PLMA™
Load Management Leadership

15th PLMA Award-Winning Load Management Initiatives

A Compendium of Industry Viewpoints

Produced by
PLMA Thought Leadership and Award Planning Groups
October 2018

PLMA (Peak Load Management Alliance) was founded in 1999 as the voice of load management practitioners and has grown to over 140 utility and allied organization members. PLMA is a community of experts and practitioners dedicated to sharing knowledge and providing resources to promote inclusiveness in the design, delivery, technology, and management of solutions addressing energy and natural resource integration. The non-profit association provides a forum for practitioners to share dynamic load management expertise, including demand response and distributed energy resources. PLMA members share expertise to educate each other and explore innovative approaches to load management programs, price and rate response, regional regulatory issues, and technologies as the energy markets evolve. PLMA will continue to maintain a forum where practical experience, ideas, and knowledge are promoted to those seeking access to a vast network of industry professionals and practitioners. It is also a place where members gather to keep abreast of the latest industry trends in load management and to inform the next generation. We offer timely subject matter and training opportunities to address key facets of our industry charge. Membership in PLMA is open to any organization interested in load management. PLMA represents a broad range of energy professionals and industries – private and publicly owned utilities, technology companies, energy and energy solution providers, equipment manufacturers, research organizations, consultants, and consumers. Learn more at www.peakload.org

PLMA Award Planning Group

Co-chaired by Nicholas Corsetti of National Grid, Laurie Duhan of Baltimore Gas and Electric, and Dain Nestel of ecobee, this Group oversees the nominations and judging process for PLMA's annual awards presentation. Any staff from a PLMA member organization may join this Group. Details at www.peakload.org/group-overview.

Nicholas Corsetti
National Grid

Laurie Duhan
Baltimore Gas and
Electric

Dain Nestel
ecobee

PLMA Thought Leadership Planning Group

Co-chaired by Rich Philip, Duke Energy and Jason Cigarran, Itron, this group guides the PLMA Strategic Vision to Accelerate PLMA Thought Leadership through more aggressive pursuit of speaking opportunities and regular creation of meaningful content. The Group seeks to enhance PLMA's role as a facilitator of industry thought leadership and will continue to position PLMA as the leading community of load management practitioners dedicated to sharing knowledge and best practices. Group Activities include: a Resource Directory at www.peakload.org/resource-directory and a Speaker Bureau at www.peakload.org/speakers-bureau.

Richard Philip
Duke Energy

Jason Cigarran
Itron

Thank you to 15ᵗʰ PLMA Award Program Judges *(in alphabetical order by organization name)*

- Laurie Duhan, BGE
- Roger Gray, CLEAResult
- Derek Kirchner, DTE Energy
- Dain Nestel, ecobee
- Audra Drazga, Energy Central
- Kitty Wang, Energy Solutions
- Grant Engle, EnergyHub
- Elta Kolo, Greentech Media
- Kate Flores, Honeywell
- Ruth Kiselewich, ICF

- Jason Cigarran, Itron
- Dennis Quinn, Joule Smart Solutions
- Jim Richardson, Landis+Gyr
- Danielle Sass Byrnett, National Association of Regulatory Utility Commissioners
- Nick Corsetti, National Grid
- Brett Feldman, Navigant
- Stuart Schare, Navigant

- Michael Brown, NV Energy
- Meridith Nierenberg, Orange & Rockland Utilities
- Wendy Brummer, Pacific Gas & Electric
- Tyson Brown, Simple Energy
- Nathan Shannon, Smart Energy Consumer Collaborative
- Johanna Koolemans-Beynen, U.S. Energy Association

PLMA (Peak Load Management Alliance) announced six winners of its 15th Annual PLMA Awards on April 17, 2018 during the 37th PLMA Conference in Coronado, California. Those recognized as the best demand response and other load management programs, initiatives and achievements from calendar year 2017 are:

Program Pacesetter

- ComEd's Peak Time Savings Program
- Gulf Power's Energy Select Program

Thought Leader

- Austin Energy's Collaborative Demand Response, Green Building, and Energy Efficiency Initiatives
- Jennifer Potter

Technology Pioneer

- Hawaiian Electric Company's Regulation Reserves Program
- Nest's Solar Eclipse Rush Hour Rewards Program

The 15th PLMA Awards recognize industry leaders who created, during calendar year 2017, innovative ideas, methods, programs and technologies that manage end use loads to meet peak load needs, mitigate price risks, and support successful grid integration of distributed energy resources. Over the past 14 years, PLMA has presented over 68 awards to recipients who have included utilities, product/service providers, end-users, and individuals responsible for demand response efforts targeted to the residential, commercial, industrial and agricultural customer markets.

The following are transcripts from webcast conversations with these industry leaders.

Thought Leader

Austin Energy's Collaborative Demand Response, Green Building, and Energy Efficiency Initiatives

Austin Energy influences the city of Austin, Texas codes through partnership with Green Building (GB) initiatives managed by its Customer Energy Solutions activity. In order to build energy efficient homes and businesses, local code amendments were added to facilitate demand response (DR) program participation. Energy codes require new buildings with automation systems controlling HVAC and/or lighting systems to have OpenADR capabilities and smart/WiFi thermostats to be installed in new single and multifamily construction. GB and DR programs work together to promote DR participation through the rating process. Ensuring commercial design teams follow a set of DR implementations, buildings can earn additional points on the rating when enrolled in the utility's commercial and industrial program Load Cooperative. The utility further encourages installation of smart/Wi-Fi thermostats with $25 rebate for single and multifamily customers. The utility partners with an implementer to operate a retail program with national home improvement stores to offer instant discounts for products such as LED lighting and ENERGY STAR appliances. Thermostats are advertised with signage to promote communicating thermostats and rebates to influence customer choice.

Dialogue with Beth Crouchet and Sarah Talkington, Austin Energy; and Nick Corsetti, National Grid and PLMA Awards Co-Chair on June 7, 2018

Corsetti: Today's discussion with Beth and Sarah from Austin Energy, personally for me, is a pretty interesting one, because while we do see a lot of discussion around integration of energy efficiency and demand response, there is something unique with this initiative in terms of its connection with green building and building codes in the City of Austin. I think what we'll do just to start, Beth and Sarah, if you both wouldn't mind just introducing yourselves a little bit of background. And then, we'll just jump right in. And if you can just provide a brief overview of your DR programs and how the company in Austin is organized to promote both your energy efficiency and demand response offerings.

Talkington: Hello, I'm Sarah Talkington. I manage the commercial green building program here at Austin Energy. The green building program at Austin Energy was the first green building rating system in the nation and it dates back to 1991, so we have a rich history of green buildings and ratings development in Austin. Roughly, you could say that we are responsible for the utility's "New Construction" programs. In addition to green building rating development, verification, and consultation, this group is also responsible for guiding the development of the City of Austin's Energy Code. I also serve at the Vice Chair for the Technical Advisory Committee at the United States Green Building Council, which administers LEED. Finally, I previously worked in the "Demand Response" group here at the municipal electric utility, so I have some familiarity with it.

Crouchet: I'm Beth Crouchet, and I'm the conservation program coordinator for the Power Partner Thermostat Program, in the Demand Response segment of the group roughly responsible for the rebate offerings that serve Existing Buildings. And I'm glad Sarah's here with us. She has some great background knowledge from, what you'd call our origin story, if you're looking for a comic book reference. *[laugh]*

The demand response programs that we have span both residential and commercial programs. First, we have a Load Cooperative program, which is our commercial and industrial offering. We pay $1.45 per kilowatt hour that the company saves compared to their baseline. For primarily multi-family residential, although we do have some single family homes participating, we have a direct-install Water Heater Timer program. The water heater program uses timer technology, so it simply curtails, between 3:00 and 7:00 PM every day throughout the summer.

We also have the Power $avers Thermostat program, which started in 2001; it is a direct install program that served primarily residential customers, but also has some small commercial customers. That's our free thermostat program, so the consumers didn't receive a monetary incentive or payment, but the utility installed

a new, programmable, thermostat free of charge. This Energy Star thermostat enabled customers to program their thermostat to save on energy bills, and received a one-way radio frequency (RF) signal from the utility to curtail during events. At the peak of that program, we had about 90,000 thermostats in the field. But over the years, as you can imagine, we've seen some attrition as the thermostat industry has advanced. So of those 90,000 thermostats we installed, we estimate probably about 20,000 thermostats, or approximately 40 MW of demand response are still out in the field, receiving our RF signal to curtail on a demand response event day. So though we're not advertising it anymore, it's still viable.

More recently we've moved into this 2-way communicating, wi-fi enabled BYOT (bring your own thermostat) space. In 2013, actually, Sarah, who's with me, helped start that BYOT program. For this program we offered an $85 monetary incentive for the enrollment of a customer's smart thermostat in our demand reduction program. Customers can join our program using the participating thermostats they already have on the wall, or a new participating thermostat that they install. Either way, they receive an $85 enrollment incentive per installed thermostat. This program currently has a 92% customer satisfaction rate, so we're pretty happy with it and apparently, our customers are too. That's the demand response side.

> We recognize that customers appreciate simplicity and that the same technologies we use for demand response have value for customers in their energy efficiency capabilities.

We have really tried to break down any perceived silos that a utility could have administering programs for energy efficiency and demand response across different markets (single family, multi-family and commercial) for both new and existing buildings. We recognize that customers appreciate simplicity and that the same technologies we use for demand response have value for customers in their energy efficiency capabilities. This is why we are able to utilize the contractor partnerships developed though our energy efficiency programs to help us get these wi-fi enabled, DR-capable, thermostats on the customers' wall.

We started first with our Home Performance with ENERGY STAR Program; it is an Existing Buildings program, where customers receive an energy audit and use the results to purchase a personalized whole-home package of weatherization and energy efficiency upgrades. Austin Energy provides the customer a customized rebate based on the work done. We started including our Power $aver Thermostat as an item on the menu of whole-home energy efficiency upgrade options.

Next, we started including our Power $aver Thermostats among the items for which we provide individual, single technology rebates. At this point we had so many customers signing up for that $25 rebate, we had to develop a new rebate processing procedure to keep up with the demand. We learned that this strategy was relevant and could be very effective.

Based on these lessons learned, we are now launching a Power $aver Thermostat multi-family option. A property owner can earn $25 for each thermostat they install. This enables their tenants to enroll in the Power Partner program and earn the $85 demand response incentive. We have not yet launched the program, but we've already had interest — property owners inquiring into when this will be available. So those are our Existing Building packages.

We also have, as mentioned before, Green Buildings and energy code to help us out on the New Construction side. Our residential energy code mandates smart, wi-fi enabled, thermostats in new construction. It's not specifically requiring the Power Partner Thermostats that are included in our demand response program, but the idea is that, builders will see the benefits to these devices, including the $25 point of sale rebate, and will be motivated to install the thermostats that are participating in our program. Finally, in the Green Building rating programs, projects earn points for installing the participating thermostats or enrolling in Load Cooperative.

Talkington: Yes, I guess the breakdown is we use Green Building ratings and codes to focus on new construction. We use rebates and incentives to reach Existing Buildings"and garner participation in Demand Response Programs.

Corsetti: So, one immediate question I have, back to the Green Building code, so how recent has this been in place? Has this been around for a while or it's just that the last few years you've seen the building code get updated to where now you have a mandate for WiFi thermostats?

Talkington: It's recent. We update the energy code

roughly once every 3 years. We started including Demand Response strategies in the energy code in the 2016 update. In the Commercial Energy Code we require Open ADR compliant building automation systems. In the Residential Energy Code we require wi-fi enabled thermostats.

Corsetti: To continue building on the green building conversation. We did get a question pre-submitted from Alice Anthoff from Missouri Public Service Commission, which I had the same question. So the initiatives we're discussing here today that Austin Energy has been delivering, was that discussed in part to the meet the city's emission reduction goals? So is there a climate angle to this program and the green building codes, or how is that all kind of working together?

Crouchet: I can actually speak to that. We do have a City of Austin Climate Protection Plan and it is considered part of that, because we are focusing on peak demand reduction. But beyond that, in Austin, we have strong environmental goals and a goal of providing economic opportunity and affordability. We, at Austin Energy, have a vision of driving customer value with innovative technology and environmental leadership. So, with that, our city council gives us some pretty great goals to reach for. We have 900 megawatts that we are to save by 2025. And 200 megawatts of that is to be demand response. So it does speak to the climate protection plan. And I'll defer there as well about the green building side of it.

> ...demand reduction and energy management in the built environment go hand in hand with solving climate change.

Talkington: There is a pretty interesting conversation happening in the sphere of green building advocates and professionals. Somewhat recently, I would say, there's a real recognition that if we're going to solve climate change, *[laugh]* as building designers and architects, the utilities and other partners in the energy realm are our best partners. Building professionals are recognizing that climate change won't be resolved with energy efficiency and building market transformation alone. There's recognition that kilowatt hours don't have a one to one correlation with greenhouse gas emissions; it's not a simple multiplier. Relationships with the electric utilities deserve more nuance. So, I think that what you're witnessing is the beginning

of a potentially rich partnership between the green building and the utility industries. Where there's a real recognition that demand reduction and energy management in the built environment go hand in hand with solving climate change.

Corsetti: Sarah, I think you said, you were, correct me if I'm wrong, were the ones involved with USGBC. So obviously, you have this in place in Austin, which is great. Do you see, on a national scale, this picking up as a part of demand response being included in LEED certification or other standards that USGBC may be putting out in the near future?

> ...grid citizenship is complicated and buildings play a role in the energy market...

Talkington: Back in October of 2016, LEED V4 really launched. There is a credit in the rating for demand response participation. It awards one point if you're demand response enabled and two points if you're actively participating in a DR program. So with that one point for enablement, there's recognition that future proofing your building with DR capability is an important step. I'm also pretty excited about a pilot initiative in LEED version 4.1 for existing buildings. It awards points for Grid Harmonization, that's the terminology they're using. It's a broader recognition that grid citizenship is complicated and buildings play a role in the energy market, or at least they should be. So yes, it's happening now, and I think you'll probably be getting a lot more questions and involvement from the green building community globally.

Corsetti: I did want to shift the conversation a little bit back to the actual mechanics of the program, given that a lot of the folks within PLMA are DR practitioners. We discussed a little bit the integration with energy efficiency and DR. And the one thing that always comes up is the ability to offer great rebates for both, which is what it seems like you folks do down in Austin. And then more importantly, being able to track that. Can you kind of walk us through how you're able to track customers that are getting the rebates through efficiency programs? And then, how that converts into DR and what your experience has been thus far with it?

Crouchet: Sure, actually, I've been heading up the initiative to get the energy efficiency rebate into all of our programs. We have two different enrollment processes.

For demand response, the enrollment is done through our partners, and they've been absolutely great about marketing and administering the application process for us. To get the energy efficiency side of it, we have added a measure to our current enrollment processes for our other programs. Having two different enrollment processes can be a little cumbersome, so we've been working on making that as streamlined as possible.

We have these two different resources. One batch of data that's from our vendors, with the thermostats coming into $85 DR rebate the Power Partner Program and another batch of data that's from our rebate processing software for the $25 Power $aver rebate. I've been able to take both of those batches, and determine how many of them are converted from the $25 efficiency rebate to the $85 demand response program. I work in demand response, right? That's my world. I'm personally really interested in how effective this energy efficiency rebate has become, I find it to be pretty exciting. We have about an 80% conversion rate. So, of the people that get the $25 energy efficiency rebate, 80% of them are signing up for DR too. And that's pretty exciting!

Corsetti: One quick follow up to that is, obviously you can do on the backend, figuring out what the conversion rate is. But in terms of how Austin Energy is messaging this and marketing it to customers, have you experienced any confusion with people understanding how all this works and what their bottom line is? And can you share some of the best practices or learning that you might've taken from that over the last few years?

Talkington: One of the really exciting things we experienced four or five years ago, when we were launching this Bring Your Own Thermostat program, was working with the vendor partners. They really developed sophisticated and nuanced messaging for our mutual customers, and we were able to learn from them. For me, it was clear that investing in this type of a distributed energy market requires putting a lot of research and money into customer education and messaging. I think we were able to leverage our relationships with our partners to learn precisely how to communicate with customers in a far more sophisticated way. That was pretty exciting for us as a municipal utility, to be part of this developing conversation. But there've been more lessons learned down the line, and Beth should speak to those.

Crouchet: As we've started to message the second similar but different *[laugh]* measure, it's been an interesting

learning experience. When we have one device that we're using for two different programs, it can be a bit confusing for customers. So, we really have worked with our vendors and really appreciated their input. Rather than adding the money to the demand response incentive to total $110, we kept the rebate and incentive separate to emphasize the energy efficiency capabilities of the thermostats. So, we have continued to message it as a separate rebate. And with that, we been able to take the two separate messages and say, thank you so much for joining our programs.

If you would like extra money, we have an installation credit, so you can apply on this other link by clicking here. And a lot of our vendors have really done well supporting that and have added the messaging we need for both. They have a demand response message in the beginning. And then at the bottom they also include, "if you'd like another $25 for purchasing and installing this Click here", and that goes to our webpage where we have both of them marketed.

Since we started our big push for this $25 energy efficiency rebate, the installation rebate, we've seen exponential growth and we've had to actually install bulk processing features on the back end of our rebate processing software. And really, it has achieved far better results than we expected, right off the bat. So, it's gone well.

We also have our SPUR program "Strategic Partnership with Utilities and Retailers". It enables us to identify the devices we rebate in stores, retail outlets, with stickers. So, we have "$110 in Austin Energy Rebate available" stickers next to every participating thermostat. That's another recent strategy. And then, for more information they can always go to our website or email me directly. Quite frankly, we're very accessible as a utility, so that's helped a lot. We do a lot of events in the community. So, when we put something out where we've gotten back confusion from customers, we've been able to quickly examine and revamp our message. Whether it's a radio ad, or our social media, we really try to make sure they realize that there is a $25 installation, or purchase rebate. And then there is an $85 rebate is for joining/enrolling in our demand response program.

Corsetti: It sounds like it's a pretty seamless customer experience *[laugh]* From my perspective, that's great to hear. Okay, shifting gears just a little bit just because we've got a few questions that came in. And I know we spent most of the time, or the last 20 minutes or so,

talking more or less about the residential side. We did get a question from Phil Davis in terms of how this program extends to the commercial sector. So, can you guys spend just a little bit of time talking about the experience for the C&I (commercial and industrial) customer?

Talkington: For the commercial customers we have a few voluntary, programs. First, there is the Load Cooperative program. Basically, you register, you give us a general understanding of the size load or demand reduction you have available. And come event days you get an email notification an hour or so in advance, asking you to participate. We pay a rebate based on your performance during the event. It's $1.45 a kilowatt-hour you're able to drop. So, this is intended to be a good experience, where you earn a rebate check at the end of the summer that makes participation worth your while. Ideally you would invest those earnings and rebates in energy efficiency updates in your building. But of course, you could also blow the money on popsicles or something. *[laugh]* The bulk of our demand response for commercial customers is going to be through the Load Co-op program.

We do also have a commercial, installation and participation rebate for the Power Partner Thermostat Program. This would be a good program for small to medium businesses. We are trying to reach the strip mall and franchise retail locations. They can have one or several thermostats at one or several locations. You can earn the $25 per thermostat installed plus the $85 for each thermostat enrolled. The technology also enables customers to manage HVAC runtimes remotely, which can effectively help them manage the majority of their energy use in our climate. This small business sector can be really hard to reach; these small businesses are often too small for the Load Cooperative program.

Also, on a voluntary basis we award points in our Green Building rating system for participation in these DR programs. And in terms of Commercial mandatory requirements, demand response is an amendment in the adopted energy code. We require installed energy management systems be OpenADR compliant. The commercial energy code does not currently have a requirement for communicating thermostats, but I think that could be on the horizon.

Corsetti: Okay, and then I think one last piece of this conversation I do want to touch on. We did get a question on this exact topic, which is great, from Andrew Armstrong, is, right, so what I've heard is good coverage of residential and commercial sectors. Certainly, this is tied into the building code which is great. Do you have any results or data that you guys can speak to thus far in terms of how this is working? You mentioned that conversion rate from EE (energy efficiency) to DR, which is excellent. But any other figures or talking points around results that you want to make sure folks are aware of that you've seen?

Crouchet: Let's see, so for residential, we've seen a variety of reports about energy efficiency, and you can kind of google those, quite frankly; we're seeing different numbers. We've seen energy efficiency savings reported between 17 and 23% of the AC (air conditioning) load. And so we're actually doing our own M &V (Measurement and Verification). We want to look specifically at Texas as we have a very unique climate. *[laugh]* It's already blazingly hot down here. And in addition to the energy efficiency studies, we're doing some M&V on the demand response side too. With our old thermostat programs, we have been able to demonstrate about 40 MW in reduction. And then with the new wi-fi, 2-way communicating Power Partner Thermostat program, I want to say we crested at 35 MW in demand reduction last summer (2017). We're starting to get in new results and do more detailed M&V this summer.

Talkington: I think we're all waiting for Energy Star reports on thermostats to have the official word. Until then, I think, we're optimistic that the research we're seeing from our partners is on point, particularly here in Texas where HVAC (heating, ventilation, air conditioning) is such a huge part of our electric load.

Corsetti: I think it's something we should all be keeping an eye on over the next few years, because this is the unique model, and see how this continues to scale and how successful you guys are able to be in the coming years. Thank you to you both for taking the time to share your best practices and learnings from this great program.

The conversation above is from a webcast recording at
www.peakload.org/dr-dialogue-austin-energy-green-building-initiative

Program Pacesetter
ComEd's Peak Time Savings Program

ComEd's Peak Time Savings (PTS) is an opt-in behavioral DR program offered to residential customers with smart meters. PTS, which has been operational for three summers since 2015, is a first-of-its-kind program to be offered in the Midwest, paying participants for voluntarily reducing consumption during summer Peak Time Savings Hours when electricity demand is typically high. PTS enrollment began in the fall of 2014 with approximately 20,000 customers enrolling in the first 90 days, resulting in one of the most successful program launches in ComEd's history. Since then, enrollment has risen to upwards of 230,000 customers, with more than 250,000 expected to participate in the summer of 2018. Not only is the program cost-effective, but market research has also confirmed significant customer satisfaction. Most recently, ComEd launched the integration of If This Then That (IFTTT) which has demonstrated the commitment to leveraging AMI (automated metering infrastructure) capabilities while providing customers with comprehensive IoT (internet of Things) enablement. Leveraging the IFTTT platform, ComEd customers have the power to completely customize how their connected devices respond to pricing signals and Peak Time Savings events. Customers can set their devices to interact with ComEd and IFTTT whether they have an entire line of Connected Home products or a single smart light bulb. This, along with the potential integration with EVs (electric vehicles) and DERs (distributed energy resources), gives customers an immense opportunity to save money when their devices automatically curtail energy usage in response to DR events and changes to market price.

Dialogue with Brian Kirchman, ComEd, and Alan Mellovitz, Accenture, with Dain Nestel, ecobee and PLMA Awards Co-Chair on August 2, 2018

Nestel: Thanks everybody for dialing into this DR dialogue where we're going to be talking about ComEd's Peak Time Savings Program and why we recognized it for an award. For today's conversation, I want to make sure we get a chance to have our attendees, our co- hosts, introduce themselves. And then we'll cover what we gave

in the award itself for the Peak Time Savings Program. I just want to do some introductions.

Kirchman: This is Brian Kirchman with Commonwealth Edison in Illinois. I am manager of emerging technology and innovation. And I manage ComEd's innovation lab which, for the intents and purposes of this award and program, I am in charge of the If This Then That, or IFTTT, enhancements for the Peak Time Savings Program.

Mellovitz: Thanks, Brian, this is Alan Mellovitz speaking, Accenture Utilities, focusing on response and really the merging of the grid with the connected home. I've been fortunate to be working with ComEd on this great program, serving as the implementer and program manager for Peak Time Savings. Look forward to this dialogue and conversation.

I appreciate PLMA's recognition of this great program and this great innovative work. I'll give a little bit of overview of the program to just provide a little bit of background before we jump to the dialogue. Peak Time Savings was launched in 2015. It's kind of a first of a kind program as a behavioral demand response program.

Customers are paid dollar per kilowatt hours saved. All customers are eligible to enroll with a smart meter. And a couple success points here. When the program was launched in the fall of 2014, there were about 20,000 customers that enrolled in the first 90 days of the program.

> ...to enable an IoT type of platform using If This Then That as a way to really transform the experience for customers...

It was just a massive response from customers in terms of the enrollment, and now we are at over 270,000 enrollments. We've been measuring the cost-effectiveness of the program and it's been proven to show benefits outweigh costs. And then last year we managed to enable an IoT type of platform using If This Then That as a way to really transform the experience for customers in the program to really automate everything in their home.

From smart thermostats, to electrical vehicle charging, to plug load, to lighting, to really enhance their experience and provide full choice and customization for how their home and their devices respond to demand response. Brian, I don't know if you want to add anything else in terms of the overall program, If This Then That.

Kirchman: Just for those folks that might not have heard of If This Then That before. That platform is really designed in a way to allow users of the system to connect up to services together. When you think of the actual work, If This Then That, you're talking about if one thing happens then I want some other to happen in reaction.

In the case of the ComEd Peak Time Savings, if there's a demand response event, then I want to do whatever it is that the customer is interested in performing in their home to reduce energy. I think I could be changing the setting on my thermostat, or turning off a flood control.

All the way to hundreds of other apps that IFTTT hooks up to. That could be as simple as tracking the events in a spreadsheet, or sending a notification to someone's iPhone, or posting a message on Facebook that says I'm participating. That all can happen automatically without the customer needing to think about it on the event day when we call the program.

Nestel: That's a great summary and I really appreciate you guys diving into that. And we have some other questions I want to make sure we get to. But the first question that I think is going to be important, Brian, you're part of the innovation lab. I think it makes sense that you guys are looking for new ways to be driving engagement, driving load management.

Why did you select If This Then That?

Kirchman: Sure, I mean one of the great things about that platform is just kind of the ease in which customers can connect with all these devices. IFTTT has done a great job kind of getting all of those service providers in under one house, right? Instead of us as ComEd needing to go out and integrate with a provider in order to do remote control, and control to smart thermostats, and pop ups on a Comcast cable box.

For us to not have to do that integration is pretty huge. And then IFTTT just having a large customer base and kind of that ease of integration are all ways for us to experiment with this type of technology without having to spend a huge cycle of development time launching it with customers. Because our goal within the innovation

lab is really speed into customer's hands, right? We want to be able to test these things so that if there is a major breakthrough and customers really like the way that we have integrated with this system with their thermostat, for instance. We'll do a close integration, interactions, even faster, easier for the customer. This is really kind of this challenge to allow us to test lots of different scenarios at minimal cost between the management.

Mellovitz: It's opened up a whole community of customers that are using the tools. Customers are able to publish applets with each other and kinda co-develop, co-create innovative new ways of using this type of service. And I think it's really a neat way to give control to the customer.

Nestel: It's very progressive. It's great to see that you guys found such success with it. What makes ComEd PTS different from other behavioral BDR programs?

> The fact that we have 270 thousand customers that actually enrolled in the program. I don't often hear a lot about programs that are that size…

Kirchman: Sure, I think aside from the whole If This Then That enablement, the BDR program has not only been big, and I think just the scale of this is a pretty large differentiator. The fact that we have 270,000 customers that actually enrolled in the program. I don't often hear a lot about programs that are that size, but also the real-time nature of it.

It's a market-based program, fitting in capacity and dispatching in near real-time. Customers are getting notified two hours or up to 30 minutes prior to the event starting, we're still able to see about a 7 to 8% drop during those event hours.

Nestel: You have pretty significant opt-in enrollment. But then you're also leveraging the structure of the program to get people to participate, the automation would be via If This Then That. Then also put that into the market at the same time. It seems like it's a win, win, win.

Kirchman: Absolutely, and that was I think one of the core benefits of bringing the If This Then That service, is the real time nature of the program for the customers that are unable to respond on shorter notice. This just makes investing in all sorts of connected device

technologies to make that experience more convenient and make it more real time.

Nestel: I'm sure from when you guys put this on the blueprint, everything must have gone perfectly. No barriers, no little bumps in the road. Sort of little joke there. What are some lessons learned, and what would you say would be items that other energy providers can take away in terms of learning?

Mellovitz: I think it really starts with customer research and stepping outside of our utility bubble, in terms of how we frame and position a new product or service to customers. I mean, before launch, there was a lot of time in customer research and really diving in which and the marketing materials and make that customers were going to understand exactly how the program works and what the benefits are.

That was a huge lesson learned from results of that marketing research. Those results showing up in terms of a massive response. And then second, I think it's very important to establish strong partnerships internally across customer research, marketing, IT, and all the vendors that are supporting the program. There's a very strong team culture internally to make this program possible. I think that's very important.

Kirchman: Just to leverage what Alan was saying. He said to note on, the If This Then That enhancement side is, if you're going to go down a path like that, try to step out of the mind frame of the traditional demand response program, where you're calling an event and you're expecting a very specific reaction from a customer in terms of demand with something like a thermostat, right. Through something like the Internet of Things, you're really handing over the power to the customer, to react to those demand response signals in whatever way they choose. That's a double-edged sword, right? I mean, you're not going to get a consistent reaction, but you are going to get new reactions from customers in new ways to interact on these types of behavioral demand response programs that you wouldn't have had before. Going into it, just keep that kind of an open mindset with how you're going to interact with those types of customers.

...we've seen half of the enrollment come in through a business reply envelope...

Mellovitz: I was going to just add one more tidbit that it's very important to continue to look at the data as well and continue to build the program upon the data that you're seeing in the market. Continue testing and market and continue building off that. One example is we've seen half of the enrollment come in through a business reply envelope, which seems shocking that direct mail would be that successful in terms of the outreach and the marketing. But that was obviously a very strong data point to continue marketing the program through direct mail and offering a business reply envelope for the enrollment option.

Nestel: I mean, it makes sense. The behavioral DR program, the DR program which is reliant on customers, so understanding the customers before you reach out to them but also being prepared for how they respond. That seems intuitive but I'm not sure I'll be ready to go through all those processes. That's really helpful. That sounds like more of the positive lessons learned. What about some key challenges that you incurred as you are both implementing the program but also enabling the IoT component of this?

Mellovitz: I think just going back to the same lessons learned, right? You start off small, test out things like those applets with your customers on a smaller scale. They don't necessarily linger either right at the balance between speed to market and making sure that you get things right with your customers.

But with anything tacked on innovation you have got risk, right? You have applets that don't always, the way the customers want them to, right? Get customers' feedback around that. The kind of lesson learned there is, get something out there that works. Slowly ramp up enrollment on an enhancement program like that.

Get as much customer feedback as you can and often as quick as you can, and then feed that back into the design, right? We've gotten plenty of feedback from users that have used parts of it. We'll tweak language. We'll tweak to help those applets work and continue to evolve it rather than the thing that we throw out there for a whole year. We might make changes every month during the summer just to tweak and continue to evolve how the product offers.

Nestel: Are you developing the applets, or are the customers?

Kirchman: It's definitely a blend, I'd say probably 60 to 70% of the applets that are turned on right now are using

the predefined ones that we've set up. But the more interesting feedback that we get from the system are from ones that are set up by customers. Things that use new services with new devices that we didn't even know had moved in to the connected home space. That's fun and definitely a lot to be learned from the customer.

Nestel: That's super interesting. What's the most surprising thing or things that you've sort of found that bring this program to market?

Mellovitz: I think starting from the marketing aspect, we were very concerned around the dispatching and sending notifications out to customers, 30 minutes prior to the start of an event. We did some research around that after the program was in market, and surprisingly, the majority of the customers in the program were satisfied with the amount of time given for those notifications. We still get some complaints around it. That was a very surprising aspect, that the full time nature of the program did not deter from participating, and customers were satisfied with that. And then obviously, just the method response in terms of the enrollment was a very surprising result.

Nestel: Are you guys still actively allowing enrollment? It sounds like it's grown, but are you still marketing and continuing to try and grow the population of participants?

Mellovitz: The program continues to grow through the course of the AMI deployment which is to complete this year. As customers get smart meters, they'll learn about the program for the first time and we expect the enrollment volumes to increase during that deployment. And then after that, we expect enrollments to sort of taper off and remain at a more steady state.

Nestel: You said the AMI deployment is nearing completion. What's the future hold for this program? You've got over a quarter million customers in there, it's a real time program. What's next?

Mellovitz: I think the focus is really going to be on maintaining engagement with the current population. We've grown this program, we've acquired all these customers. I think the key will be to continue to innovate, continue to expand the services like IFTTT, to make the program more convenient to participate. And I think just focusing on the tips and the actions and the aspect of ensuring customers are continuing to stay engaged, continuing to keep their notification preferences updated and take action during those events. I know we have plans to hopefully expand on IFTTT, or make the experience better.

Kirchman: One of the things that we've only about 60 to 65% of the customers whose use the connection process for IFTTT actually hook up and create or turn on an applet. That's kinda one of the bigger feedback points that we had early on is how do we make it easier to get through that process. And how do we better inform the customers that don't really understand what it is up front to have a better feeling when we go into the process of setting up an IFFFT account of what the platform is meant to do for them. As we move forward we'd like to make that enrollment process easier. If we can get to it, a one-click kind of turn on for devicesin a beta program, all of that will help us with kind of the larger adoption and kind of ease of use with the customers.

Nestel: This is really helpful information. We've got some questions that have come in through the webinar so want to try and get through as many of those as possible. The first one is, the term behavioral is used in different ways by different organizations. For many, it means the signal or dispatch is not automated, for example, email or text is used. How are you guys on behavioral, how do you sort of interpret it?

Mellovitz: The program is behavioral. When customers enroll they select the notification preferences of phone, email, or text messages to notify that demand response events. And it's really up to the customer to take action based on those notifications. We have of the 270,000 customers in the program about 1,800 with IFTTT activated, and of those activations, we have some customers that are automating things in their home, like smart thermostats, to automatically take the action for that. But 99% of the program is behavioral. Hopefully that clears that up.

Nestel: What about geofencing? Was geofencing used? I know when I tried, I had IFTTT in the past I had activated geo-fencing, is that playing a role here?

Kirchman: Maybe, maybe not directly. You can use geofencing as the input into IFTTT kind of applet, but for the most case, it's is there a demand response event going on? Yes, then take certain actions in my home. I don't know that it's necessarily dependent upon whether or not you're there or not.

Nestel: I think IFTTT is becoming something more of interest within the industry and folks are wondering if they can get a look at the of platform to get a better sense of how it works. Obviously not now in the seven minutes we have left. But is there maybe a place that they can go or somewhere where they can get examples that are used for your program?

Kirchman: We have two different service channels on IFTTT. You just search for ComEd on the IFTTT platform. IFTTT is also very good about allowing or showing off kind of behind the scenes what the platform would look like in terms of analytics and reporting and capabilities. We're happy to share any of those analytics, but IFTTT's also a pretty good proponent of helping folks out early on so they know what they're getting into. Both of those are good resources.

Nestel: Okay that's great. Lots of questions. Are there specific characteristics of customers that are reducing load in terms of demographics or other characteristics? For example, are they prolonging different demographic buckets? What insights do you have there? What type of customer demographics are we seeing?

Kirchman: Off the top of my head, good lower to medium income, senior citizens. That's kind of just knowledge off the top of my head. I think the benefit of making this program behavioral and not requiring equipment like AC switches or smart thermostats is we kind of open it to all sorts of demographics. It's really any customer with a meter and a phone. That really broadens the customer demographic.

Nestel: How do you know who's using IFTTT? Who's automated the home devices?

Kirchman: Unfortunately with our first year rollout, we decided to go lightly and not complete the circuit of tying your IFTTT account with your ComEd.com account. Our analytic reporting is pretty minimal there. And that just goes to the speed of delivery right? Sometimes you have to make concessions on what the features are for the first year and that was one of them.

For next year what we're basically planning to do is offer customers that if they'd like to link their account. We know who the customers are. We can do measurements on how much more load response we're getting from customers and also potentially provide them reporting kind of as that carrot for linking their accounts. They get reporting on here's how well you're doing with your actions taken, here's information based on what we know you've purchased in our marketplace. As customers start to do that link, we'll get more data and they'll get more features.

Nestel: Okay, how are you tracking the actual impacts on load and how accurate are you finding those results?

Mellovitz: We're obviously looking at the smart meter intervals to measure load. As Brian mentioned, we unfortunately can't look at the customers using If This Then That, specifically. We're looking at the total program population in terms of the load impacts during the event hours using a difference/ indifference methodology, kind of a necessary model to compare non-participant segment with the participant segment. The 90% confidence, and we're measuring about 7 to 8% of impact during the DR event hours.

Nestel: The program started running for a little bit, definitely found some successes, some learnings as well, but every great program's gotta go through evaluations. Which of the methodologies is being used to quantify load and the results you're seeing?

Mellovitz: The methodology I just mentioned, it's got difference/indifference methodology to conduct the M&V.

Nestel: In terms of loads you're going after the home. I would assume you'd be targeting HVAC obviously, but are you seeing customers go after other types of load, or what are you seeing in terms of where the load is coming from? Or do you have that visibility, because it sounds like you may not have that much visibility exactly?

Mellovitz: The insight we have is really what we're seeing at the meter and what we're seeing with the half a percent of customers using If This Then That in terms of what they're automating. We're under the impression that a majority of the impacts are through air conditioning, and just avoiding the use of central AC and window AC units during the event hours. The tips that we send customers also focus on things like large appliances and avoiding the use of dishwashers and washing machines and vacuum cleaners and so forth. But based on what we see at the meter, we expect the majority of the load is air conditioning in terms of the impact that customers are making.

Kirchman: On the IFTTT side, we're at about 75%, 80% thermostat, 15% of those applets turned on are actually notification. Phone calls, text messages, push notifications, iOS reminders, Google Calendar alerts created. A pretty significant portion are either notifications or thermostats on the IFTTT side.

Nestel: It's really interesting. Well guys, we're at time, so Ed, I'm going to hand it back over to you.

The conversation above is from a webcast recording at
www.peakload.org/dialogue-comeds-peak-time-savings-program

Program Pacesetter
Gulf Power's Energy Select Program

As the first fully-automated price-based demand response program, Energy Select was designed to reduce generation needs, better use existing capacity, and enhance customer satisfaction. The Energy Select rate features four tiers that better reflect the cost of producing electricity during those periods, and customers pre-program central cooling and heating systems, electric water heaters and pool pumps to respond automatically to the different prices. As many utilities have struggled to successfully implement price-based DR programs, this "set it and forget it" approach enables easy customer participation. Over the years, the program's enabling technology has evolved to meet the changing needs of Gulf Power and its customers. The program initially used one-way paging for communication into the home and customers had to program the devices through the thermostat. Using Itron's IntelliSOURCE Enterprise software, Energy Select now leverages customer's Wi-Fi networks for two-way communications and devices are programmed through a mobile device or computer. The technology improvements have dramatically increased enrollments, improved customer satisfaction and reduced service costs. Gulf Power deserves recognition for being a pioneer in price-based demand response as well as for its commitment to innovation that has significantly increased the value of the Energy Select program for the utility and its customers.

Dialogue with David Eggart and Tommy Gardner, Gulf Power; and Jason Cigarran, Itron and PLMA Thought Leadership Co-Chair on June 14, 2018

Cigarran: My name is Jason Cigarran and I'm a director of marketing communications for Itron in our distributed energy management business. I also serve on the PLMA executive committee and spearhead the thought leadership initiative with Rich Phillip from Duke Energy. And today, I'm excited to be joined by David Eggart and Tommy Gardner from Gulf Power. David is an energy efficiency supervisor at Gulf Power, where he has been since 1983. David was responsible for the development and implementation of the Energy Select Program, as well as the daily operations and success of the program. Also joining us is Tommy Gardner, and he's the program

manager for Energy Select, and Tommy has been at Gulf since 2007. Tommy currently provides program support through customer service and the district marketing teams. Tommy also conducts maintenance and customer feedback analysis to ensure satisfaction with the program. To get us started here, I was hoping we'll start with you David. I was hoping you could start with a background on Gulf Power along with the review of some of the driving factors behind the creation of Energy Select. And then also a brief overview of the program and the pricing tiers, how they're structured. And then finally, discuss what the targeted loads are for the program.

Eggart: Before I get started, I'd like to thank Jason and the PLMA Group for the opportunity to speak with you today about the Energy Select Program. Gulf Power's based in Pensacola, Florida. We're an energy company and subsidiary at least for the time being of the Atlanta-based Southern Company.

Our beginnings go back to 1926, when Gulf Power Company became an actual operating public utility. Today, we serve nearly a half million customers in 71 towns and communities throughout Northwest Florida. At Gulf Power, our customers are at the center of everything we do. Our mission is to safely provide exceptional customer value by safely delivering reliable, affordable, and environmentally responsible electricity while also strengthening our community. As the first fully automated, price-based demand response program. Energy Select was designed to reduce generation needs, better use existing capacity or improve the load shape, as well as enhance customer satisfaction and value. The Energy Select rate is a key component of the program. It features four pricing tiers that better reflect the cost of producing and delivering electricity during those periods.

Customers pre-program central cooling and heating systems, electric water heaters and pool pumps to automatically respond to the different prices. Now I realize many utilities struggle to successfully implement priced-based DR programs. However, by providing an effective rate design and equipment so customers can pre-program their system and don't have to do anything to effectively respond to changes in the price signals — this set it and forget it approach enables easy customer participation.

Cigarran: Thanks for that background info. Now, the award recognized the technology evolution behind the program. Could you please provide some color on that but keep the focus on what technology that Gulf is utilizing today?

> ...the program's enabling technology has evolved to meet the changing needs of Gulf Power and its customers.

Eggart: Over the years, the program's enabling technology has evolved to meet the changing needs of Gulf Power and its customers. The program initially used one-way paging for communication into the customer's home, and we utilized the customer's landline system to respond back to it. Customers pre-programmed their devices on their thermostat. Energy Select now uses customer's Wi-Fi network, two-way communications, and devices are programmed through a mobile device, or on their computer. The technology improvements that we have made have dramatically increased enrollments, increased customer satisfaction and reduced their costs.

Cigarran: What was the primary driver to upgrade the technology?

Eggart: We were losing customers, but it wasn't a customer satisfaction issue, it was solely a technology issue. We had a reliance on landline phones and landlines were becoming obsolete. Hardly anybody has landlines anymore. So what that did was it made us scramble to find an available and affordable alternative. I think the biggest thing, take away or lesson learned from that was that if you're not planning for tomorrow today, you're already behind. And with that in mind, we're already working with Itron on a bring your own device alternative.

Cigarran: Tommy, what are some of the results that you've achieved since the technology upgrade? Making it more user friendly for the customer to participate?

Gardner: Since the switch to broadband in 2011, the Energy Select Program has continued to grow. The cost effectiveness has improved, and customer satisfaction rates have remained high. We believe these results are directly tied to more user-friendly technology. And in the six years following the technology upgrade, Energy Select added more participants than enrolled in the first ten years.

In 2011, Energy Select had roughly 8,000 customers. The program now has over 19,000 participants. Energy Select customers also enjoy greater control over their energy usage, and lower prices. Even with the increase in active customers, we're also seeing a steep decline in customer service calls, which have dropped about 20% annually with the technology upgrade. Customer attrition has also declined from about 20% annually to less than 2%. The savings associated with the decline in customer service calls and equipment removals has helped contribute to the program's cost effectiveness and increased customer satisfaction.

> ...Energy Select program now has a customer satisfaction rate of 95%.

Based on our most recent survey, the Energy Select program now has a customer satisfaction rate of 95%. And nearly 90% of those participants say programs such as Energy Select improves their overall satisfaction with Gulf Power.

Cigarran: Those are some very impressive results. The program has usually been utilized as an emergency resource. But now there has been some targeted use recently to ease load on a transformer in one of your specific zones of your service territory. Could you provide some more detail on that, please?

Gardner: One example of the value of Energy Select recently occurred at one of our substations. We had a trip breaker that nearly caused a widespread power outage in the Destin, Florida area. And I'm not sure if you're familiar with Destin, but Destin is a major tourist location in our service area. Energy Select was used as a solution to provide relief of already costly equipment damage and impact to our customers. So when the breaker tripped, power was rerouted. That resulted in a double load on one of the other feeders. And thinking, that issue was resolved, the next day temperatures rose, and the load climbed on that feeder, then we realized we needed a solution that would preserve the equipment and keep the customers' lights on.

The decision was made to call a critical pricing event that afternoon and by identifying the Energy Select customers that were on that beta, we were able to reduce demand by about 250 KW which provided the load reduction needed. In the end, we were able to positively impact thousands of customer's satisfaction

by utilizing just the load from those Energy Select customers. This is just one example of the growing operational value of the program and the greater role it plays with Gulf Power's DSM offerings.

Cigarran: Before we go to the audience Q & A that we received, Dave I was wondering if you could provide some final comments on the program? Also maybe just to provide a little more detail behind the Energy Select rate? It's obviously a critical component of it. And I think the audience today would benefit from understanding a little bit more about it, if that's okay.

Eggart: Sure. First of all, let me tell you we love the program and so do our customers. I don't believe this is an accident. The program appeals to a universal customer desire to both save money and have control over their energy purchase. Now how do they do that? The rate is a really critical, absolutely an essential part of what we do.

And the rate itself has four pricing tiers, three of which are pre-programmed. We have a high, medium, and a low pricing period. The high, medium, and low are all in effect on the weekdays. On weekends there's only a medium and a low rate. The high rate is above the average cost of the flat residential rate, and the medium and low prices are below the standard rate, so 87 percent of the time customers are paying a price that is less than standard residential rate.

That's how they can shift their load from higher price time periods into lower price time periods through pre-programming and utilizing that programmable thermostat, programming their water heater and pool pump to be off during high price periods and things like that. And that's how they get their win in this program while we get the win from reduced generation and improving our load factor. And, this particular program, we strongly believe that this technology, this application, will work anywhere.

Cigarran: We did get some questions in advance for this session. And the first one we got was, what has been the customer's reaction to the program and how does this compare to other DR programs at Gulf?

Gardner: As I mentioned earlier, the customers have responded well to the new equipment. Customer participation continues to grow, and we hope to reach 20,000 customers by the end of the year. Customers really enjoy the ability to set and then forget it and remain comfortable in their home. And then as far as the differences, and David touched on many of these, Energy

Select differs in a couple ways from other DR programs. Energy Select follows a variable pricing schedule, so customers have the ability to respond accordingly to fit their comfort needs.

The only other component that could change is the critical [event]. And if we decide to call a critical, customers get a notification either by text message or email. So customers are fully aware of any demand events that are going to happen.

Cigarran: How often on average, the last few years has Gulf used the program?

Gardner: Well, I'd say our criticals are typically in the high demand period. The coldest days of the winter, the hottest days of the summer. We see usually three to five criticals per season. Some years are lower, some years are higher. And then we have those other events where we might have an issue with power delivery equipment, so we have to go in, and call a critical that might go outside of our normal one-hour criticals.

Cigarran: Building on the question I asked earlier, we just got a question in from the audience that asked this, please explain how the price responsive function works and is it keying off wholesale power prices, time of use (TOU) rates, or rate tiers unique to this program. And you touched on that a bit earlier David, but I'd hoped you could just expand on that slightly.

Eggart: When the rate itself was designed we took all of the load shape information by hour to determine what our cost was and taking into account the factors that go into the generation of electricity with delivery of electricity including all of those things in and say, okay, this is our total costs during those time period. Now, one thing I think that's important to note is that you know you can't do 24 hours because customers won't do that. You can't have a price every hour during the day because it's just too complicated. Customer's don't want to put that much time and effort into this. But by going with something simple like a low, medium, and a high and putting in an easy to remember schedule that does not change, like Tommy said, customers can manage that. We're all used to following schedules for a variety of things. And this is really no different. Everybody understands low, medium, and high.

So as far as the determination of that, our rate department puts all that together through the cost-of-service studies and says, okay, this is what it costs to provide a kilowatt hour during this time period. And we

set the rates accordingly so that the customer could have a win in the situation — that's the carrot — and we can meet our needs as well.

Cigarran: Regulatory plays a key component of any demand response initiative. We had a question here about how long did it take for the Florida Public Service Commission to approve the program and maybe also touch more broadly how the regulatory bodies have reacted to the program as its evolved throughout the years.

> We busted that belief by showing that customers will and do respond to changes in price.

Eggart: Once the pilot was completed and the results were analyzed it took a little over a year to get commission approval. Now it's important to keep in mind that was a while back and that the price-based programs were very rare. The general belief was that the price of electricity was inelastic, in other words it didn't matter how much you charged for electricity. Customers needed it, had to have it right then, and therefore were going to buy it, regardless of the cost. We busted that belief by showing that customers will and do respond to changes in price. We have a much better load shape. But we really flatten the load shape and it's all based on response to the rate. The price-based demand programs now are really readily acceptable. And in fact, many Public Utility Commissions are calling for more pricing options for customers.

You mentioned the commission perception of it, and it's difficult for me to speak about other states, although we've had some discussions. And those have gone pretty favorably. I think it's important to note that we went from a commission that was very skeptical, to a very strong supporter and advocate of what we're doing. So, I have to give them a lot of credit for basically looking at the results and saying okay, the reality was different than what we perceived, and we think this is a good idea. You all go forth and conquer.

Cigarran: When you see those customer satisfaction scores, it's hard to argue with success of the program, in addition to operational benefits that Gulf achieved. Well, we just got another question in here, about a common thing you hear about Wi-Fi based DR programs, do you have any issues with customers losing their Wi-Fi connection?

Gardner: We do see some offline devices. Our program is an opt-out program, so when a customer moves out of a home that has Energy Select and the new customer moves in, we mail them a package, we mail them the instructions to reconnect their devices. And then, through all that if they still can't get the device connected, they can call customer service. And customer service walks them through reconnecting that device. We do see some offline devices, but we even saw that with the gateway equipment that's connected to the ethernet cable. I wouldn't say there's a major change in offline devices from one platform to another. We still see the offline devices, and I don't know that there's anything you can really do about that.

Because with 19,000 customers, you're going to have a healthy mix of old routers, not so old routers, and then new routers. And the same as far as signal strength for those routers, so I think that's just part of it. You're going to see some offline devices, but how do you manage those? We're looking at some type of notifications with customers, as far as how long they have been disconnected, and trying to send them some type of a message to reconnect that device

Eggart: Let me add too, that in the nearly 20 years now that we've been either testing or running the program, we've looked at a lot of different technologies, and I'm just going to tell you, there's not one out there that's perfect. You're going to have issues with every technology that you come across. We feel like this has been the best by far. There are going to be moments when customers lose that connectivity. But, by and large, it does not cause a problem for either the customers or for us, in terms of either the response to the program or the ability to call criticals.

Gardner: I'll also add that, customers, they're aware of the pricing schedule. And if there is an event, a critical event, they're going to get the notification. And if it's in the winter, because our high tier is in the morning they'll get the notification the day before on their phone or through email. And they're going to get that device reconnected, because they know the meter is separate and the meter is going to charge them accordingly. So it polices itself, in a sense.

Cigarran: That's a great point, Tommy. I was just going to add and say, this is a bit of a different approach then your traditional demand response program, where the customer is really incented to keep the equipment online and available to the utility. So that probably helps

mitigate devices going offline. We have more questions that just came in, and one thing we didn't cover, but this question was around can C&I customers participate? But I also was wondering if you could discuss the type of customers that are targeted for the program. I don't believe C&I customers are, but if you could just touch on that quickly.

Eggart: At this point in time we don't do a C&I program. We've discussed it over the years but have never really moved forward on it. Now the types of customers you're talking about, the demographics of the typical Energy Select customer. That's been the Holy Grail for years trying to find that, but I don't know if it exists. And I say that because customers have the opportunity to save, because they want to be in control. It really applies to a very broad base of customers. We used to think that customers that stayed at home during the day, older customers, retirees, things like that, would not be good customers or good targets for this, because of the fact that they were at home.

And it turned out to be just the opposite. That those customers, in fact, are some of our closest, let me say. They watch their programming and prices closer than a lot of other folks do. And probably the only group that we really struggle with is the group that's pretty much 20 to 30. Somewhere in that range where they're very mobile, they're moving from one place to another. But it applies to a very broad band of customers, whether it's a high income or a low income, or any age. There's just not really one particular demographic that says, this is it.

Cigarran: There are two more about the rate and a couple of components to it. The first one is, do the rate tiers reflect Gulf's average cost of service for the time period or the actual customer bill changes? And then the second one on top of that is, are there any incentives for the program or is the entire incentive related to the promise of lower electric bills?

Eggart: Okay, let me take that. Let's address the last part of it first, there are no incentives. The incentive is the savings that the customer receives every month on their electric bill. And again, the satisfaction rates on the program are very high. We've always felt like customers would be better suited, better pleased by having more control over what they do. And they police how much they save or try to maximize it. As far as the

costs themselves, we don't change our base rate prices between rate cases. We don't go in and say, okay, the price of electricity for this day, this week, this month, this year is different than what it was before. We go through the rate hearings, we use the cost of service studies to determine what it costs to produce a kilowatt hour during those hours for a residential customer.

We tried to make the price itself, in effect, neutral. In other words, it's designed such that, if a customer didn't change their usage patterns at all, there would be no difference in the bill. The great thing about that is, though, is that they do respond. And therefore, it does result in a savings to the customer and it results in a savings to us, as well.

Cigarran: So the last question here before we'll end it, and I'll take this one, and David and Tommy, if you want to add anything to it, that would be great. So the question is around, do you know any other similar varying price-based programs in the US or worldwide? And I would say there's an increasing number of these types of programs that are being deployed across utilities. But what makes Gulf Power's program unique is that it's automated, so the customer can easily participate. And Itron has done a number of these programs, Tampa Electric is another one which is in Florida, near Gulf. And then city of Wadsworth and Oklahoma Gas and Electric are just two more that come to mind. And there are other automated programs out there, but we certainly see, and Gulf Power has gotten a tremendous amount of benefit from this automation. But certainly, we see these types of programs expanding over the next few decades, as utilities want to get the benefit of a price-based program.

Eggart: You mentioned a very, very important aspect of the program and that's the ability to pre-program and then the program responds automatically. Like Tommy said, you send the signal out to the customer that a critical price is coming, they don't have to do a thing. They don't have to do a thing if they've got the system programmed to respond to that critical event, which they do. It's primarily for just the notification to say, this is coming. If you want to change anything, you can, but the majority of people don't make any changes. They don't have to be home, they could be in Europe. However their system is programmed is how it's going to respond.

Cigarran: Thank you David, and thank you Tommy as well for the time today.

The conversation above is from a webcast recording at
www.peakload.org/dr-dialogue--gulf-power-energy-select-program

Technology Pioneer
Hawaiian Electric Company's Regulation Reserves Program

Hawaiian Electric Company (HECO) has successfully utilized customer assets to provide utility grade Grid Services. Faced with the 100% Renewable Portfolio Standard target, HECO will use demand response and other demand-side resources to provide various grid services needed to maintain the grid reliability of the islands, including capacity, regulation reserves, and frequency response services. Regulation reserves is the most complex service requiring continuous real-time operation with variable controls every four seconds. HECO's Demand Response team, led by Richard Barone and supported by OATI technology, has defined and managed this highly innovative demand response initiative, truly moving demand response and distributed energy resource management to a higher level, to enhance and strengthen grid reliability while allowing greater levels of renewable generation.

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Dialogue with Rich Barone, HECO and Dain Nestel, ecobee and PLMA Awards Co-Chair on May 3, 2018

Nestel: I'm excited to welcome Rich Barone, who's part of HECO's focus on regulatory reserve program. I'd like to introduce Rich, or ask Rich to introduce himself. And then give us a little bit of background on what was in this program. Rich?

Barone: Yes, good morning. And thanks Dain, and good morning everybody. Thanks for this opportunity. And thanks to PLMA for the award, which we're very proud of here at Hawaiian Electric. Just a little, so my name is Rich Barone, I'm the manager of the Demand Response department here at Hawaiian Electric.

Responsible for DR across all three of our operating companies, Maui Electric, Hawaiian Electric Light, and Hawaiian Electric Company. A little backstory on this particular project. It falls into little bit of a larger sphere. And you'd have to go all the way back to 2014 to understand the origins of this project.

2014, our Commission came forward with a number of inclinations and policies, and one of those policies, one of the four pillars, was DR policy. In that statement, the Commission ordered us to pursue and publish plans for an integrated Demand Response portfolio. By that, they meant put together a portfolio, by the way, one that engaged customers and offered customer choice.

One that engaged a competitive market. And one that delivered a variety of services beyond capacity or energy, or negative energy, but also ancillary services. And the evolution of that portfolio that followed thereafter resulted in a preliminary portfolio filing by the company in December of 2015.

And then a subsequent and revised filing in February 2017. And the reason for the two filings we were as a company going through, I guess you might call a new resource plan. And so, we had to line the portfolio with that resource plan. But what was interesting about this is that in 2016, so in the middle of all these things, we had no portfolio approved, our public utilities Commission had ordered us to proceed with implementation before the end of 2016.

And of course, we were scratching our heads, saying well, how can we do this when we don't have an approved portfolio yet? What are we to do here? And so, what we then did, back in 2015, we had actually put out an RFP for the provision of grid services through a variety of aggregators.

And we received about 25 responses to that, and they sort of sat there on the sidelines until we had approval for the portfolio. We down-selected at the time to nine shortlisted vendors. So what we did at this time is we looked at each other and said, okay, why don't we reach out to these guys, these nine shortlisted vendors, and see if any of them would be interested in partnering with us in a demonstration phase. Where we could look at a variety of customer classes, look at a variety of technologies, and look across the four different grid services we're targeting with this portfolio and see what we can put together. And we cast this to our stakeholders and our Commission as what we called Implementation Phase 1.

And so in this context, we then reached out as an addendum to the original RFP, and we said hey, let's see who's interested in doing a cost-share project to demonstrate some of these services. And lo and behold, one of the projects that was proposed to us — led by

OATI — was to leverage a variety of customer-sited assets across a number of different customer classes, two in particular, commercial and residential, to deliver regulating reserves.

By far, I think in some respects, the most challenging service. The project that we then executed with OATI as the prime, was to demonstrate regulating reserves using a constructed signal from Hawaiian Electric, and actually several indicative signals of day types, if you will. Good days, bad days, average days.

To have this sort of frequency signal that then OATI could develop control sequences for a variety of assets downstream. And the assets that we were very keenly interested in were 40 electric vehicle two-way chargers. In addition to that, there were some water heaters and some commercial loads as well. But to a large extent, the real interesting stuff came out of the performance and following of that regulation signal from the electric vehicles in particular. So that's kind of the origins of this project and what we aim to get out of it. And there was a great team effort. OATI had a great team that they had put together, and were excellent partners. Backstory on this, though, is that in some ways we had a leg up because all of these assets had already been put in to Maui by way of a Jump Smart program several years ago, sort of a smart grid project. So you already had the two-way chargers in place and a captive audience in terms of customers. So we had a leg up with the terms of customer recruitment and engagement on this. And you also had a population of known entities in terms of the technologies at play. But that said, we still learned a lot and we saw some tremendous results.

Nestel: That's a great explanation. So, I've got a quick question, and this show my naivete when it comes to regulating reserves. I've spent like a week or two in Maui, and I remember seeing, and experiencing, there's a lot of trade winds, there's a lot of solar, obviously. As regulating reserves, how does that try to address some of the intermittency from those other resources, or am I totally off base there?

Barone: Well, you're not totally off base. In all cases, regulating reserves is a grid service or an ancillary service that helps the system and the people that operate it maintain stable system frequency, which is targeted at 60 Hertz. And there's lots of reasons why you would see volatility or variability in that frequency. Normally, it's reflective of a supply demand balance, right? That's kind of generally what it is. And so to some extent, variability

of production of renewables, whether it be wind or solar, could be a driver to system frequency. But you have to recognize that these are eight second round-trip telemetry signals, so you're dealing with just maintaining that in very kind of tight intervals.

And what we've seen is that, I mean, regulating reserves has been needed for a long time, even before you had the preponderance of renewables. So essentially, that variability exists in the system, especially one like ours that is a small system with not a lot of inertia. You're going to have that kinda stuff.

It's exacerbated by renewables, but renewables create the fluctuations kind of at sort of broader time signatures than when we're dealing with regulating reserves. And it wouldn't be a shock to me, whether it be in our market or others around the mainland, where you start seeing ancillary services that are a little bit slower time frame than regulating reserves that help operations deal with the variability of renewables.

Nestel: This approach was really directed at sort of the core of your service. Is that why it was so significant, or were there other reasons why this project was so significant in what you guys were trying to accomplish?

> The solution is complex and thus HECO has employed a system-of-systems approach.

Barone: The solution is complex and thus HECO has employed a system-of-systems approach. I think there are three pieces, the rule of threes with the significance of this project and it's arbitrary terms of where I start. So, first is we are pursuing four primary services with our portfolio. There's capacity, which has an energy component to it, which a lot of it looks like old school DR; if you throw in a little building element, it gets a little bit more complex. We've got a contingency reserve or what we call fast frequency response, which is extremely fast, automated type of a deal.

There's equipment that can do it. It's just a matter of herding those cats a little bit. There's a replacement reserve, which is like a non-spin instrument you've seen in other markets. And then the fourth one is this regulating reserve. And there are markets out there, like PJM, where you have a regulating reserve market. We've never engaged customers for delivery of that service. So, in and of itself, the service is one of the four main tenets of our

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portfolio. The second part of it is as we move forward with this system of systems model where we have what you might call a master distributed energy management system at the company level.

We intend to engage growing numbers of what you might call aggregators, who run their own DERMS (distributed energy management systems) out there, controlling portfolios of assets. This is an important project in that we worked with a very sophisticated DERMS technology from OATI that in and of itself intelligently controlled a number of assets downstream of itself, and then informed upstream to us.

Proving that that piece of the overall LEGO set, if you will, of our architecture, can work successfully is absolutely invaluable to where we want to go. The third piece is electric vehicles we anticipate becoming more and more a part of our interactive load pool, if you will, here in the state of Hawaii. So, starting to dip our toe in the water of how we can work with electric vehicles to be positive contributors to these services, especially one of the more, I think, difficult ones was enormous for us. So those are the three, I think, main tenets of significance for this project for us.

Nestel: It's really going to have a pretty significant strategic impact on the entire portfolio, and as you progress into the future sounds like.

Barone: It does for all of those reasons but of course in some respects, it starts to provide visibility to some additional challenges. You know the old adage, the devil's in the details. So now we started with a homogeneous set of resources, a captive audience already on board and engaged through the JUMPSmart program. So you almost had a controlled environment in that respect. But it's a good start but now you realize okay, you're going to have diversity of assets if you try to broaden it. You're going to have the mobility issues to concern yourself with especially if you're looking at AV. And you're going to have new customer segments who haven't been necessarily previously engaged in some of your offerings. So, there's a lot of uncertainty that still remains but at least we've started up that long staircase.

Nestel: That sorta of gets to another question. I'm thinking a little bit of the portfolio but also your future plans and the outlook for the future portfolio. As you're starting up that staircase, how does this project that you guys worked on, how does this relate to that portfolio to your future plans?

Barone: The intent of the company is to deliver. So when we filed our portfolio, you have a number of targets for each of these services through time, right? And we looked at it as a department, we looked at a 15-year portfolio trajectory and in concert with our power supply improvement plan that I alluded to early. That was a 30-year look ahead as you get to 100% renewables. So, you get less and less certainty as you go that far into the future. But be that as it may, the targets are established by what services can the system itself benefit from in a cost-beneficial manner.

And it is overlaid with what is our potential, right? Or what our potential study told us we should be able to garner over time. So now we have our annualized targets set out where we know how many megawatts on a per service basis we want to procure. And we are honoring the commission's directive to pursue this in a competitive market space.

So just last Friday, we issued our best and final offer to those short-listed vendors that remain from the initial RFP. We made some refinements around the services and the overall contracting structure. We expect to be making awards this June and those will be five-year contracts. We'll be procuring the growth of services hitting our first two years of targets.

We have secondary and tertiary RFPs to be planned over the next 18 months thereafter. So, this and the other four demonstration projects that we did, gave us a glimpse into the technical efficacy of this stuff. Can we get in a line of sight towards really what we think the costs of this are going to be?

What is the market and what is the market appetite and market risk? And what are some kinds of other technical challenges or just general implementation challenges that we may not have been aware of? We take all of that bitter lessons learned and as we vet through the responses that we get not only in this next round but continue to refine this overtime.

We're going to keep building on what we've learned to make sure that we scrutinize and assess what we're receiving from the market with a little bit more of a critical eye. And that will be protective to not only the company, all of our customers, but also the vendors who want to participate in the market.

We can push back on areas that we're skeptical about and say look, we've seen in other deployments, or other demonstrations that there are some hiccups here, or

there's problems with this and let's sharpen our pencils a little bit. So the are lessons learned from these projects, while the populations were small, they do give us a little bit of a deeper insight into how this market can play itself out before we get into a long term contractual obligation.

Nestel: You mentioned lessons learned a little bit. What were some of the key lessons learned and/or takeaways?

Barone: At a very high level we learned that generally speaking EVs, well, generally speaking, electrochemical storage and specifically speaking, EVs with two-way chargers can be very responsive to a complex regulating reserve signal. And by the way, there's a lot more complexity to the regulating reserve signal in Maui, for example, or on Oahu than there is in a PJM market. It's just a bunch more volatile, a lot more swings. So the fact that these asset types can be performing and even if we use the complex scoring associated with PJM, these devices granted it was a controlled environment, relatively speaking, outperformed even the best performing classes in PJM's market.

One thing we learned is that, hey, this stuff can do it. So that was a huge leg up for us. We also learned populations matter as you're trying to control portfolios. More is better, so, part of this project was working with water heaters. We only had 30 of them. Those water heaters were relatively well performed under the curve, if you will. But they were a little but more blocky and less fluid than the EVs were and there's a variety of reasons for that. One is the population size and the other is that these were not what you might call interactive water heaters, right?

These are more kind of a binary on/off switches and small populations. It doesn't really give you the ability to maneuver and manipulate. So, it gave us a line of sight towards some of the limitations of existing asset classes as well. Which is useful and it does make the case for how we best use those assets and how we look to maybe modernize, if you will, that asset class into the future. Those were two big lessons learned and I think the commercial asset class was and what we learned there is conventional commercial assets are probably not good candidates for regulating reserves, at least in the scope of what we looked at. Four commercial loads, I think almost exclusively HVAC. Just not quick enough, you know, 30 seconds response time from those guys is not fast enough to conform to the regulating reserve signal. And even if you throw them into the mix that we use, they're

so much bigger in terms of load than the distributive assets on the residential customer side that they really distorted the response from the EVs, and even the water heaters. So, we learned a lot about what some of those limitations are as well.

Nestel: I'm quite intrigued actually on the commercial, industrial side. But there's some other question I want to make sure we cover as well. Specifically, I'm interested. I think the audience would be interested to understand the solution architecture. Can you provide an overview of what that looked like?

Barone: I even have the benefit of great pictures provided to me from OATI, and their final report on the project. But I'll keep it at a kind of a high level for now. Like I mentioned earlier, the long-term solution we're implementing right now is a distributed energy management system, integrated for us by a metric underlying the Seimen's product. That's our, if you will, our master system that will integrate not only with our operators, but with our energy management system. It'll integrate with our advanced generator control for specifically regulating reserves. And it'll play a big role as we proceed downstream with an AMBS. So that's sort of the maestro, and then downstream of that will be the aggregator head end systems, which for all intents and purposes are distributed energy resource management systems.

Some are asset specifics, some like OATI's are very nimble. In the purposes of this project, we had effectively a manual interface, if you will, between OATI's DERMS, and our side. So, for example, they would deliver forecasts to us via email, and we'd deliver a flat file that had the regulating reserve signals that they could then use as dispatch downstream. And then they communicated downstream to all of these different devices via broadband — secure broadband. And then they basically had installed effectively what you call a gateway at each of the different points. The product name is the OATI grid port. And that became a mechanism for administering the local control, and capturing the information and bringing it back. In their middle tier, in their DERMS, they had lots of different kind of features that we are going to be looking for from forming the aggregators in our market. And I'll read them if you want. But basically things like forecasting, monitoring the aggregation, and then the disaggregation for sending it back upstream to us. They did other things like registration and modeling which will also be important. But that was roughly speaking the, what you might call the primordial

architecture for how we expect these things to work at in greater scale. And that architecture will be rolling out as we contract and operationalize our aggregators, let's say over the next ten months or so.

Nestel: Those underlying DERMS, are they focusing on different sectors? Do they get a specific territory, like say an island? How are they bringing that load to you? Or are you guys working through some other structure?

Barone: Basically, there's non-specific ordinance, if you will, on what they can go and get, that they will be directly correlated to, as you go into the future, as we get these RFP responses. Some of them will be head-end systems and DERMS that reach across multiple customer segments. Some will be specific to residential or commercial. Same thing with the in-use technology. Some will be specifically dedicated to one technology. Maybe that would be a grid-interactive water heater. Others may, like OATI in this instance, may reach across a lot of different devices, and some of them, if they're locationally based, specifically at a particular location like a house or a building. They may have to run co-optimization, schemes either in the Cloud or at the building. That's up to them.

But the short answer to your question is, there's no delineation, it's truly striving for a competitive market. Go out and get whatever customers and resources you can commit to these various services. Promise us you'll deliver those, we'll hold you to that, and then you go forth, and you super-recruit and enroll, and enable, and then deliver those services to us through our operators as services. I mentioned the ABMS earlier. As we proceed to a smarter and smarter grid, distribution grid in particular, we'll be able to then, at our DEMs level or our metric system level, be able to identify locational specifics of where these assets are. So sub-pools, if you will, of each of the DERMS. We will provide kind of virtual locational support to our advance distribution management system. That's the vision that we've got for this architecture, so we wouldn't necessarily... Now, that isn't to say that we wouldn't maybe talk right now. This is all system level services. There could be a time where we look to do locational targeting. But it's not our intention necessarily to specifically reach out to individual aggregators and say, hey, go get customers on this circuit, or in this zone, or on this substation level.

We would just tell the market, hey, we need assets here, this has a premium, go ahead and recruit it. So, there's no specificity across the board. It's whatever folks are good

at. Whenever they feel like they can recruit and bring us, that's the way this is going to play out.

Nestel: When you have that approach or that design, it sounds to me, looking forward that once that's in place, you're going to get a lot of strength and diversity in terms of wherever resources are coming from, how the different parties participate. But I've designed plenty of programs and the best designs sometimes run into some limitations or some challenges.

What are some of the limitations you found with this project, or maybe even looking forward that you're expecting to have to deal with?

> Hawaiian Electric is starting to understand if and how electric vehicles can contribute to grid reliability.

Barone: Best laid plans, right? So I think, I've already talked a little bit about limitations. Hawaiian Electric is starting to understand if and how electric vehicles can contribute to grid reliability. I mean, if I were to offer conjecture about the EV class, it's complicated. We were able to reach out to a known audience here and say, okay, we're going to have an event tomorrow. We're going to be calling that event between this hour and this hour. And even with all that, you got about, I mean, I don't have all eight tests that we ran in front of me, but you had roughly 45% to 55% participation, no opt out, but you still had limited participation.

And that's with very clearly defined parameters, with a very captive audience. So how predictable is this asset class going to be? Especially when it's an asset that customers directly interact with as part of their lives? So, there's still a lot to learn about EVs and I think that, and look, we leveraged the two-way charger technology for this, right? That's not always going to be the case. In fact, it's probably less common than more common. So what can we infer or deduce, if anything, with respect to one-way charging technology, don't really know. So we may have more limitations than we realize. I think there's a lot more to understand specifically to this asset type.

Your other point though, this is great. OATI is extremely talented at what they do, and we were able to demonstrate a lot of diversity. We're striving for market competition here though, right? And so this paradigm

that I relate to you relies on the fact that you can get a lot of different markets participants that would not only diversify the market just generally from a general economics perspective, but it would also diversify your customer classes and your assets. We don't have a huge market here. And we are putting a lot of burden on the aggregators admittedly because we're trying to provide our aggregators with a resource that they can rely on much like they would a generator. And so, when you're doing that, your obligations as an aggregator, feel a lot more like an ITT, right? Purchase agreement, or something like that. So, it's pretty onerous I think at first glance. There's a lot, there's a heavy lift for folks. And if you combine that, I mean, in all candor, if you combine the challenges with that, and then you look at the market size.

> There's still a long way to go, but some key steps have been made – and this is going to be an important piece in the future of HECO's systems.

There's still a long way to go, but some key steps have been made — and this is going to be an important piece

in the future of HECO's systems, I guess if I were to look in my crystal ball, my biggest concern is: are we providing a platform here that encourages the type of diverse competition and participation that we desire? Or are we going to wind up with a model that actually has almost monopolization or undesired consolidation with only a small number of aggregators that are either capable or willing to take on these challenges. We don't know the answer to that yet. That story will continue to unfold over the next year. We're not only going to get our first respondents back here in the next few weeks. But we're also going to be working with an open stakeholder dialog for the filing of next March.

We're going to be looking to file a model version of our grid services purchase agreement to five-year, at least currently constructed as a five-year contract for the procurement of these services. So, I think working with the vendor community to help shape and find the balance between the kind of, the obligations we have from our operators, to the opportunity made attractive to the vendors.

Can we find that balance over the next year and move forward with a market approach that attracts competition, healthy competition, is a big mystery to me.

The conversation above is from a webcast recording at
www.peakload.org/heco-regulation-reserves-program

Thought Leader
Jennifer Potter

Jennifer's utility and research experience cover transmission and distribution grid operations, conventional and renewable sources, distributed energy resources, integration of demand-side resources, time-based pricing and demand response. Her economic research includes cutting-edge work on market potential and economic analysis research on demand response, time-based pricing, DERs, and energy efficiency. She has provided technical assistance to state policymakers, on the behalf of the Department of Energy, to Hawaii, California, Michigan, New York, Massachusetts, and Oregon. She has published a number of reports, including as a lead author of the California Demand Response Potential Study for the California Public Utility Commission, over the last year that has been recognized as significant contributions to the industry. Her published work and reputation have been leveraged for a number of webinars and conference appearances, as well as presentations to state policymakers around frameworks and considerations for demand response and integrated demand-side management.

Dialogue with Jennifer Potter, Hawaii Natural Energy Institute, and Danielle Sass Byrnett, National Association of Regulatory Utility Commissioners, on June 27, 2018

Sass Byrnett: This is Danielle Sass Byrnett, NARUC's director for the Center for Partnerships and Innovation. I joined NARUC in December of this past year, having come from almost ten years at the US Department of Energy (DOE) and previously the EPA (US Environmental Protection Agency). And I was very fortunate at DOE to have the chance to occasionally work with Jennie Potter who received this wonderful award recently. And I'm excited to have a conversation with her to learn a little bit more about the things that she's doing in the demand response area. I also want to note that it's particularly fun for me now, being at NARUC, as I was very excited to learn that Jennie will be Commissioner Potter, starting next week—one of the members of NARUC. We have a wonderful demand response champion joining the ranks of our nation's public utility commissioners. So Jennie,

congratulations. It would be great if you would introduce yourself to the folks who are on the phone with us.

Potter: It's a pleasure to be here and thank you so much for this wonderful award. It's quite an honor to receive this and then to be appointed commissioner shortly after receiving this. The two are not related to each other by the way. So a little bit about my background. I came from the ranks of load researcher. I started out in the utility doing load research and load forecasting. And then came to SMUD (Sacramento Municipal Utility District), where I started my career in demand response and I basically fell in love with it. I've worked alongside individuals throughout the industry on demand response projects.

Whether I've been in an advisory capacity, or working with the pilots and programs, I have had some amazing opportunities to explore ways the industry can advance DR. I've had the opportunity to provide technical assistance while I was at Lawrence Berkeley National Lab to various policy makers around the country. I've written several reports. One of the most prestigious works that I've been a part of is the California Demand Response Potential Study.

Jennifer Potter

In this study we evaluated the different types of grid services that the grid requires, rather than just looking at the capacity type DR programs. We started from the bottom where demand response begins and examined how people use energy, and then moved upwards to determine how we can make changes to those load profiles via different end uses technologies, and of course, looked at how that effects the grid at both the distribution and transmission levels. Then we examined the variety of demand response typologies and services that are available. So, it's an honor to be recognized for those contributions.

Sass Byrnett: Thank you, and they're certainly notable. I had the pleasure of being on the award committee for PLMA and we were thrilled to see the application and be able to offer you this award. I'll note that in my previous roles at DOE in the Office of Energy Efficiency and Renewable Energy, we very frequently referenced the demand response, advanced controls, cost assessment framework that you published. And that it provided a tremendous framework for how to think about demand response's capabilities and how DR might relate to energy

efficiency and other DERs, so it is well earned. I did just want to start our conversation by saying that I know that you live in Maui, in Hawaii. And that you were doing all this work as a remote employee for the past few years. How have you made that work, as far as arrangements?

Potter: A lot of people think that working from home is sort of a dream job, and certainly, living in Maui is paradise. And people come here on vacation and definitely have a different experience than if you live here and you work here. And I would say that I actually have worked harder working from home than I ever did when I was in the office. And there's a lot of opportunity, I think, because to basically do things that are outside of your role and what you're paid for, what you earn from your paycheck. Your workplace is your home. So all those extra tasks, such as "could you take a look at this? Or would you mind reviewing this? Or can you provide input on this?" —all of those requests, you tend to accept, because your home is your work place and you don't have the natural break from work and home. I have not been living the vacation dream here in Maui. I've been spending a lot of time dedicated to what I'm passionate about, which is demand response and distributed energy resources. And researching and staying abreast of the different technologies. That's been a really an important part of my life here in Hawaii.

Working from home has provided me the opportunity, I think, to become more knowledgeable about the various types of initiatives and efforts that are happening around our country than if I were in a workplace where my little cubicle was my zone. *[laugh]*

Sass Byrnett: Certainly, being in Hawaii, given all the policy change that's happening there, and all of the new technologies coming on the grid: Can you talk a little bit about what your perspective is on how demand response fits into that policy and energy landscape at this point in time?

Potter: I think that I'm a little underwhelmed, in terms of how long we've been at DR, and how much attention is given to it through demand response studies and cost effectiveness analysis. Through the different types of research that have been completed, all that research that has gone into understanding how DR can affect both the transmission and the distribution systems, there is still a lack of coordination and integration of it as a reliable resource. I think that we're still seeing it move slowly while the technology moves quickly and that is a little disheartening, I'd like to see it a play bigger role in the energy landscape than it is.

That's not to say that it's not happening, but in the research that I've conducted, we still focus on capacity-based resources. And we're not necessarily looking at how to future proof these technologies and to implement technologies that are future proofed. And when I say that I mean technologies that can provide more than one service, that are smarter than just direct load control switches. I think we are still under-utilizing demand response in our industry as a resource that can really provide some benefits and a great deal of cost savings to the grid and ratepayers. So hopefully that'll change.

Sass Byrnett: Right, there is so much potential with the technology change and the increasing opportunities to identify great services and value them within the context of state policy or market policy. It feels like we're at an early stage, as you know, but with a lot of opportunity and possibility. Can you talk a little bit about how you got engaged in demand response, just as a topic and an interest area? And I see Brian Costen, from EnerNOC asks specifically what challenges did you encounter and how did you overcome them?

Potter: I'm hoping that that's what Brian was alluding to, in terms of the challenges and opportunities around demand response. While I was at SMUD I began working there as an energy efficiency and demand response strategic planner. I hadn't had a whole lot of exposure to either because I was so embedded in load forecasting. And SMUD, as you know, is a very innovative utility, and typically, cuts through the red tape on a lot of programs and technology advancements because they can. They have the ability to move more agilely and quickly on initiatives and try new things.

Becoming part of an organization that was able to do that was certainly fortuitous. I think that the biggest eye opener and where I really sank my teeth in was with the American Reinvestment and Recovery Act Grants for the smart grid investment and AMI rollout. SMUD was awarded $327 million (some of that was matching funds from SMUD) to upgrade their infrastructure and install AMI. Part of that grant was to complete a consumer behavior study, which we called the Smart Pricing Option Study. This study focused on critical peak pricing, time of use rates, and also enabling technology that received price signals from the demand response management system.

So we had to, from the bottom up, begin with installing AMI meters to managing the interval data all the way through the meter data management system, then

through the DRMS through the billing system. I was the project manager overseeing that entire effort. And so it was very hands on, in the weeds, and dealt with all the challenges that come from large projects. The devil is truly, truly in the details when it comes to commissioning all those enabling technology devices to receive price signals every single day.

[laugh] We have definitely become intimately familiar with what the objective was for SMUD; what we really wanted to do with that pilot was make it something that wasn't just going to die after the pilot period was over and the DOE funding was gone. We wanted it to have a meaningful impact and be something that could be continued on at the utility. And even the technologies that we had deployed. So that, in it of itself made it not a short term perspective, but rather a long-term learning initiative for everyone at the utility. Myself, I learned the ins and outs of different types of technologies that can be integrated with price signals and how customers responded to that.

We really did focus a lot on the customer side of the experience. And by asking customers exactly what they did to change their behavior and to decrease their load during specific hours. We wanted our customers to be successful and respond to the rates. It was also important for the utility to really get the DR event phase down to a science and how those were deployed. So that was really where I cut my teeth in demand response and it was quite trial by error and fire, but we were successful in doing so. It ended up being a very successful pilot, SMUD's moving to time-of-use rates here in the next year, I think.

And also, the State of California, the IOUs, are following suit and they're looking to default customers on to time-of-use rates in the next several years. A lot of that progress points directly to that SMUD study. Therefore, I think that it was quite successful and definitely motivated me to fall in love with demand response. *[laugh]*

Sass Byrnett: *[laugh]* So given what you experienced on really thinking about the customers side and what not: Do you think that has influenced how you've approached the analysis of demand response potential? And will you help connect the dots for an audience of practitioners relating those kinds of potential analyses to things that they can actually do and how they can move forward to continue to champion and enhance the rollout of further demand response?

Potter: Absolutely. I think that's left out of the dialogue. Even here in Hawaii where we now have a wonderful,

aggressive DR portfolio that's under consideration by the commission. The first phase has been approved. But so much of the focus is on the Renewable Portfolio Standards (RPS), and that's throughout the country. Renewal portfolio standards is primarily focused on where we're going to get the supply of energy and where that comes from. And there is so little attention given to the demand side of the equation. I think that's really where demand response fits as a resource; it's just as viable as some types of energy supply.

And it can provide resources that can, offset the demand of energy required in the RPS, if you're able to manage loads successfully. And in terms of doing so, that's the customer experience, we can't just say that there is a potential for DR and assume that the customer will be there. There's always the uptake by the customer and the behavior of the customer. And those behavioral analytics are often not included in a lot of the potential studies. There's just an assumption that because a load is available and it's controllable, then it's something that we can count on. But really, the availability of the resources is also part of the behavior of the consumer.

> ...availability of the resources is also part of the behavior of the consumer.

Thinking about demand response absent the human component and how people are actually utilizing energy in their end uses within their home is a disservice to really understanding how demand response can be a viable resource. In effect, I think there's certainly different ways to go about studying people's behavior, or taking into consideration fatigue after a number of events have been called.

I do truly think that we're moving into an area where technology is becoming so advanced that we can utilize it to adapt and change end uses without really interfering with how people go about their daily lives. This isn't a set it or forget it, but it's something more of a responsive demand rather than demand response. There's ComEd's wonderful program that uses if this then that (IFTTT), an initiative that I heard about at one of the PLMA conferences. It works by following an algorithm where if the price signal that they receive is above X then turn off the air conditioner or adjust the thermostat to X. Or to make sure that you don't start the washing machine before this period. We're in the stage where these technologies are available, including technologies

like water heaters that are can be completely and seamlessly integrated to the grid and customers wouldn't notice at all.

> The closer that we can get to that point where we are not so intrusive on consumers' lifestyles, it's going to get us closer to achieving demand response 3.0 or responsive demand.

The closer that we can get to that point where we are not so intrusive on consumers' lifestyles, it's going to get us closer to achieving demand response 3.0 or responsive demand I do think that taking into consideration how people are compensated, the incentives that they're offered, and then the types of information that you provide to them, and how to go about making changes within their lifestyles would be particularly valuable and provide assistance to the grid. Bring them along for the clean energy initiatives and that let them know that they're part of that process and they would be more willing participants or more willing to respond to price signals, and incentives, and different types of programs with the technologies that are available today.

Sass Byrnett: I like your term "responsive demand." One of the ideas that I've heard recently is that of demand following supply, which gets at the same concept of having the demand use what's available, which is particularly relative when talking about intermittent resources. And as you know, the opportunity for demand response to dovetail with other types of technologies (or in some cases, it's the same technology, but other types of characteristics) that we've often thought of as separate in the DER space like energy efficiency or renewables or EVs. Where are you seeing that intersection these days across those different types of fields? Are you seeing intersections of demand response, energy efficiency, and other DERs? How does demand response fit in with distributed energy resources broadly?

Potter: There's some folks that would I think it is in New York state that demand response is a DER. There's still not a lot of consistency in the industry on the thinking, is demand response a DER? Is it not, is it? So it's always our acronym soups that kind of gets things mixed up and I think in different parts of the country, you just have different responses to that question. I consider DERs to be

something that can produce energy or that can dispatch energy, and that would include storage.

Demand response can play on the DER, so what I mean, giving the best example, is using demand response to control batteries to dispatch onto the grid or to absorb loads from the grid. Or however you would want to use it: for frequency regulation or voltage support. There's a whole lot of applications where I think we'll see batteries in the future providing demand response resources. And in particular here in Hawaii, batteries seem to be the go to resource as we move forward, that's going to be, I think, a pretty significant requirement. Because of the island grid structure, we have no bulk power system interconnection here, so we're going to have to be able to store what we can, and then dispatch it when we need to, and have those batteries provide services to the grid that you definitely can't get from anything else, unless it burns fossil fuel. In that regard too, electric vehicles will play a significant role. I think we'll be seeing a lot more of interaction between charging and discharging from the electric vehicles and responding to price signals, for example. And I also think that there's a possibility for even solar to start playing a little bit more into a pricing scenario.

I would back up really quick. I'm classifying demand response in two types of buckets, one being a price responsive demand response and then the other being incentive based. And incentive based would be things like base interruptible programs or capacity bidding programs. And then with price responsiveness, obviously, would be time of use, or critical peak pricing, or real-time pricing. And so there are two different mechanisms in which you can utilize demand response to sort of play on distributed energy resources.

> ...DR is going to be an answer to a lot of the problems that are going to come up from integration issues and as we move to 100% renewable energy here in Hawaii.

I can't imagine a world without that, moving forward. I think that DR is going to be an answer to a lot of the problems that are going to come up from integration issues and as we move to 100% renewable energy here in Hawaii. And I know that the rest of the country is coming up too, we've got 80% over here, and 70% here

and 50% in California. There's a lot of initiatives to move to cleaner energy supply resources. And integrating those will require us to start utilizing demand response in both incentive-based and pricing, and in a lot more detail and a lot more scale.

Sass Byrnett: That makes a lot of sense. And thanks for pointing out the distinction, I think that's helpful for how we think about it. And it also, I think, leads me to one of the other questions we received from Mark Martinez from Southern California Edison. He asked, what possible terms of service in the future could potentially obligate customers to participate in DR? Do you have any thoughts about how that might work moving forward? Considering, as you noted, the need to have more responsive demands?

Potter: I hope, for my vision, I look at the low income and the vulnerable populations, and their participation in achieving a clean energy future. And everybody needs to come along for the ride. I mean, we're not going to get to the goals that we're trying to accomplish, about reducing greenhouse gasses and incorporating clean energy technologies and solutions, without having the customers come along for the ride. We cannot just focus on the supply side. And so for the low-income and the vulnerable populations in particular, their one mechanism will be time of use rates and real-time pricing or something along those lines. That will be a way that they're able to contribute to meeting some of these needs.

And that typically, comes with a smart meter or something along those lines. And these rates can't be punitive, but right now most of our rates are regressive anyway, and we place a higher burden on the lower users than we do on higher users. And so hopefully, with real-time pricing or with time of use pricing, we can actually even the playing field a little bit and then bring populations along that currently don't have the ability to put solar up on the roof or to buy an electric vehicle, that can play with the grid during necessary times.

So certainly, not looking for punitive pricing by any means, but I think that there is a point in time where we are going to hopefully see folks move to time of use pricing. And that would be a compulsory participation and bringing demand response like the definition of

pricing versus incentive based. Because, ultimately, demand response is attempting to change the load profile or the profile of the customer to meet the needs of or the supply that's available on the grid. So that would be one way that I can see that being a compulsory sort of service. I also can see there being a potential, Hawaii hasn't shied away from the fact of requiring inverters that are capable of providing services when there's an interconnection for the system.

So that's another option as well, as we're installing some of these distributed energy resources. We can create provisions in legislation that requires customers to participate in certain programs when they interconnect with certain technologies. I know Green Mountain Power has actually implemented a battery storage program where they have batteries available for customers for like $15 a month. They can use them as backup power, but they are used primarily if the utility needs to call upon it for capacity or frequency or whatever type of grid service. So making these resources available in people's homes, but allowing for the utility to basically have some control over that. Those are some situations that I can see where you would get more of the population involved, based on their priorities or their interest in demand response and distributed energy resources.

Sass Byrnett: Very interesting, thanks for sharing those. We just have one more minute. I would like to ask you one last question which is, just how do you stay abreast of industry trends? *[laugh]* You've been sharing all these examples and things with us, can you offer any insights or suggestions for folks?

Potter: I read a lot. *[laugh]* It's that work from home kinda thing. I do read from the Green Tech Media and Utility Dive and Energy Central. And stay on top of that, I think, more than national news these days. *[laugh]* It's just kind of a reprieve, right? There's so much going on. I also just have questions about what other states are doing, just in general, that I need to find the answers to. Thus, I definitely try and keep on top of that.

Sass Byrnett: Great, well thank you so much, Jennie. It's been wonderful to talk to you and get to hear some of the things that you're thinking about these days as the industry is moving forward.

The conversation above is from a webcast recording at
www.peakload.org/jennifer-potters-award-winning-initiatives

Technology Pioneer
Nest's Solar Eclipse Rush Hour Rewards Program

Nest achieved unprecedented consumer engagement in its Rush Hour Rewards program during the solar eclipse on August 21, 2017, by recruiting 750,000 Nest devices to shift 700 MW of cumulative demand. During the eclipse, many grid operators predicted that solar energy production would be reduced by as much as 9,000 MW. Nest launched a wide-reaching marketing campaign to recruit customers to reduce their cooling energy use during the eclipse by opting into a special Rush Hour Rewards event with just one click on their Nest Learning Thermostat. The number of customers who participated is unparalleled in any other demand response program to date. The success of this campaign demonstrates that consumer-friendly, multi-channel marketing campaigns coupled with a simplified one-click opt-in experience can drive consumer engagement significantly to manage energy load.

Dialogue with Aaron Berndt, Google, and Nick Corsetti, National Grid and PLMA Awards Co-Chair on July 19, 2018

Corsetti: Today we're going to be joined by Aaron Berndt, who is at Nest. He's going to speak to us a little bit about the Solar Eclipse Rush Hour Rewards Program that was awarded a Technology Pioneer Award, this past awards session. Aaron, perhaps, you can introduce yourself in more detail first and then give folks a little bit of background as to how this program came about and some of the details around it.

Berndt: Hi everyone, Aaron Berndt with Nest. I run all of our Central Region Energy Partnerships. I've been with the company about three years now, before that spent almost six years at Pacific Gas and Electric running all sorts of different energy efficiency programs.

The Solar Eclipse Rush Hour Rewards Program, this program this last summer. The way it kinda came about was, we were out in California to talk with the CPC and had a meeting with President Picker to talk about whatever we particularly wanted to talk about. All that he wanted to talk about was the solar eclipse and getting folks excited about using that as an opportunity to highlight how California's demand site management programs and technology vendors could be really rallying customers around the opportunity that we have to showcase what demand side management programs can be doing. So we took that back to the team and really the excitement that Picker was driving within kind of California stakeholders around using that as an opportunity to engage a whole bunch of customers on sort of the capabilities that they have in their homes already to help drive change. So that's kind of what initiated a lot of the discussion to begin with.

Corsetti: Great, and then I guess you just move right into what exactly the solar eclipse event looked like, kind of what went into it and then how it actually was executed on the day of.

Berndt: We have two flagship energy programs that we work with our partners with. One on the energy efficiency side, which we call Seasonal Savings, and then the other called Rush Hour Rewards. This is our demand response program. Seasonal Savings, you could think of as kind of a set points or schedule tune up and the way that is dispatched or deployed to all of the Nest thermostats within that energy partner's territory or a size of program that they've determined.

It's as simple as us sending out a push notification to their thermostat and into their Nest app on their phone, which has real simple messaging of, would you like us to help you save more energy. And then all the customer needs to do to enroll in the program is click a button, yes, and then it starts running in the background, making them more efficient. So, the program itself helps make that specific customer a little bit more efficient which on its own relatively small amount of energy, but when you aggregate that across many, many devices, it can be a meaningful program. The other program that we have, Rush Hour Rewards, is more of a traditional kind of bring-your-own thermostats.

Smart thermostat DR program where you would recruit customers that have purchased a Nest thermostat in the market to join that program. So, they're typically an enrollment incentive to customers to drive them to that utility's website, go through an enrollment process

where they're capturing name, address, typically utility, account number, and then the utility's matching that with a customer on the backend. So that it's more of a traditional kind of enrollment flow, and there's a big difference between a one-click opt-in and then, versus say, an enrollment process I was just talking about. On Seasonal Savings, we get can something like 80% of customers that we dispatch it to opting into that program because it's so simple.

Whereas on Rush Hour Rewards, it depends a little bit on the program structure and marketing all that kind of stuff, but it's more like 10 to 15 or 20% if it's going really well. So, what we had taken back to the team was, well, what if we took the enrollment or the dispatch capability of Seasonal Savings, to have that push notification, a one-click opt-in and married it with a real simple demand response event during the window of the eclipse.

So that's at a high-level kind of what our engineering team did which was definitely an engineering exercise to kind of flip how we were deploying that program. And then on the day of the eclipse, what we did was run a staggered kind of dispatch of that program or deployment to that program. So that as the eclipse kind of travel across the country, we were recruiting more and more costumers at the right time frame, when it was dark out and solar production would have been at its lowest. That's in an essence kind of how it was run, sort of a one-time very simple opt-in to a demand response event deployments.

Corsetti: Great, so before we get into the results, just one question I had. So, was this only push to customers that might have been in the path of totality for the eclipse or were essentially using any thermostats that were connected in a broader region of the country? And then as the eclipse moved east, you were pushing it to those thermostats?

Berndt: It was dispatched, not just within the path of totality. But really more kind of state by state. And even President Picker would say, because the markets knew well ahead of time that solar production will be dropping up at this time frame, so that gave the market plenty of time just took a lot of procurers in know that as needed. So it was really meant to be more of a demonstration project and kind of a showcase of what demand-side management could be doing, and that's kinda how we treated it as well. To really just kinda get the maximum number of customers that we could across the country to just see if it worked. Because we weren't 100% sure what the opt-in rates and that kind of stuff would be either.

Corsetti: That's a perfect kind of segue right into the results. We have some of them on the screen here, but if you kind of just want to walk us through, just some of the findings Nest's head event participation rate. Just the number of utilities that might have been involved with respective customers with thermostats you were pushing the notifications to, and then I guess just some of the hard numbers in terms of savings. And then any of the metrics that you want to share.

> ...we delivered roughly 700 megawatts of cumulative demand during the eclipse time frame.

Berndt: I don't have many more metrics than we've already provided, but over that time frame, we had 750,000 Nest devices participate in the events, so that was all across the country. The results were roughly equivalent to what our standard Rush Hour Rewards program would deliver. We delivered roughly 700 megawatts of cumulative demand during the eclipse time frame. What I don't have is state-by-state percentage of the total but we did see pretty similar opt-in rates as we did for our Seasonal Savings program. So, I saw the question around, how do we engage with the utilities on this?

In each of the major markets where we either have very kind of dense pockets of Nest thermostats and/or a big partner with the local utility. We definitely let them know ahead of time what our plans were for the events, whether the market could plan or the utility could plan kind of accordingly. But we actually limited, so we didn't dispatch it to every single thermostat across the territory. California is a good example where we already have a very big Rush Hour Rewards program as a part of Southern California Edison Save Power Days Demand Response Program. We didn't actually dispatch The Solar Eclipse Rush Hour Program to their program. So because we have so many Rush Hour Rewards programs, we didn't dispatch them duplicative so that utility could be running their own events during that same time frame.

Corsetti: Here is another question to build on that. This came in from Rolando Quervo at Southern California Edison. This was a fairly simple ask and activity on your part, right? But just in general what was the feedback you got from the participating utilities in terms of simplicity and just the overall success you saw with this? What's been the perspective you've gotten since then?

We got 50,000 customers enrolled in an HVAC schedule tune-up program in the first day.

Berndt: I think that the number one reaction that we've gotten is really just a strong understanding of the potential of leveraging a lot of the connected devices that all of our joint customers are installing within their homes, particularly smart thermostats for demand side management overall. And really the scale that that can be happening. We had already started to get some of those kind of reactions with just our Seasonal Saving program where one example, not this last winter but the winter before we ran our winter Seasonal Savings Program with SoCalGas. We got 50,000 customers enrolled in an HVAC schedule tune-up program in the first day.

When you're talking about very simple, kind of streamlined enrollment processes, you can go from 0 to 50,000 customers participating. That same type of HVAC program or like a traditional HVAC program back in my teaching days would have taken us a decade to get that many customers engaged. So it's quickly changing the discussion from, how can we go from small smart thermostat or connected home pilots to, what's the potential when we have millions of customers in these programs to really help shape load on the demand side and help customers save energy. I would say that's the number one kind of reaction.

Corsetti: And it might help to have more solar eclipses over the course of the summer too.

Berndt: Right.

Corsetti: Okay, so I guess just some other questions then, I'm learning, so obviously this was a successful one-day thing. As you all know, we don't have solar eclipses every day, so you can't have the same kind of approach all the time, but just in terms of what Nest is doing now, kind of looking forward and working with some of your partners, what are some of the learnings you guys have taken away that you think can be applied to potential programs going forward. And for those on the call that might be practitioners in a load management space, what can we take away from this that can be incorporated elsewhere?

Berndt: I think the number one learning from our side really was the power of removing friction from participating or even enrolling into programs. It's often the case that program enrollments just get complex

[laugh] . And this really showed us, and now we're definitely talking about it with all of our partners, of really figuring out how to simplify program enrollment, and particularly around demand response, just because there's so much potential and appetite for customers to be engaging in these programs. We're definitely looking at sort of a sweep of different work streams right now to really figure out, on our side and with our partners of what can we be doing to make it as close to one click or as streamlined as possible to be able to get enrolled in that program, all the way up to doing pre-enrolled devices on say a utility's marketplace so that when they're on that marketplace buying smart thermostats, they can be participating in the energy efficiency rebate program but also in that same time frame enrolling in that utility's demand response program. They can really just think through multiple different ways to be reducing friction for participation in our programs. And I would say that that's been the key learning for us in terms of thinking through how we can be looking at all the different components of that with our partners to make that grow, and really see the potential of getting millions of these customers engaged in these programs going forward.

...what can we be doing to make it as close to one click or as streamlined as possible to be able to get enrolled in that program.

Corsetti: Aaron, I'm just going to shift gears just a little bit here. I think we've talked quite a bit about the solar eclipse event and Rush Hour Rewards. But we did get a question in from Melanie Torrey at the Ministry of Energy up in Ontario, Canada, and I was wondering if you could speak generally about how smart thermostats are enhancing consumer response to time of use pricing. Dynamic pricing in general, either how this overlaps with what you did last summer or kind of the vision moving forward?

Berndt: We are definitely thinking about how we could be adding value to both our energy partners and really enabling our joint end customers on time of use. We have a few different thoughts on that. So, the easiest one that we have so far is, actually, a new version of our Seasonal Savings program. Seasonal Savings, the summer version, adjust your cooling schedule throughout the day. It's roughly increasing your set points by a degree over a three-week period, so that at the end of that three-

week period, your schedule is a bit more efficient, and overall you're going to be saving a good amount of kWh, because that's just going to be your new schedule for the remainder of the cooling season.

We've recently launched a version that we call Peak Aware Seasonal Savings, where, with our energy partner, we can define the peak period where the algorithm will be a little bit more aggressive in driving KW out of that window. So it'll do things like a little bit of precooling and the scheduled adjustments during that window so that for, let's say, a program where the utility may have several hundred thousand of our thermostats in their territory and they dispatch it too. They may have a demand response program, where they have 15 to 20,000 customers enrolled, then this is a way that you can be engaging the rest of those customers and driving a little bit of KW, but then you're also helping those customers reduce their usage during those higher priced time windows.

We also have a couple other work streams going on. We have a product called Timeless Savings, which we really launched and are essentially still piloting to see if that's the right approach, where it's very similar to our demand response program, which our Rush Hour Rewards customer enrolls into it. The utility then provides us their rates information, and then the algorithms can adjust the thermostat accordingly. We're also really looking at easier solutions in terms of just basic capabilities to receive a price signal, maybe through either a developed program application where if the prices this set the thermostat to this amount if the price is higher than this do x some very simplistic approaches which we think you drive a lot of value for customers.

The key is just making it easy for customers to find out about it and make those adjustments and do that initial set up so that it's just doing that consistently day in, day out. So we definitely see a lot of opportunity for growth and new ideas in terms of how to fully leverage smart thermostats in that area.

Corsetti: Perfect, then I guess then one follow-up on the TOU piece, just to go back to the solar eclipse event. So do you have a sense of how many customers that you might have made those push notifications out to during the solar eclipse, were actually on a time of

use plan where we kinda had a little bit of both TOU management, but then also the demand response due to the special event?

Berndt: Unfortunately, I wouldn't know that, but by and large, with exception of some markets most of our programs are in areas that aren't heavily under TOU. But there's certainly some. So, the ones that I know of like Phoenix markets and then California transitioning to default TOU here in the near future. So we're definitely really kind of partnering with our utilities around different solutions both communications and strategies but then automation strategies that we could be jointly talking about with our customers.

Corsetti: I know that was a difficult question, put you on the spot for. Okay, I think I've kind of extinguished the list of questions I wanted to ask you. Anything Aaron, you wanted to just kind of add about future direction for Nest or perhaps what's the next Solar Eclipse event that we might see Rush Hour Rewards latching onto?

Berndt: I would say sort of the future direction for Nest and now that Nest is part of Google Hardware broader is really around Voice and Google Assistant and Amazon Alexa and how those digital assistants and assistants more broadly are really driving a lot of the coordination of all of the connected devices within the home. So we really see that as a very kind of keen area that a lot of our partners are looking at right now thinking about how they can be engaging customers through that channel, but then also leveraging that for sort of simplified home energy management within our platform but using that utility's capabilities or integrations or their energy management capabilities, both to just send some simple notifications through say Google Assistant. But then also how you can be setting up some simple routines to kind of automate some of the adjustments going forward. That's definitely one area where we're having a lot of discussions with our partners on kind of next generation of connected home and how a lot of these programs can be defined going forward.

Corsetti: Aaron I just want to say thanks again for taking the time to speak with the group and sharing learnings and some of the details on your solar eclipse event. Helpful for me and hopefully others. A bunch of insight and kind of next steps in best practices as well.

The conversation above is from a webcast recording at
www.peakload.org/dr-dialogue--nest-s-solar-eclipse-rush-hour-rewards-program