



Power System
Engineering, Inc.



Dynamic Pricing Programs

Focus on Peak-Time Rebate Programs



**Kansas Rural Electric Cooperative
Accountant's Association**

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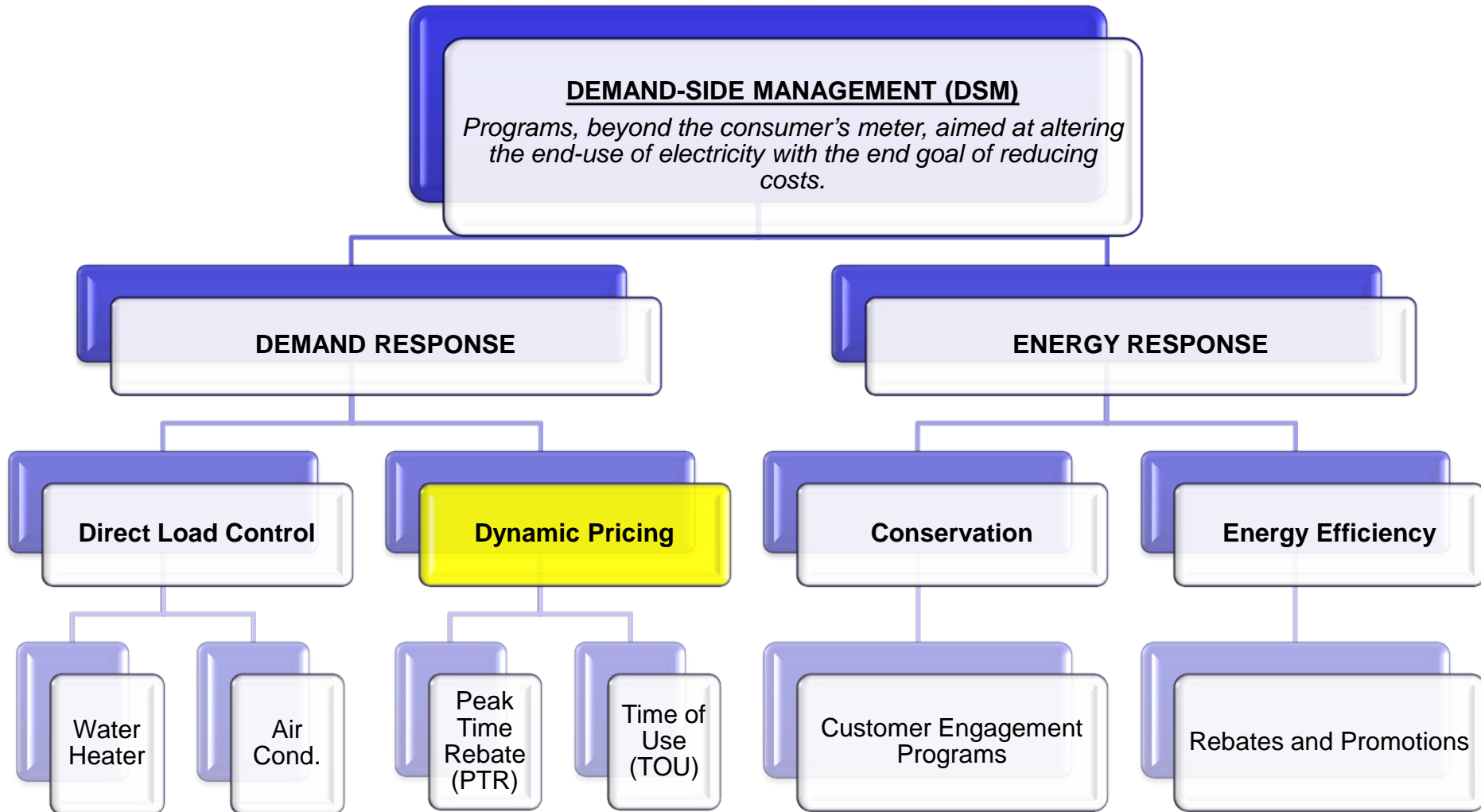
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Customer Engagement & Demand Charges

- Members are expecting their cooperatives to become “trusted energy advisors”
 - Pricing programs can help engage and educate members
- Both generation and transmission demand charges are increasing throughout the industry and make up a large portion of the total cost of service
 - With AMI meters being deployed, pricing programs provide a low-cost way to lower these demand charges

Demand Side Management (DSM) Overview



What is a Dynamic Pricing Program?

- Essentially: Any rate structure that does not have a flat rate
- Any rate structure where price of electricity varies with time (hour, day, month, season)
- Can be as simple as block peak rates (e.g. \$0.25/kWh from 3 p.m. to 6 p.m. every day, \$0.15 all other times) or as advanced as real-time pricing
- Peak-time rebate is often classified as a dynamic pricing program, even though it technically does not change the rate structure (PTR can be used with a flat rate)
 - More on PTR later

Types of Dynamic Pricing Programs

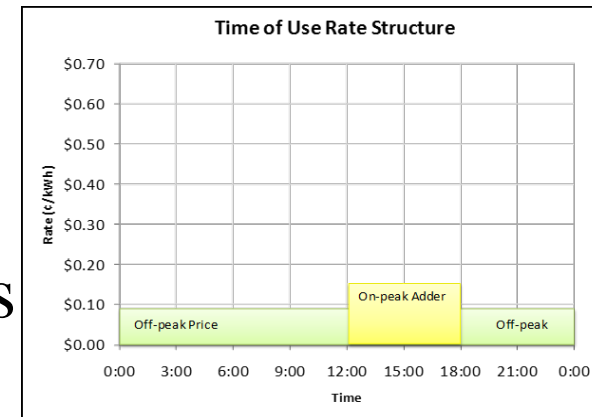
Time of Use (TOU): Differentiated prices at pre-set time of day (e.g. all summer weekdays between 1:00 p.m. – 5:00 p.m.; winter weekdays between 5:00 p.m.– 8:00 p.m.)

Pros:

- Easy to set up
- No need to notify members of events

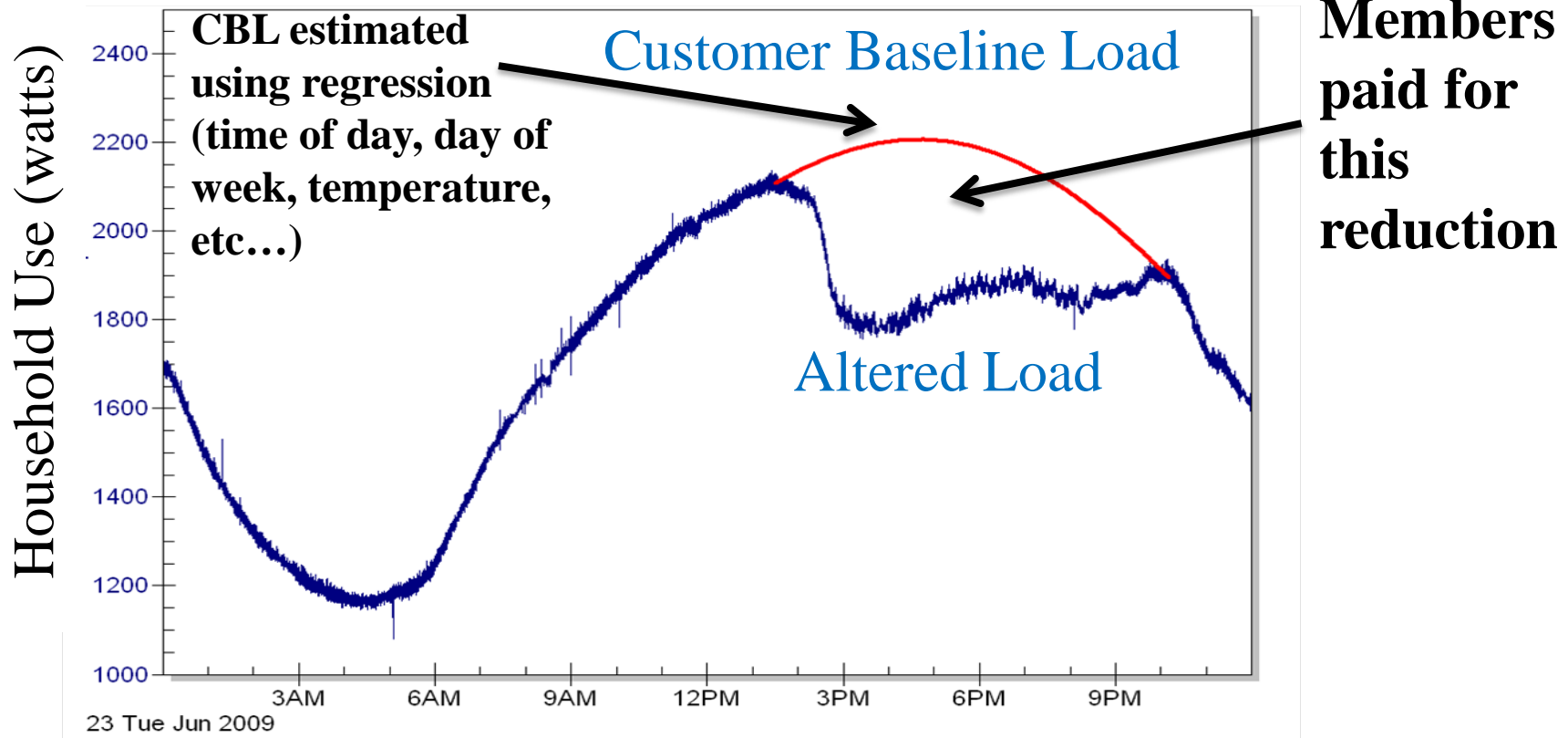
Cons:

- Members need to react every single day for maximum impact
 - Small impacts because of this
- Lost revenue on every high-price block
- Members can be harmed on TOU



Peak-Time Rebate (PTR)

- Pay rebate to consumers for actual load reduction (cooperatives should set the rebate amount equal to or below power supply/transmission savings).



Peak-Time Rebates

- Reward members for reducing electricity demand during peak event hours (after being informed by their utility of an “event”)
 - Rebate check could be monthly, quarterly, or annually
 - Can also pay by bill credit (not recommended)
- Signals
 - Text messages, E-mail, phone call
 - Social media, local media
 - In-home display (more costly)



Advantages of PTR

- PTR programs are completely voluntary (and can be combined with load control, TOU, or other programs)
- Very low revenue erosion relative to TOU
- Members cannot be harmed by a PTR program.
- Members control how much or how little they reduce
- PTR programs do not require any change in the rate structure.
- Participation rates in PTR programs are high.
- Customer satisfaction with PTR programs is high.
- No equipment (aside from AMI) is required.
- Small risk of “stranded assets” if wholesale rates change

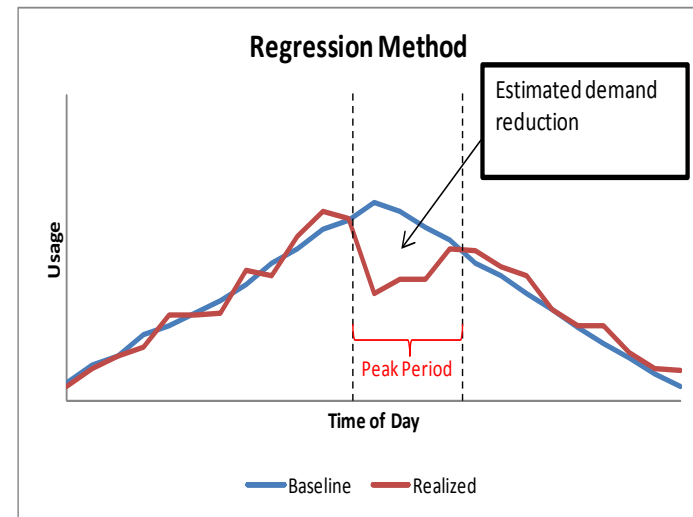
PTR Disadvantages

- Need to predict event days
- Need to notify members of event
 - This is fairly easy and inexpensive to accomplish with text and e-mail
- Need to calculate an accurate baseline (what they would have consumed without the event)
 - This is the key to a successful program



Baselines

- PSE highly recommends using regression techniques to evaluate baselines (need to provide accurate evaluations of reductions and prevents gaming)
 - For cooperatives where we've run regressions on rebate amounts, they've had successful programs
 - Cooperatives have increased margins, members received rebates, very few member complaints, and high satisfaction
 - Heartland approach
 - Accurate and no gaming

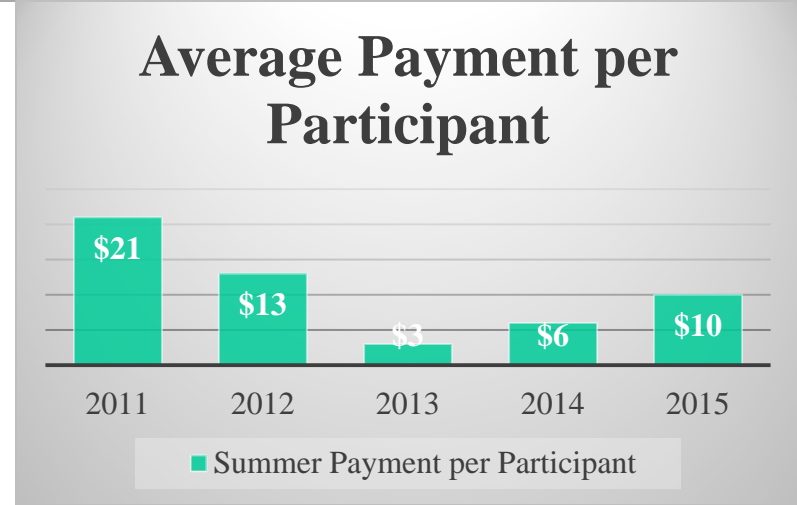
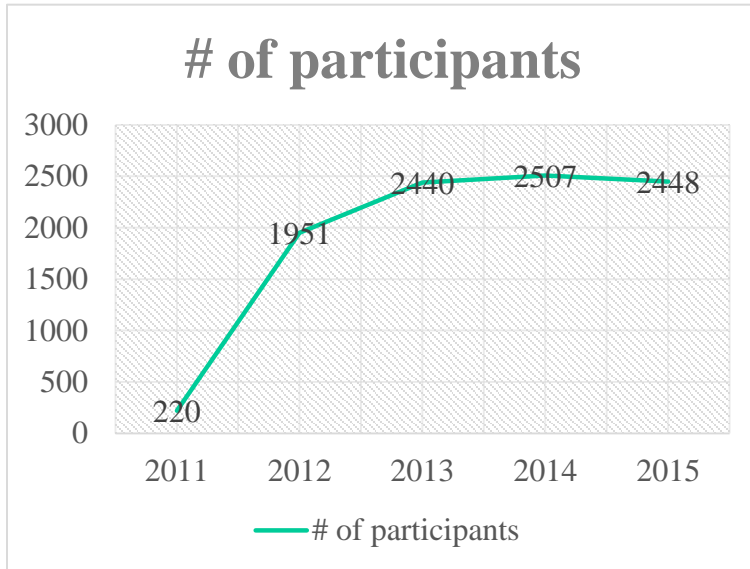


Case Study: Heartland Rural Electric Cooperative

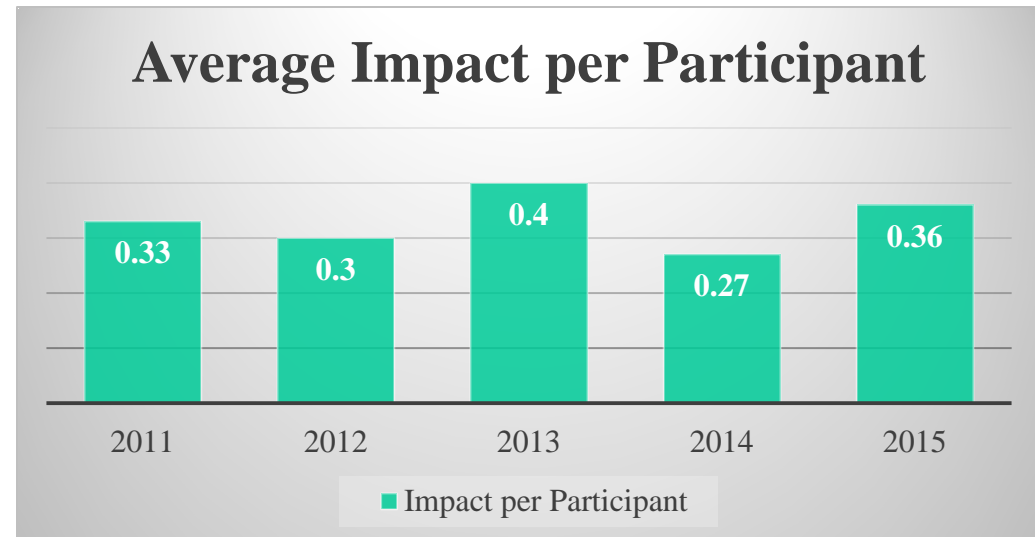
- Cooperative in Eastern Kansas (~ 10,000 members)
- In 2010, PSE examined costs/benefits of DSM programs
 - Recommended a PTR with a rebate of \$1.00/kWh
- Summer of 2011: Heartland piloted the program
 - Initial 20% sign-up rate
- Send separate checks at end of summer
- Fully deployed in 2012
- Currently 25% of members signed up



Graphical Depiction of Heartland PTR

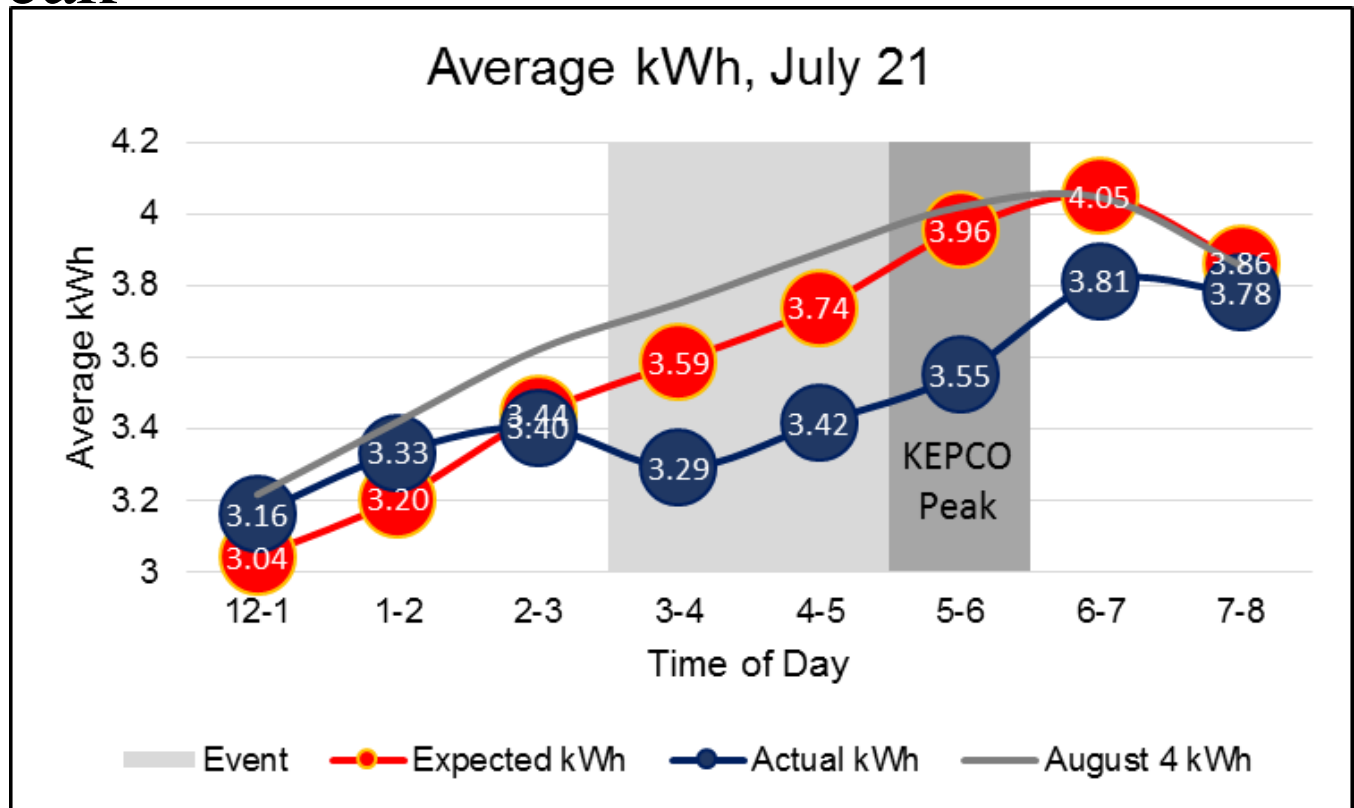


Highest impact members usually receive over \$100 and provide 3 kW or more. Heartland pays \$1/kWh during events.



2016 Results

- 2,345 residential participants
- Impact of 0.41 kW per participant (961 kW) at KEPCo peak



2016 Cost/Benefit

- Heartland members made almost \$75k in 2016 with no risk of stranded costs

2016 PeakSavers Benefits and Costs	
<u>Benefits</u>	
	Demand Saved at KEPCo Peak (kW)
	1060.037
	KEPCo demand charge savings (\$)
	\$ 96,940.38
<u>Costs</u>	
	Rebates Paid
	\$ 11,000.00
	PSE fees
	\$ 20,000.00
	Check mailing and other costs
	\$ 2,000.00
Total Costs	\$ 33,000
<u>2016 Margins</u>	
	\$ 63,940.38
<u>2016 Financial Benefit to Members</u>	
	\$ 74,940.38

Case Study #2 (Sunflower/MKEC)

- PSE provided a turnkey option to a G&T for a PTR pilot in summer 2015 for 6 of their member cooperatives
- Events times and durations varied between 12 p.m. and 9 p.m.
- When events were determined for a particular participant group, two notifications were sent to the provided text numbers and / or emails
 - Event Notification (sent either the evening before, between 5:15 p.m. and 5:45 p.m., or the morning of the event, around 10:00 a.m.)
 - Event Reminder (sent about 20 minutes prior to the event)
- Actual usage during Peak Event compared to econometrically-modeled baseline
 - Rebate of \$0.75 paid per kWh reduced during Peak Events

Residential Pilot Recruitment

- Enrollment packets mailed in late March
 - Cover letter with enrollment form & return envelope
 - Information Brochure
- Enrollment Form
 - Requested authorization to enroll in the program & contact information



Peak Time Rebate Program

I understand that I have the opportunity to participate in Southern Pioneer's Peak Time Rebate program this summer (expected to be June through August). For that purpose only, I am authorizing and requesting to be notified of peak events as indicated below (text messaging is the default method). Please provide all that apply:

Text Message Phone #: _____ Second Text Message Phone #: _____

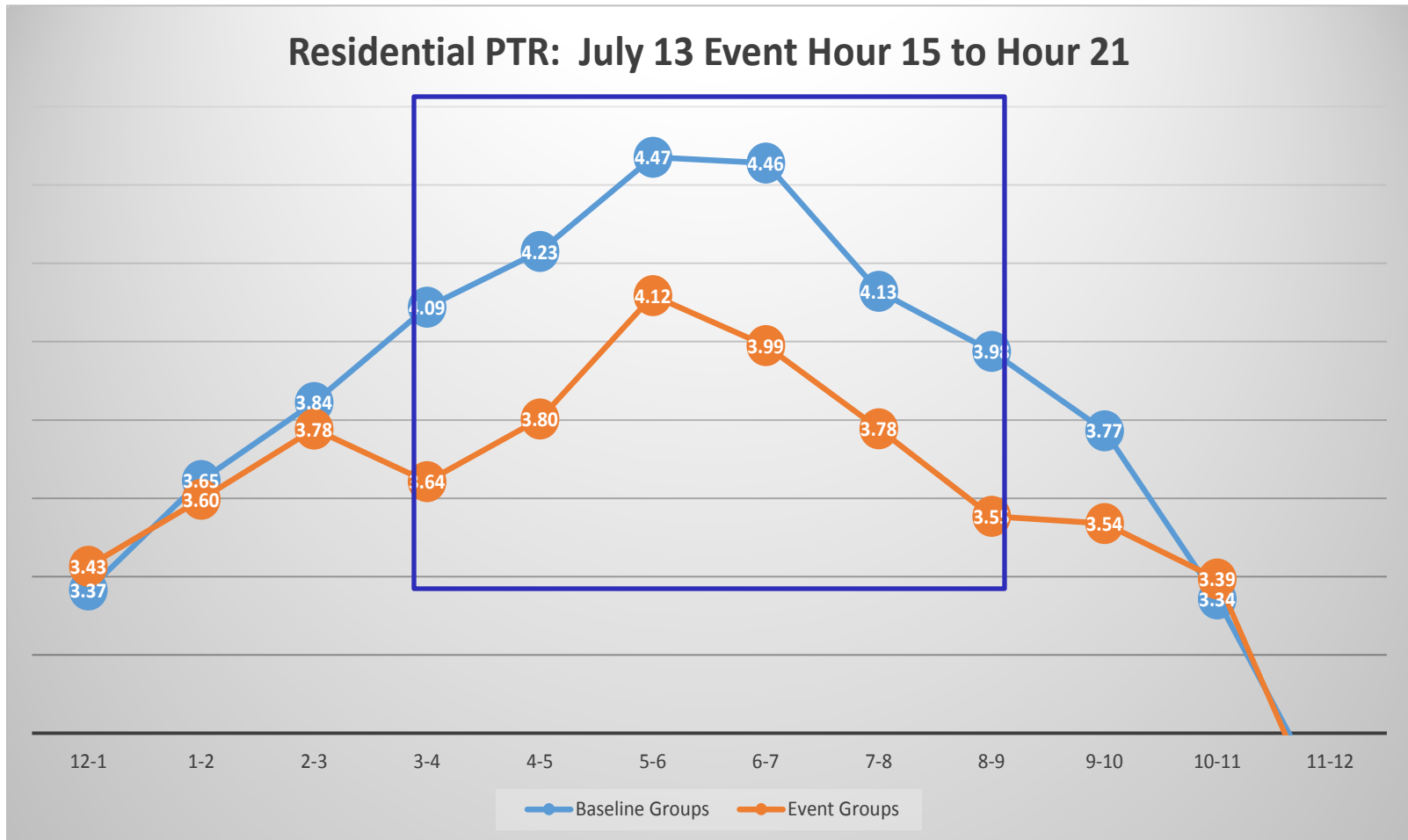
Email Address: _____ Second Email Address: _____

Signature: _____ Date: _____

'A Wholly-Owned Subsidiary of Pioneer Electric Cooperative, Inc.'

Peak Day in 2015

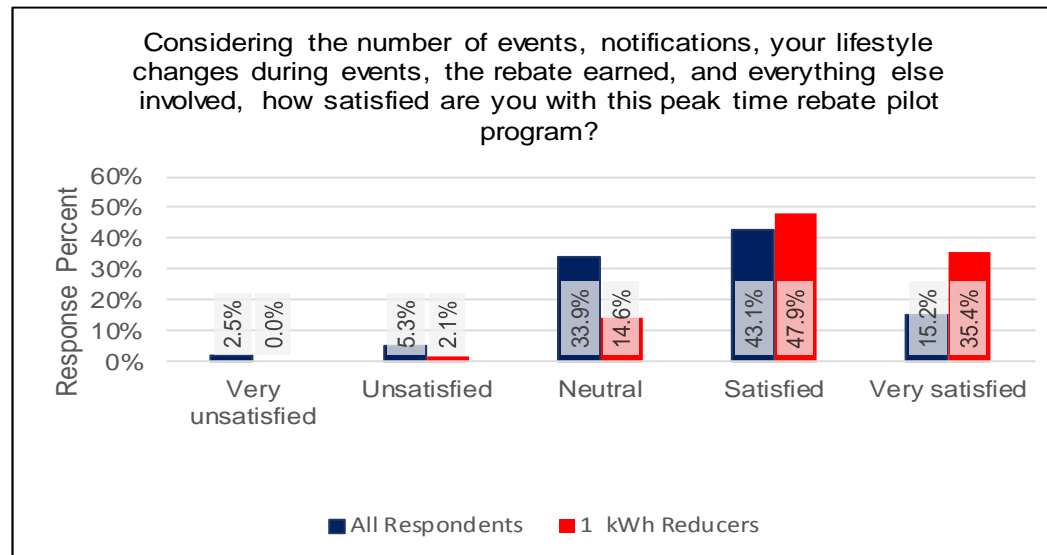
- PTR event was called for 6 hours from 3:00 to 9:00



Question 20: Program Satisfaction

Q20 Considering the number of events, notifications, your lifestyle changes during events, the rebate earned, and everything else involved, how satisfied are you with this peak time rebate pilot program?

	Frequency		Percent	
	All Respondents	1 kWh Reducers	All Respondents	1 kWh Reducers
Very unsatisfied	7	0	2.5%	0.0%
Unsatisfied	15	1	5.3%	2.1%
Neutral	96	7	33.9%	14.6%
Satisfied	122	23	43.1%	47.9%
Very satisfied	43	17	15.2%	35.4%
Total Responses	283	48	100.0%	100.0%
Missing Responses	10	0		
Percent Missing	3.4%	0.0%		



G&T PTR Study Conclusions

- Impacts were as expected (at 0.31 kW)
 - Participation rates as expected (around 20%)
- Having first notification time at “morning of” (as opposed to day before) did not significantly erode impacts
 - Increases real-time dispatch of program (may want to test this even later in the day)
- Impacts do not erode and may even increase as temperature increases (there when you really need it)
- Half of impacts come from 1 kWh reducers (all said they’d either do the same or reduce more if on the program next year)

Quick Business Case Evaluation PTR vs. TOU

- Assume power supply \$ kW-year = \$120
 - Requiring 30 hours of events to hit summer peaks
- Assume a 5,000 residential member system
 - PTR and TOU participation rate of 25% = 1,250 members
- TOU rate: \$0.30/kWh on-peak, \$0.10/kWh off-peak
 - On-peak is June, July, Aug., and Sept. 3:00 – 6:00
 - Demand impact of 0.15 kW in all four months
- PTR rebate: \$1/kWh rebate payment
 - Demand impact of 0.30 kW in all four months

TOU and PTR Benefits

- $\text{TOU} = 1,250 * 0.15\text{kW} * \$120/\text{kW} = \$22,500$
- $\text{PTR} = 1,250 * 0.30\text{kW} * \$120/\text{kW} = \$45,000$

Line losses should be added in for both cases

Assume 5%

TOU benefits = \$23,625

PTR benefits = \$47,250

TOU and PTR Costs

- TOU lost revenue = \$9,900 (88 days * 3 hours * 0.15 kW * \$0.20/kWh * 1,250)
 - Plus other costs such as rate design, education, billing
 - Assume \$0 for this business case
- PTR rebate costs = \$11,250 (30 hours * 0.30 kW * \$1.00/kWh * 1,250)
 - PTR other costs (rebate calculations, notifications, bill credits/checks, education, marketing) = \$12,500 @ \$10/participant
- **Member inconvenience**
 - TOU = inconvenience for 264 hours
 - PTR = inconvenience for 30 hours

Summarized Results

Using Current Assumptions

Program	Benefits	Costs	Margins	Member Inconvenience Time
TOU	\$23,625	\$9,900	\$13,725	264 hours
PTR	\$47,250	\$23,750	\$23,500	30 hours

Conservative Assumptions:

1. Unlikely to see a sustained 0.15 kW reaction from TOU with only a 20 cent gap
2. Participation rates will be higher for PTR than TOU
3. No rate study, education, etc... costs included in analysis for TOU

How Can This Work?

- Step 1: Need AMI and ability to reliably gather and store interval data for each participant
 - Decision on whether to include current load control members in PTR, or to exclude them
- Step 2: Verify interval data processing and develop marketing and overall program strategy
- Step 3: Fully deploy program and evaluate/improve

Questions?

Thank You



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