

# Award-Winning Demand Response Initiatives

Moderator: Ed Thomas, PLMA

Panelists:

Neetika Sathe, Alectra Utilities

Dain Nestel, CLEAResult

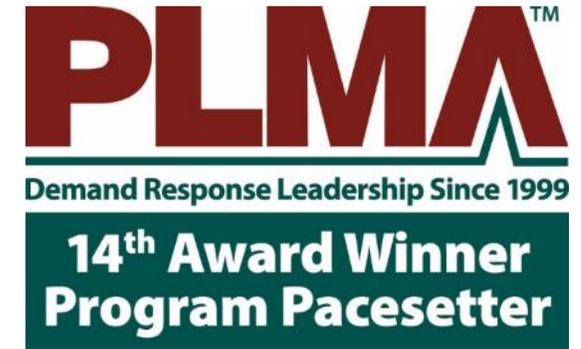
Rich Philip, Duke Energy

Brett Feldman, Navigant

1. Advanced Energy
2. Alectra Utilities
3. AESC
4. AESP
5. American Public Power
6. Apogee Interactive
7. APS
8. Aquanta
9. Austin Energy
10. AutoGrid Systems
11. BGE, an Exelon Company
12. Berkshire Hathaway Energy
13. Bidgely
14. Bonneville Power Admin.
15. BPL Global
16. BTES
17. Buffalo Niagara Medical Ctr
18. Carina Technology
19. CaSA
20. Central Hudson G&E
21. CLEAResult
22. Comcast
23. ConEd
24. Consumers Energy Co.
25. CPower
26. CPS Energy
27. Crius Energy
28. Dairyland Power Co-op
29. DTE Energy
30. Duke Energy
31. E Source
32. E4TheFuture
33. Eaton
34. Ecobee
35. EcoFactor
36. Ecova
37. Edison Electric Institute
38. Emerson Climate Tech.
39. Encycle
40. EnerNOC
41. Energy Federation
42. Energydatametrics
43. EnergyHub
44. Energy Solutions
45. EnerNex
46. EnerVision
47. Engie
48. Entergy
49. E.ON
50. EPRI
51. ERS
52. Extensible Energy
53. FleetCarma
54. Franklin Energy Group
55. Gravity Oilfield Services
56. Great River Energy
57. GridOptimize
58. Hawaiian Electric
59. Honeywell Smart Grid
60. Hydro One
61. ICF
62. Idaho Power
63. Indianapolis Power & Light
64. Integral Analytics
65. IPKeys Power Partners
66. Itron
67. Jackson EMC
68. JouleSmart Solutions
69. KCPL
70. Landis & Gyr
71. Lockheed Martin
72. mClimate
73. MidAmerican Energy Services
74. Modesto Irrigation District
75. Mosaic Power
76. National Grid
77. NRECA
78. Navigant
79. NB Power
80. Nest Labs
81. New Hampshire Electric Coop.
82. Nexant
83. Next Energy Party
84. NJR Homes Services
85. North Carolina EMC
86. Northwestern REC
87. NRG Curtailment Solutions
88. NTC Corporate
89. Oglethorpe Power Corp
90. Okla. Gas & Electric
91. Omnetric
92. OpenADR Alliance
93. Opinion Dynamics
94. Orange & Rockland Utilities
95. Pacific Gas and Electric
96. PECO, an Exelon Company
97. Pepco, an Exelon Company
98. Portland General Electric
99. Puget Sound Energy
100. Rappahannock Electric
101. Research into Action
102. RF Demand Solutions
103. SMUD
104. Salt River Project
105. San Diego Gas & Electric
106. Schneider Electric
107. Scope Services
108. Sensus USA
109. Seven States Power Corp
110. Skipping Stone
111. Silver Spring Networks
112. Simple Energy
113. SEPA
114. Snohomish PUD
115. Southern Calif. Edison
116. Steffes Corporation
117. Sunverge
118. Synergy Companies
119. Tacoma Power
120. Tantalus
121. Tendril
122. Tenn Muni Electric Pwr Assn
123. Tenn. Valley Authority
124. Threshold
125. Tri-State G&T Assoc.
126. Tucson Electric Power
127. United Illuminating
128. Utility Load Mgmt Alliance
129. Vaughn Thermal Corp.
130. Vectren
131. Westar Energy
132. Whisker Labs
133. Xcel Energy
134. Zen Ecosystems
135. Zeuthen Mgmt Solutions
136. ZOME Energy Networks

# 14th PLMA Awards

- PLMA Awards Program recognizes industry leaders who create innovative ideas, methods, programs and technologies that meet peak load needs, respond to variable generation, manage end use loads and mitigate price risks.
- Those honored have made exceptional contributions to the industry's ability to achieve real time balance of supply and demand for electricity; resulting in increased efficiency, economy and a smarter, more reliable electric grid.



# Award Categories

Award	Recognition	Recipient Categories
Program Pacesetter	Innovative solutions require excellent program design and delivery. The Program Pacesetter Award seeks to recognize outstanding programs that effectively support and deliver peak load management.	Utility or Regulator
		Independent System Operator or Regional Transmission Operator
		Aggregator or Marketer
Technology Pioneer	Achieving the potential for peak load management can be greatly enhanced by technology. The Technology Pioneer Award seeks to recognize innovative applications of technology with demonstrated potential to scale.	Consumer
		Solutions Provider
		Manufacturer
Thought Leader	Education, Research and Outreach are key elements in any market transformation. The Thought Leader Award seeks to recognize the impact projects, outreach campaigns and individual contributions that have the potential to shape the industry's future.	Individual
		Organization
		Project
<ol style="list-style-type: none"> <li>1. The recipient categories are arranged in this table adjacent to the most likely award category.</li> <li>2. As appropriate, any of the individual recipient categories can be associated with any of the three award categories.</li> <li>3. An organization may belong in more than one category.</li> <li>4. The awards committee may make multiple awards or no awards in each category each year.</li> </ol>		

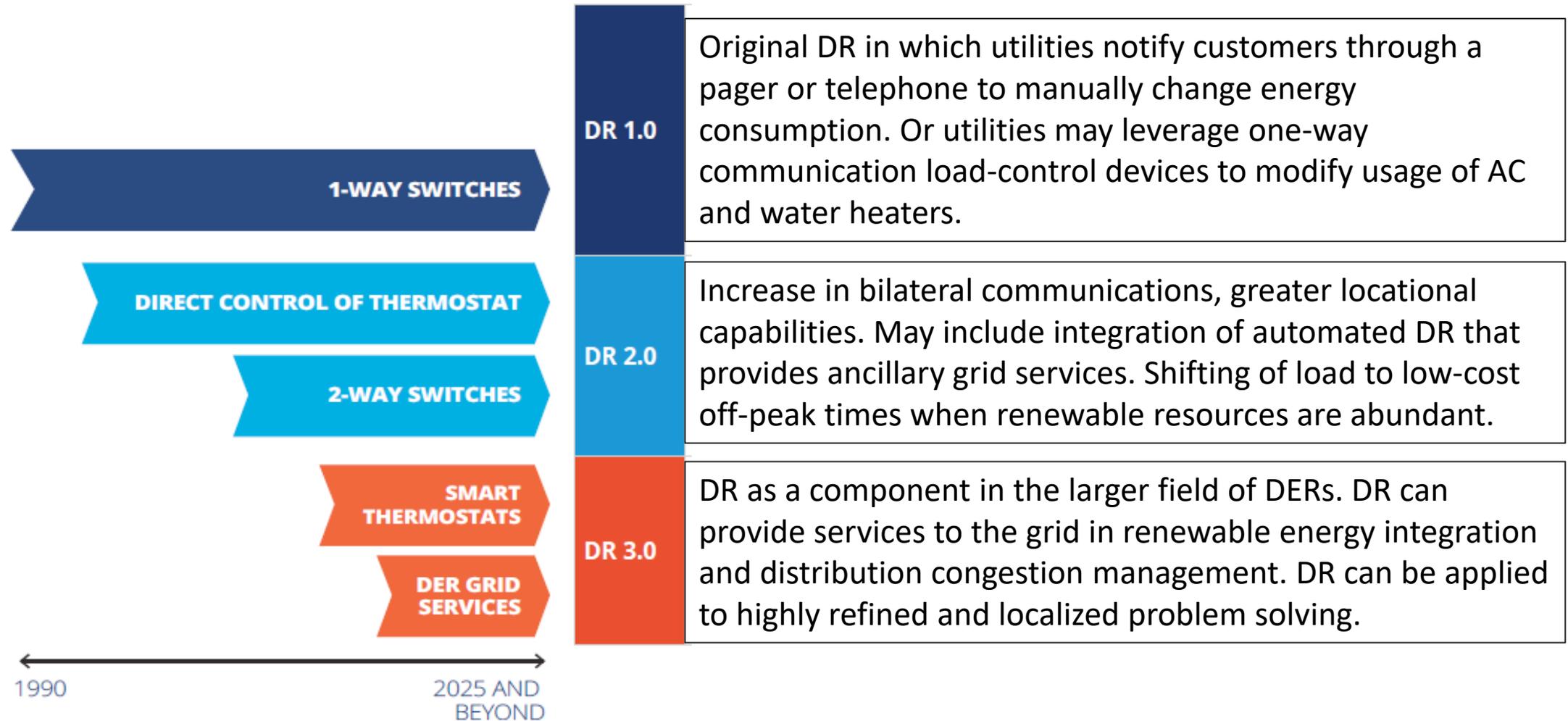
# Alignment of Awards with PLMA Goals

- PLMA has presented over 65 awards over the past 14 years
- DR Practitioner perspective with emphasis on results in past calendar year
- Open to PLMA Member and nonmember alike – International too
- Can be Utility, Trade Ally, Consultant, Government, Individual,
- Transparent judging process
- Spotlight on collaboration between all sizes of utility and consultant / trade allies

# Award-Winning Initiatives Dialogue Series

- AEP Indiana Michigan Power Company's Demand Response Service Emergency Program
- City of New York's Municipal Demand Response Program
- Central Hudson Gas & Electric's Peak Perks Program
- Portland General Electric and AutoGrid for Pricing and Peak Time Rebate Program
- Target Corporation's Demand Side Energy Program
- KCP&L and Nest for the KCP&L Thermostat Program
- Brett Feldman, Navigant Research
- Alectra Utilities, Advantage Power Pricing
- Web recordings at [www.peakload.org/2017-winners](http://www.peakload.org/2017-winners)

# The Evolution of Demand Response



Source: Smart Electric Power Alliance, Navigant, and Peak Load Management Alliance<sup>4</sup>, .

# Thought Leader — Individual

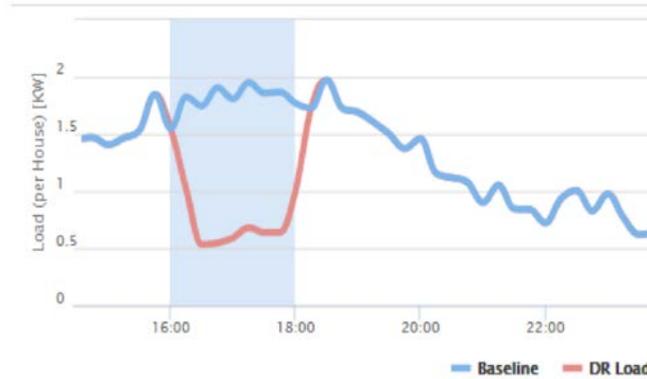
## **Brett Feldman**

- Published research reports on leading-edge topics in 2016, including Bring Your Own Thermostat DR, Integrated DSM, Dynamic Pricing, DR Global Market Data and Forecasts, and Demand Response Management Systems
- Leveraged reports into webinars, presentations, and articles
- Planned and moderated PLMA DR Dialogue on FERC Order 745 Supreme Court Decision within days of the announcement in January
- Guiding force in the completion of the joint AESP/PLMA/ADS (SEPA) DR industry survey

# Non-Wires Alternatives (NWA)



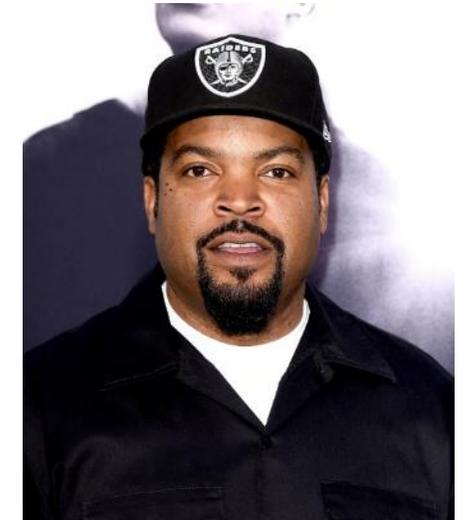
Energy Efficiency=Easy E



Demand Response=Dr. Dre



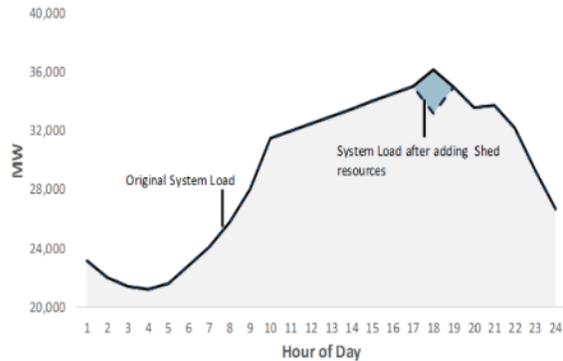
Thermal Storage=Ice Cube



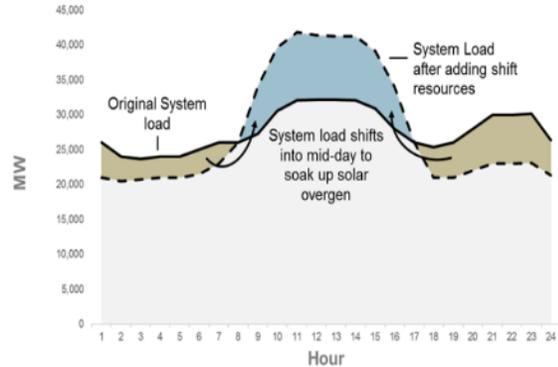
# DR for Renewables Integration



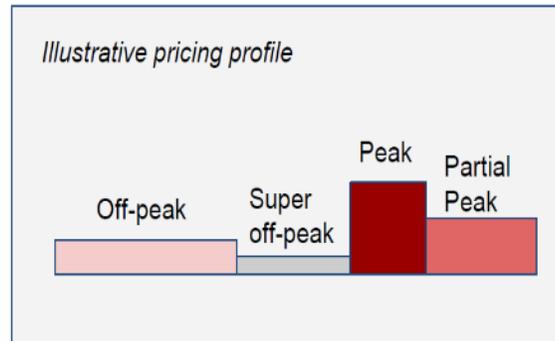
**Shed** Service Type: Peak Shed DR



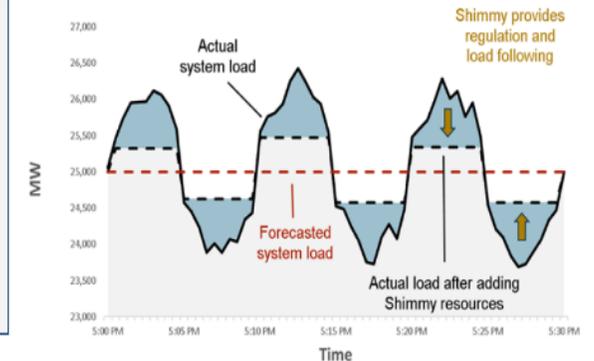
**Shift** Service Type: Shifting load from hour to hour to alleviate curtailment/overgeneration



**Shape** Service Type as modeled: Accomplishes Shed & Shift with prices & behavioral DR.



**Shimmy** Service Type: Load Following & Regulation DR



(Source: Lawrence Berkeley National Laboratory, 2015 California Demand Response Potential Study, Phase II Report; Final Study Results)

# Natural Gas DR





# Program Pacesetter — Utility

## Central Hudson Gas & Electric's Peak Perks Program

- Defers new infrastructure in 3 zones in response to New York's REV initiative
- Targets all customer classes with offerings that include:
  - Residential direct load control using two-way Wi-Fi thermostats, load control switches and customer engagement portal
  - Customized curtailment agreements for commercial and industrial customers
- Results:
  - Over 30% participation of eligible customers within 6 months
  - 5.9 MW of first-year load reduction for all three zones (versus a 5.3 MW target)
- Itron is key ally

# Why does Central Hudson need Demand Response?

10MW



1MW



5MW

# Project Status

- Approximately 3,000 active devices currently deployed
- 9 large C&I Customers
- 40% adoption rate within the Fishkill area
- Achieved first incentive milestone of 8.0MW

# Whole Home Generator Program

- Existing backup generation is used as a DR resource
- Digital control units create automatic switchover
- Estimated 3.9kW/device
- Great incentives of \$500 and \$250/year



# How Does Central Hudson Benefit?

- Instead of investment ROI, an incentive-based model was implemented:

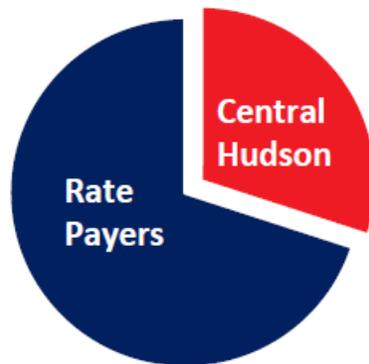
*Estimated Cost of Traditional T&D Solutions*

*– Actual Cost of DR Solution*

*+ Actual Capacity Savings*

*= Program Financial Benefits*

- Central Hudson shares program financial benefits with all customers:



70% of benefits go to rate payers by reducing future bill pressure

30% of benefits are provided to utility as incentive to achieve the program targets

# Key Takeaways

- Non-wires alternatives can be used to defer localized infrastructure even for utilities who are long on capacity
- Innovative incentive structure can offset the lost utility earnings associated with capital investments
- High incentives and aggressive marketing campaigns are needed to get the penetration levels needed in a localized deferral
- Incorporate both DCU's (switches) and thermostats to ensure you have a solution that works for all customers

# Thought Leader — Utility

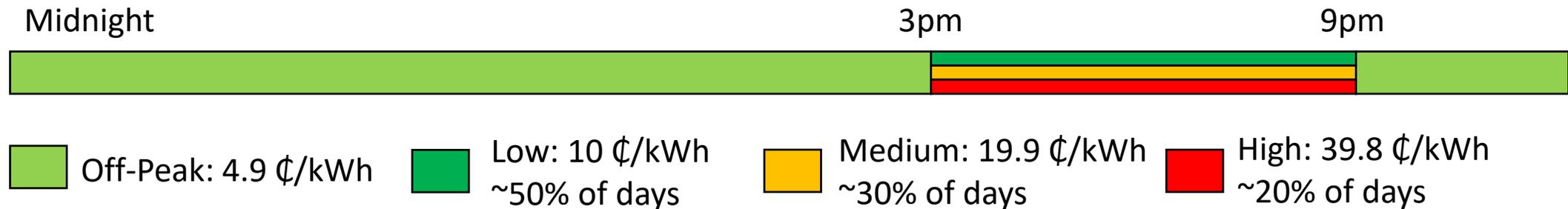
## **Alectra Utilities Advantage Power Pricing**

- Combines enabling technology with revenue-neutral dynamic rates to deliver average DR impacts of 0.2-1.4 kW during critical periods, depending on technology usage
- Meaningful customer bill savings
  - averaging \$74 of summer commodity cost savings
  - achieved with over 70% of participants not having previously participated in DR or EE programs
- Variation among groups of customers with different characteristics (demographics, technology) a key learning
- Pilot continues to provide important information as the provincial regulator moves forward along its roadmap for the provision of optional alternative regulated rates

# How does the APP pricing plan work?

## Weekday APP Price Schedule

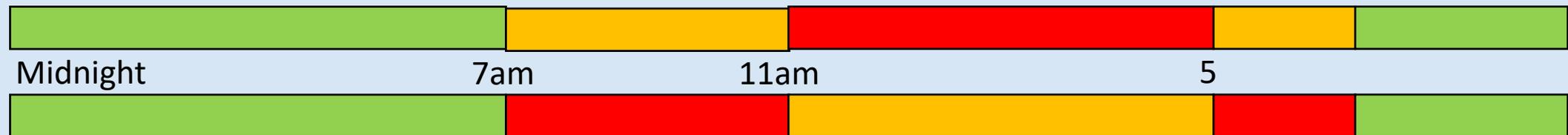
(Weekends and holidays only Off-Peak price)



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 March 2018

## Standard Mandatory Weekday TOU Price Schedule

(May through Oct.)

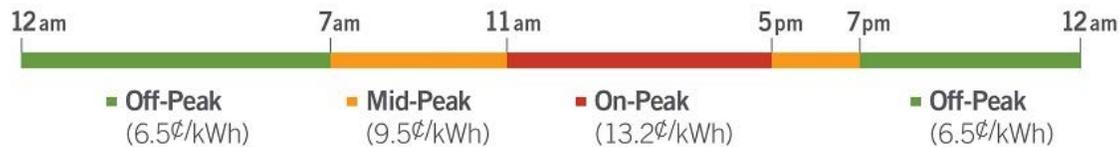


(Nov. through Apr.)

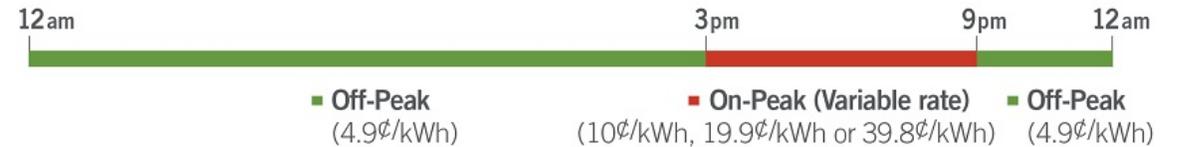


# Advantage Power Pricing – Moving Forward

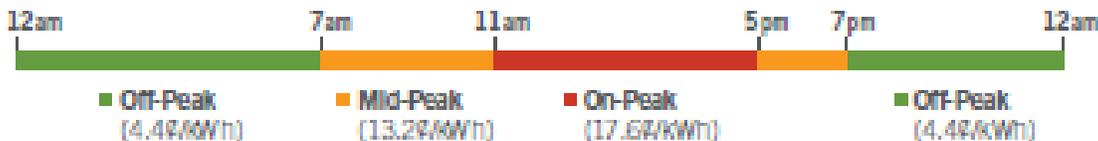
- APP has expanded into a portfolio of three time-varied pricing pilots touching 10K customers
  - Supported by the Ontario Energy Board as part of a study into future rate options.



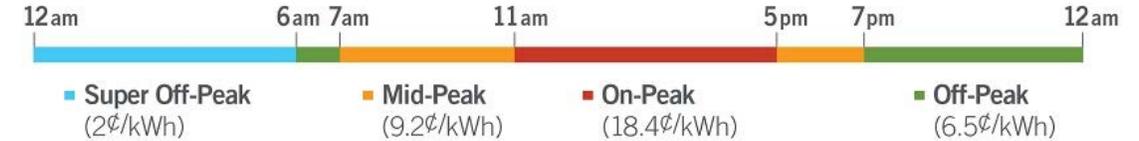
**REGULAR TOU**



**APP- DYNAMIC (extension of previous APP) 3K customers**



**APP - ENHANCED 6K customers**



**APP - OVERNIGHT 1K customers**

# Advantage Power Pricing – Moving Forward

- Bill protection removed after trial period: unprotected period for 12 months
- Both Bring-your-own-device and direct install methods of thermostat support
- Both opt-in and opt-out approaches
- 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!

# Program Pacesetter — Collaborative

## **Portland General Electric and AutoGrid for Pricing and Peak Time Rebate Program**

- Results:
  - Deploying and evaluating relative effectiveness of 12 pilot programs to engage customers and deliver reliable load sheds
  - Engaging over 10,000 residential customers with behavioral demand response opportunities and/or dynamic rates
  - Deployed 14 DR events that achieved average 1.1 MW load shed per event during summer and winter 2016
- Program Drivers:
  - Will extend best program designs and rate structures to all qualified customers in 2019
  - Expected to lead to at least 30 MW of peak load reduction when fully rolled out
- AutoGrid and CLEAResult are key allies

# Flex Pilot Platform Requirements

BDR  
BDR + Opt In  
BDR + Opt Out  
BDR + TOU

PTR x 3

TOU x 3

“Flex times”

## Flex Time (BDR) – *PTR w/o rebate*

- **Informs customers** of DR events through email, text, and/or phone call
- Communication provides tips for reducing or shifting load
- Results based on customers’ actual usage delivered via email day after event

## Flex Time (PTR) – *event-based earnings*

- Same as BDR but customer is rewarded with a **bonus check** at the end of each season

## Flex Schedule (TOU) – *every day savings*

- **Rate plans** where off-peak times are cheaper than on-peak times

Economic incentive

# Flex TOU

Here's how it works:

## Flex Schedule

- Check out your Flex schedule below that shows you when peak times occur throughout the week
- The less you use during peak times, the more you'll save on your PGE bill
- If you end up spending 10% more on the Flex plan than on PGE's basic service after your first year, we will send you a check for the difference



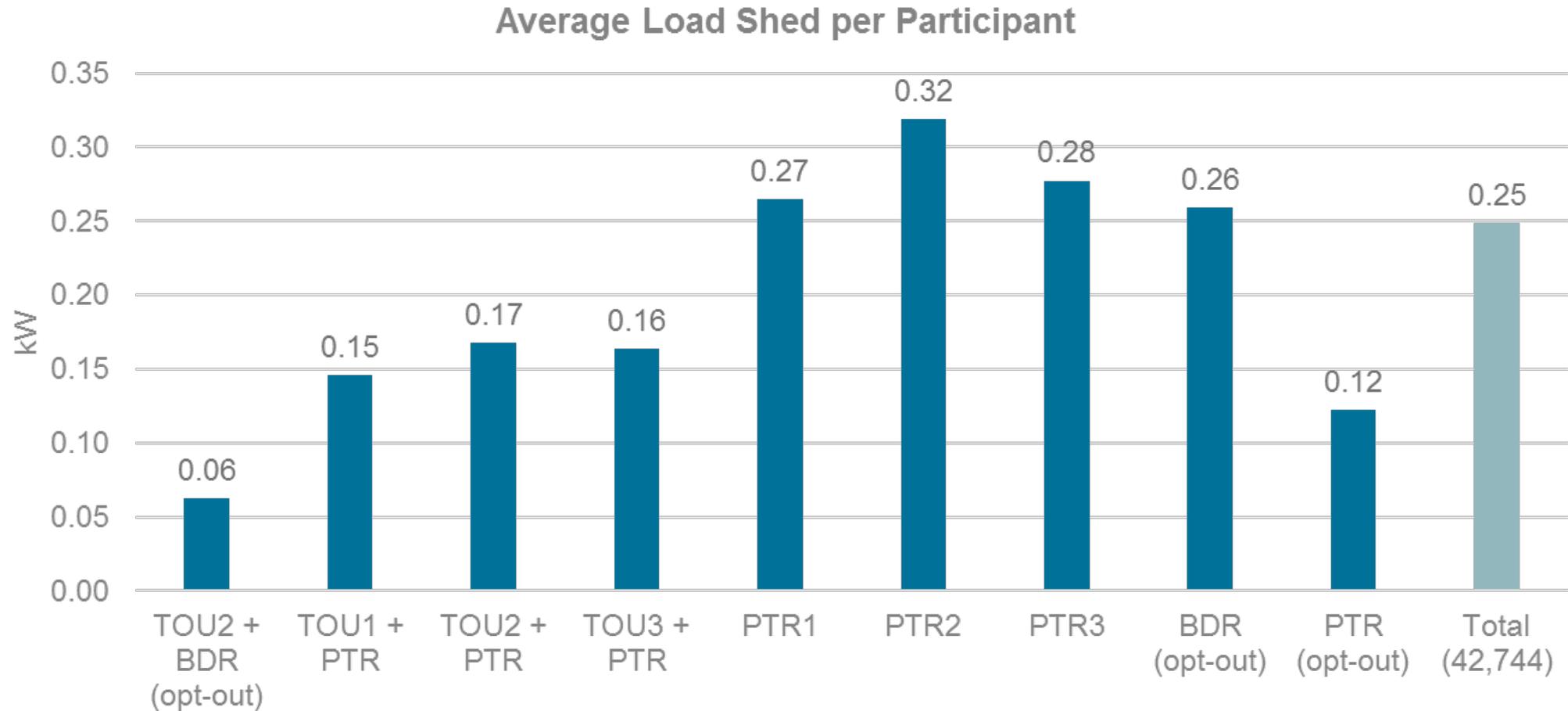
**8.0¢/kWh**

**M-F** 10 PM – 6 AM  
All day weekends and some  
holidays

**14.1¢/kWh**

**M-F** 6 AM – 10 PM

# Flex Times (PTR & BDR)



Note: preliminary results from AutoGrid model

# Flex Analytics

## Your Energy Usage

DAY MONTH YEAR

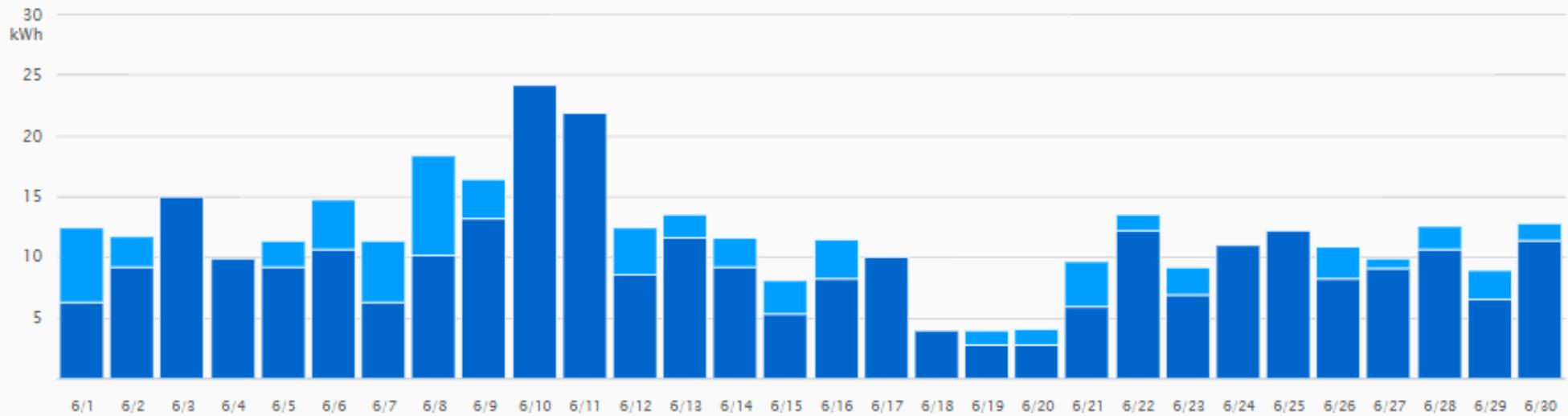
JUNE 2017



VIEW BY

\$\$

KWH



Colors show price per kWh

● 8.8¢/kWh ● 18.1¢/kWh

View more information about the rates included in Your Flex Plan [here](#).

# Flex Analytics

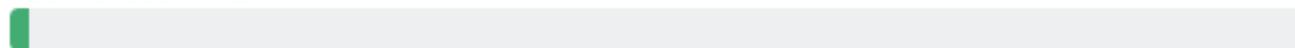


## Your Flex Time results



Scroll through the Flex times below to track your energy-saving progress.

Your flex use - 0.05 kWh



Your expected use - 1.98 kWh



Great job!

You used 98% less than your expected use. Keep it up!

< Previous

Feb 1, 2017

7:00 am - 10:00 am

Next >

# Key Takeaways

- Beginning to scope out full scale implementation to all customers in 2019
- Preliminary evaluation results indicate strong overall response, with summer results exceeding planning estimates
- First winter was an extreme season, with unusually high snow levels, so interested to see how program performs under more typical conditions

# Thought Leader — Collaborative

## **KCP&L and Nest for KCP&L Thermostat Program**

- Pioneering nature with customer-centric approach to revamping 70 MW DLC program
- Transitioned 35,000 participants from legacy 1-way to 2-way thermostats in Missouri
- New program kicked off in April 2016 to leverage self or pro install option
- Achieved 200% of the Program Year One goal with 8,000 thermostats
- KCP&L partnered with Nest Labs and CLEAResult

# Innovative Delivery Channels

1



Direct Install



Pro Installation

\$25 Annual Incentive

2



DIY Install



\$50 Self Installation Incentive

\$25 Annual Incentive

3



Bring Your Own Nest (BYON)



\$100 Enrollment Incentive

\$25 Annual Incentive

# Direct Installation (DI)



Free Nest Thermostat

**CLEAR**Result

Free Installation by CLEARResult



24/7 Maintenance and Customer Support



\$25 annual incentive for participation

# Do-It-Yourself (DIY)



Free Nest Thermostat



\$50 Self Install Incentive



24/7 Maintenance and Customer Support



\$25 annual incentive for participation

# Bring Your Own Nest



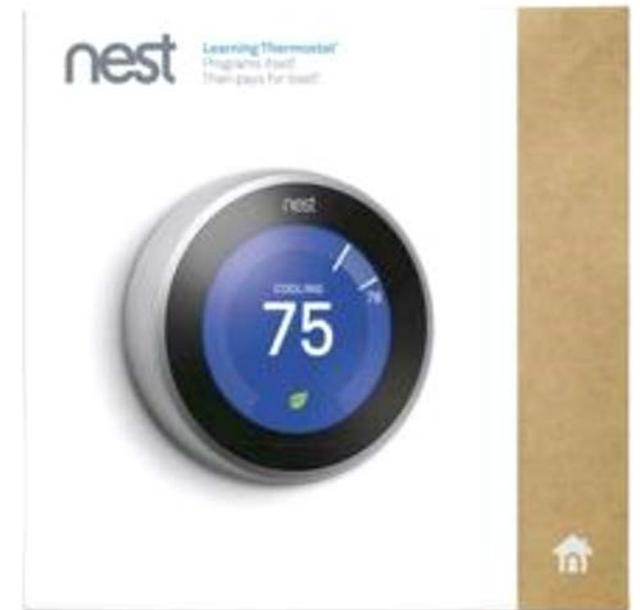
\$100 Enrollment Incentive



24/7 Maintenance and Customer Support



\$25 annual incentive for participation



# Demand Response & Energy Efficiency Savings

Real + persistent savings

Reducing load while preserving customer comfort



1 kW

average demand reduction

15% savings on cooling bills

10-12% savings on heating bills

\$131 - \$145 avg. savings/year

Additional 5-10% with Seasonal Savings



55%

Cooling Load Reduction

85%

Events completed without adjustment

462

kWh reduction annually

1.2

kW reduction per Thermostat

# Key Takeaways

- KCP&L's Demand Response Program originally launched in 2005. Through various partnerships, the program has acquired more than 70,000 residential and small business participants in demand response at the thermostat level.
- Since beginning the partnership with Nest and CLEAResult in early 2016, KCP&L has achieved almost 150% of their program goal. Nearly 80% of these participants have joined through the Do It Yourself channel.
- By leveraging the two-way technology and innovative software of the Nest Thermostat, KCP&L has evolved its program from being pure demand response, to delivering both energy savings and demand response capabilities, claiming 462 kilowatt hours and 1.26 kW per thermostat installed. On an annual basis, program participants save up to 12 percent on heating costs and up to 20 percent on cooling costs.
- Have deployed over 30k of 35,000 Nest thermostats to both new participants to the thermostat program and legacy participants; this includes transitioning customers from 1 way to 2 way, but that segment does not represent the entire initiative/participants in our program to date

# Program Pacesetter — Municipality

## City of New York's Municipal Demand Response Program

- Results:
  - Reduced over 58 MW for over \$9.5M in revenue in summer 2016
  - Over 10% of load of locations engaged, comprising 40% of City's municipal peak load
- Program Drivers:
  - Year-round participation in NYISO with expanded participation in Con Ed summer programs
  - Allowing agencies to keep earned revenue
  - Training for city agency administrators and building operations staff
  - Recognition of top performers
  - Integration of real-time monitoring technology
- NuEnergen is key ally

# IT'S HOT TODAY!

TODAY'S HIGH TEMPERATURE IS PLACING A STRAIN ON OUR ELECTRIC GRID. FOR THIS REASON, TODAY IS AN ELECTRIC **DEMAND RESPONSE** DAY. OUR BUILDING IS PARTICIPATING IN NEW YORK'S DEMAND RESPONSE PROGRAM.



## TO CONSERVE ELECTRICITY AND HELP AVOID BLACKOUTS, OUR BUILDING STAFF MAY BE:



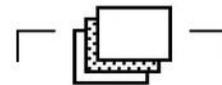
Turning off unnecessary overhead lighting



Reducing elevator service



Increasing space temperature



Lower shades to block the heat of the sun



Turn off computer monitors & other equipment when not in use



Unplug personal electronics, such as coffee makers or cell phone chargers

**ACTIONS YOU CAN TAKE TO KEEP THE BUILDING COMFORTABLE FOR EVERYBODY**

# Key Takeaways

- For summer 2017, the City of New York contributed over 75MW of grid relief across over 400 locations as part of its DR Program.
- Estimated savings in excess of \$9M again, but don't have final revenue numbers

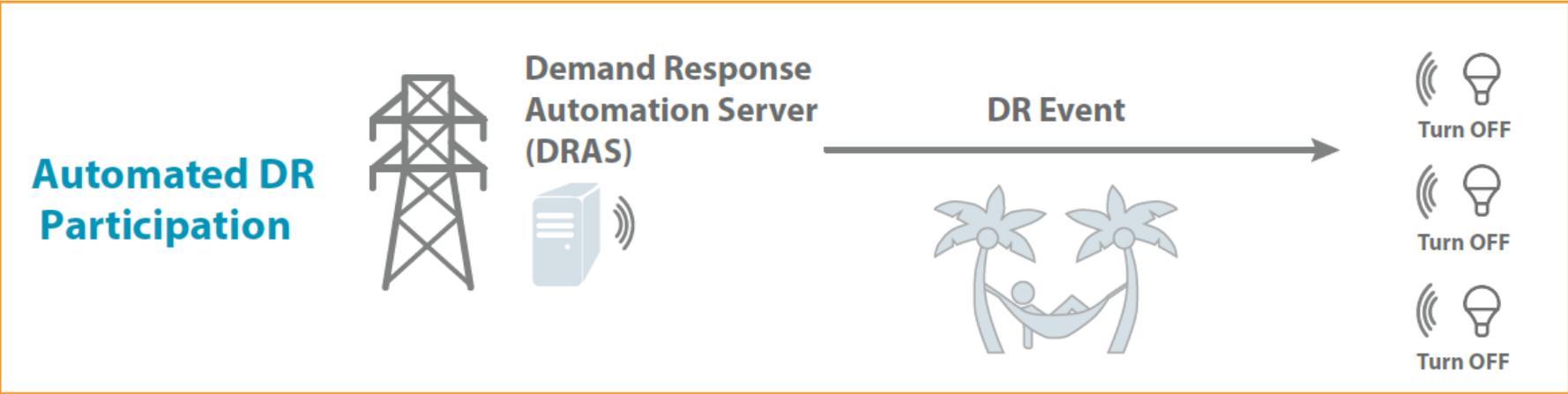
# Program Pacesetter — End-Use Customer

## **Target Corporation's Demand Side Energy Program**

- Influences how retailer operates stores, leveraging new and existing technology and control strategies
- Results:
  - Grown to over 800 U.S. locations enrolled delivering 800,000 kWh of demand reduction and over 70mW of capacity in 2016
- Program Drivers:
  - Strong industry partnerships
  - Prioritization of aggressive internal demand management goals
  - Leverages building automation systems, data aggregation, and analytics strategies



# Automated Demand Response Example



# Key Takeaways

- Target has continued to expand its Demand Response program in areas where programs are available
- Expects to enroll close to 900 locations for 2018/19
- Expanding automation capabilities including implementation of two ADR 2.0 compliant solutions with more currently in development

# Program Pacesetter — Utility

## **AEP Indiana Michigan Power Company's Demand Response Service Emergency Program**

- Innovative approach set a new bar for C&I peak load programs in Midwest
- Over 110 customer sites provide over 55 MW of peak load curtailment
- Drivers:
  1. Customer performance obligations are fair and simple
  2. Opportunity for aggregators to work with all customers
  3. Ongoing efforts to work with customers and aggregators

# Retail Utility Program Designed for Wholesale Market

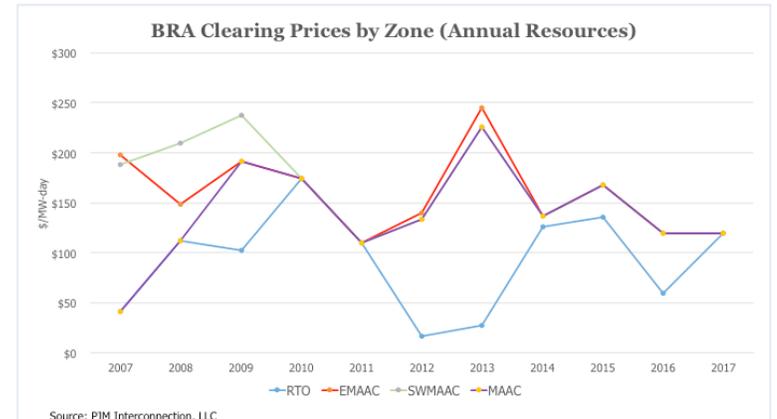
- Utility participates in PJM as a Fixed Resource Requirement entity; meaning utility self-supplies their own load
- Under PJM's traditional wholesale DR program, Curtailment Service Providers (CSPs) offer the load resource directly into the market
  - This doesn't change PJM load forecast and utility is still required to have capacity to serve entire load obligation
  - Benefits only the curtailable customer and their CSP
- Utility program requires load to be registered through utility (either directly or through the customers' choice of CSP)
  - Load committed through utility may be used to offset utility's load obligation, requiring fewer generation resources to be built or procured
  - Benefits all customers

# A Tariff Based Approach

- All conditions of service, including incentive pricing, are available in a public, Commission-approved tariff
- Customers may participate directly with utility or through CSP of their choice
- Tariff is updated regularly to maintain compliance with PJM program requirements
- Although the requirements closely mirror the PJM program, there are some key differences designed to benefit customers

# Program Benefits

- Participating customers (and their CSPs) receive a monthly capacity payment
  - To reduce volatility, utility's incentive payment averages previous 4 years of PJM clearing prices (with a floor)
- Utility receives a capacity resource that may be used to offset the Company's load obligation
- All customers see reduced cost of utility having to build/buy capacity



# Continuing Evolution

- Program and tariff have been significantly revised over past several years to maintain compliance with PJM requirements
  - Challenge moving forward to maintain customer participation through the PJM transition to 100% Capacity Performance product
- Utility maintains open dialog with CSPs and customers resulting in program improvements and higher participation
  - Customers now have expanded aggregation options when working with a CSP
  - Streamlined registration process
  - Increased program certainty and quicker issue resolution

## Key Takeaways

- Agnostic to whether end-user partnered with the utility or a third-party curtailment service provider
- Aligned and evolves with PJM Interconnection program goals
- Facilitate/mentor end-user to work within Independent System Operator requirements

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**Web recordings at [www.peakload.org/2017-winners](http://www.peakload.org/2017-winners)**

# Call for Award Nominations Now Underway



Learn More and Submit Nominations at [www.peakload.org](http://www.peakload.org)