

PowerCentsDC

Smart Grid Washington DC: A Case Study in Empowering Consumers



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PowerCentsDC Case Study

Smart Grid pilot

- About 1,000 residential customers throughout District of Columbia

Integrated “Smart” approach

- “Smart,” dynamic prices
- Energy information feedback: with bills, in home, online
- Smart appliances: automated control via smart thermostats

Consumers had ability to manage their energy costs

- By shifting use from peak to other times
- By reducing total electricity use

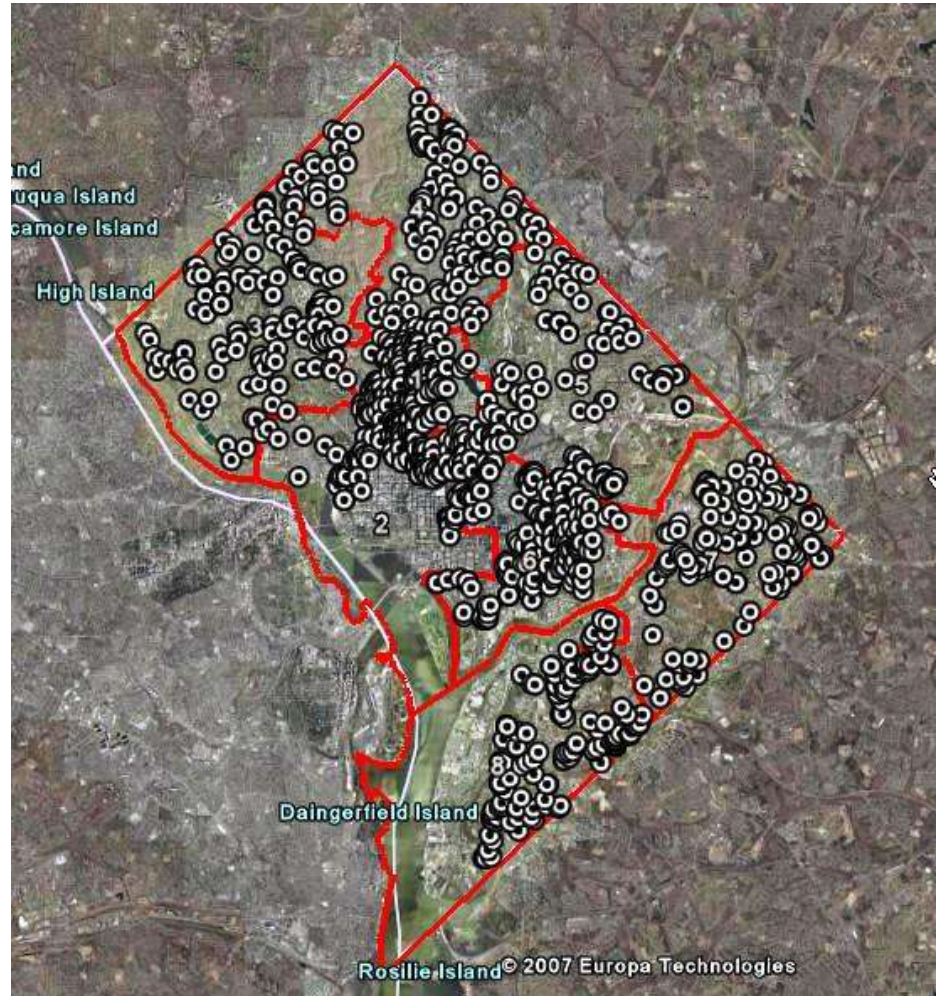
Program Design

- Test goals
 - Test plan by Frank Wolak, Professor of Economics at Stanford
 - How much do consumers reduce peak demand?
 - How do consumers feel about the program and features?
 - Classic experimental analysis by comparing control vs. treatment
- Participants selected randomly
- Customer groups
 - Critical Peak Pricing
 - More than 5x higher prices for 4 hours per day, 15 days per year
 - Discount remaining 8700 hours
 - 2-6 pm summer; 6-8 am & 6-8 pm winter
 - Day ahead notice around 5 pm
 - Critical Peak Rebate
 - Hourly Pricing: regional (PJM) wholesale market price



Sample Distribution

- Entire District
 - All eight wards
- All housing types
 - Single family
 - Multi-tenant
- All demographics
 - Income
 - Education



Participant Education

- Welcome Kit
 - “Smart price” brochure
 - Refrigerator magnet
- Informational meetings
- Ongoing
 - Electric Usage Reports
 - Monthly bill insert
 - Consumer engagement website
 - Smart thermostat in home display
- Blog



Peak Demand Reduction By Group

- Higher price differentials led to greater peak demand reductions

Price Plan	Summer Peak Reduction	Winter Peak Reduction
CPP	34%	13%
CPR	13%	5%
HP	4%	2%

- Participants at all income levels responded to the price signals

CPR Participants by Income Level	Summer Peak Reduction
Residential	13%
Residential with Limited Income	11%

Automation and Weather

- Smart thermostats caused larger reductions

Rate Group	No Smart Thermostat	With Smart Thermostat
R-CPP	29%	49%
R-CPR	11%	17%
AE-CPP	22%	51%
AE-CPR	6%	24%

- Higher temperatures caused larger reductions

Rate Group	Peak Reduction	
	At 85°F	At 97°F
CPP	26%	43%
CPR	8%	20%
HP	3%	3%

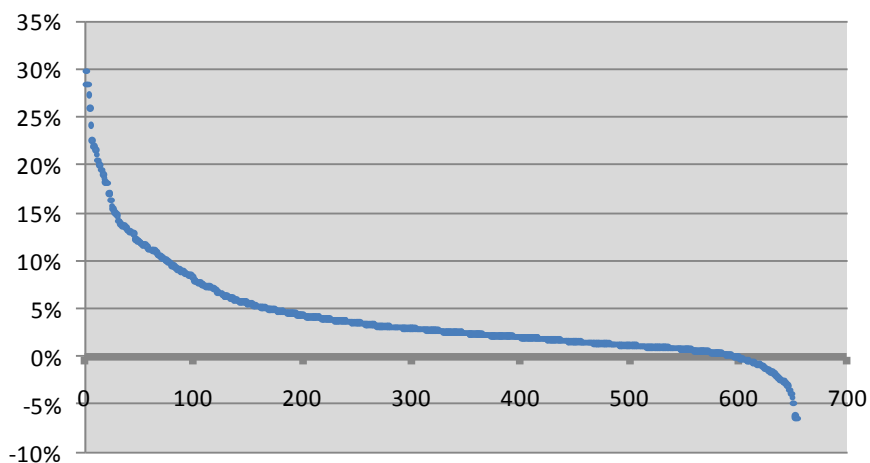
Bill Savings

- Prices designed to be revenue neutral
 - Average customer pays same bill if no peak load reduction

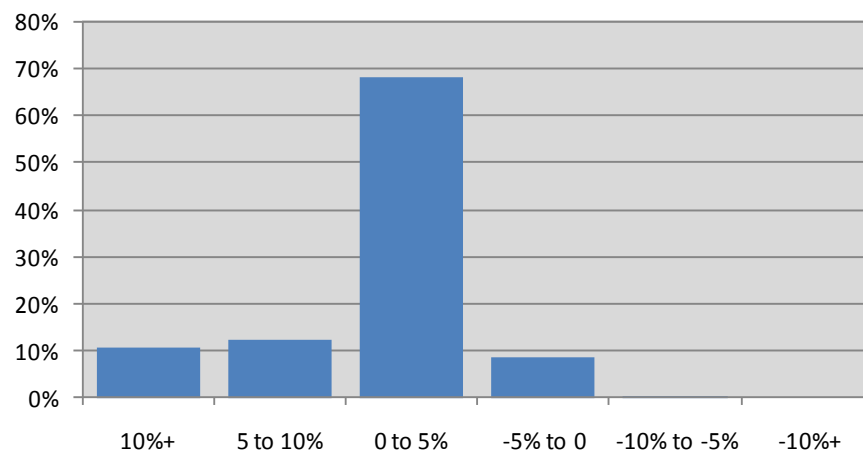
Analysis for CPP and CPR customers

- **91% of participants saved money**
- Average 12-month savings was \$43.83 (4%)
- Average 12-month bill increase for the other 9% was \$17.43 (2%)

Percent Savings by Individual CPP or CPR Participant

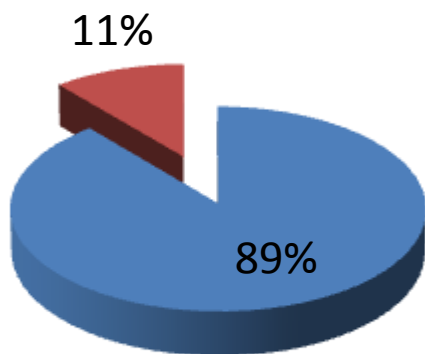


Participant Savings by Range



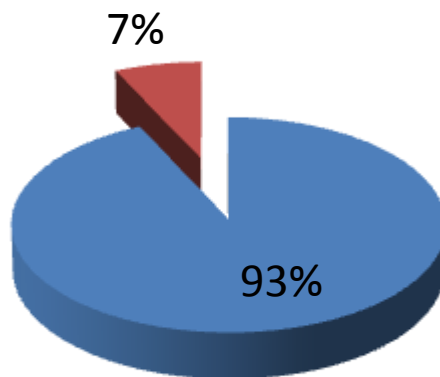
Participants Liked the Program

Would you recommend PowerCentsDC electricity pricing to your friends and family?



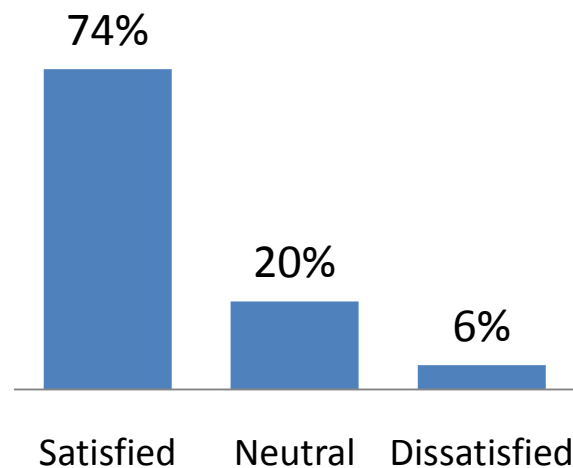
■ Yes ■ No

Which price plan did you prefer?

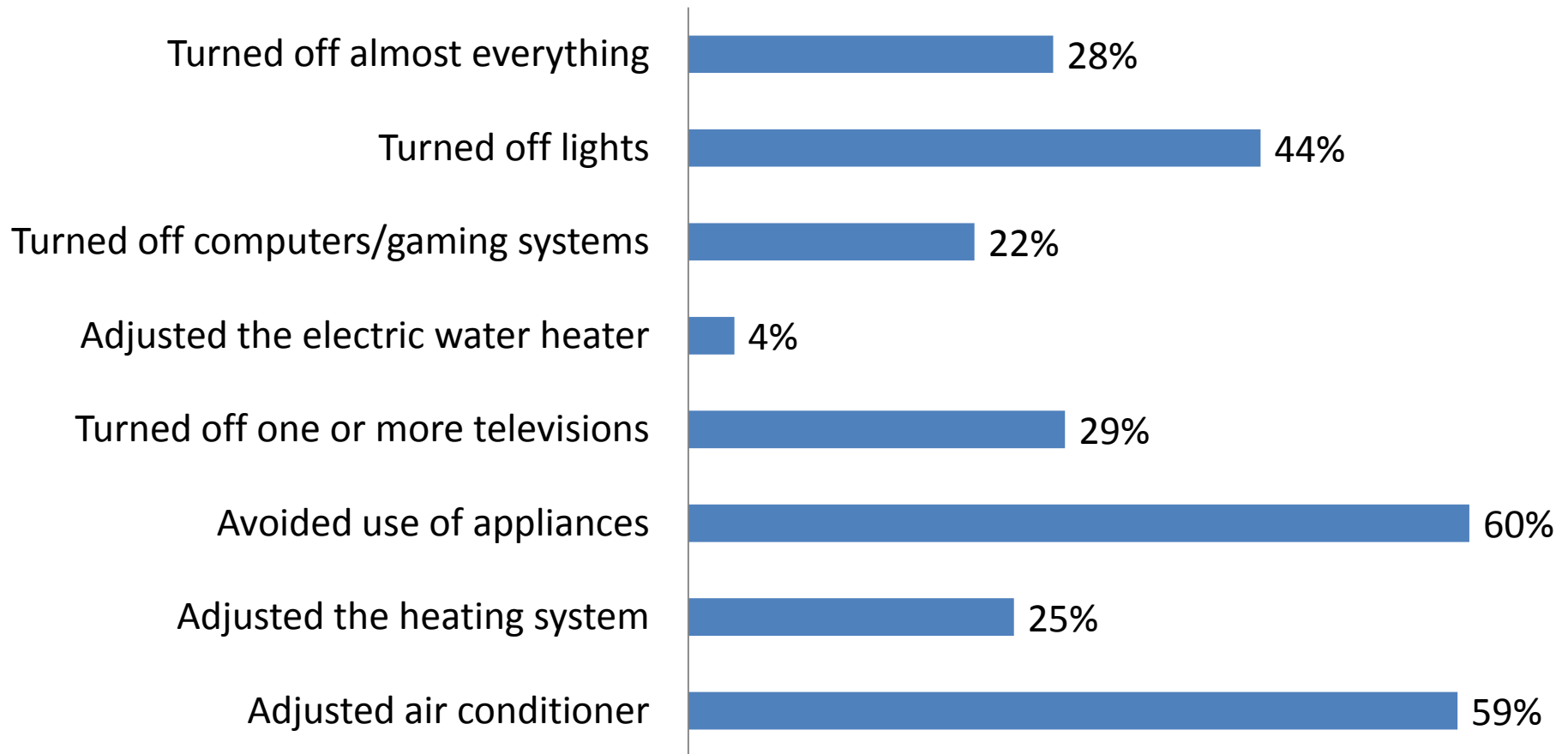


■ PowerCentsDC Plan
■ Former Pricing Plan

Overall, were you satisfied, neutral, or dissatisfied with the PowerCentsDC program?



What actions, if any, did you take to reduce your electricity use during critical peak periods or during times of high energy prices?



Conclusions

- Consistent with other pilot programs, PowerCentsDC showed that consumers reduced summer peak demand in response to dynamic prices, energy information, and automated control,
- CPP prices led to the greatest peak demand reductions,
- CPR prices were most popular,
- Customers with limited income signed up at higher rates than others, reduced peak load less than others, and saved money on the program,
- Summer peak reductions were greater than winter, implying more discretionary load,
- Automated response via smart thermostats increased the reduction, and
- The vast majority of participants saved money, even with revenue neutral prices.

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- Thank you!
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