

Offer it...and They Will Save?

A look at direct load control and innovative pricing pilot results.

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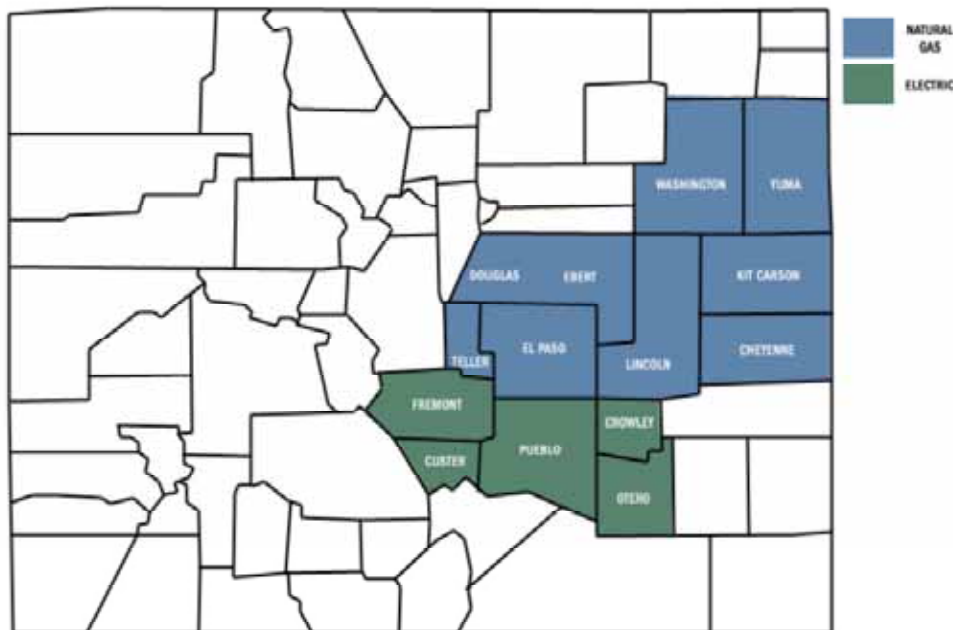
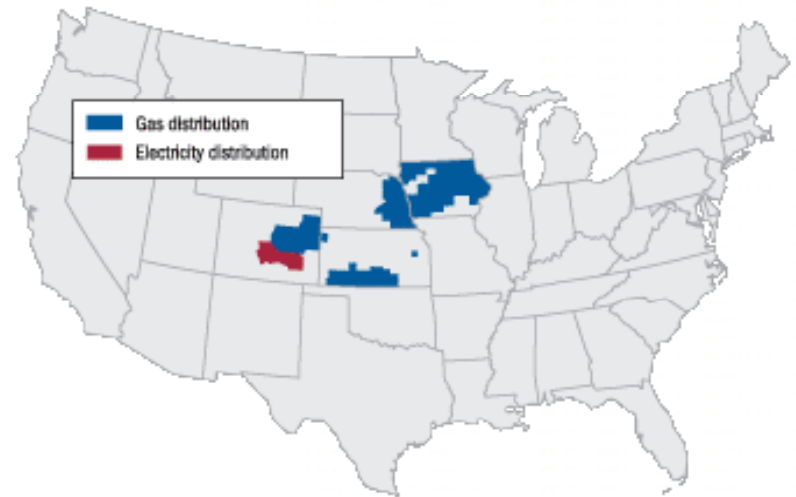
Agenda

- Black Hills Energy overview
- AMI infrastructure
- Demand response pilot overview
- Results and key observations
- Lessons Learned for the future
- Conclusion

Black Hills Energy – Who are we?

Black Hills Energy is a Black Hills Corporation company that provides electric and natural gas service to over 759,000 customers in Colorado, Iowa, Kansas, Montana, Nebraska, South Dakota and Wyoming.

www.blackhillscorp.com



In Colorado, we provide electric and gas service to approximately 170,00 customers in 35 southern Colorado communities.



AMI Infrastructure

BHE's Advanced Metering Infrastructure (AMI)

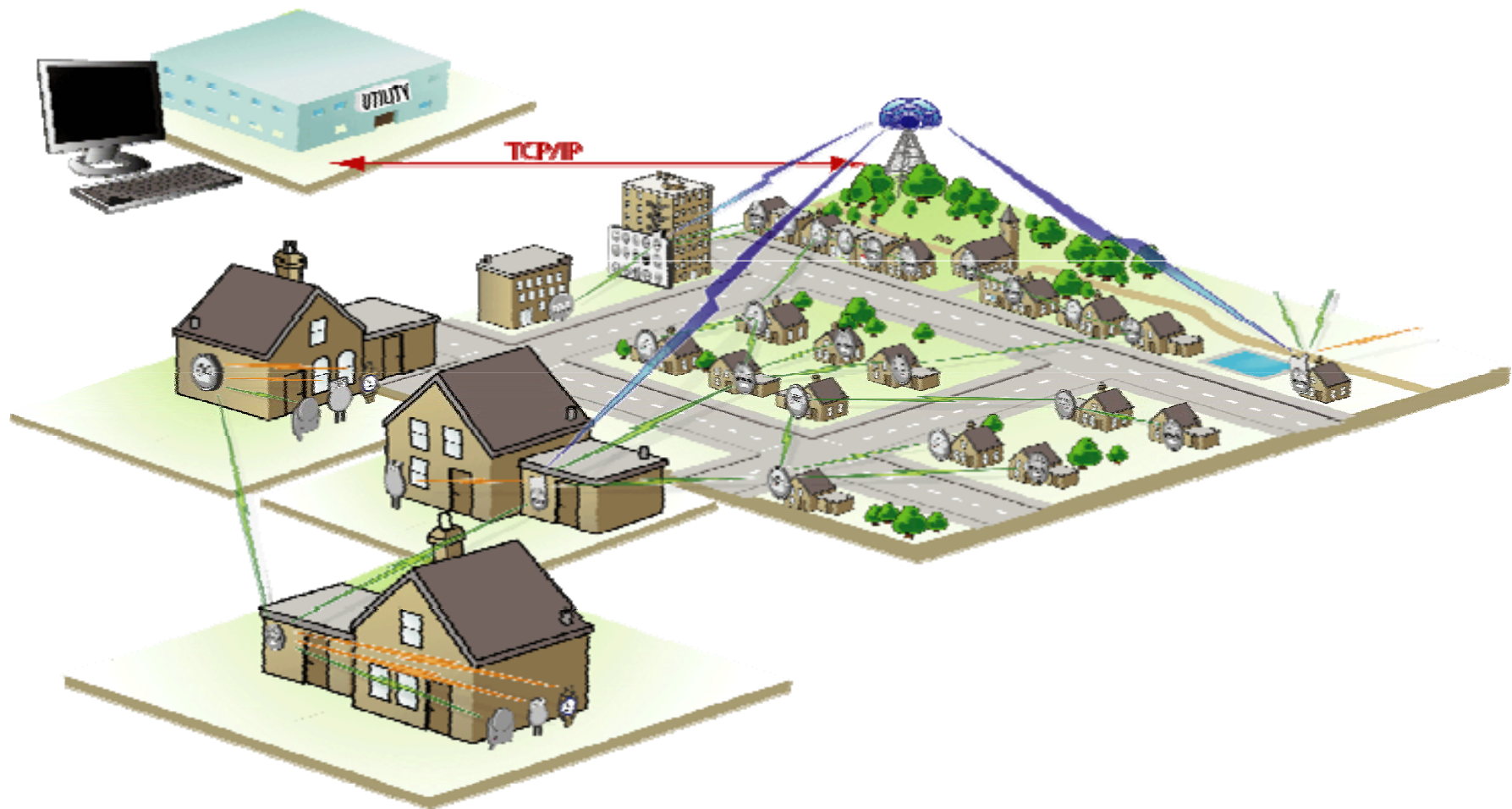
- Every home and business in Black Hills three electric service territories now has a smart meter (roughly 200,000 meters)
- AMI smart metering has taken 50 vehicles - and their carbon footprints - off the streets
- Virtually 100% accurate
- Near real-time meter reads
- Remote turn-on/turn-off
- Enables “whole house” connectivity



Current AMI Technology Deployed

- Current AMI system is an Elster Energy Axis System
- Communication via 900 Mhz Wireless mesh network technology
- Collectors are installed throughout the entire service territory that gather meter information that communicates back to the Metering Automation Server (MAS) via digital cellular communications
- Meter information is exchanged between the MAS server and the CIS system for billing and records

Typical Mesh Network Topology





Demand Response Pilot Overview

Demand Response Pilot

Two pilot programs were offered:

- Direct Load Control

- ✓ intended to gauge customer response to direct control of HVAC cooling during peak events
- ✓ 10 4-hour events June through September 2010 & 2011
- ✓ usage reduction automatic - 5 degree temperature increase

- Innovative Pricing

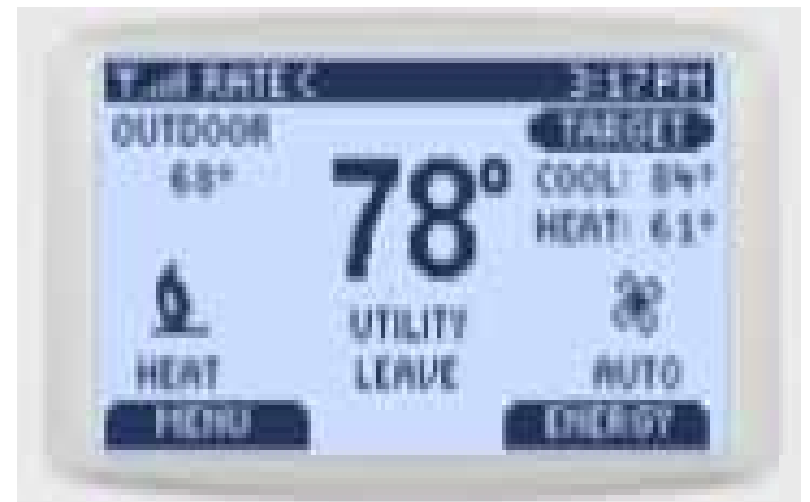
- ✓ intended to gauge customer response to pricing signals
- ✓ 10 4-hour events June through September 2010 & 2011
- ✓ customer action required to increase thermostat temperature and to take other usage reduction steps to earn more credit

Demand Response Pilot

- Valiant recruitment efforts resulted in limited participation.
 - Direct Load Control (DLC) – 128 participants Year 1, 112 year 2
 - Innovative Pricing Program (IPP) - 126 participants Year 1, 114 Year 2
- Participants for each pilot randomly assigned to DLC or IPP (per PUC).
- Each participant received a “smart” thermostat, two way Zigbee enabled meter and a credit on their November bill.
- A baseline control group consisted of 197 customers for each year and provided BHE with a “yardstick” to measure energy savings for the DLC and IPP for each peak event over what would have been expected if neither pilot program were in effect.
- Information provided proactively to customers once enrolled was limited to: (1) day ahead event alert and, (2) end of program individual customer result credit for the summer.

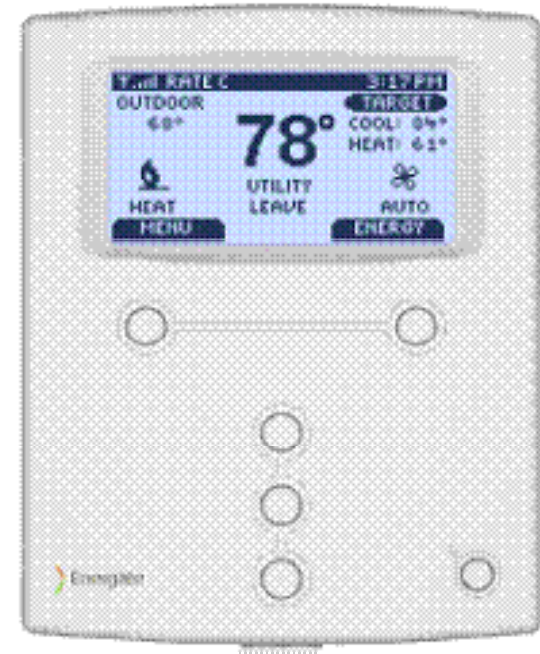
Direct Load Control Program

- Customer received a “day-ahead” message that BHE was calling an event for the next day 2- 6 p.m.
- BHE remotely raised the thermostat by 5 degrees during the event no higher than 84° .
- Customer could override the signal and manually adjust thermostat.
- Customer could opt out of any one event and still receive the full \$30 credit.
- If customer opted out of more than one event, they forfeited the credit but kept the thermostat.
- Customer chose whether or not to participate in the 2nd year pilot program.



Innovative Pricing Program

- Customer received a “day-ahead” message that BHE was calling an event for the next day 2-6 p.m.
- Any curtailment below the normal usage during that time period (taken from previous 5 days) received a rebate credit that was calculated based on the load reduction and the offer price for each event, at a minimum \$0.50 per kWh.
- Customer chose to participate and how to reduce energy use (washer/dryer, AC, dishwasher, lights, etc.).
- No obligation to participate and no penalty.



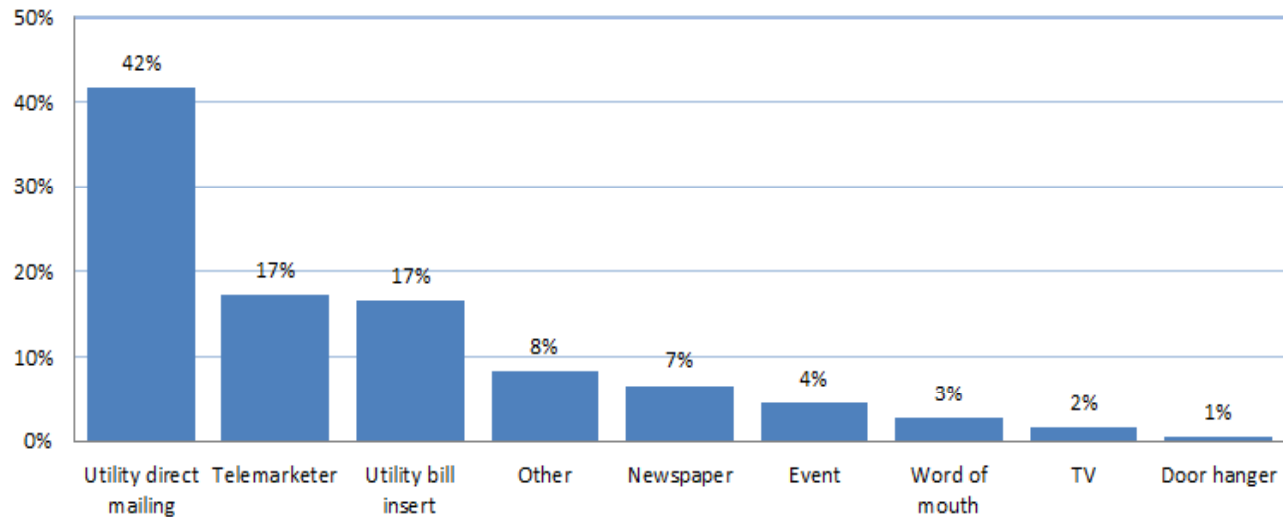


Results and Key Observations

Pilot Results - Outreach

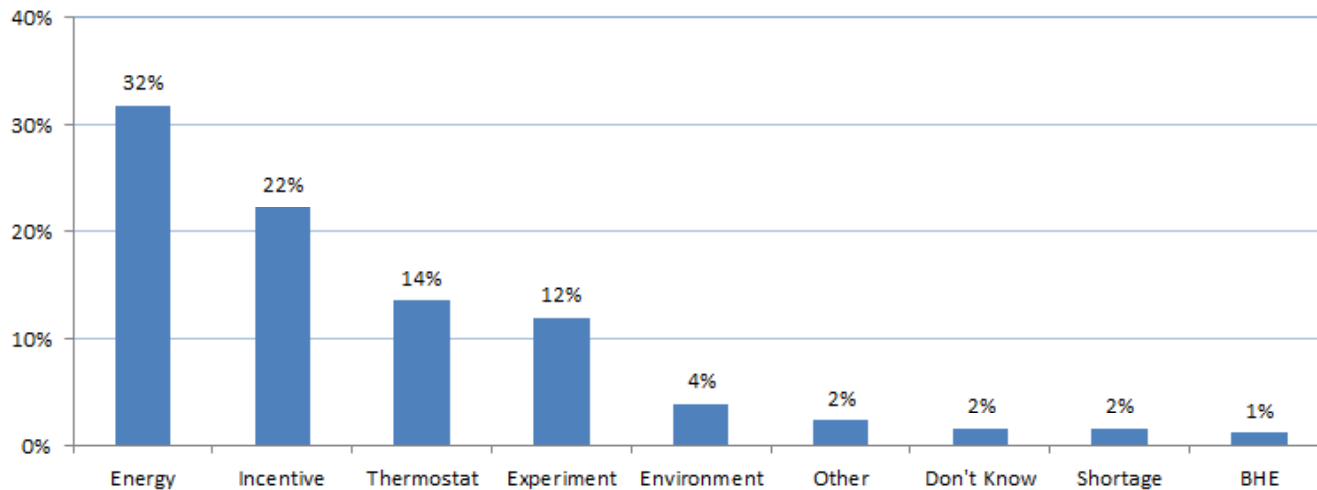
Program enrollment was challenging.

- Black Hills Energy implemented several marketing and outreach campaigns to enroll customers, but only succeeded in 297 enrollees in Year 1 and 284 in Year 2.
- Customers who did enroll, most often first heard about the program from the utility direct mailing.



Pilot Results - Motivation

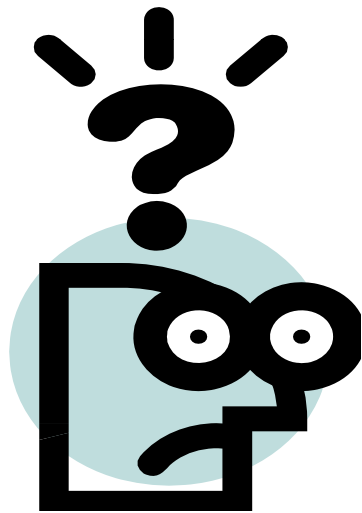
The primary motivation for customers to participate was the promise of energy savings followed by the offer of an incentive.



Customers were also curious about the smart thermostat and about participating in an energy savings experiment.

Pilot Results – Technology

Customers had difficulty understanding and operating the smart thermostat causing many to drop-out of the program.



“It was not worth the effort to learn how the new thermostat worked. It was too complicated.”

“It was just too much technology for us, and we're not technology people. It's frustrating.”

“Honestly, I think the thermostat was the problem. I did not understand the signals or manual. I could not understand what I was trying to accomplish.”

Pilot Results – Energy Reduction

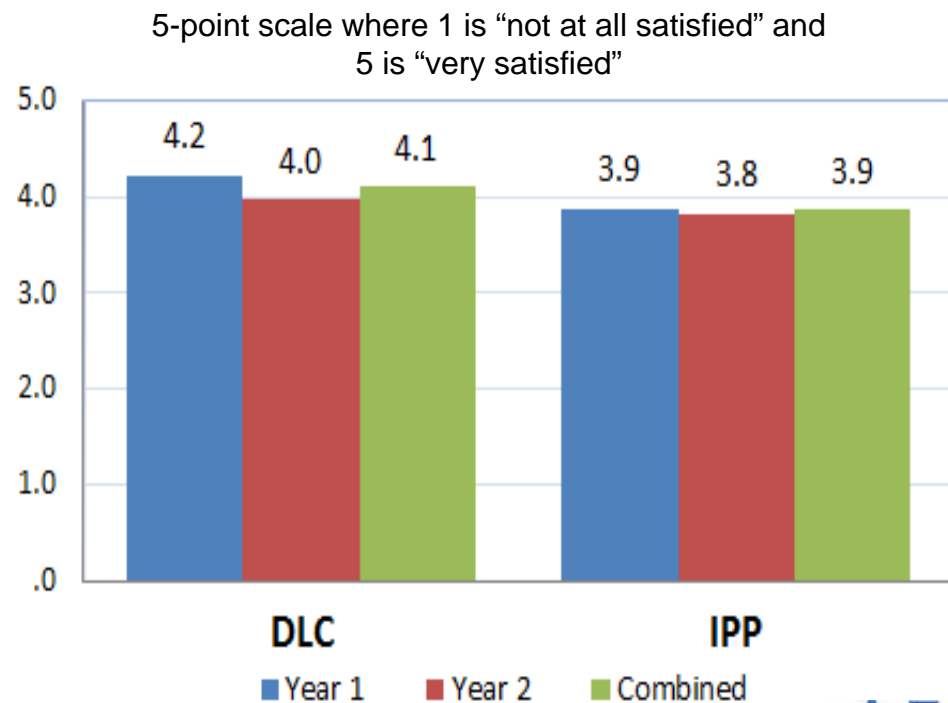
- In Year 1, the clear winner was the DLC program who, in aggregate, achieved an encouraging 40% energy savings during the 10 peak events as compared to their baseline usage.
- In comparison, the IPP counterparts achieved a moderate 2% reduction in energy savings while...
- the baseline group increased their usage by 6%.

Note: Year 2 results will be available mid-January

Pilot Results – Satisfaction

Despite the challenges, those that remained in the program were largely satisfied.

- The average satisfaction of the program overall was 4.1 for DLC and 3.9 for IPP over the two-year pilot.
- Supporting this high satisfaction is that 40% of DLC and 35% of IPP customers recommended the program to a friend or family member.





Lessons Learned for the Future

Pilot Results – Lessons Learned

- Program technologies matter.
- DLC is a good fit for many customers.
- A voluntary curtailment program also has potential for some customers.
- Information may assist savings; however, in order to achieve these savings the program must provide real time feedback on consumption.
- Keep program requirements simple and the message explaining the programs clear.
- More money and less pain may increase program recruitment and retention.

Conclusion

Conclusion – What is next for BHE?

The objective to test the effectiveness of two different demand response program options—Direct Load Control and Innovative Pricing by leveraging the existing AMI infrastructure—was achieved.

We gained valuable insight into the current mindset of this customer base along with lessons learned for future load control and behavioral based program development and implementation.

BHE believes that these types of offerings are the future of energy savings and is committed to leveraging the lessons learned from this pilot and other research for future program development.



Questions and Observations?



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Baltimore, MD**

Oct. 15-17, 2012

**AESP's Fall Conference
Long Beach, CA**

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