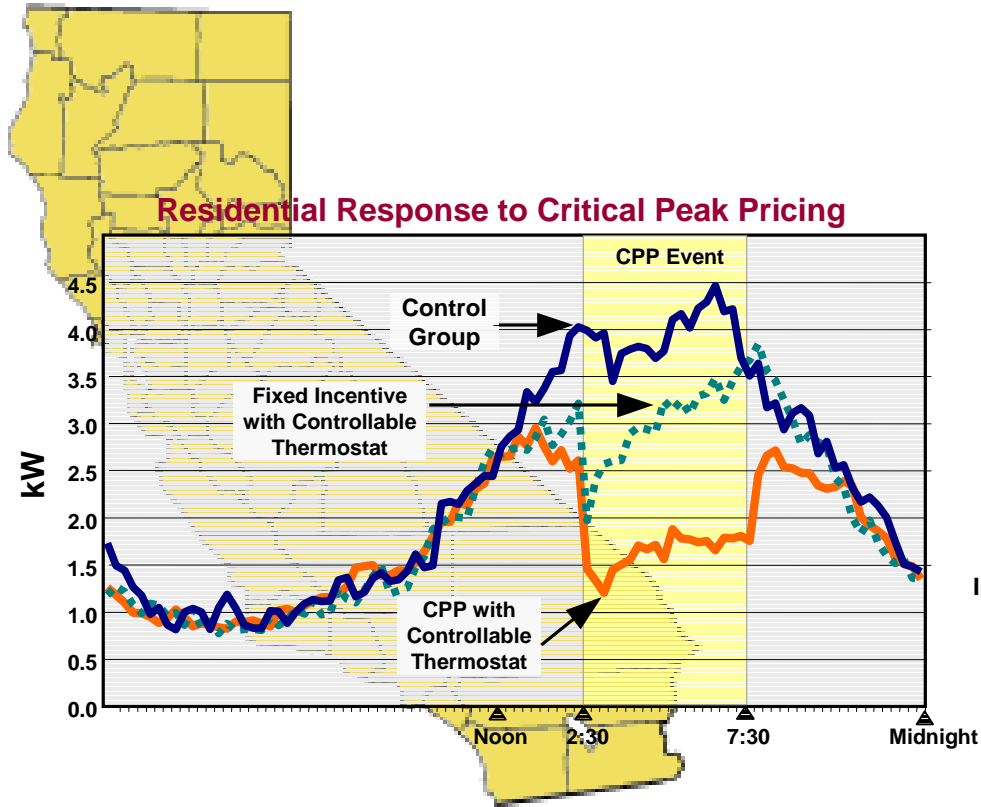


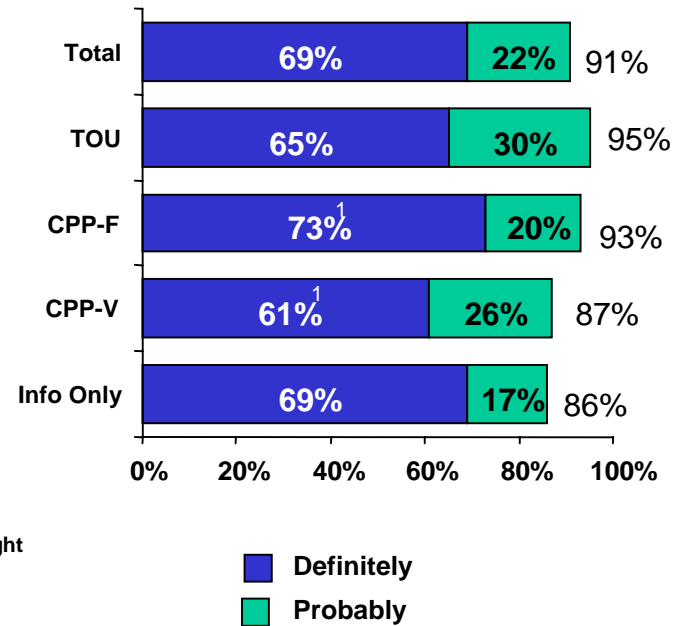
California Statewide Pricing Pilot (SPP)

Overview and Results

2003-2004



Should dynamic rates be offered to all customers?



SPP Conclusions

System Wide Impacts

Residential CPP rates can, within five years of deployment reduce California's peak load by 1,500 to over 3,000 MW.

Conservation and Peak Load Impacts

Dynamic rates encourage greater conservation and peak demand impacts than conventional inverted tier or time-of-use rates.

Customer Acceptance

Residential and small to medium commercial and industrial customers understand and overwhelmingly prefer dynamic rates to existing inverted tier rates.



SPP Background / Design

Pricing Pilot - Objectives

- 1. Estimate usage (kWh) and demand (kW) impacts from different time-differentiated rate forms.**
- 2. Estimate price elasticities and develop econometric models to examine the effects of weather, customer usage and a other customer characteristics.**
- 3. Estimate customer preference for dynamic and current rate forms.**



Significant Design Features

- 1. Approximately 2,500 participating customers.**
- 2. CPUC, CEC and CPA cooperative regulatory proceeding.**
- 3. SCE, PG&E and SDG&E cooperative joint-venture pilot.**
 - Revenue neutral rate designs.**
 - CPP-V participants linked to existing thermostat pilots mandated under SB970.**
- 4. Cost – approximately \$20 million.**



SPP Background / Design

Statewide Pricing Pilot (SPP) Research Projects

Projects	Objectives	Authors
Customer Demand Elasticity's	Econometrically measure customer price elasticity and model customer response to critical peak pricing.	Charles River Associates
Customer Load Impacts	Measure customer load impacts in response to critical peak pricing.	California Energy Commission
Market Research Participant Response	Establish pilot participant demographic and behavioral response to pricing options.	Momentum Market Intelligence
Market Research Statewide Preferences	Establish customer demographic, knowledge and pricing preferences statewide.	Momentum Market Intelligence
Technology Impacts ADRS Pilot	Measure full automation impacts on customer response to critical peak pricing.	<ul style="list-style-type: none"> •Invensys •Rocky Mountain Institute •Boice Dunham Group
Information Impacts ORB Pilot	Determine the impact of information display options on customer response to critical peak pricing.	<ul style="list-style-type: none"> •Nexus •Primen

Rate Forms

Inverted Tier

- ❑ Existing Rate
- ❑ Rate increases in stages based on monthly usage.

Time of Use (TOU)

- ❑ Experimental Rate – applicable statewide
- ❑ Seasonal, different rate for fixed on-peak and off-peak time periods.

Critical Peak Fixed (CPP-F)

- ❑ Experimental Rate – applicable statewide
- ❑ Time-of-use rate with an additional ‘critical peak’ price that can be dispatched during the peak-period for up to 15 times each year, with day ahead notice.

Critical Peak Variable (CPP-V)

- ❑ Experimental Rate – applicable target population only
- ❑ A Critical Peak Fixed rate with a critical peak price that can be dispatched during the peak-period for 2-5 hours, with 4 hour advance notice.

Note: TOU, CPP-F and CPP-V layered on top of existing Inverted Tier rates.

SPP Background / Design

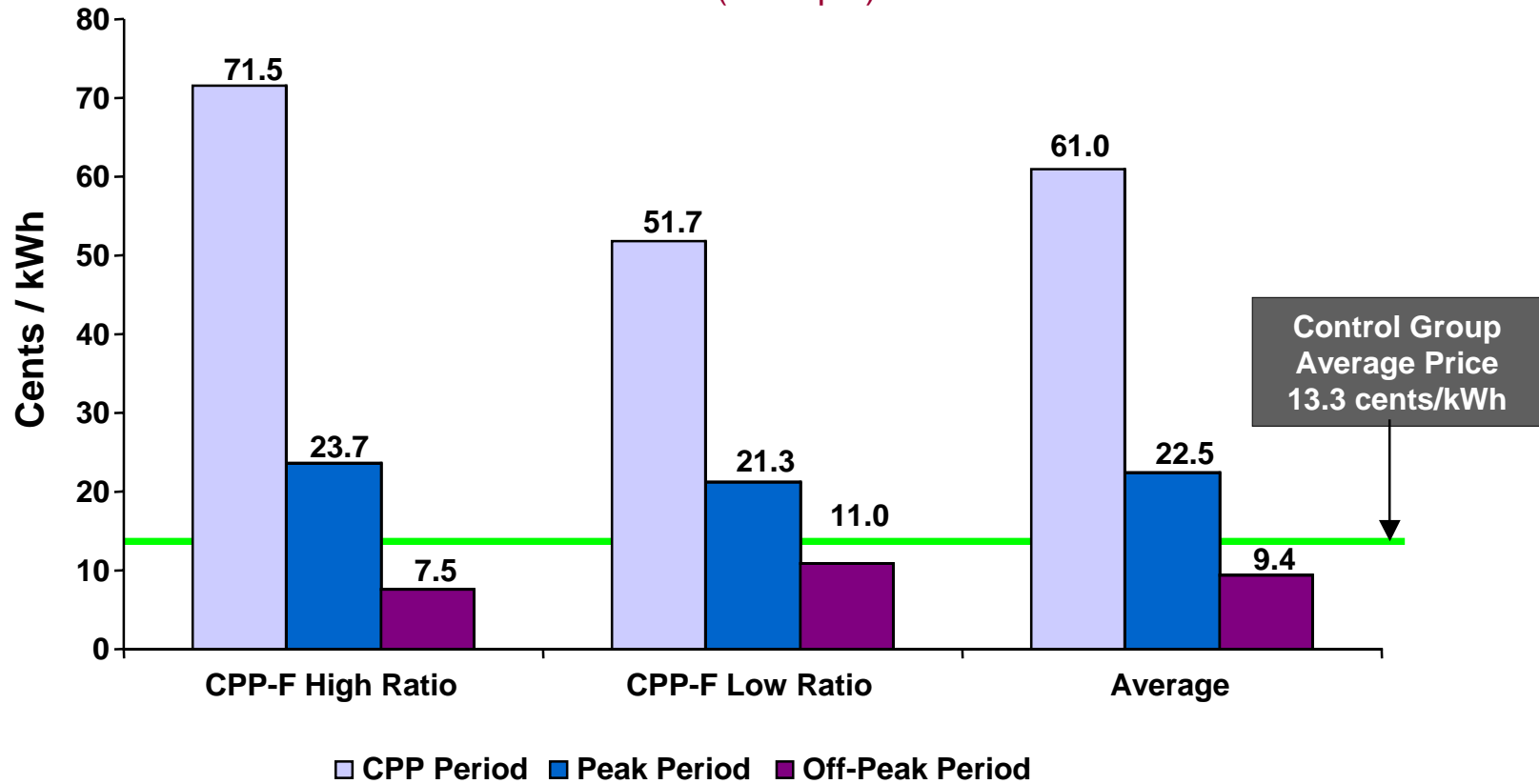
Experimental Design

	Control	CPP-F	CPP-F Info Only	CPP-V SDGE	Info Only	TOU	Total Participants
Track A - Random Sampling with Opt Out Design							
Residential	470	542	0	125	126	200	1463
Commercial < 20kW	88	0	0	58	0	50	196
Commercial > 20kW < 200kW	88	0	0	80	0	50	218
Track B - San Francisco Cooperative							
Residential (PGE)	0	64	126	0	63	0	253
Track C - AB 970 Sub-Sample							
Residential	20	0	0	125	0	0	145
Commercial < 20kW	42	0	0	56	0	0	98
Commercial >20kW < 200kW	42	0	0	76	0	0	118
TOTAL PARTICIPANTS	750	606	126	520	189	300	2,491

Source: Statewide Pricing Pilot, Summer 2003 Impact Analysis, Charles River Associates, August 9, 2004.

SPP Background / Design

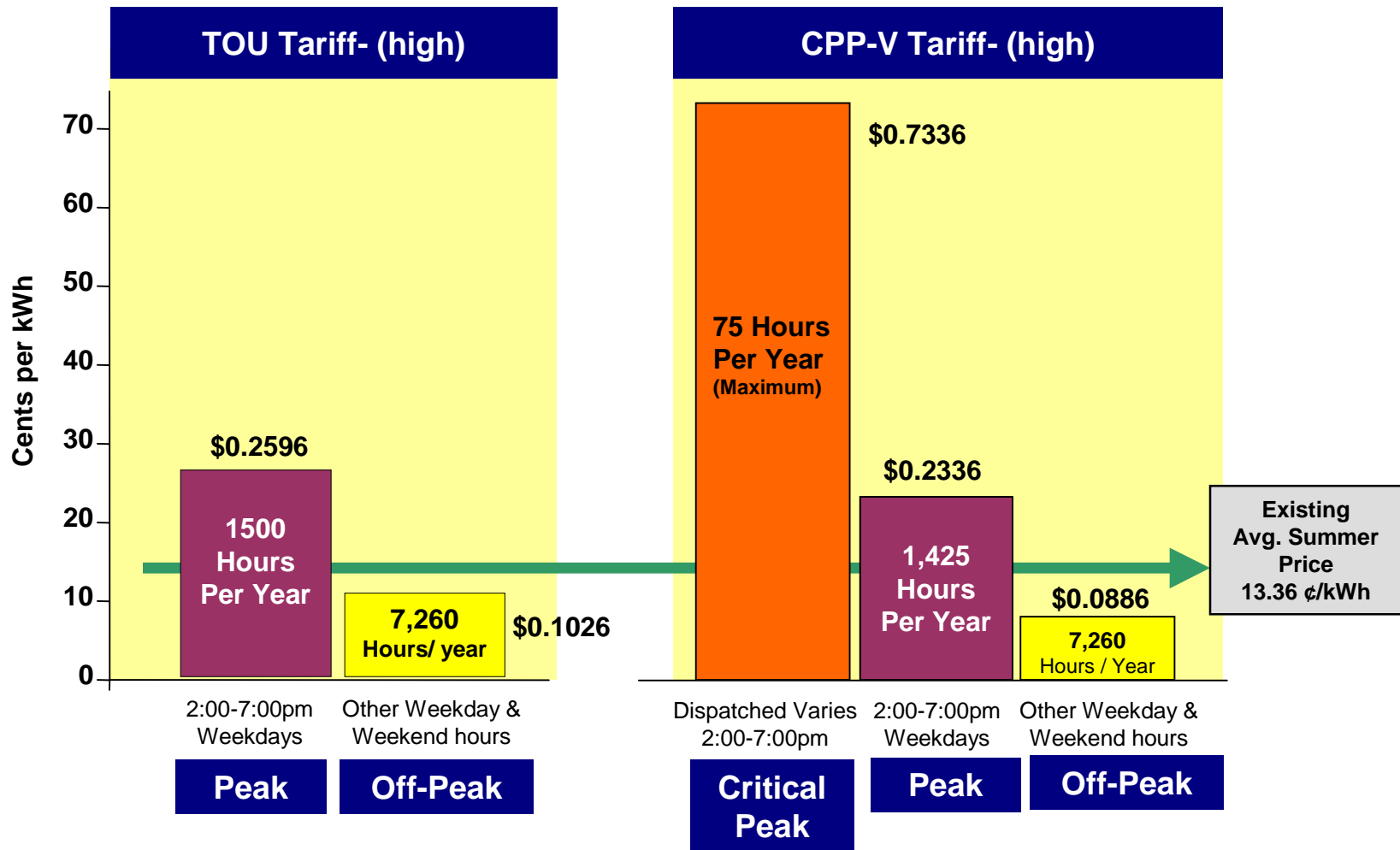
Residential CPP-F Rate Design (Example)



Source: SPP Summer 2003 Update Analysis, Charles River Associates, June 9, 2004.

SPP Background / Design

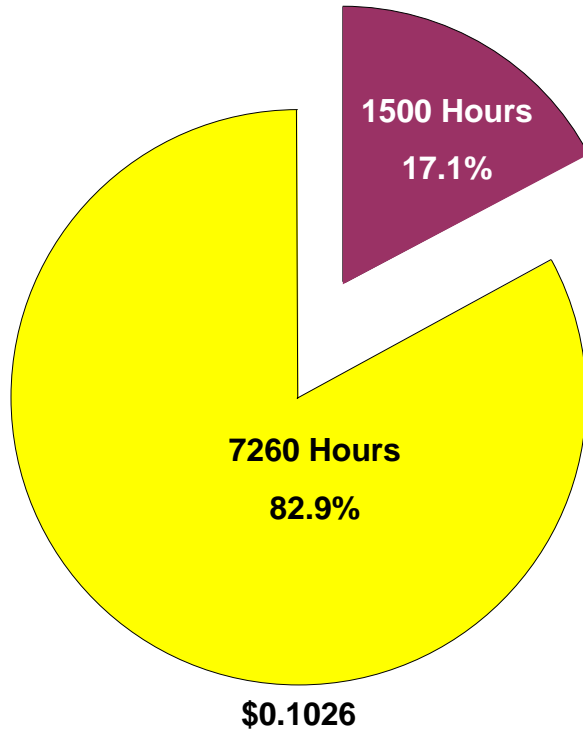
SPP Residential Rate Forms (Example TOU & CPP High Options)



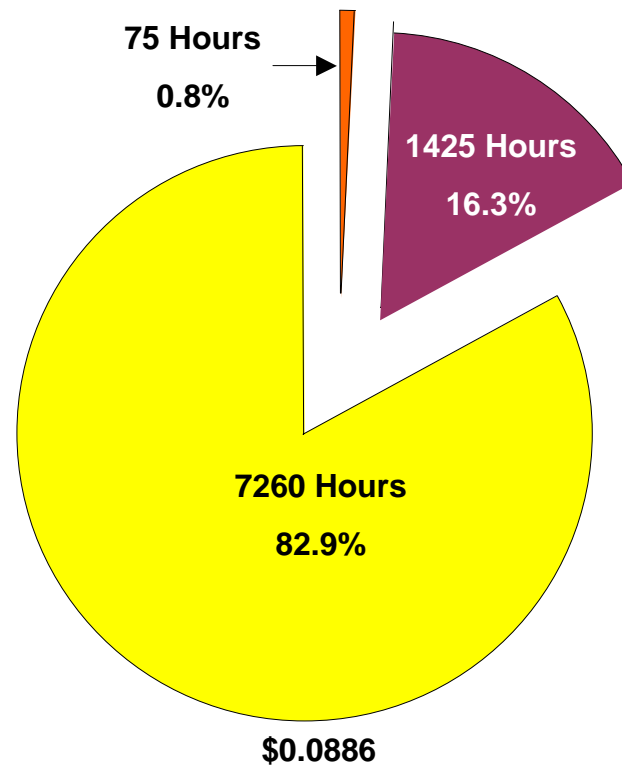
SPP Background / Design

SPP Residential Rate Forms

Time-of-Use (TOU)
Hours per Year (%)



Critical Peak Pricing (CPP)
Hours per Year (%)



SPP Background / Design

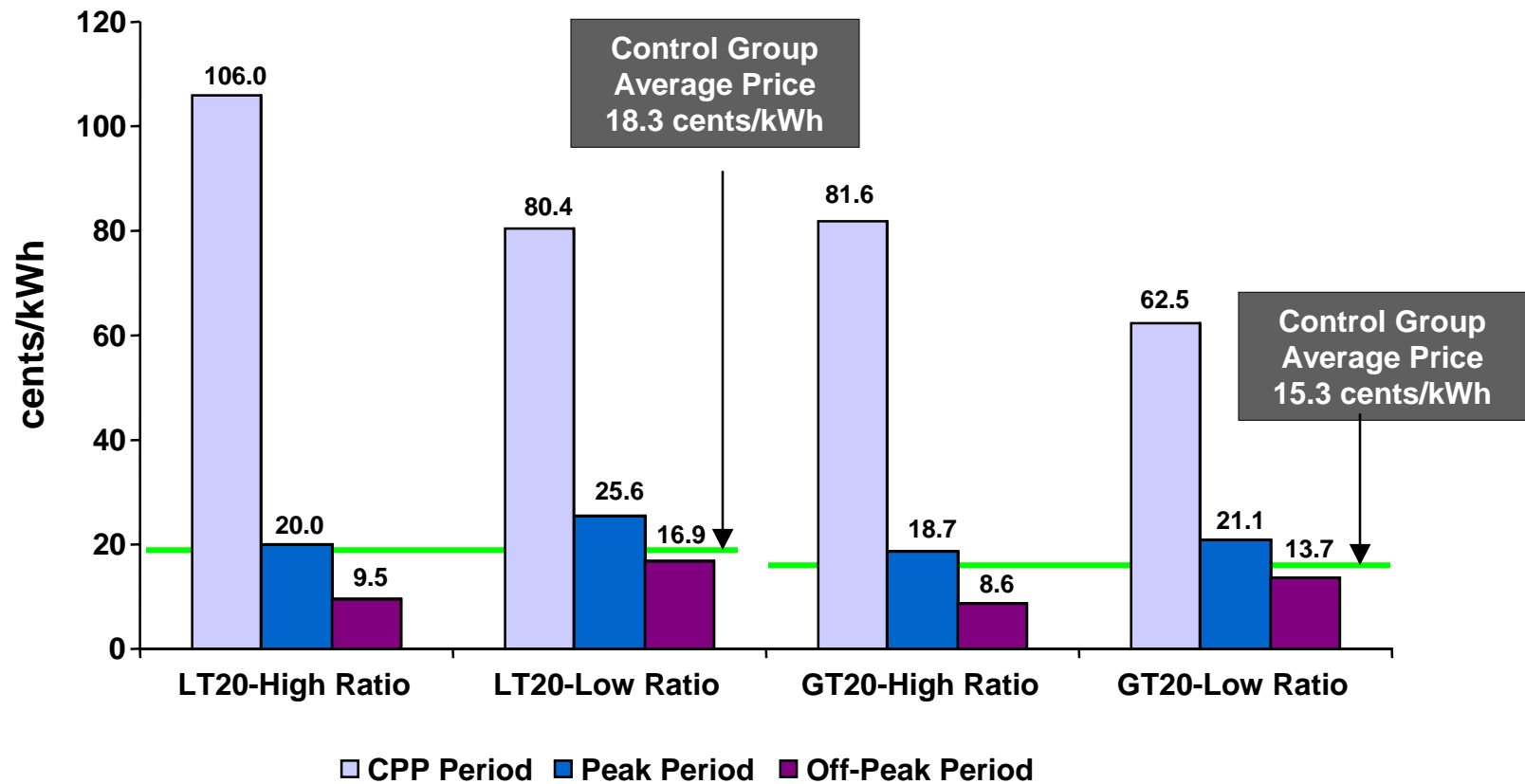
Small and Medium Commercial Rate Forms SPP TOU & CPP High Options

Average Prices For C&I Customers During Treatment Period (\$/kWh)						
Customer Segment	Rate Treatment	Price Ratio	Non-CPP Day		CPP-Day	
			Peak Period	Off-Peak Period	Peak Period	Off-Peak Period
Less Than 20 kW	Avg. Inverted Tier	n/a	Average Tier 0.186		Average Tier 0.186	
	TOU	High	0.272	0.094	0.272	0.094
		Low	0.325	0.159	0.325	0.159
	CPP-V	High	0.200	0.095	1.070	0.091
		Low	0.256	0.169	0.813	0.166
Greater Than 20 kW	Avg. Inverted Tier	n/a	Average Tier 0.154		Average Tier 0.154	
	TOU	High	0.224	0.100	0.224	0.100
		Low	0.254	0.144	0.254	0.144
	CPP-V	High	0.187	0.086	0.820	0.084
		Low	0.212	0.137	0.629	0.136

Source: SPP Summer 2003 Update Analysis, Charles River Associates, June 9, 2004.

SPP Background / Design

Small and Medium Commercial CPP-V Rate (Example)



Source: SPP Summer 2003 Update Analysis, Charles River Associates, June 9, 2004.

Price Elasticity's – Load Impacts

Conclusions

- ❑ Residential CPP-F rates reduce peak period demand on CPP days by more than 14%.
- ❑ Residential peak period impacts held steady from 2003 to 2004.
- ❑ Residential peak period impacts held steady throughout multiple day events.
- ❑ Small commercial customers (<20kW) reduce peak period demand on CPP days between 6% to 9%.
- ❑ Medium commercial customers (>20kW but < 200kW) reduce peak period demand on CPP days between 8% to 10%.
- ❑ Impacts persist across multiple consecutive CPP days and across two years of the experiment.
- ❑ Residential customers are more price responsive than Commercial customers but absolute load impacts may be greater for Commercial customers.



Price Elasticity's – Load Impacts

Price Elasticity's

	Residential		Commercial			
	CPP-F	Info Only	Track A <20kW	Track A >20kW	Track C <20kW	Track C >20kW
Daily Price Elasticity	- 0.041	NS	NS	NS	NS	NS
Elasticity of Substitution	- 0.086	NS	- 0.045	- 0.069	- 0.055	- 0.063

NS – results were not statistically significant

Track A – More representative of population than Track C. 33% of <20kW and 60% of >20kW chose Smart Thermostat.

Track C – Participants from SCE Thermostat Pilot.

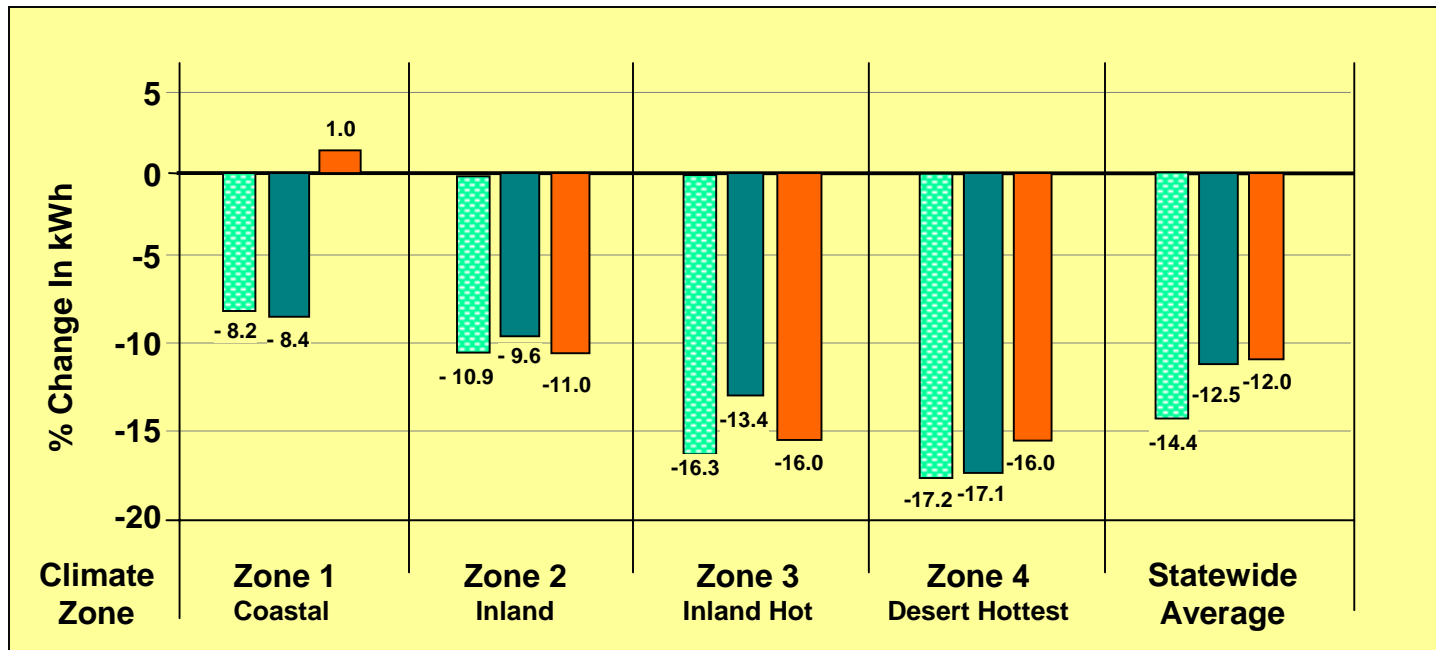
Rate Treatments: Residential on CPP-F. Commercial on CPP-V with day-of notification.

Source: California's Statewide Pricing Pilot: Update of Results, Charles River Associates, January 7, 2005.



Price Elasticity's – Load Impacts

Percent Change In Peak Period Energy Use CPP-F Customers on Critical Peak Days By Weather Zone



CRA Econometric Model 2003
 CEC Engineering Method
 CRA Econometric Model 2004

Source:

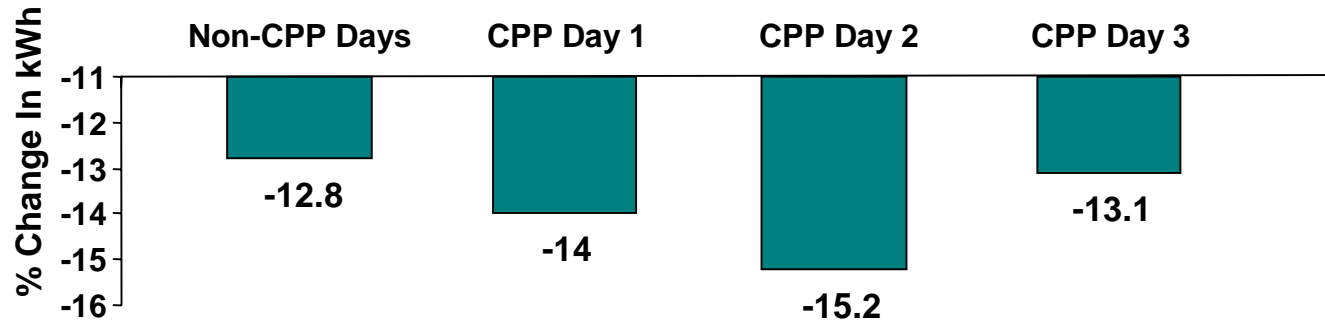
Statewide Pricing Pilot, Summer 2003 Impact Analysis, Charles River Associates, August 9, 2004, Table 5-4
 California's Statewide Pricing Pilot: Update of Results, Charles River Associates, January 7, 2005, Slide 4.



Price Elasticity's – Load Impacts

Percent Change in Residential Energy Use on Consecutive Event Days

(Average CPP-F Prices and Average 2004 CPP-day weather)



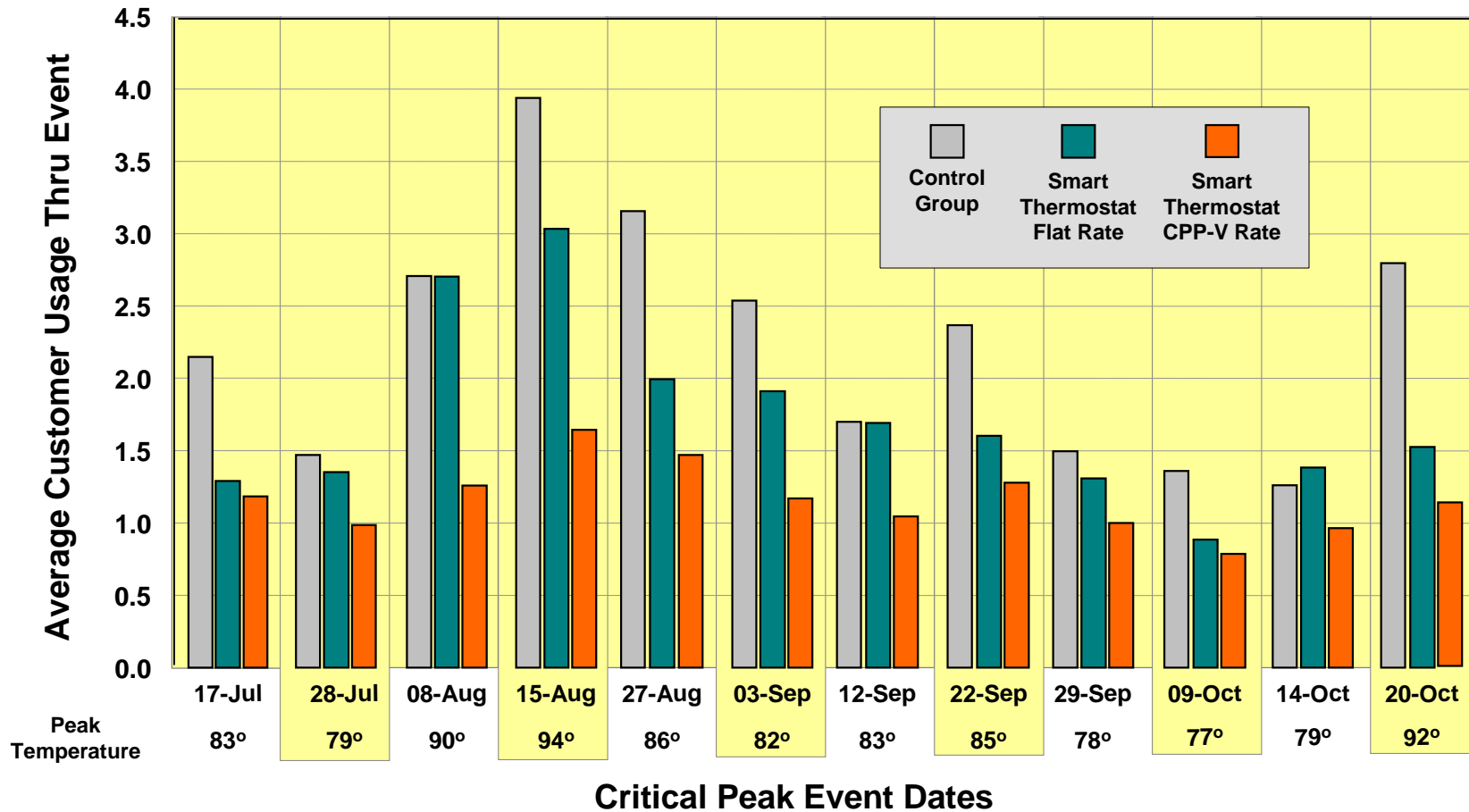
The impact on each CPP day type is significantly different from the non-CPP day impact, but the three day-type impacts are not statistically different from each other based on the Chi-square test.



Price Elasticity's – Load Impacts

Residential Critical Peak Impacts

Control Group, AB970 Smart Thermostat and CPP-V Treatments



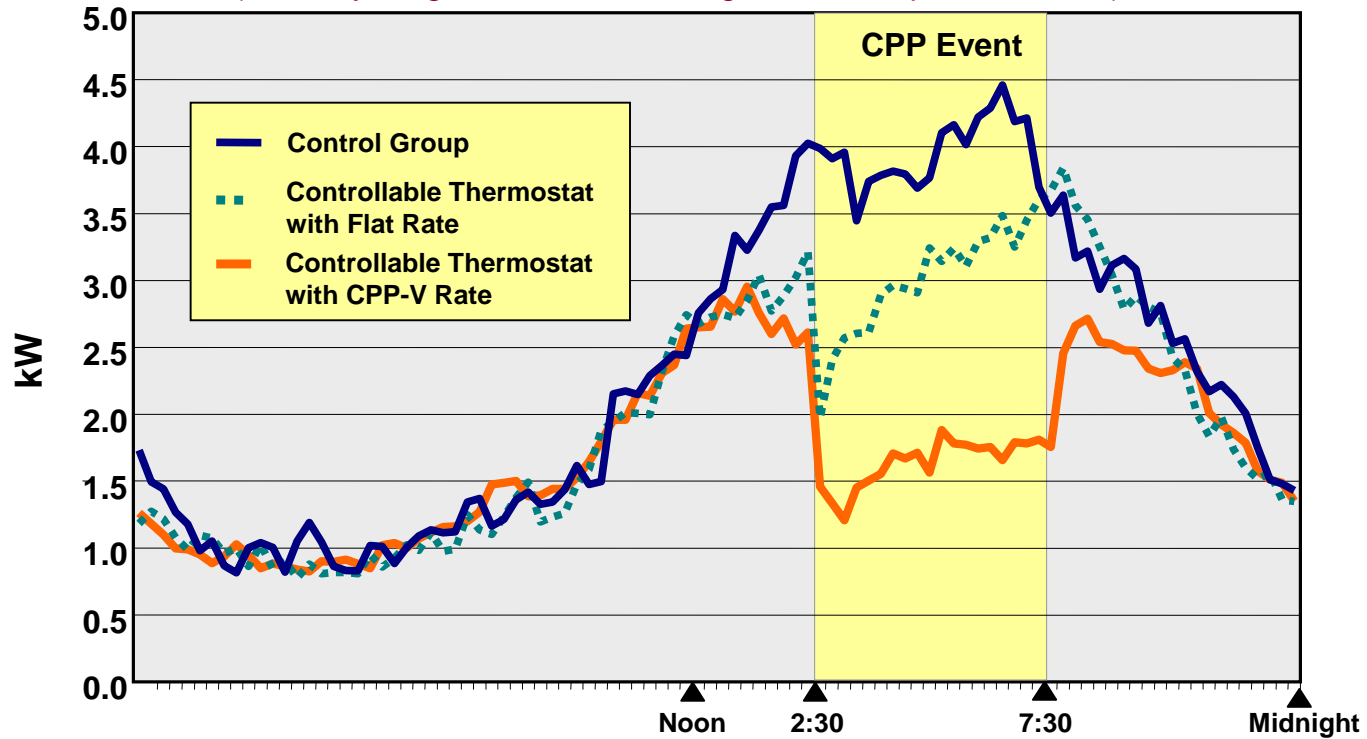
Source: Response of Residential Customers to Critical Peak Pricing and Time-of-Use Rates during the Summer of 2003, September 13, 2004, CEC Report.



Price Elasticity's – Load Impacts

Residential Response Control vs. Flat Incentive vs. CPP-V Rate

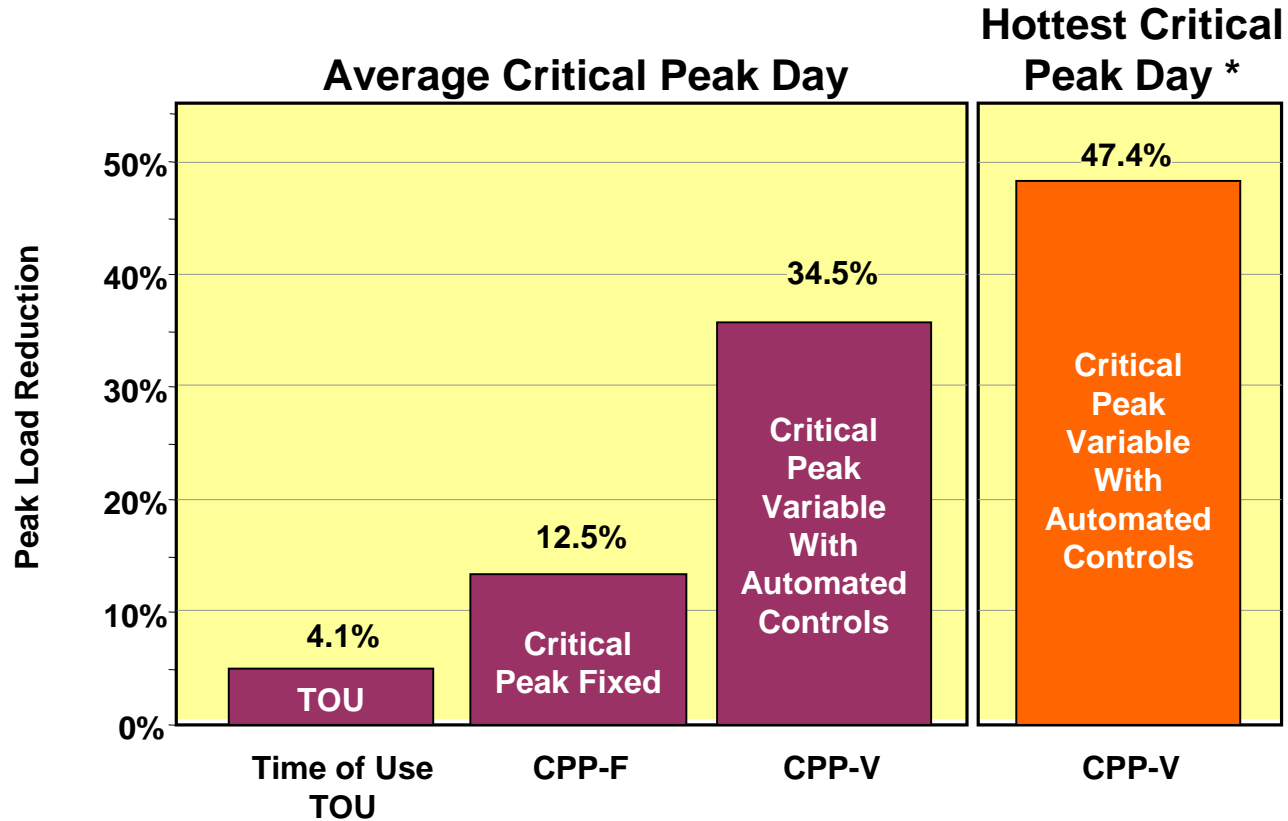
(Hot Day, August 15, 2003, Average Peak Temperature 88.5^o)



Source: Response of Residential Customers to Critical Peak Pricing and Time-of-Use Rates during the Summer of 2003, September 13, 2004, CEC Report.

Price Elasticity's – Load Impacts

Residential Critical Peak Impacts 2003 By Rate Treatment



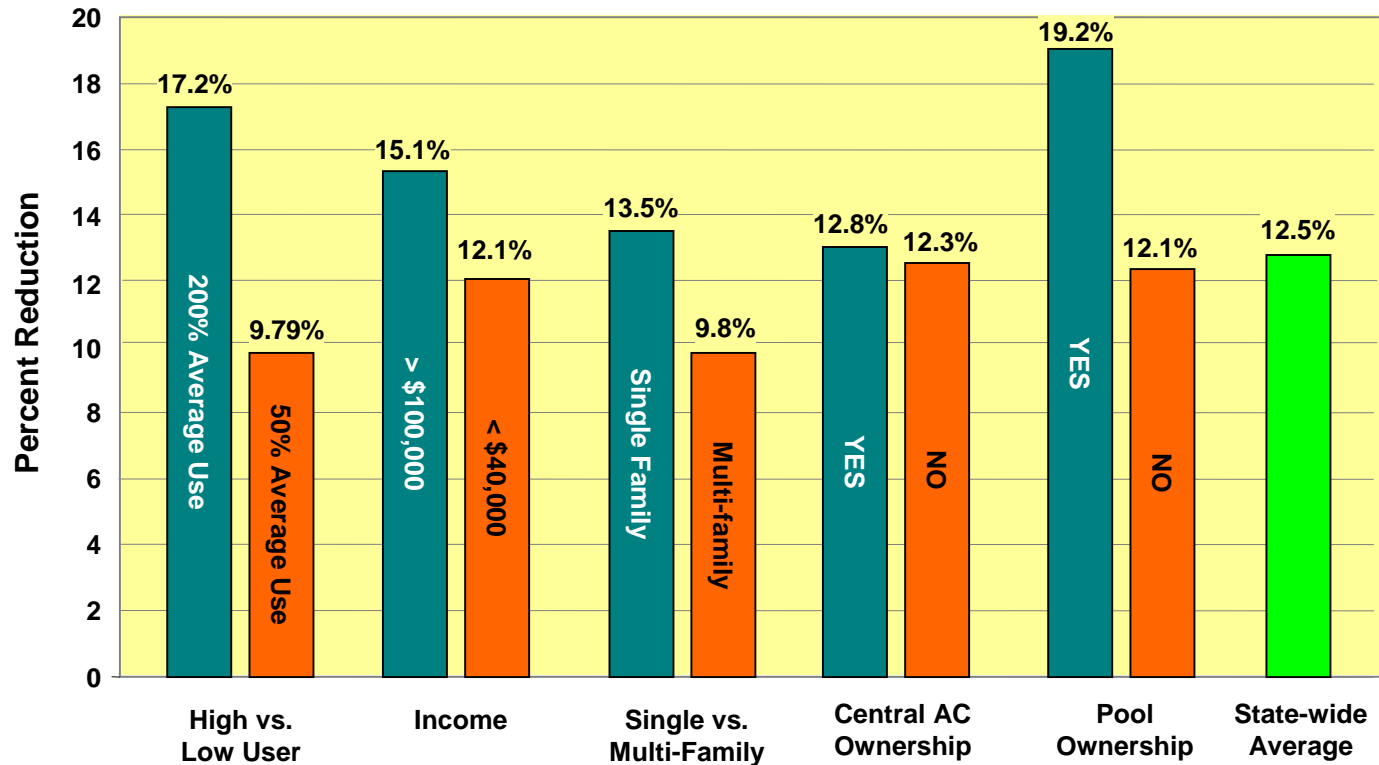
Source: Statewide Pricing Pilot Summer 2003 Impact Analysis, Charles River Associates, Table 1-3, 1-4, August 9, 2004.

* Hottest day impacts discussed on page 105.



Price Elasticity's – Load Impacts

Residential 2003 CPP Response by Attribute Percent Reduction in Peak Period Usage

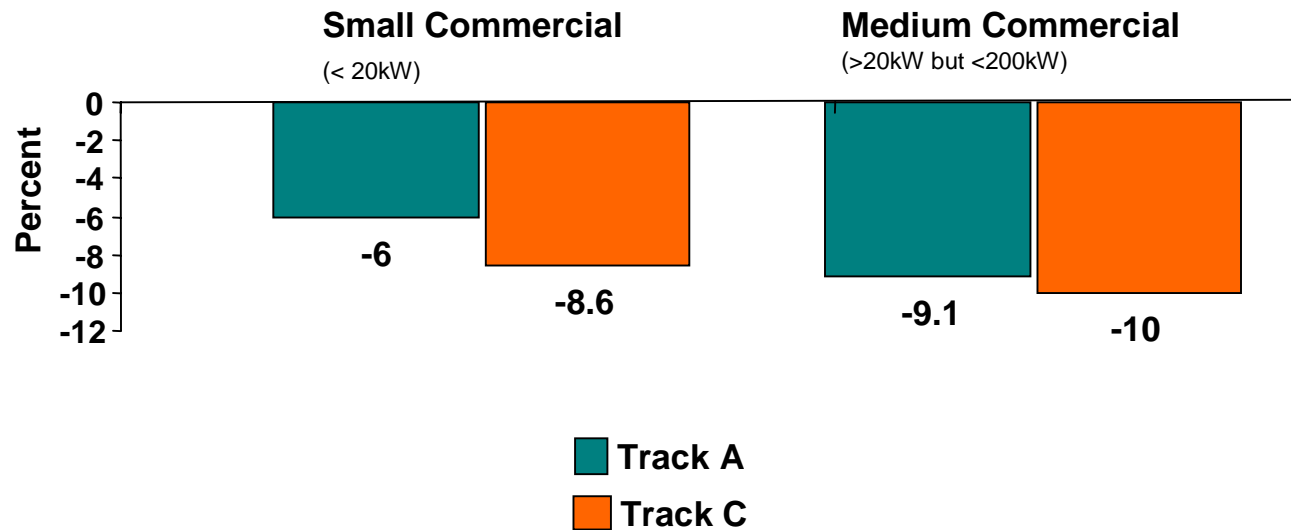


Source: Statewide Pricing Pilot, Summer 2003 Impact Analysis, CRA, August 9, 2004, Table 5-9, p.90



Price Elasticity's – Load Impacts

Commercial Customer CPP Day Percent Reduction in Peak Period Energy Use 2004



Source: California's Statewide Pricing Pilot: Update of Results, Charles River Associates, January 7, 2005, Slide 13.



Customer Bill Impacts

Customer Bill Impacts

Residential Participant Bill Impacts

		2003			2004			
		CPPV	CPPF-A	TOU	CPPV	CPPF-A	CPPF-B	TOU
Customers With Bill Savings	Participants (%)	71.1%	73.7%	70.0%	71.9%	74.1%	93.7%	65.7%
	Average Monthly Savings (%)	5.1%	5.5%	4.5%	5.8%	6.2%	8.3%	4.0%
	Average Monthly Savings (\$)	\$6.81	\$3.89	\$3.25	\$8.46	\$4.89	\$4.12	\$3.15
Customers With Bill Increases	Participants (%)	28.9%	26.3%	30.0%	28.1%	25.9%	6.3%	34.3%
	Average Monthly Increase (%)	4.0%	6.2%	3.0%	2.9%	6.0%	2.9%	1.6%
	Average Monthly Increase (\$)	\$5.03	\$4.93	\$3.32	\$5.32	\$5.62	\$0.68	\$0.47

CPPF-A Statewide Representative Sample

CPPF-B Residential Low Income, SF Hunters Point

Source: Statewide Pricing Pilot, Shadow Bill Results, WG3 report, June 9, 2004 and Joint Utility Bill Analysis, January 12, 2004.

Customer Bill Impacts

Commercial Participant Bill Impacts

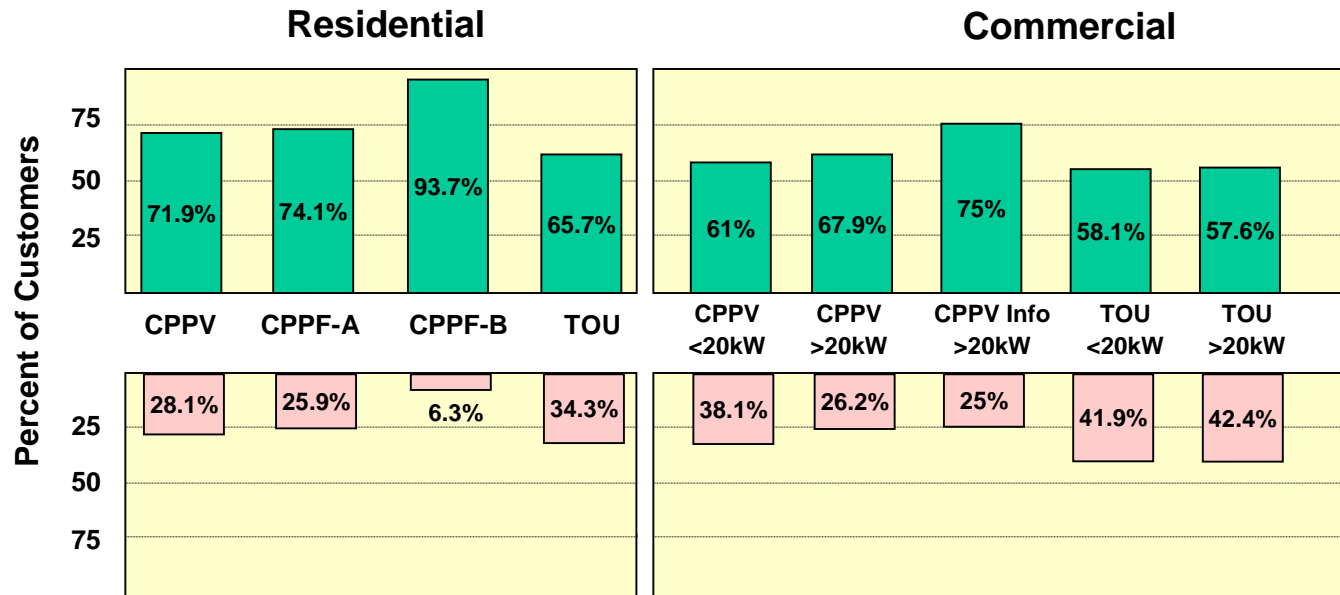
		2003		2004				
		CPPV	TOU	CPPV <20kW	CPPV >20kW	CPPV Info >20 kW	TOU <20 kW	TOU >20kW
Customers With Bill Savings	Participants (%)	80.3%	58.2%	61.0%	67.9%	75.0%	58.1%	57.6%
	Average Monthly Savings (%)	12.2%	9.6%	12.1%	11.4%	15.5%	12.1%	8.7%
	Average Monthly Savings (\$)	\$155.17	\$90.65	\$46.83	\$184.59	\$32.75	\$26.45	\$176.39
Customers With Bill Increases	Participants (%)	19.7%	41.8%	38.1%	26.2%	25.0%	41.9%	42.4%
	Average Monthly Increase (%)	5.0%	10.0%	7.1%	6.5%	3.3%	8.5%	5.6%
	Average Monthly Increase (\$)	\$22.89	\$62.52	\$18.24	\$75.12	\$23.48	\$24.02	\$92.99

Source: Statewide Pricing Pilot, Shadow Bill Results, WG3 report, June 9, 2004 and Joint Utility Bill Analysis, January 12, 2004.

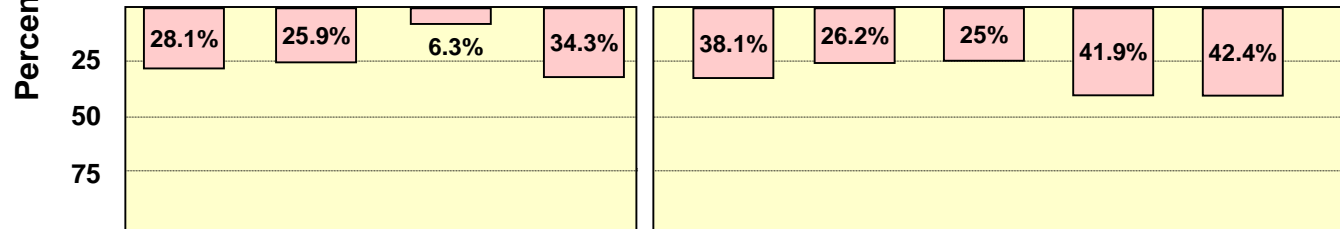
Customer Bill Impacts

Participant Bill Impacts - 2004

Customer Bills Decreased (%)



Customer Bills Increased (%)



Customer Acceptance

Conclusions

- ❑ Residential and commercial participants show strong support for critical peak pricing (CPP), time-of-use (TOU) or information only programs.
- ❑ Support for alternatives to the inverted tier rates has increased from results in 2003.
- ❑ Participants have a good understanding of the pilot rates but misunderstand some of the specifics.
- ❑ Participants associate dynamic rates with saving money and conservation and report making behavioral changes in how they use energy as a result.
- ❑ Residential and commercial participants stated they use energy management strategies that reduce electricity use for more than just the key high use time periods, resulting in conservation.
- ❑ The vast majority of residential and commercial participants respond to critical peak periods by reducing or shifting for the entire duration of the event. Very few choose not to respond to critical peak events.
- ❑ Over 70% of participants have initially chosen to remain on their CPP rate even if they have to pay an additional monthly meter charge.



Statewide Market Research

Customer Understanding of Electric Rates

- 1. Customers don't understand how electricity use is measured.**
- 2. Customers don't understand how electricity is priced.**
- 3. There is an uncertain and inaccurate link between how customers use energy, what they pay and what they get in service value.**
- 4. Bill accuracy – customer's must trust their supplier. No other choice.**

Source: Residential Customer Understanding of Electricity Usage and Billing, Momentum Market Intelligence, WG3 Report, January 29, 2004. pviii-ix.



Statewide Market Research Customer Understanding of Dynamic Rates

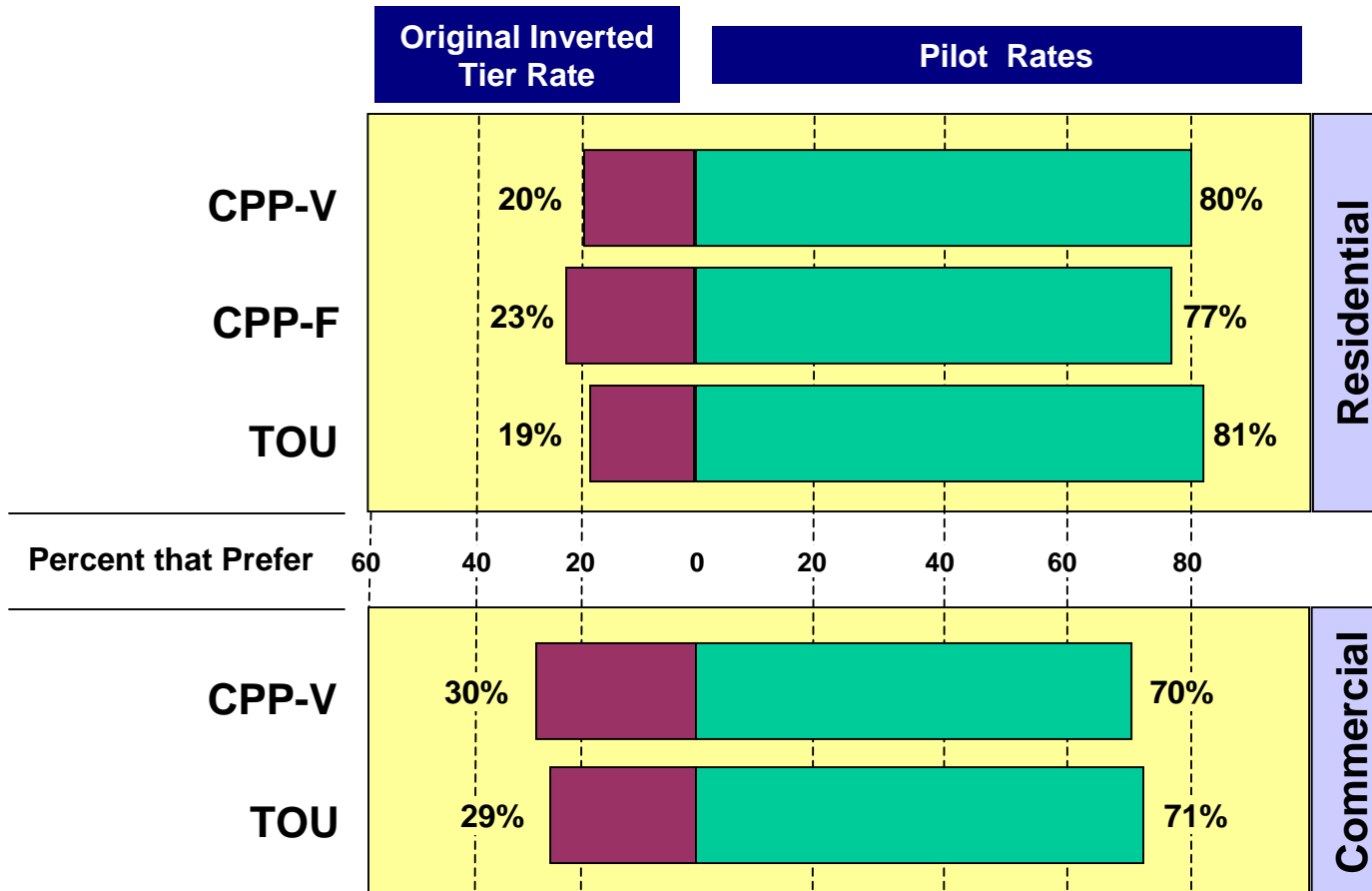
- 1 **“..most respondents could easily understand the logic of time-differentiated electricity prices,..”**
- 2 **“..customers understood time-differentiated pricing (at least the on-peak / off-peak variety) more easily than they understood the notion of inclining block [tiered] or declining block pricing.”**

Source: Residential Customer Understanding of Electricity Usage and Billing, Momentum Market Intelligence, WG3 Report, January 29, 2004, p16.



Customer Acceptance

SPP Participant Rate Preference - 2003

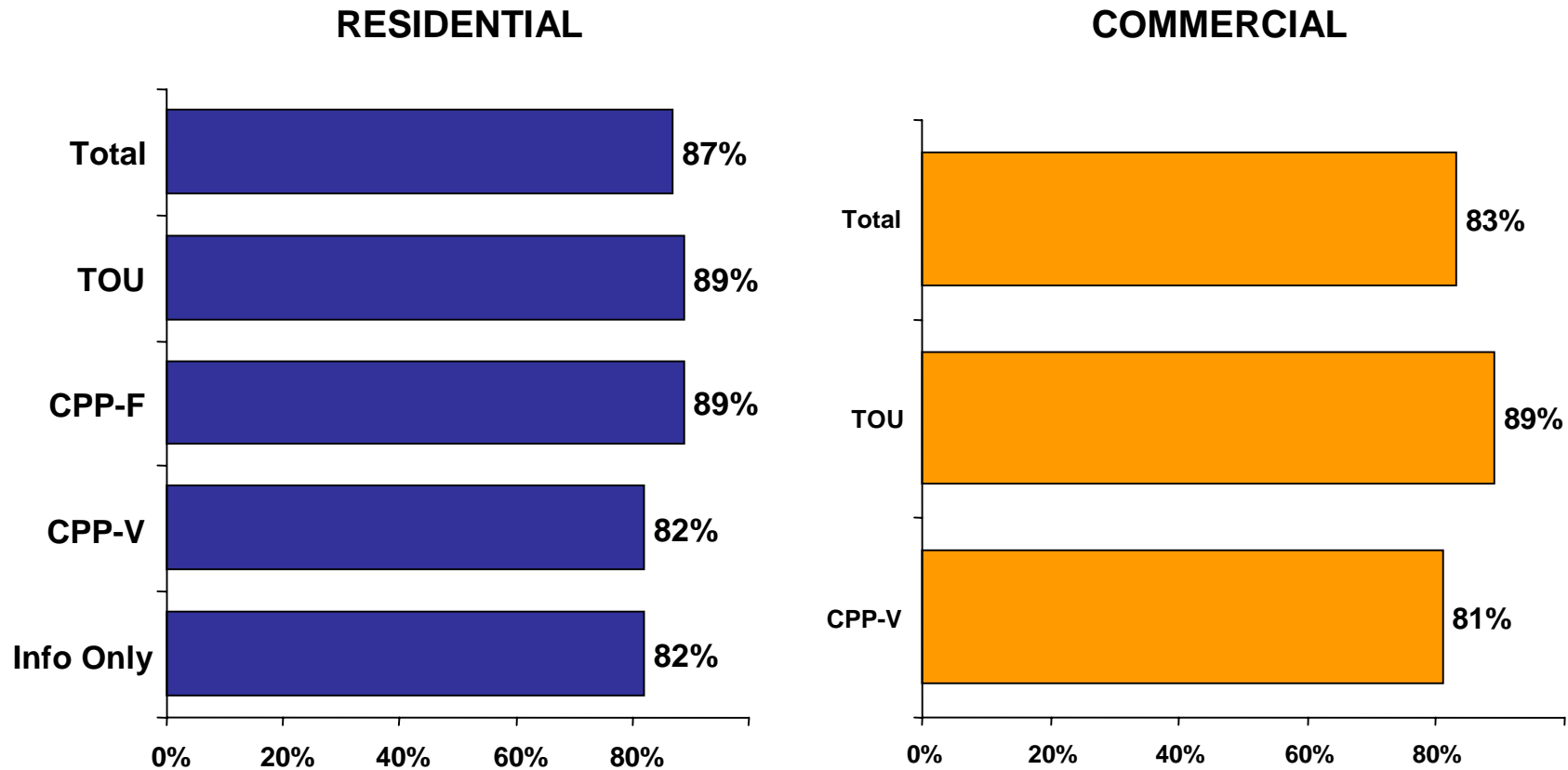


Source: SPP End-of-Summer Survey Report, Momentum Market Intelligence, WG3 Report, January 21, 2004, p23-24.



Customer Acceptance

Participant Stating the Pilot Rates are Fair - 2004

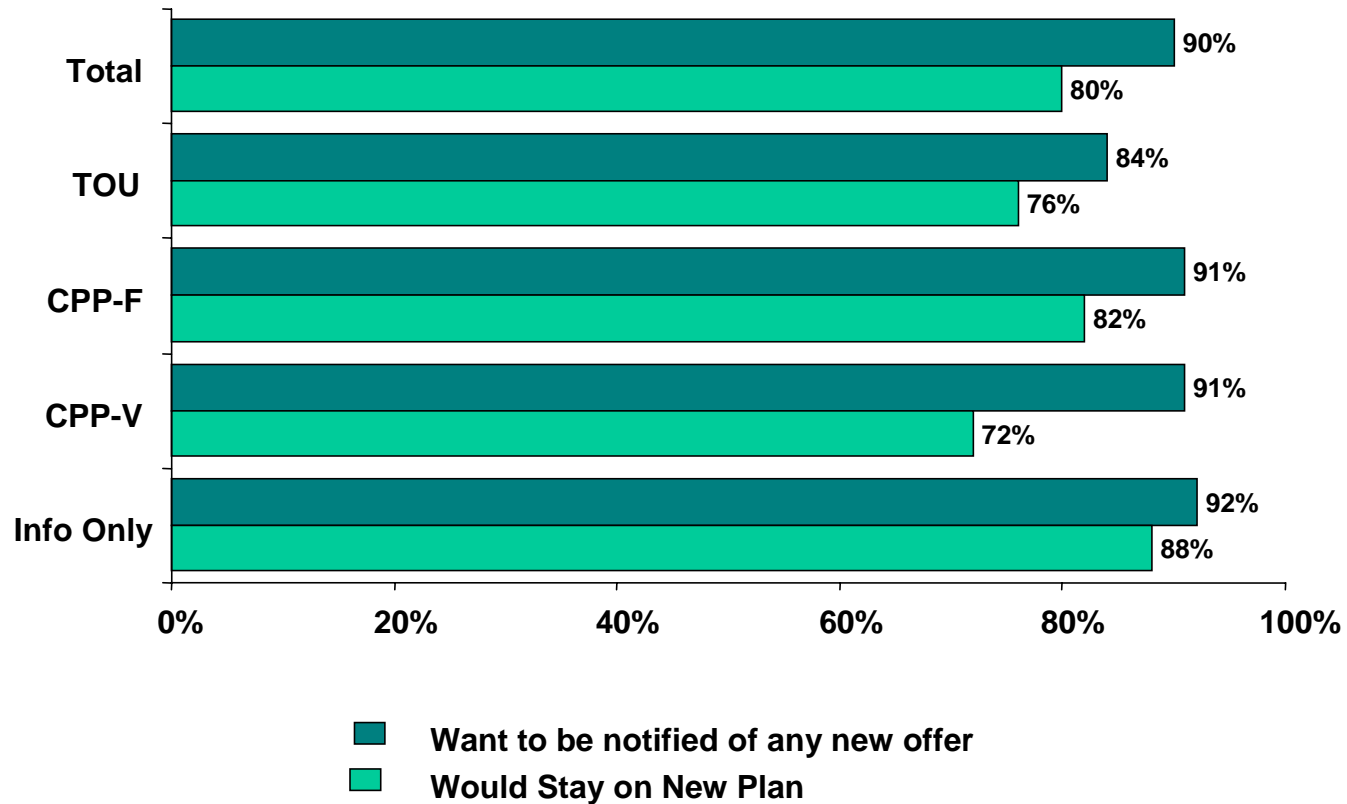


Source: Statewide Pricing Pilot: End-of-Pilot Customer Assessment, December 2004, Momentum Market Intelligence.



Customer Acceptance

Residential participants Interested in continuing on a dynamic rate even without a supplementary participation incentive - 2004

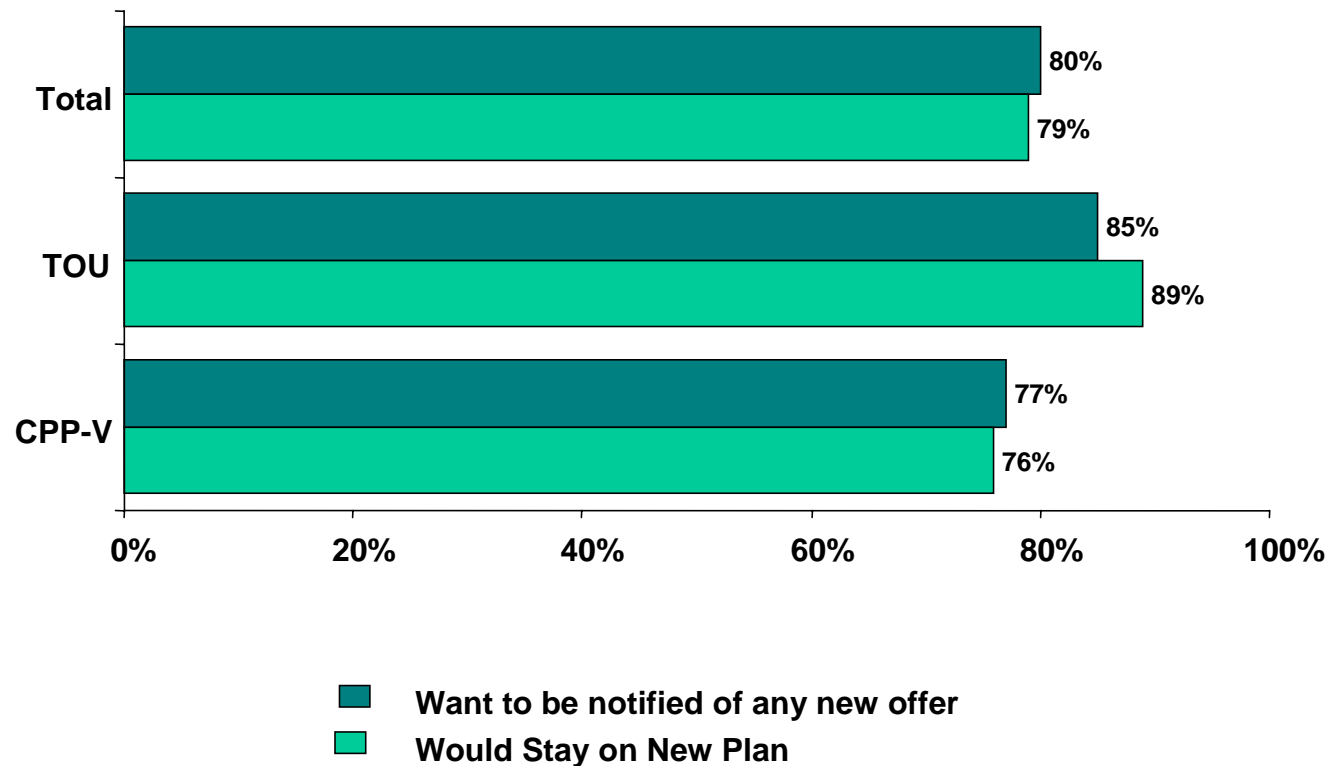


Source: Statewide Pricing Pilot: End-of-Pilot Customer Assessment, December 2004, Momentum Market Intelligence.



Customer Acceptance

Commercial participants Interested in continuing on a dynamic rate even without a supplementary participation incentive - 2004



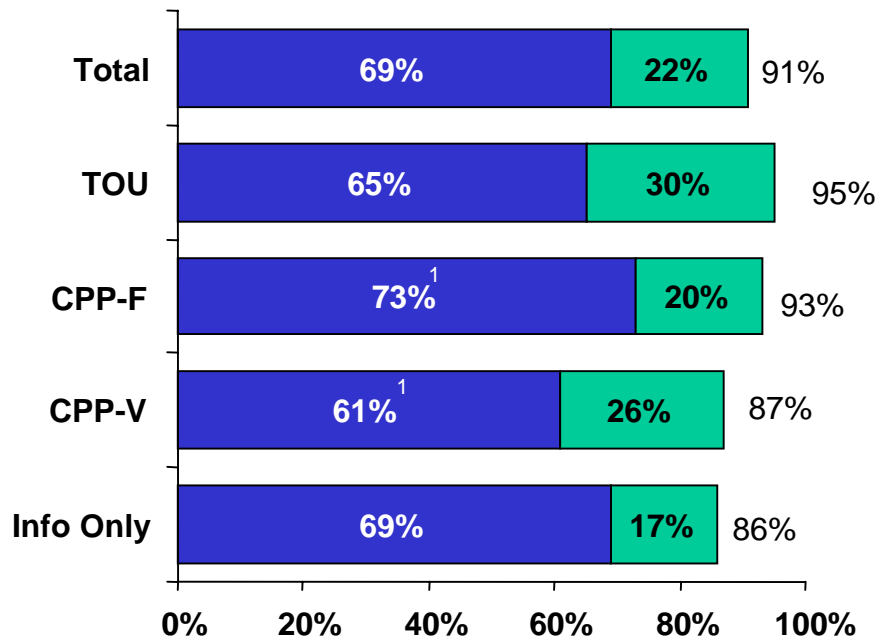
Source: Statewide Pricing Pilot: End-of-Pilot Customer Assessment, December 2004, Momentum Market Intelligence.



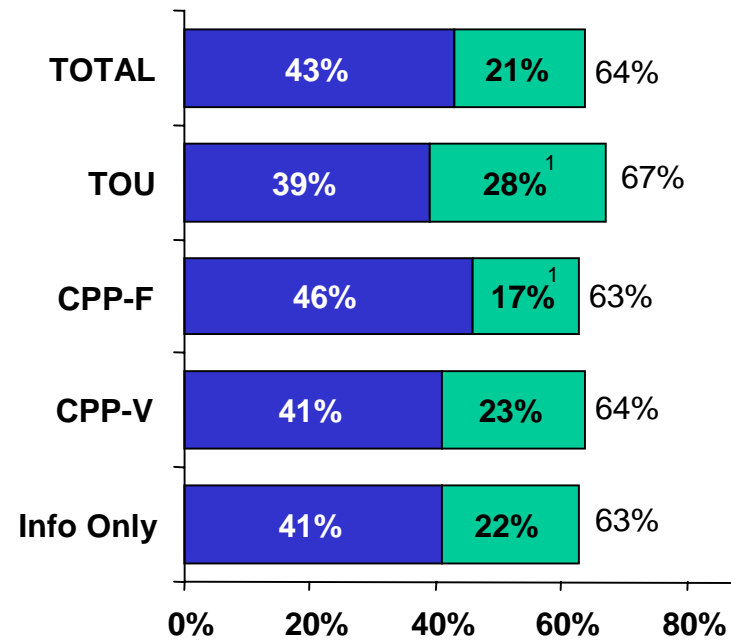
Customer Acceptance

Residential participants express a strong interest in having dynamic rates offered to all customers.

Should dynamic rates be offered to all customers?



Should all customers be placed on a dynamic rate and given an option to switch to another rate?



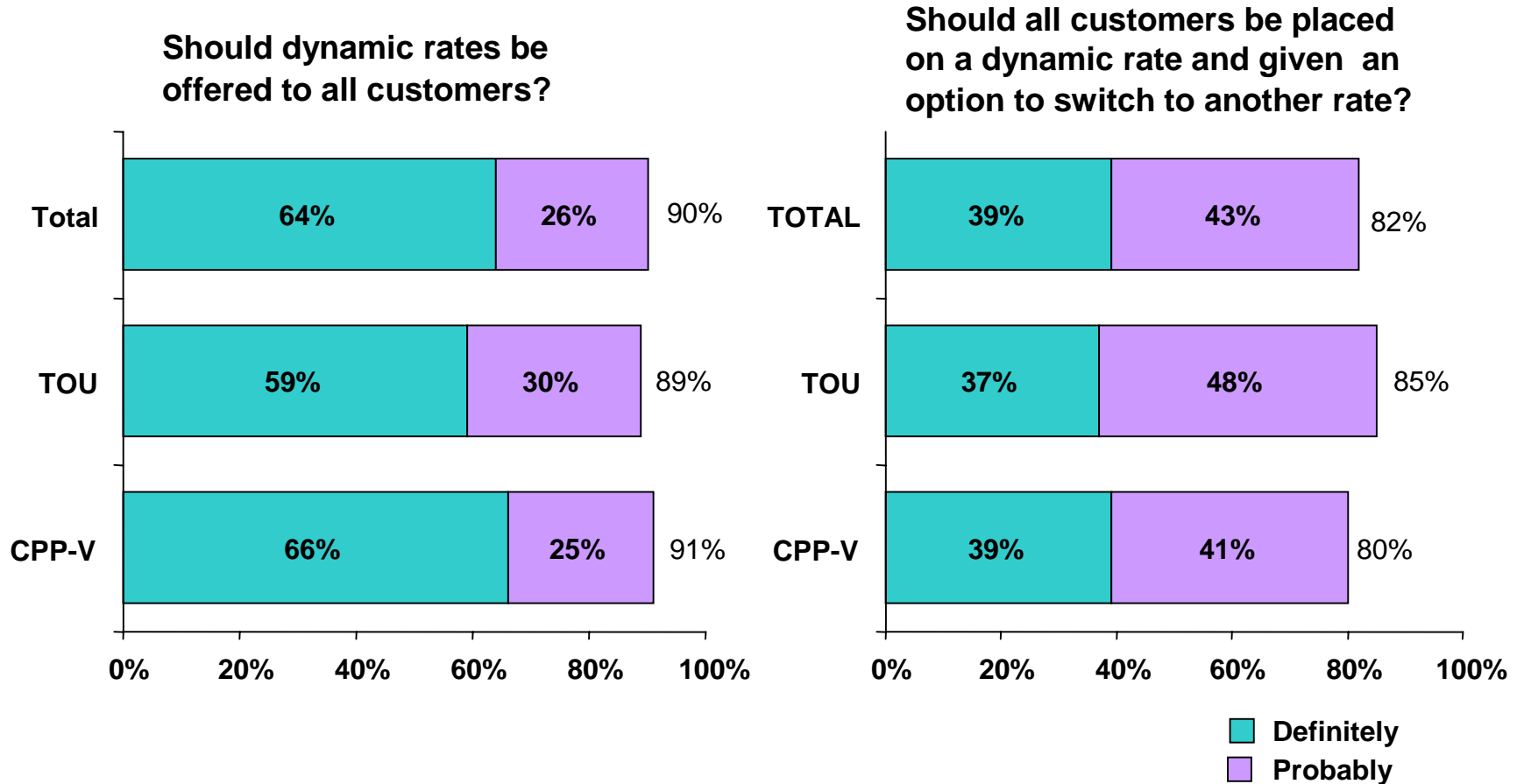
■ Definitely
■ Probably

Source: Statewide Pricing Pilot: End-of-Pilot Customer Assessment, December 2004, Momentum Market Intelligence.



Customer Acceptance

Commercial participants express a strong interest in having dynamic rates offered to all customers.



Source: Statewide Pricing Pilot: End-of-Pilot Customer Assessment, December 2004, Momentum Market Intelligence.



Automated Demand Response System (ADRS)

Conclusions

- ❑ On summer non-event days ADRS equipped homes
 - used 34% less on-peak electricity (3.7 kWh per home) than comparable homes on inverted tier rates (A03 control)
 - used 18% less on peak electricity (1.6 kWh per home) than comparable homes on CPP-F rates (A07 control).
- ❑ Over the twelve Super Peak days, ADRS equipped homes
 - consumed 50% less Super Peak energy per day (7.4 kWh per home) than comparable homes on standard rates (A03 control)
 - consumed 26% less super peak electricity per day (2.5 kWh per home) than comparable homes on CPP-F rates (A07 control)
- ❑ ADRS equipped homes total daily usage was 5% lower than that of the control group (A03 control) on non-event weekdays and 12% lower on Super Peak days.
- ❑ ADRS equipped homes total daily usage was 2% lower on both Super Peak and non-event weekdays than comparable homes on CPP-F rates (A07 control).



ADRS

Research Objectives

Technology Demo

- Assessment of technology capabilities / ease of use
- Logistics of technology deployment

Program Evaluation

- Energy consumption analysis (pre- and post-pilot)
- Pilot technology effectiveness
- Economic analysis of pilot and large-scale rollout
- Cost effectiveness analysis from the societal, utility and customer points of view

Customer Satisfaction

- Motivation to join pilot
- Relative importance of ADRS features
- Overall customer experience with the technology
- Customer satisfaction

ADRS

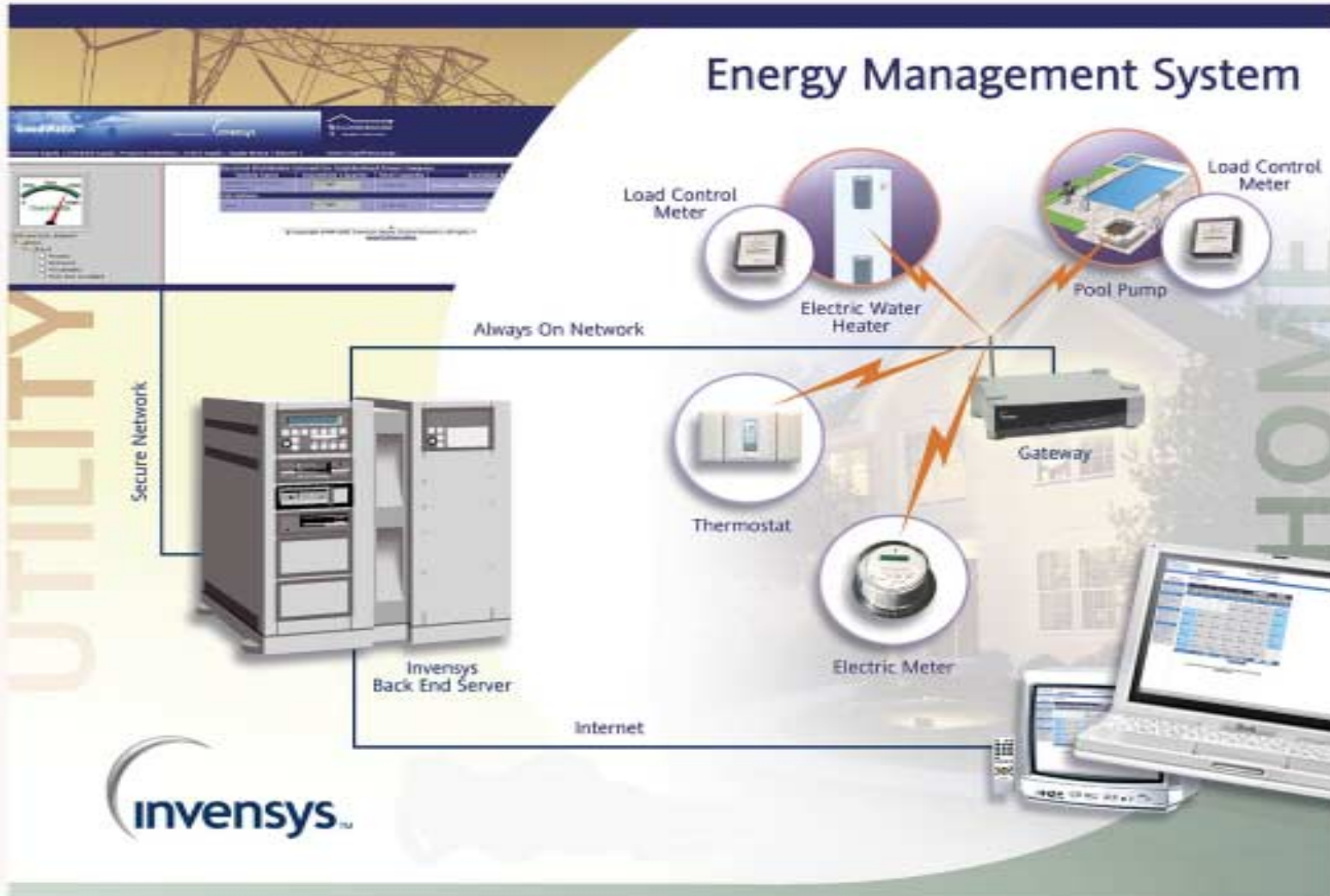
Technology Components



Source: ADRS Load Impact Presentation, December 18, 2004.

ADRS

Technology Components



Source: ADRS Load Impact Presentation, December 18, 2004.

ADRS Customers were provided with a full compliment of automation technology and real-time access to energy information

- The ADRS enabling technology includes:
 - Two-way communicating interval whole house meter
 - Wireless internet gateway and cable modem
 - Smart thermostat(s)
 - Load control and monitoring device (LCM)
 - Web-enabled user interface and data management software
- Technology programmed to automatically respond to electricity prices
- Via the Internet, pilot participants can
 - View real time interval demand and trends in historical consumption
 - Set climate control and pool runtime preferences
 - Program desired response to increase in electricity price
 - Change in thermostat temperature set point
 - Reschedule operation of LCM controlled appliance
- ADRS continuously displays current electricity price on the thermostat and the Web

ADRS and control group customers were segmented into Low / High Consumption strata for analysis purposes

Characteristics of Treatment and Control Group Populations and Distribution of Homes, September 2004

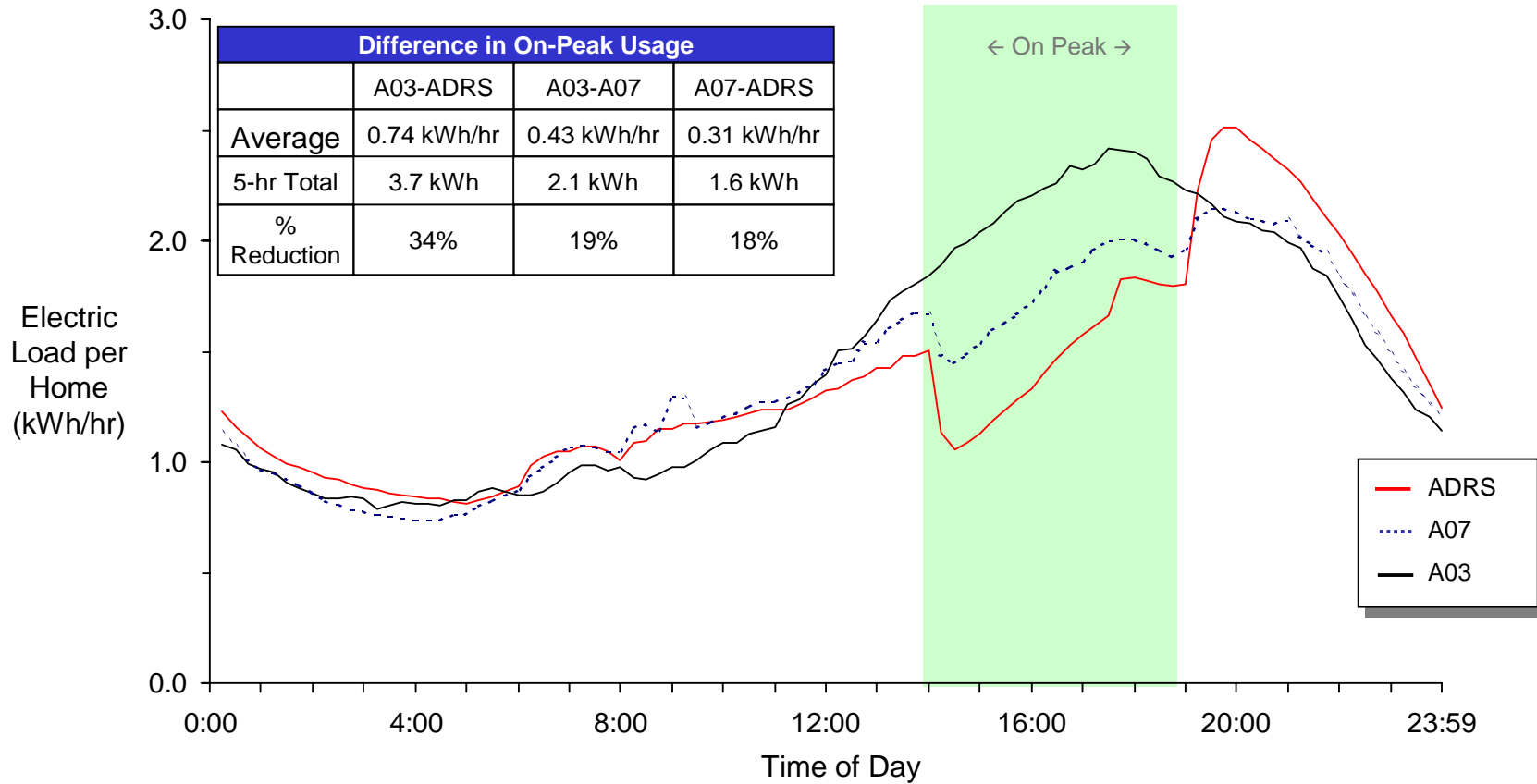
	A03 – Control Group			A07 – Control Group			ADRS Participants		
Rate	Standard tiered-block pricing			CPP-F			CPP-F		
Technology	Not Provided			Not Provided			Invensys		
Price Response	Monthly billing			Manual Shift and Save			Automated Shift & Save		
Pools Penetration	23.1%			23.7%			25.6%		
Participants	PG&E	SDG&E	SCE	PG&E	SDG&E	SCE	PG&E	SDG&E	SCE
Low Stratum	2	3	14	10	1	16	22	15	4
High Stratum	12	3	22	21	5	38	49	7	65
Total	14	6	36	31	6	54	71	22	69

Source: ADRS Load Impact Presentation, December 18, 2004.

ADRS

Load Impacts

Average Non-Event Weekday Load Profile July through September

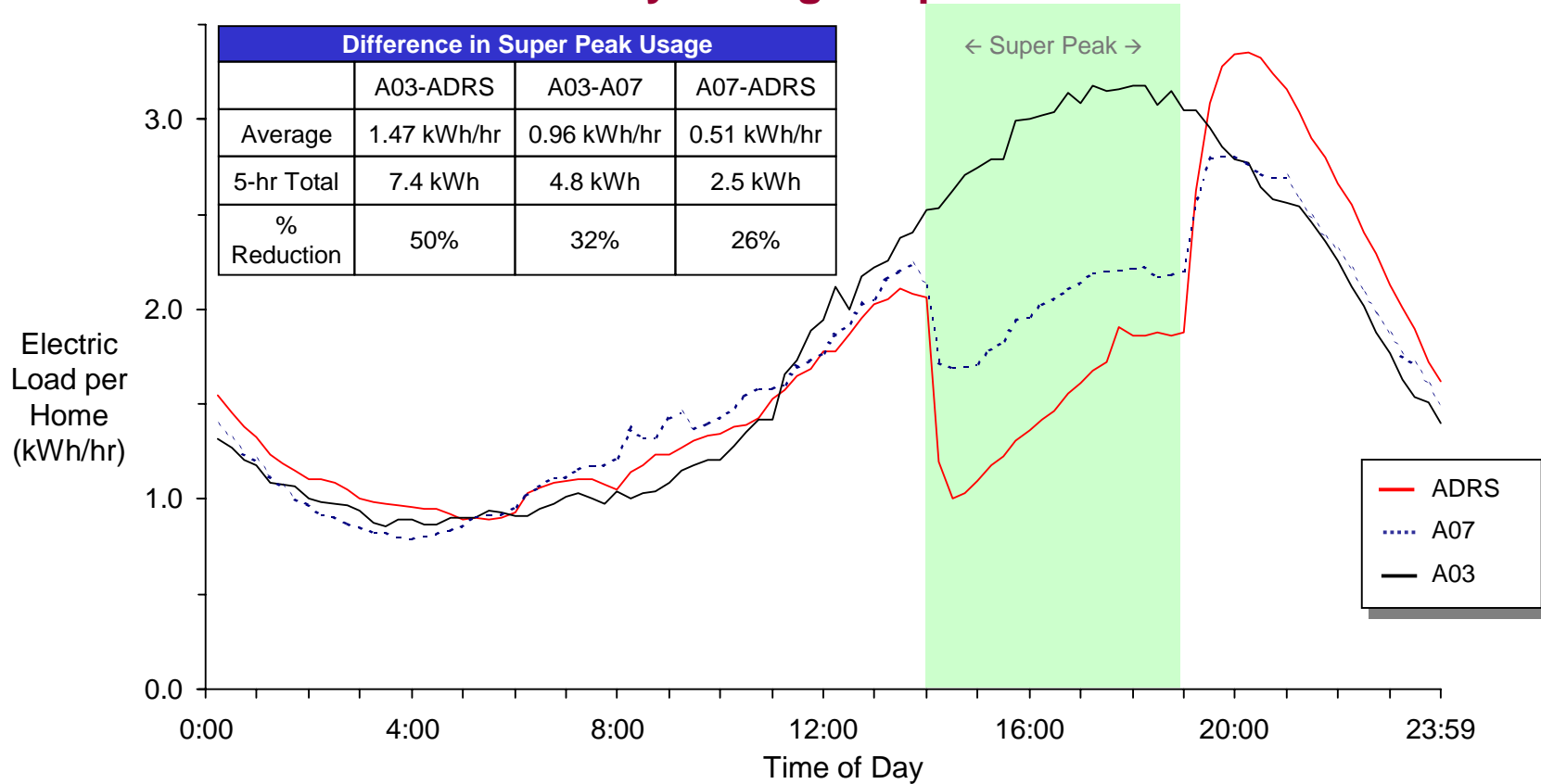


Source: ADRS Load Impact Presentation, December 18, 2004.

ADRS

Load Impacts

Average Critical Peak Weekday Load Profile July through September



Source: ADRS Load Impact Presentation, December 18, 2004.

ADRS**Bill Impacts**

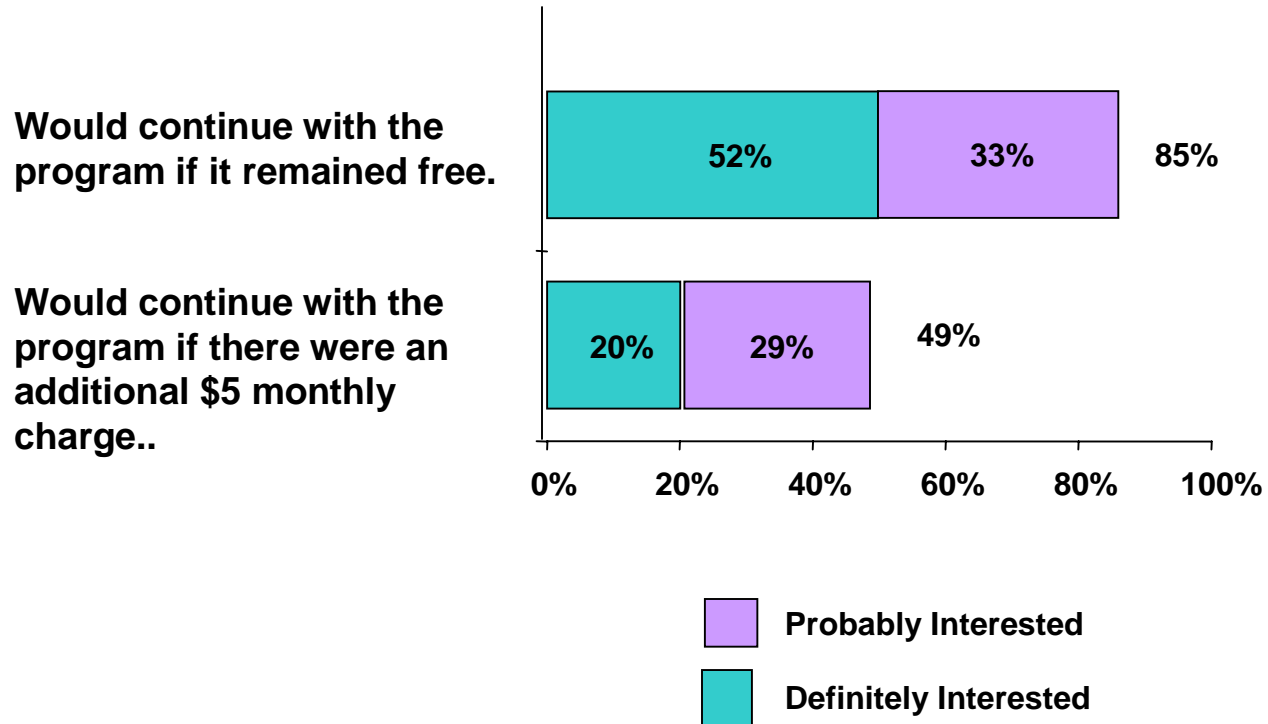
88% of the ADRS customers realized bill savings during the summer of 2004 (not annualized)

	SCE	PG&E	SDG&E	Total
Net Savers	67 (96%)	57 (79%)	20 (95%)	144 (88%)
Net Losers	3 (4%)	15 (21%)	1 (5%)	1 (5%)
Savings Amount				
Max	\$432.22	\$53.90	NA	
Median	\$100.53	\$48.94	NA	
Average	\$108.31	\$160.28	NA	
Loss Amount				
Max	(\$17.69)	(\$45.05)	NA	
Median	(\$9.68)	(\$24.20)	NA	
Average	(\$40.74)	(\$20.86)	NA	

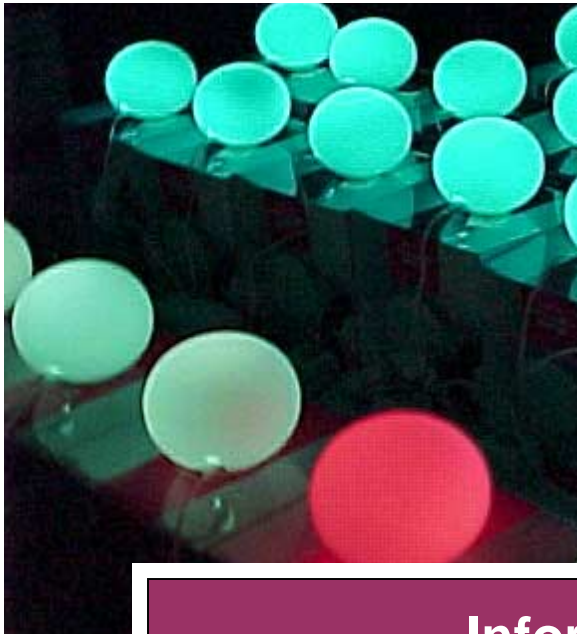
Source: ADRS Load Impact Presentation, December 18, 2004.



Customer Acceptance




Source: ADRS Customer Insight: Research Results, Boice Dunham Group, A Report to Working Group III, January 7, 2005.




Information Display Pilot

To view this email as a web page, go [here](#).



Smart Shift & Save Plan

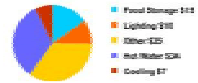


Your Account Number: 000123

Dear SUSAN,

The **Smart Shift & Save Plan** allows electricity prices to adjust based on demand shifts. Here is some important information about your usage and how you can make a difference.

Peak Period Electricity Cost



The chart above shows your energy usage during the peak hours last month. The estimated costs above were calculated based on data from your authorized meter and usage information you provided.

Visit our [Super Peak](#) homepage to maximize your savings and

Your Report Card

This month you used **12% of your energy On-peak**. That's **6% less** than the average customer.

- Way to go! Keeping your peak usage low is a great way to save money.

20% on Critical Peak days. Last month your energy use increased by 50%.

- Using the tips and energy savings tools can help you reach your goals.

Flip the switch... Save \$3
Turn off unnecessary lights - especially the high-wattage floodlights typically recessed in the ceiling. We've estimated the monthly savings for turning off 50% of the lights in an average home during peak hours.

Put off those Dishes... Save \$1
Even though your water heater uses gas, your dishwasher still uses energy for its motor and dryer. The savings above is an estimate of how much extra you spend each month if you run your dishwasher during peak hours.

Tips

of the biggest air appliances, primarily during monthly savings for drying it for drying instead of peak hours.

All of these steps can save you energy & money while helping the community and environment on a larger scale. Find even **more information** about your usage, how to save, and the Smart Shift & Save program on our [super peak homepage](#) at www.energytipsn.com.

This email was sent to: susan@ketchum.com

This email was sent by: [Elizabeth@SmartShift&SavePlan.com](#)
20 Laurel Ave., Ste. 200 Wellesley, MA 02458 United States

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Objective

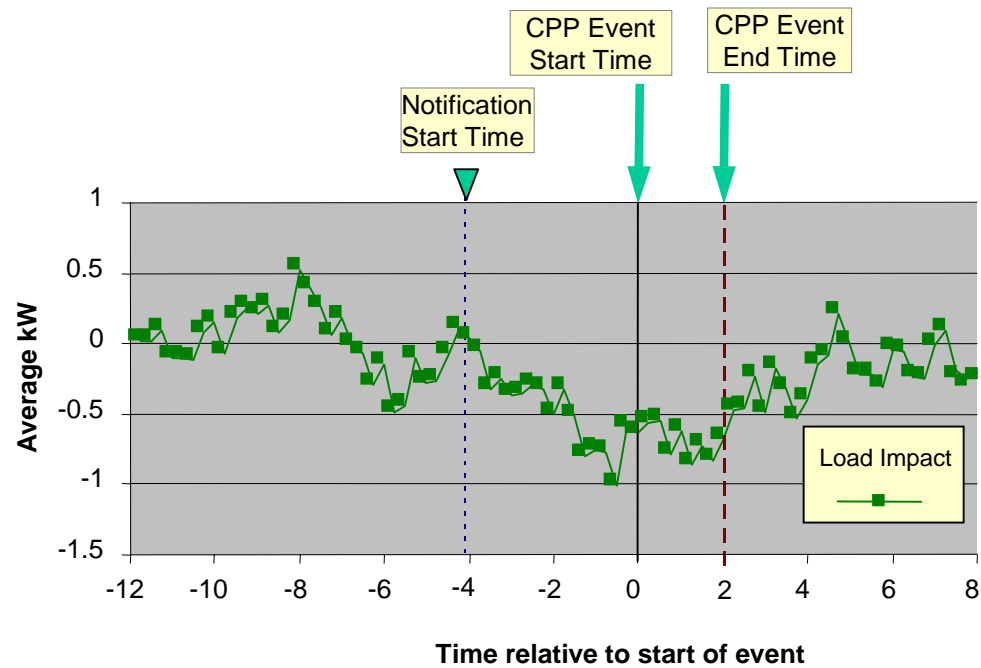
Assess the load impact of providing enhanced information treatments to customers, over and above the impact of enabling technology and the rate/price

Conclusions

- There is anecdotal evidence that residential customers respond to 'notification' information by reducing load during a critical peak period.**
- There is insufficient evidence to fully evaluate commercial customer response.**

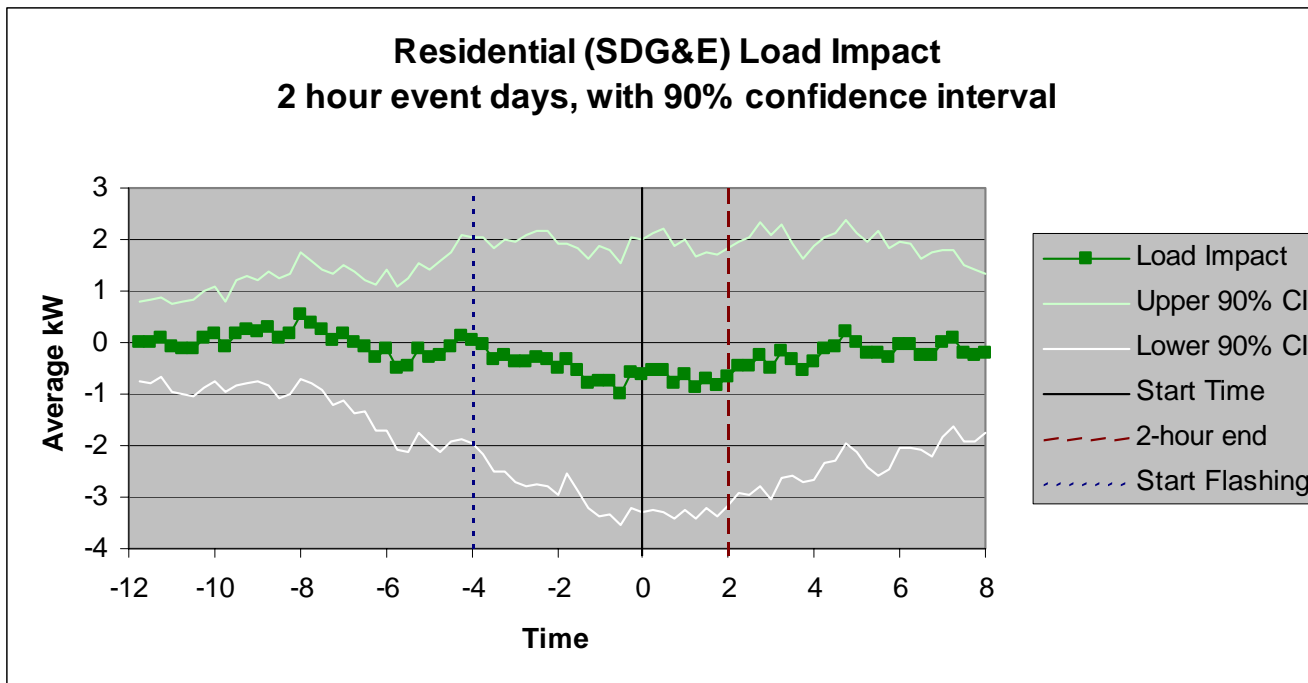


Residential (SDGE) Load Impact Average for 2-hour event days



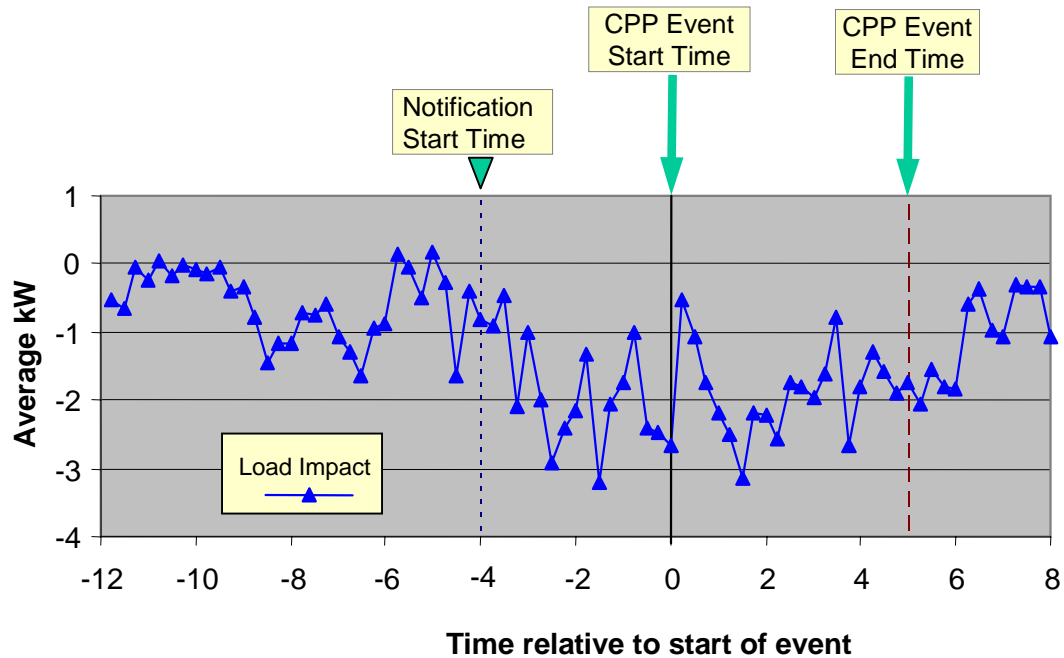
Source: California Information Display Pilot, Load Impact Analysis, EPRI
Solutions Presentation to Working Group 3, January 7, 2005.

Residential Response to Notification Information is not Statistically Significant



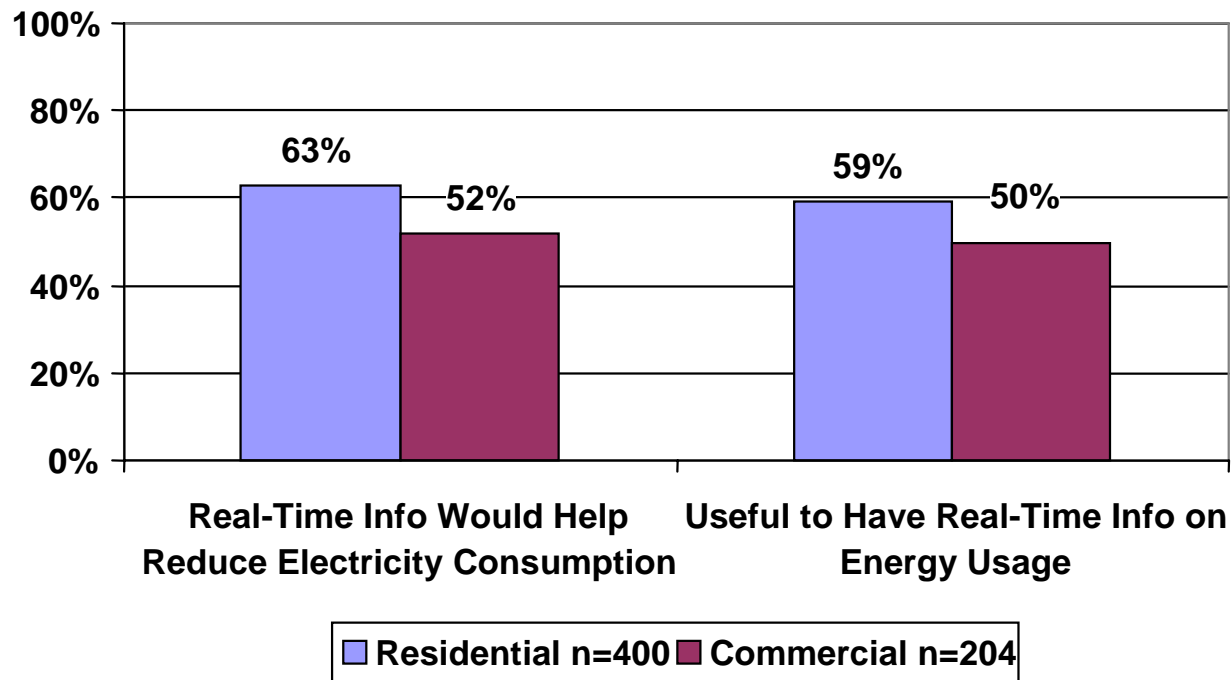
Source: California Information Display Pilot, Load Impact Analysis, EPRI Solutions Presentation to Working Group 3, January 7, 2005.

Commercial (SCE) Load Impact Average for 5-hour event days



Source: California Information Display Pilot, Load Impact Analysis, EPRI Solutions Presentation to Working Group 3, January 7, 2005.

Percentage of customers that feel that real-time information displays would be useful



Source: California Information Display Pilot, General and Pilot Research Findings, Opinion Dynamics Corp. January 6, 2005.