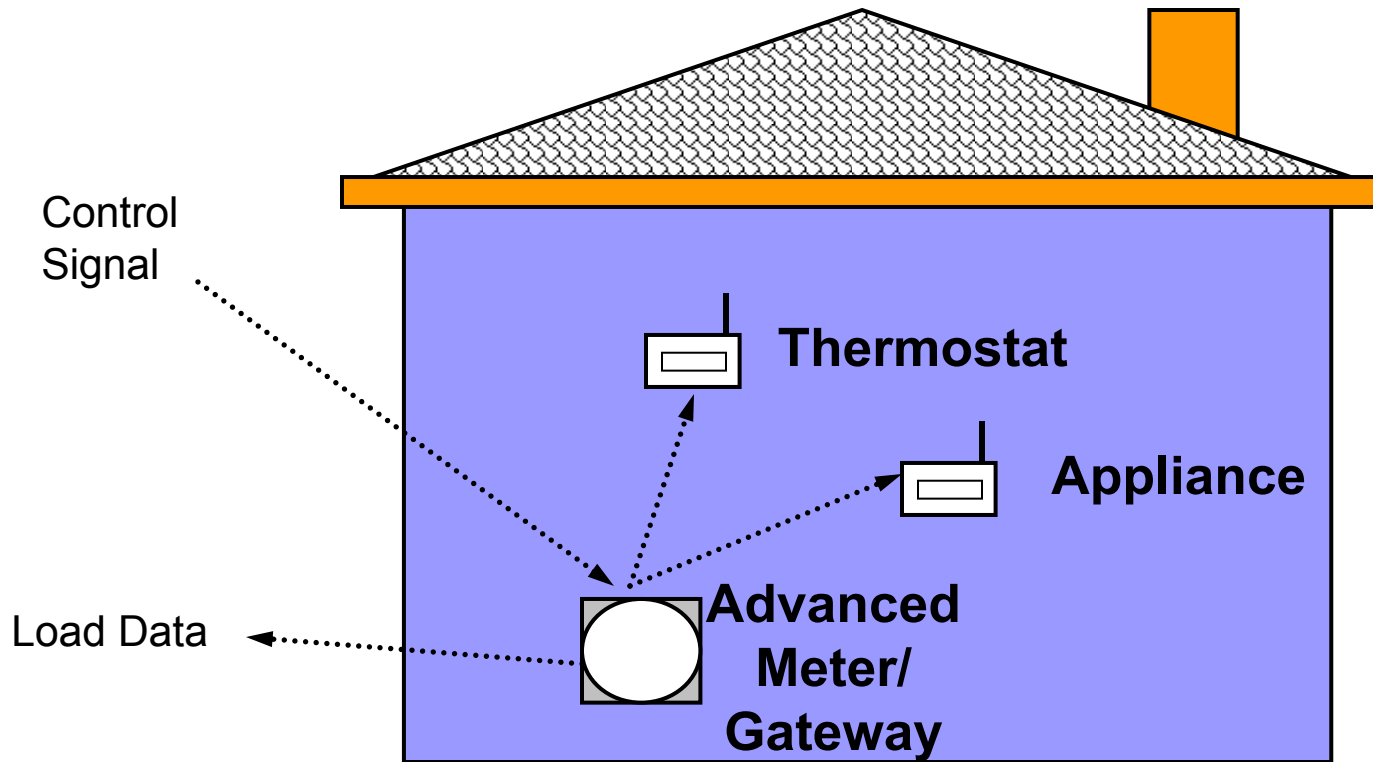


- Critical Peak Rebate/Peak Time Rebate
- Consumer-friendly rebate approach to critical peak pricing
 - Dispatched same as CPP
 - Leave customer on current rate
 - Pay customer 35 cents per kWh for reductions during critical peak hours
 - kWh reduced = "baseline" kWh - actual; baseline calculated on non-event days
- *No incentive payment for pilot participation*



Gulf Power Automated CPP - ongoing

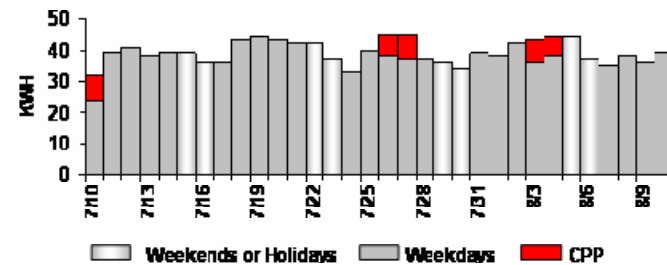
- Control during critical peak hours
 - Raise temperature setting
 - Consumer override



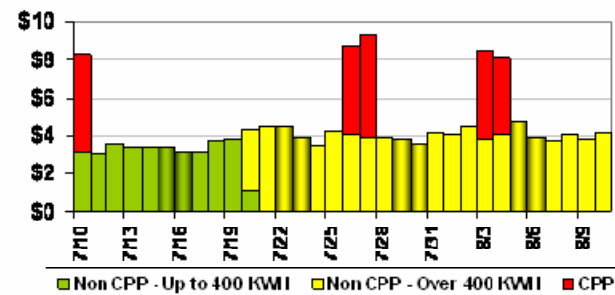
- Comparative price plans
 - Inverted tier plus CPP
 - Inverted tier plus CPR
 - Hourly pricing
- Messaging highlights
 - Smart thermostat
 - Efficiency education
 - Monthly statements
- Notable firsts
 - Side-by-side comparison of CPP, CPR, HP
 - Bill and use to date messaging on thermostats
 - Show inverted tier price effects clearly



Daily Electricity Usage



Daily Electric Spending

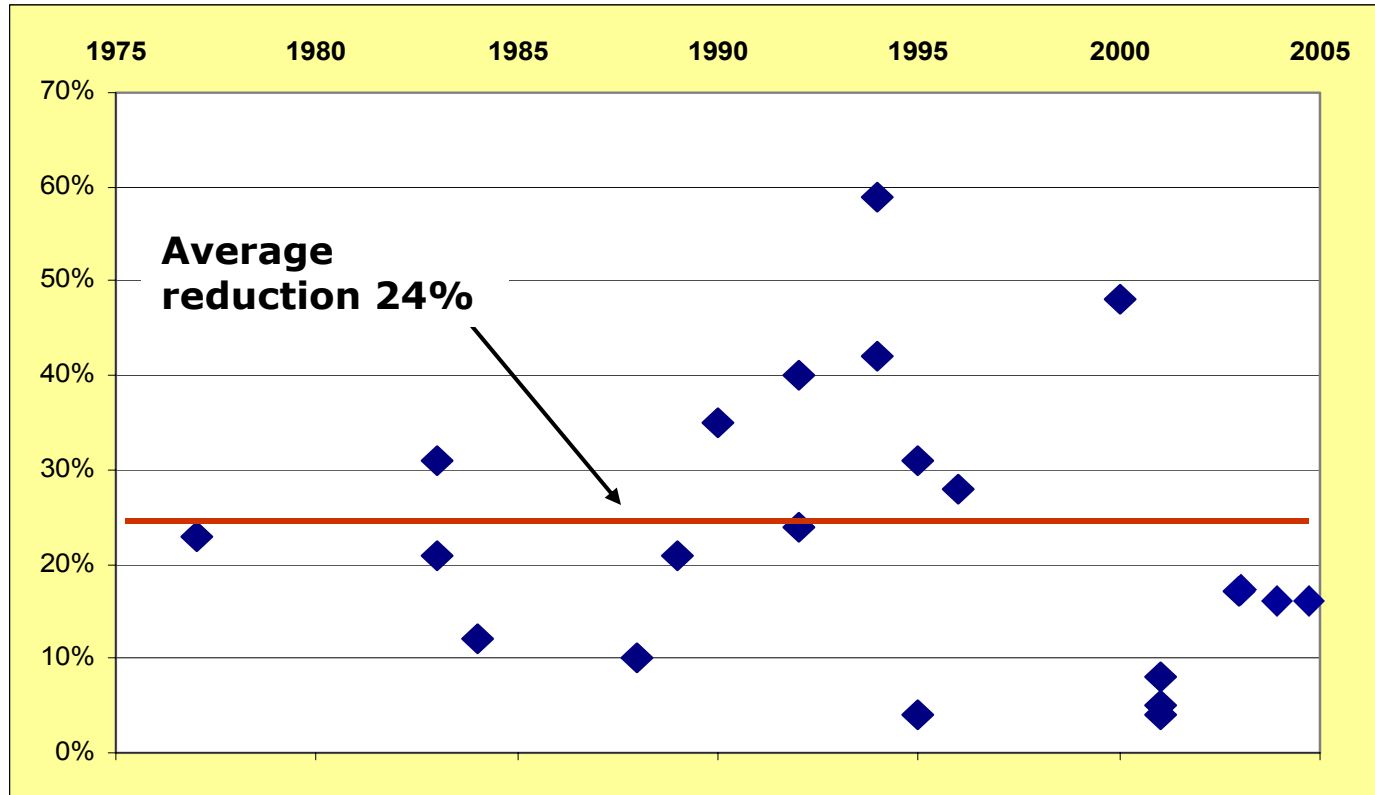


Residential Electricity Pricing Pilots

Results

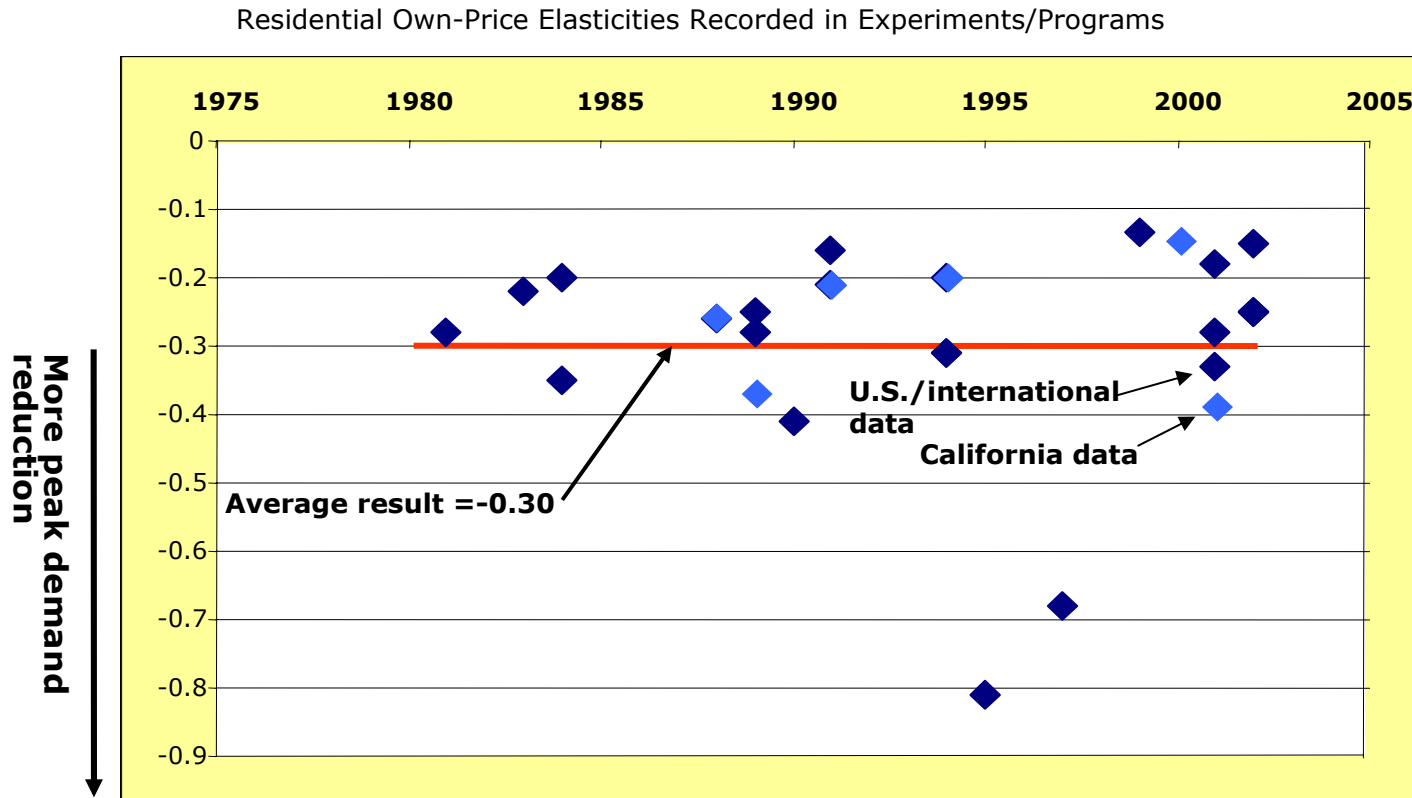
Peak Demand Reductions

- Results of 32 pilots and programs



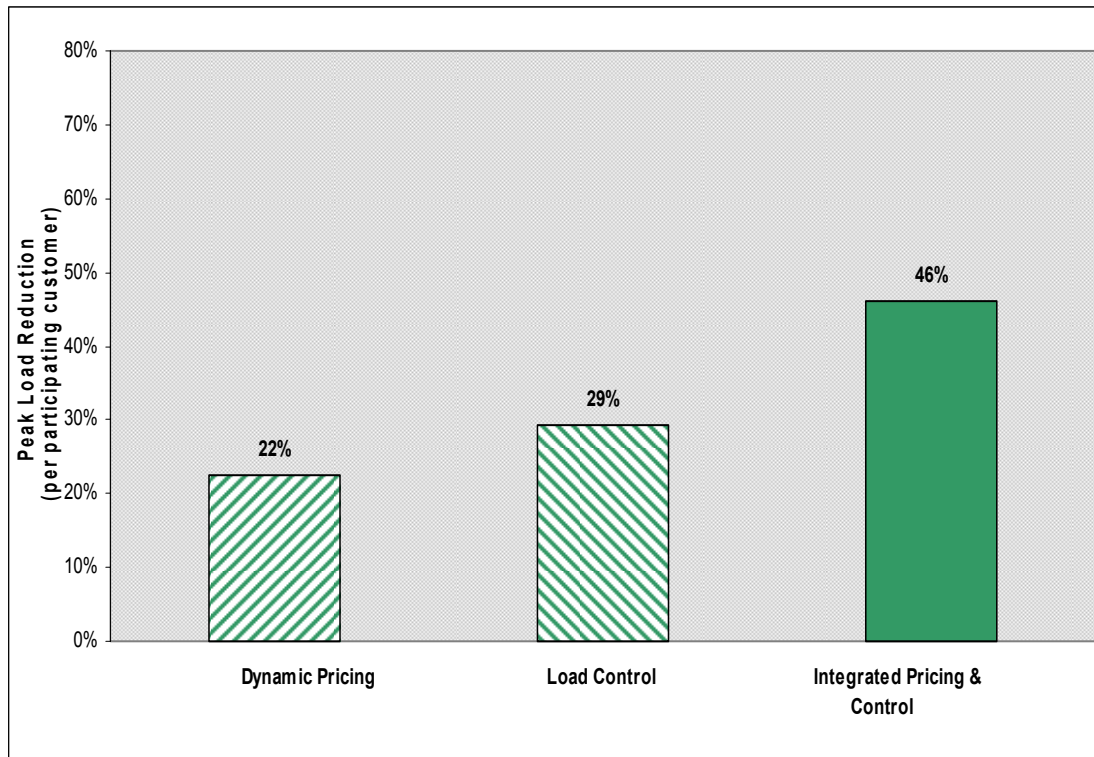
Pricing Results – Price Elasticity

- Results of 56 pilots and programs



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

- Results of 24 programs
- Strong customer preference for automated response
- Synergy doubles the response



Feedback Results - Conservation

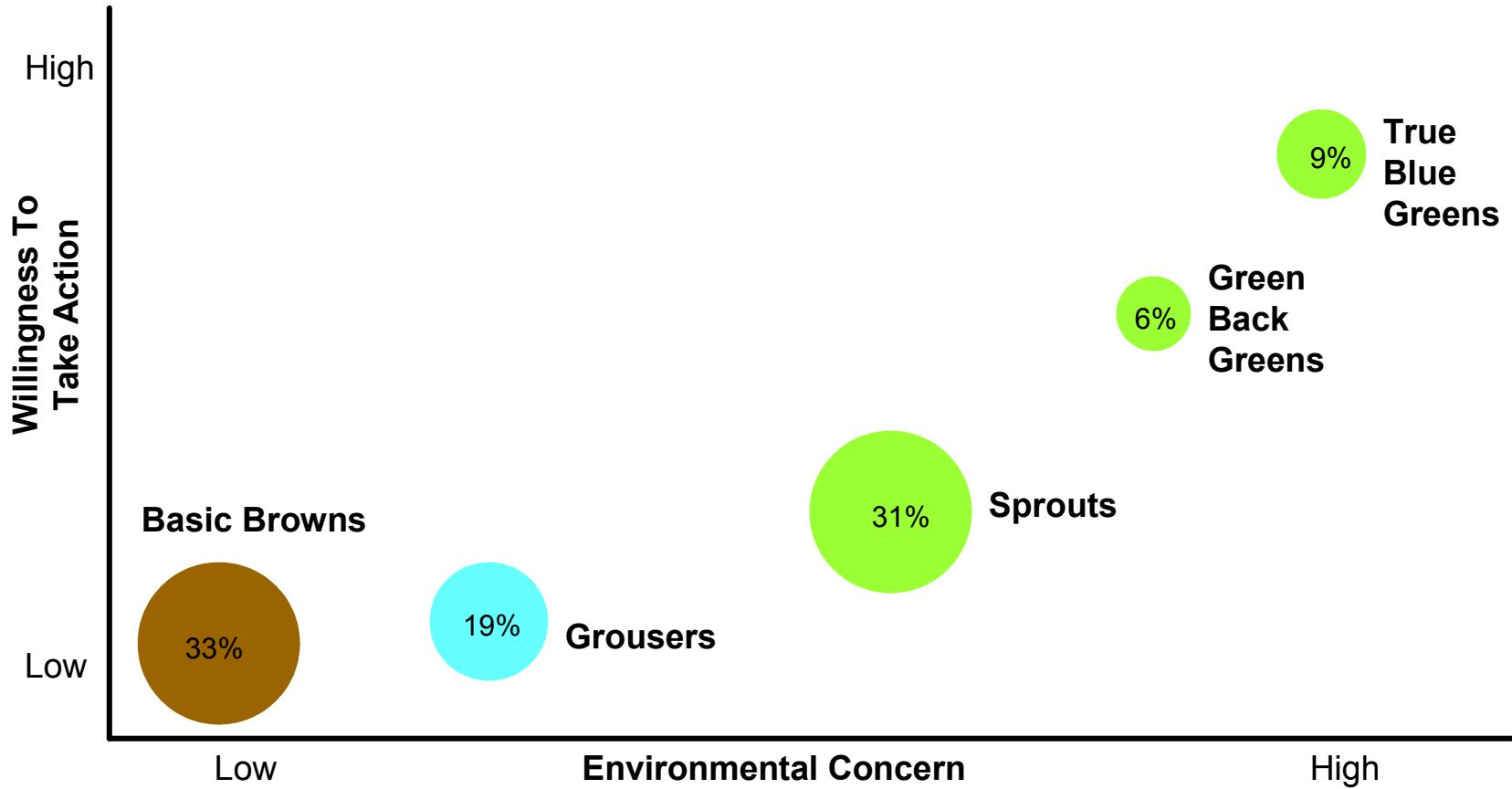
- Energy conservation
- Two mechanisms
 - Appliance efficiency
 - Consumer behavior
 - Information
 - Control
- Varying methods
 - Improved monthly bills
 - Energy usage reports
 - Real-time displays and monitors

Conservation Effects Shown in Feedback Studies

Energy Use Reduction	Number of Studies
20%	3
15-19%	2
10-14%	13
5-9%	8
<u>0-4%</u>	<u>5</u>
TOTAL	31
AVERAGE REDUCTION	11%

Source: King and Delurey, Public Utilities Fortnightly, March 2005

- Rich diversity of attitudes and willingness to act



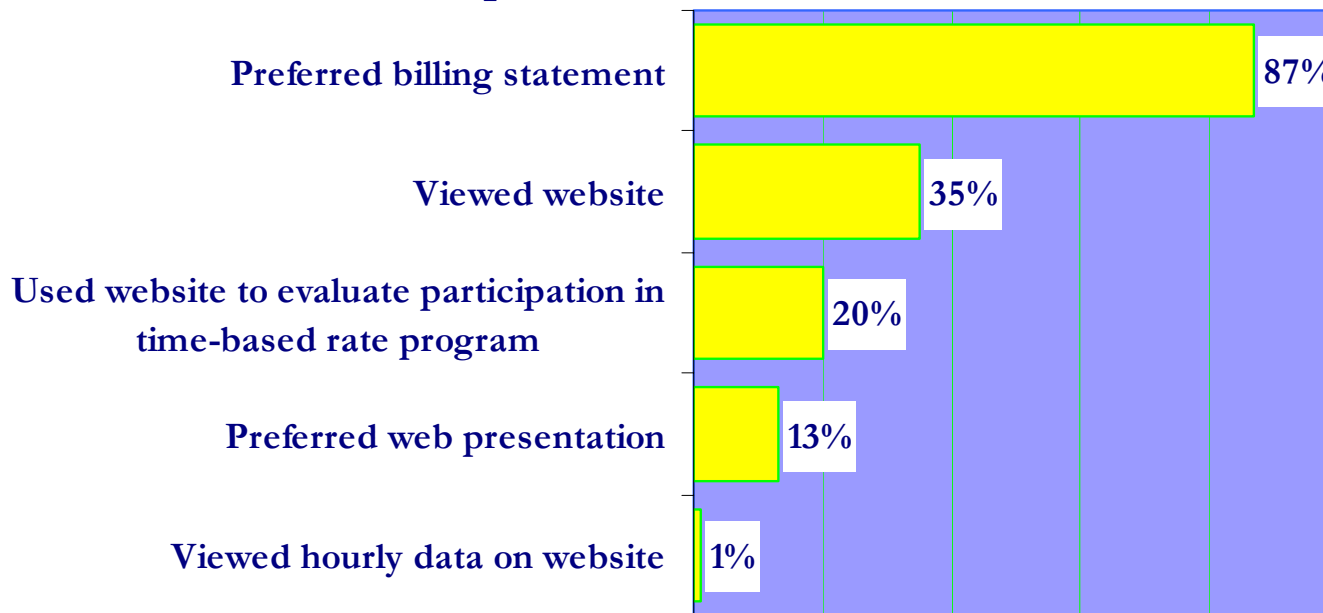
Source: Roper ASW. "Green Gauge Report"

Consumers' Preferred Data Source

Customers often don't use web presentation of data.

Idaho Power Company offered customers the option of accessing their monthly, daily, and hourly usage on the web. Most preferred to receive the information in their bill.



Idaho Power Web Presentation Experience Reported December 2005



Source: UtiliPoint, Inc.

Pricing Reminders

- Consumers like refrigerator magnets
- Complex is ok
- Completeness is essential

ONTARIO SMART PRICE PILOT / PROJET PILOTE DE PRIX INTELLIGENT
 CRITICAL PEAK REBATE PERIODS AND RATES / PÉRIODES D'UTILISATION ET PRIX

Day of the Week Jours de la semaine	Time Heures	Period Périodes d'utilisation	Price/Prix* (¢/kWh)
Weekends & Holidays Fins de semaine et fériés	All Day / Toute la journée	Off-peak / Période creuse	3.1 ¢
Summer Weekdays (May 1 st - Oct 31 st)	7 am to 11 am / 7 h à 11 h	Mid-peak / Période moyenne	7.5 ¢
	11 am to 5 pm / 11 h à 17 h	On-peak / Période de pointe	10.5 ¢
Jours de semaine l'été (du 1 ^{er} mai au 31 octobre)	5 pm to 10 pm / 17 h à 22 h	Mid-peak / Période moyenne	7.5 ¢
	10 pm to 7 am / 22 h à 7 h	Off-peak / Période creuse	3.1 ¢
	Upon notification / Sur la notification	Critical peak / Pointe critique	30.0 ¢ <small>per kWh reduced / réduit</small>
Winter Weekdays (Nov 1 st - Apr 30 th)	7 am to 11 am / 7 h à 11 h	On-peak / Période de pointe	10.5 ¢
	11 am to 5 pm / 11 h à 17 h	Mid-peak / Période moyenne	7.5 ¢
Jours de semaine l'hiver (du 1 ^{er} novembre au 30 avril)	5 pm to 8 pm / 17 h à 20 h	On-peak / Période de pointe	10.5 ¢
	8 pm to 10 pm / 20 h à 22 h	Mid-peak / Période moyenne	7.5 ¢
	10 pm to 7 am / 22 h à 7 h	Off-peak / Période creuse	3.1 ¢
	Upon notification / Sur la notification	Critical peak / Pointe critique	30.0 ¢ <small>per kWh reduced / réduit</small>

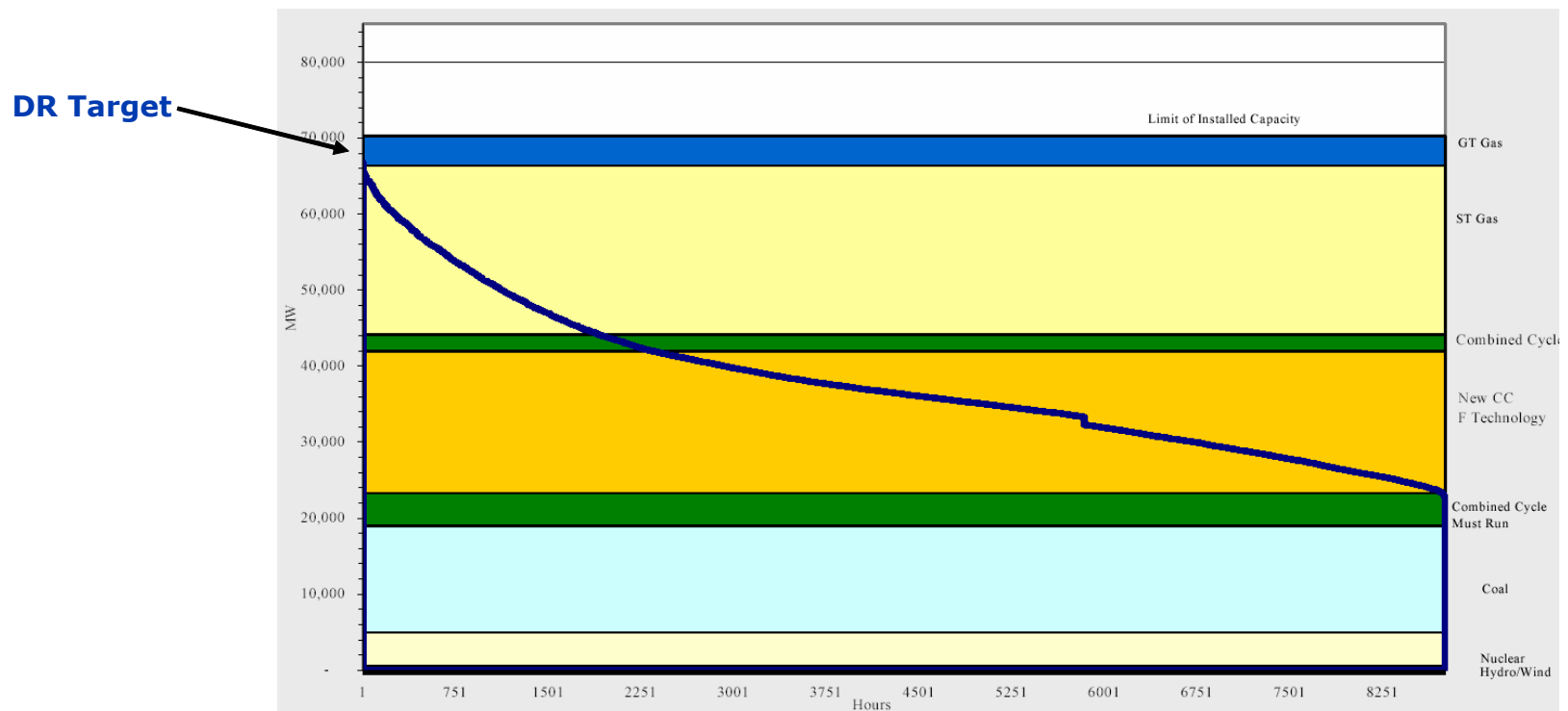
* Critical peak occurs for 3 or 4 hours during the on-peak period, on critical peak days only. The maximum number of such days in the pilot will be 9.
 * Le pointe critique arrive pour 3 ou 4 heures pendant le sur les heures de pointe, sur les jours de pointe critiques seulement. Le nombre maximum de tels jours dans le pilote sera 9.

Effective August 2005
 Efficace le 2006 août

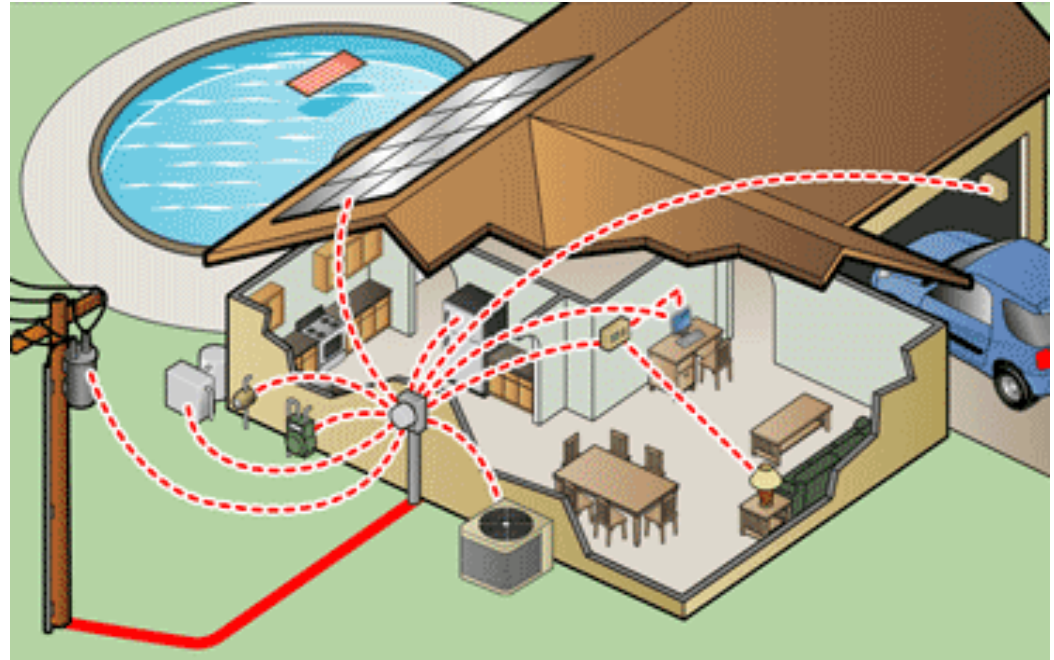
- Demand response savings
 - 20% reduction during 90 critical peak hours per year
 - \$45 per kW-year capacity cost
 - 2 kW average peak demand
 - Savings: \$18 per year
- Conservation savings
 - 5% year-round average reduction
 - Average monthly bill of \$90
 - Savings: \$54 per year

- Effect is highly dependent on resource mix
- Emissions generally higher during critical peak hours
- The real solution is conservation

ERCOT Load Duration Curve and Dispatch Order



- Wireless or power line carrier
- Meter to premise data
 - Usage data
 - Price data
 - Control signals
 - Alerts
- Other possible functions
 - Home automation
 - Appliance control
 - Security monitoring
 - Etc.



Source: SCE

Policy Implications

- Integrated DR and EE for all
 - Reduced consumption
 - Lower peak demand
 - Higher reliability
- Infrastructure needs
 - Information
 - Energy use
 - Energy price
 - Control
 - Automation
- Solutions
 - EE and DR programs, including price signals
 - Advanced metering
 - Automation networks
 - Advanced energy information

"Synergy – the bonus that is achieved when things work together harmoniously."– Mark Twain