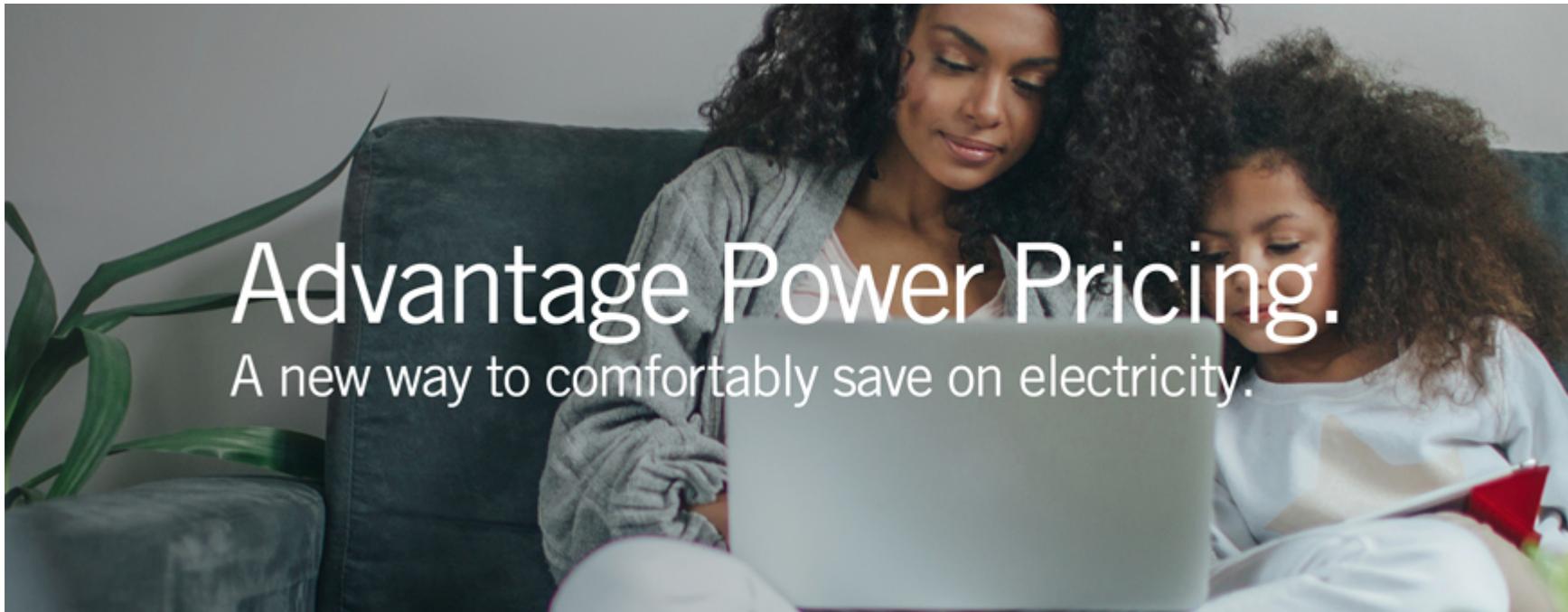


Evolving Variety

How Price Response Varies by Enabling Technology

alectra
Discover the possibilities

NAVIGANT



Presented at the 36th PLMA Conference

November 15, 2017

What is Advantage Power Pricing?

APP is a technology-enabled dynamic residential electricity pricing pilot program.

- Timing:** APP began May, 2015 and is scheduled to run until the end of 2018.
- Design:** The program design is based on the OG&E “SmartHours” program, but targeted to serve Ontario’s future system needs.
- Technology:** Summer 2015 participants were all provided with Energate technology. Since then, legacy provincial DR program participants with controllable thermostats, and “bring-your-own-device” (BYOD) participants have also been enrolled.

How do the APP prices work?

Weekday APP Price Schedule

(Weekends and holidays only Off-Peak price)

Midnight

3pm

9pm



Off-Peak: 4.9 ¢/kWh

Low: 10 ¢/kWh
~50% of days

Medium: 19.9 ¢/kWh
~30% of days

High: 39.8 ¢/kWh
~20% of days

CPP Rate: 49.8 ¢/kWh Unscheduled Critical Peak Price (CPP) events: 6/season and 1-4 hours in length.

All participants receive bill protection until January 2018

Standard Mandatory Weekday TOU Price Schedule

(May through Oct.)



Midnight

7am

11am

5



(Nov. through Apr.)

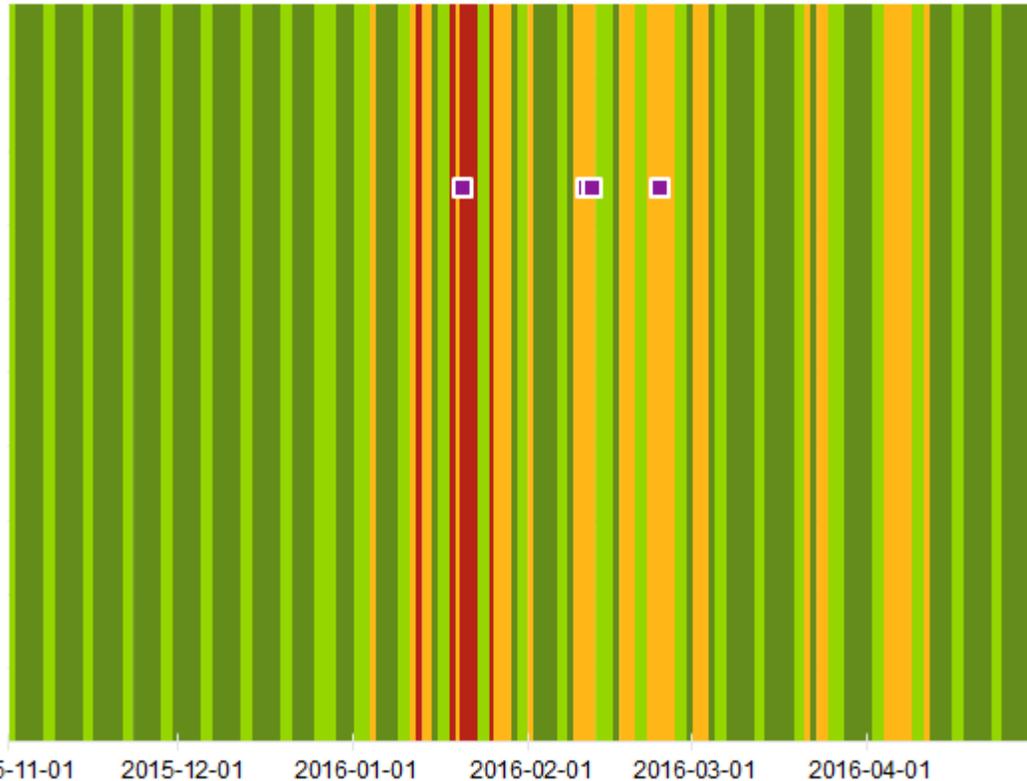
Off-Peak: 6.5 ¢/kWh

Mid-Peak: 9.5 ¢/kWh

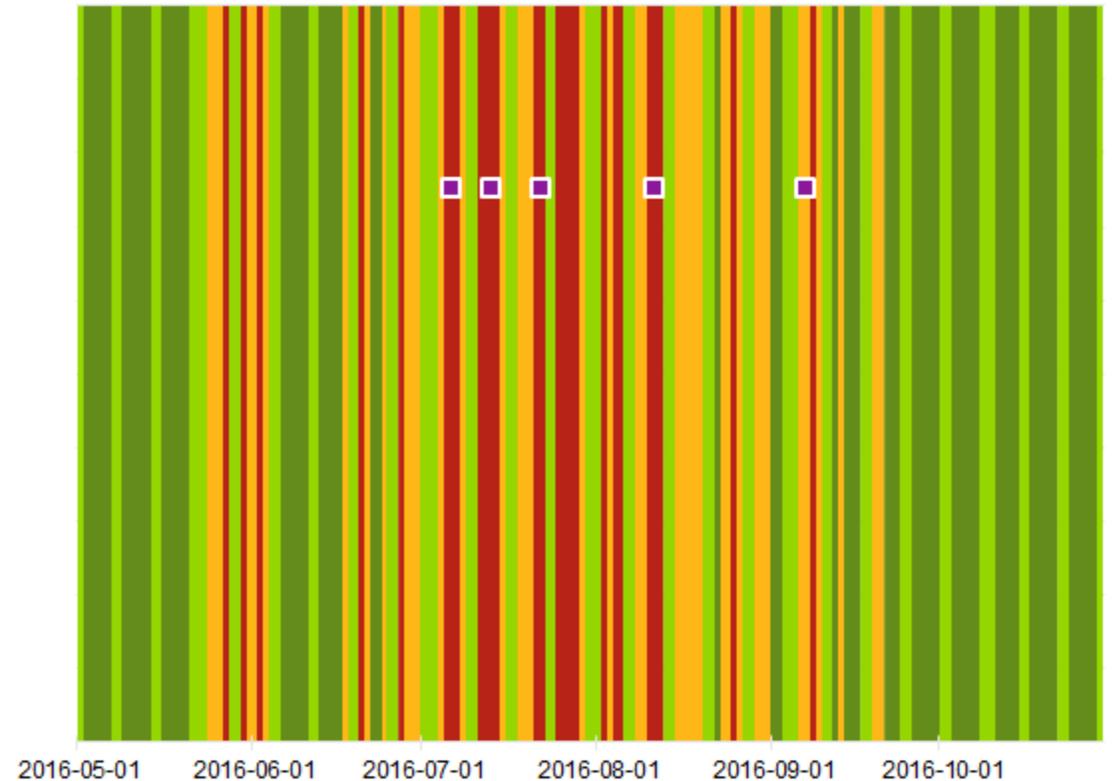
On-Peak: 13.2 ¢/kWh

What was the pattern of pricing days?

Winter 2015/2016



Summer 2016



■ APP Off-Peak ■ Low ■ Medium ■ High ■ Critical Peak Event

■ APP Off-Peak ■ Low ■ Medium ■ High ■ Critical Peak Event

What are the enabling technologies?

Energate (Standard)



Energate (Pioneer)



Honeywell (legacy DR)



BYOD



Free to customer?

Yes

Yes

Yes

No

Price-sensitive response?

Yes

Yes

Yes*

No

Electric end-use controlled

A/C

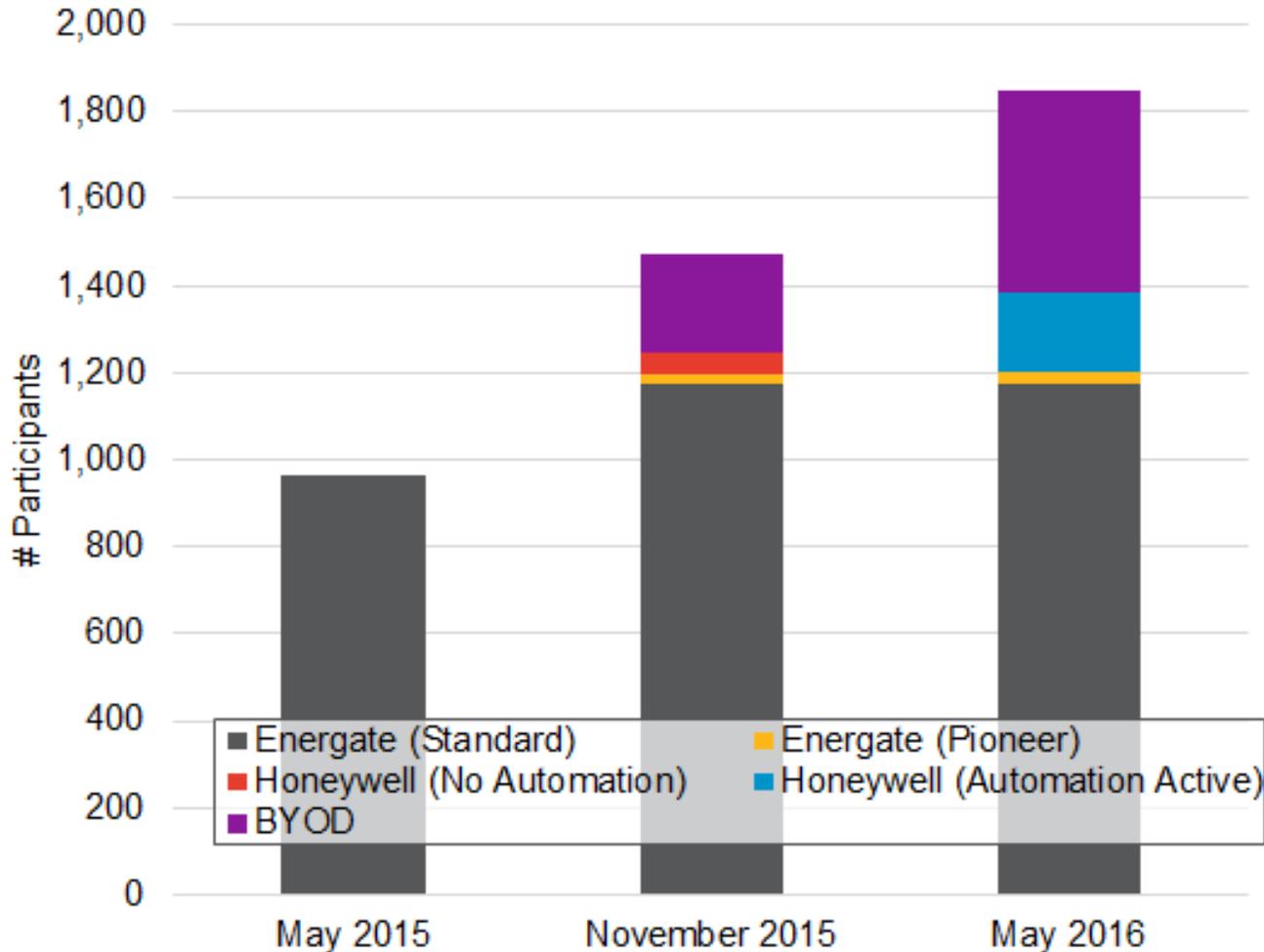
Baseboard Heat

A/C

A/C

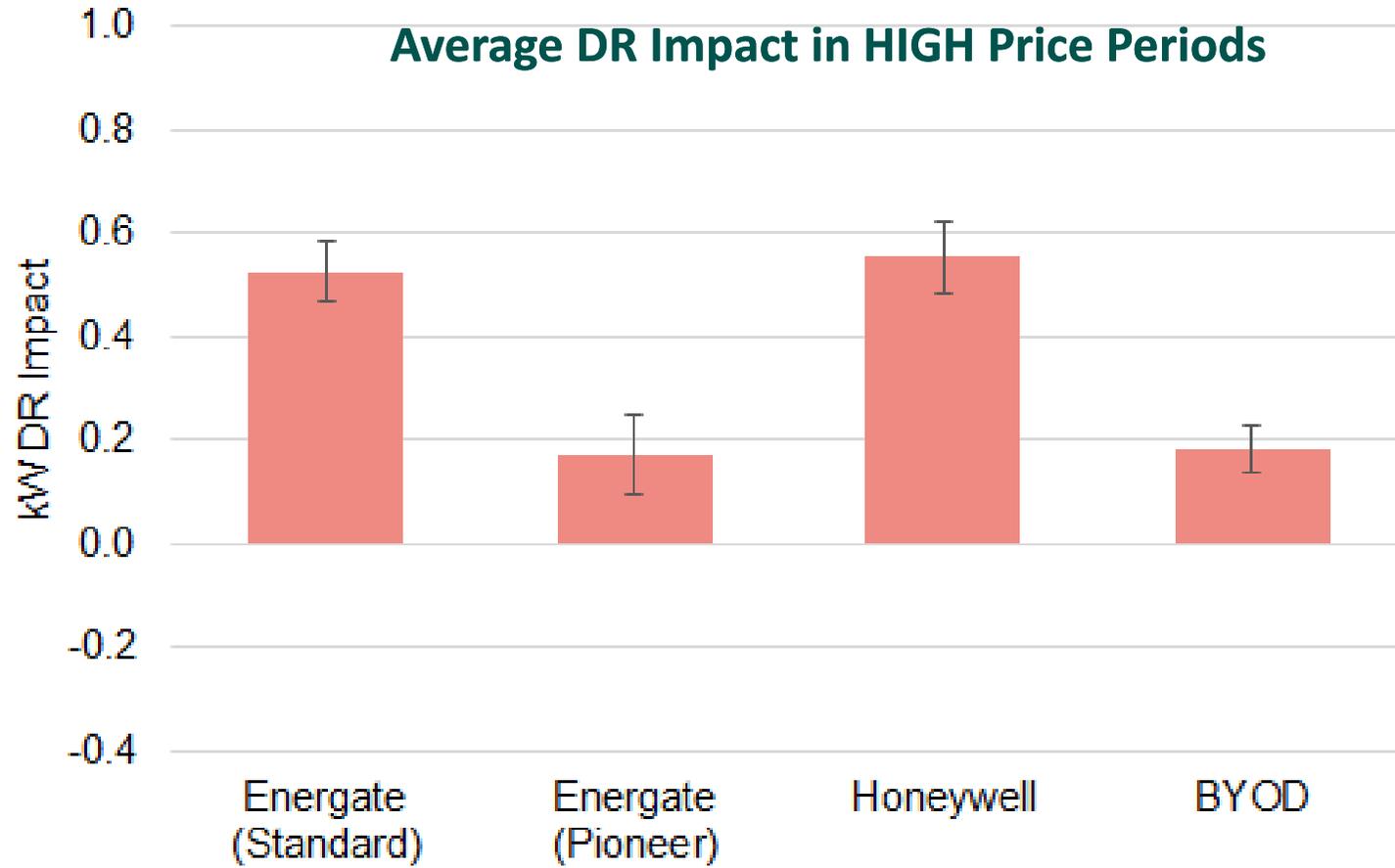
**Honeywell participant automation implemented May 1, 2016*

Who has which technology?



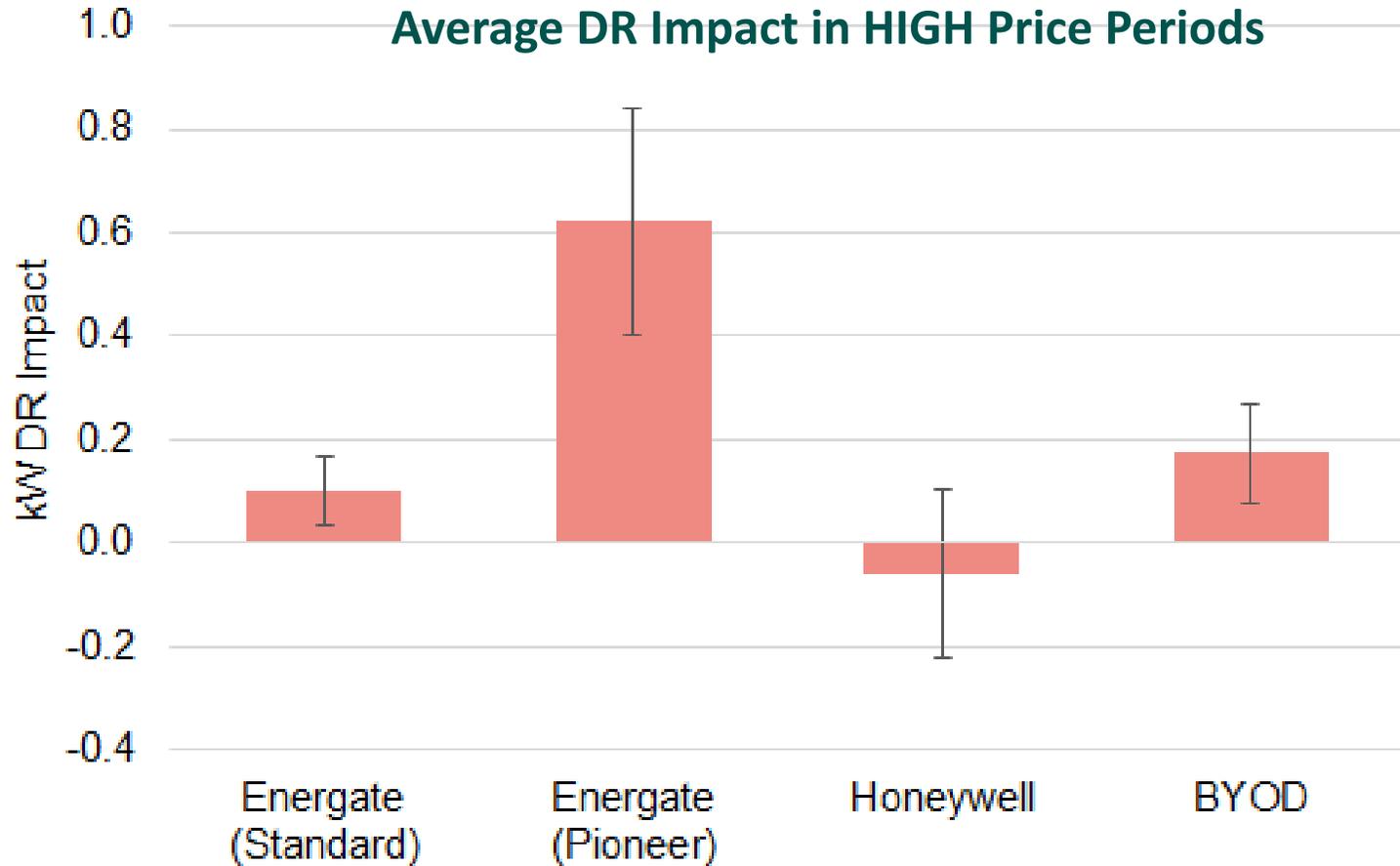
- Results are from period Nov. 2015 – Oct. 2016.
- Honeywell participants are legacy *peaksaver*[®] provincial DR program participants
- Honeywell participants receive automated price-sensitive response as of May 2016

Summer Impacts



- Honeywell participants (w/ automation) deliver highest impacts
- BYOD participants deliver modest, but material DR – 0.2 kW
- Pioneer participants have no summer automation – response is behavioural.

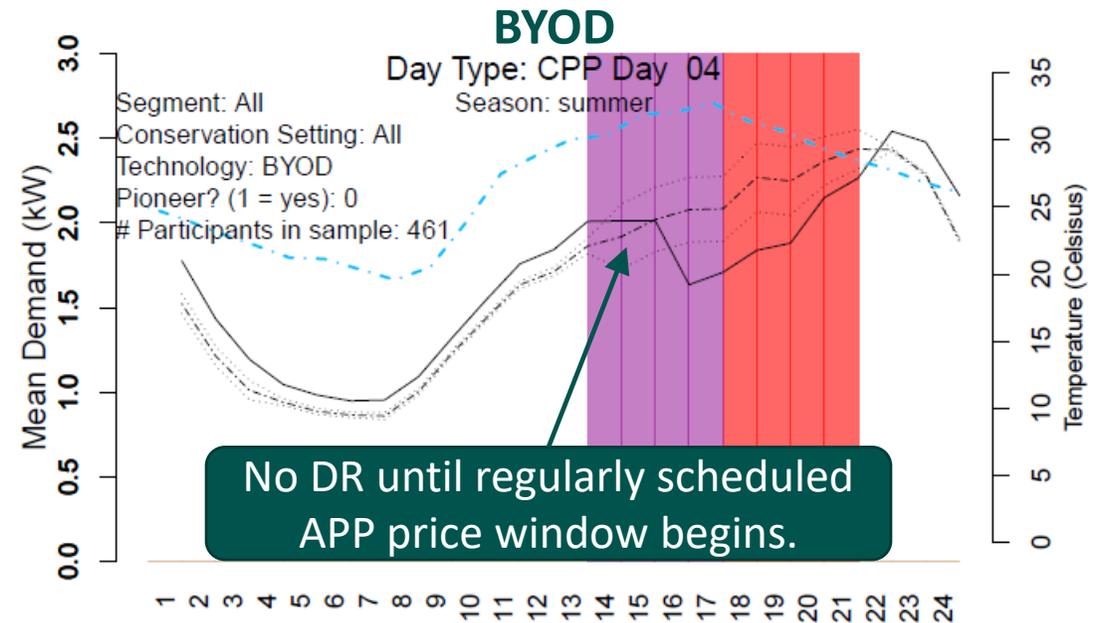
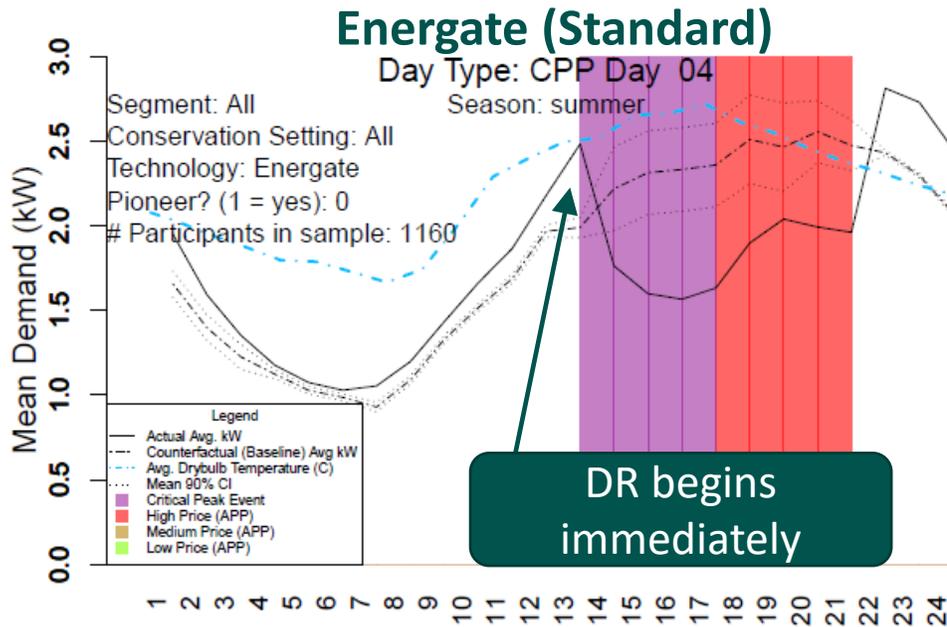
Winter Impacts



- Pioneer delivers most substantial savings (as expected)
- Honeywell (w/ NO automation), deliver no savings.
- BYOD participants continue to deliver modest, but material DR – 0.2 kW

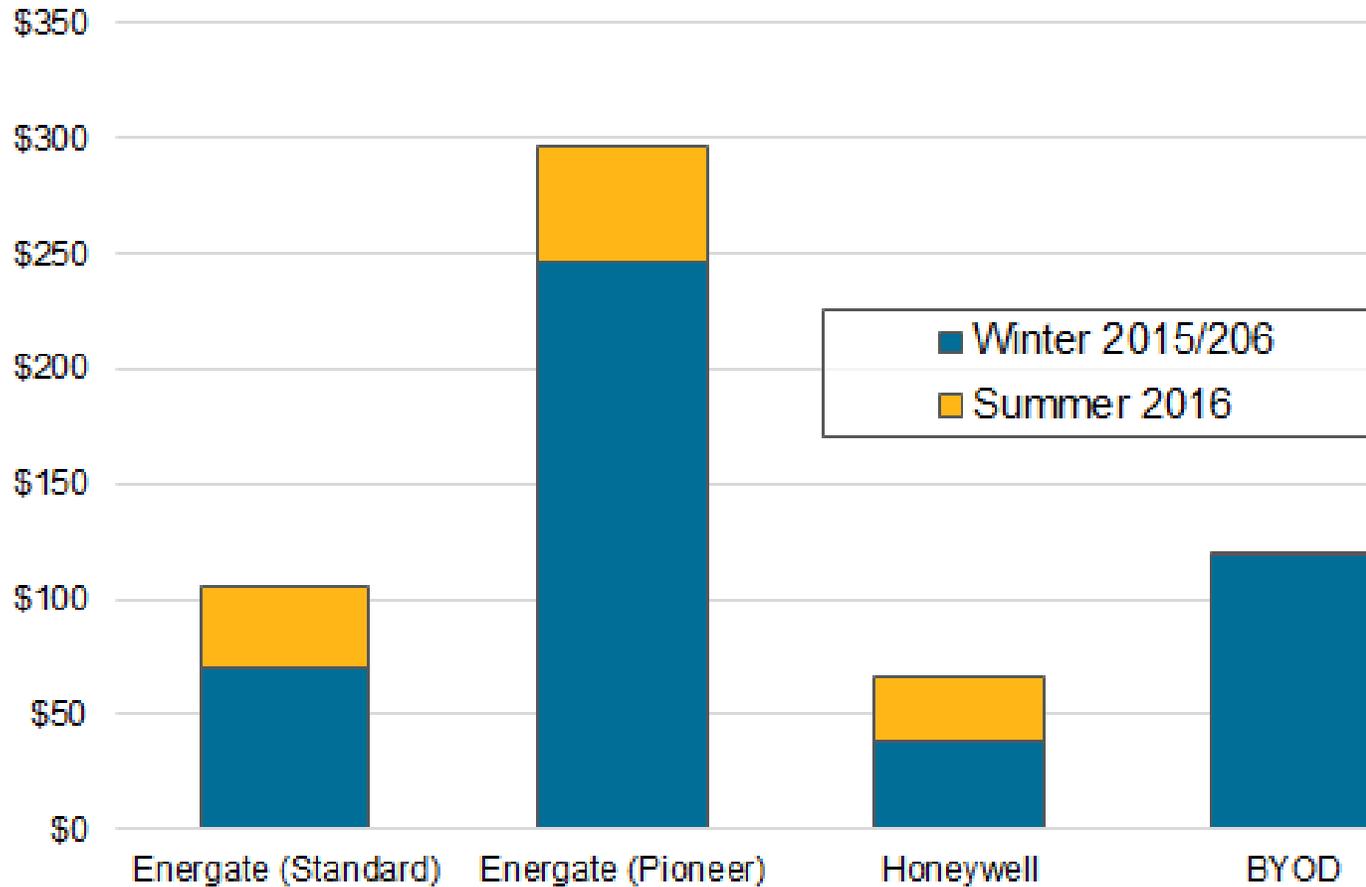
How do the technologies compare during CPP events?

The 4th CPP event of summer 2016 began 2 hours prior to the standard APP dynamic price window.



BYOD participants respond consistently to regularly scheduled high-priced periods but cannot accommodate irregular critical peak pricing events

Did much money did participants save?



Winter:

- Fewer high-priced days called than anticipated due to mild weather & low gas prices.
Result: high savings.

Summer:

- Participants take advantage of very low Off-Peak price – increase kWh consumption in non-peak periods.
Result: increased comfort but only modest bill savings.

NB: participants in this period have bill protection.

Key lessons

- **Customers are (mostly) rational:** A consistently scheduled price signal can deliver modest, but material DR through behaviour change
- **Technology matters:** If you want response to unscheduled critical peak events, you *need* automation
- **Choice is good:** consumers and the grid can benefit from alternative rate structures, especially when it fits their lifestyle

What's next for APP?

- **The Experiment Will Continue:** APP has been folded into a portfolio of time-varied pricing pilots being funded by Ontario's regulator, the Ontario Energy Board.
- **With More Options:** Two additional pricing options are being offered.
- **And No More Training Wheels:** Bill protection will be removed beginning January of 2018.
- **With Potential to Scale to the Province:** Depending on the findings of the final evaluation in 2019, APP may one day become an optional rate available to all Ontario residential electricity consumers!

Recognition for our Supporters

- This project was made possible through the financial support of the Independent Electricity System Operator
- Thanks to our partners for their contributions of resources and expertise towards the success of this project:
 - Navigant - Pricing design and evaluation
 - Energate – Smart thermostats and pricing communications
 - Eaton – Communications to Honeywell thermostats through Yukon system
 - Util-Assist – Billing, customer service and project management support



Daniel Carr

Manager, Advanced
Planning

Alectra Utilities

Daniel.Carr@AlectraUtilities.com



Peter Steele-Mosey

Associate Director

Navigant

peter.steele-mosey@navigant.com



About Alectra

- 2nd largest “municipally-owned” utility in North America
 - 7 shareholders – 6 municipalities and Borealis
 - Serves customers in 15 municipalities/communities
- Close to one million customers across 1,800 square km in the Greater Toronto/ Greater Golden Horseshoe Area.
- Approximately 1,600 employees
- Energy sales of 25,000 gigawatt-hours in 2016
 - 21% of the electricity consumed in Ontario
- Regulated and non-regulated businesses
- \$3.56 billion in total assets





alectra
Daniel Carr

Daniel is a Manager in the Advanced Planning group at Alectra Utilities, which serves approximately 1 million customers in the Greater Toronto Area. His role is to develop and lead projects that bring new energy technologies and concepts into practice, thereby engaging with and benefitting Alectra's customers.

Daniel has expertise in energy program design & delivery, policy development and regulatory strategy. Currently his areas of focus include electric vehicles, demand response and dynamic electricity pricing. He is often heard encouraging others to make their next car an electric one.

Prior to role at Alectra, he has held positions in the areas of innovation, conservation policy, and regulatory affairs at the Ontario Power Authority.



NAVIGANT
Peter Steele-Mosey

Peter Steele-Mosey is an Associate Director in Navigant's Canadian Energy practice. Peter is an econometrician with nine years' experience evaluating the impact of energy efficiency and demand response programs, quantifying the impact of alternative electricity rate structures on demand, forecasting electricity demand, and estimating the effects of marketing drivers on energy efficiency program uptake. Peter's principal area of expertise is the econometric evaluation (and design) of demand response and dynamic pricing programs. Over the last three years, Peter has increasingly combined his expertise as an econometrician and data scientist with his understanding of the potential future adoption of new demand response, energy efficiency and alternative fuel technologies (and storage) to provide forward-looking scenario analyses to agencies and utilities tasked with system planning.