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Comments of Portland General Electric on 2019 Title 24, Part 6, Building Energy Efficiency Standards Rulemaking

Please find attached Portland General Electric Company's comments to the California Energy Commissions on the 2019 Title 24, Part 6, Building Energy Efficiency Standards Rulemaking.

Additional submitted attachment is included below.

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March 5, 2018

Portland General Electric Company ("PGE") appreciates the opportunity to provide comments to the California Energy Commissions ("CEC") on the 2019 Title 24, Part 6, Building Energy Efficiency Standards Rulemaking ("draft rulemaking"). PGE is a fully-integrated energy company based in Portland, Oregon, serving 875,000 customers in 51 cities. For more than 125 years, PGE has been delivering safe, reliable energy to Oregonians and is committed to building a cleaner, more efficient energy future.

PGE shares the values and vision for a decarbonized future. In addition to driving down greenhouse gas emissions in our resource portfolio, we are also committed to an evolved, more resilient energy grid that can efficiently integrate renewable resources. PGE see's demand response and flexible loads as a key component of this smarter, flexible, and more resilient grid. This vision is consistent with the State of California's goal for a decarbonized future as outlined in California Air Resources Board ("CARB") 2017 Climate Change Scoping Plan.

As California and the CEC continue to lead in load management and building standards, PGE found it necessary to weigh into this CEC docket. We want to ensure that the precedent set under this, and other load management dockets, does not hinder the advancement and adoption of demand response at the residential level as this is a key component of a decarbonized future. With this in mind, PGE submits the following comments to the CEC on the draft rulemaking.

PGE supports the comments submitted by NRDC on the specification for electric water heating with load management for California Title 24 2019 building standards.

PGE endorses the NRDC specification. While the specification may seem overly prescriptive, removing any one requirement will create problems with interoperability in the future, thus leaving many of these important assets useless in their ability to support the variability of wind and solar generation.

PGE would add only one additional requirement to the NRDC specification – a requirement for the water heater to use an open standard physical modular interface such as USB or the physical layer of CTA-2045. The primary reason is that the single biggest barrier to residential demand response at scale is the cost of establishing the communication link between the device and the demand response service provider. The cost is measured in both hardware necessary to make this happen, and more importantly, the customer experience associated with establishing and maintaining the communication link. By establishing one or two standard modular interfaces, benefits would accrue from:

1. No parasitic energy would be consumed for communication until a communication device is plugged in.

2. The customer is in charge of when and why a communication gets added to their device, and their decision can be changed at moment's notice.
3. There is increased flexibility for the customer. Every physical layer communication protocol is enabled, by simply plugging in a different device. A modular interface allows every type of communication layer language including OpenADR. Application layers can be translated from one standard to another in the communication device that is "plugged in." There is zero risk of obsolescence compared to embedding a communication method in the device. Certainly Wi-Fi is enabled, but also, every future communication protocol – in particular, 5G communication[1] - would also be enabled. Please note that load devices last a lot longer than business models and communication methods du jour. The customer can change to a new value proposition at any time; this forces innovation by service providers to bundle value propositions.
4. With the modular interface, a demand responsive service provider can provide service via any communication method, and need not rely solely on the customer's Wi-Fi connection.
5. An open modular interface is more secure. First by definition, there is no security risk because, out of the box, the device is not connected to any communication network and never will. The communication device is where security lives. If in 2020 a flaw is discovered that can't be fixed in software, simply replace the communication device with a new one. The demand responsive device never has to be upgraded for cyber security reasons since its only connection is a short wire via the socket to the communication device.
6. Using the same interface standard has the added benefit of economies of scale, meaning a large volume of one interface is key to lowering the cost of the communication device. Imagine how much more expensive cameras, smart phones, televisions, and computer accessories would be if USB did not exist, and every manufacturer of hardware had a non-standard way to connect accessories.

PGE specific comments on proposed Title 24 Section 110.12 (a) 1.

In the draft rulemaking, the proposed specification does not specify that OpenADR compliance must exist, locally, at the appliance. In the technical world of communication standards,[2] OpenADR is an "application layer" and as such, access by 3rd parties[3] could physically be anywhere. The early trend of manufacturer's using a proprietary application layer at the demand responsive device and translating it into an "open" protocol in the manufacturer's cloud needs to be changed to an open application layer at the demand responsive device. (The proprietary application layer at the device and translated to OpenADR in the manufacturer's cloud will be referred to as "open access in the cloud" for simplicity reasons). The NRDC proposal for electric water heaters corrects this problem and further specifies a number of other important details that must be addressed to have "open communication at the device."

It is also important to note that open communication at the device, such as CTA-2045, can enable both standard commands for demand response, as well as, proprietary commands to enable value added services by the manufacturer. A properly designed communication device can enable two

[1] https://www.forbes.com/sites/washingtonbytes/2017/09/22/the-dawn-of-5g-will-wireless-kill-the-broadband-star/#264a292cfd7f

[2] See https://en.wikipedia.org/wiki/OSI_model for an introduction communication protocols.

[3] In these comments, 3rd party means someone that is not a building occupant or the manufacturer of a specific demand responsive system, e.g. a demand response provider, or an entrepreneur making an in-home energy management system, or a microgrid operator.

communication links: (1) for Wi-Fi for the proprietary commands to the manufacturer's cloud and (2) for a modular interface for the demand response provider. Alternatively, the device manufacturer can add two communication channels at the device. An open standard at the appliance does not preclude the manufacturer from using OpenADR nor does it prevent the customer from choosing to use services exclusively from the manufacturer.

An obligation for open access at the device may be opposed by some manufacturers and the main reason will likely be that it will diminish the revenue that they can collect by controlling access using a proprietary application layer at the device. This is likely a true argument. However, the importance and accessibility of demand response and flexible loads in a decarbonized future is crucial. The CEC must justify the change in the public interest, or define the requirement in a way that is optional for manufacturers, required only if they want to obtain some type of program benefit.

Drawbacks of open access in the cloud.

This section details the many drawbacks that occur with translating a proprietary application layer at the device in the manufacturer's cloud. Open access in the cloud will greatly diminish participation of residential customers' demand responsive devices for three general reasons. First, revenue collected by manufacturers for demand responsive behavior will reduce the benefits to customers and 3rd parties. The consequence is reduced enrollment and participation for lack of economic incentive. Second, the high cost to 3rd parties of establishing secure connections in the cloud will greatly reduce innovation and access by entrepreneurs and will likely diminish the customer value proposition and adoption. And finally, access in the cloud makes the customer experience for many value propositions too costly and/or difficult, and this will limit the end-state adoption level. As the CEC is likely aware, the total benefit for most residential demand responsive devices is very small per device. It is only collectively, when we impose equal obligations on all manufacturers, that we gain significant benefits in the aggregate of millions of devices. These drawbacks and other potential drawbacks of open access in the cloud are further explained below.

1. The current trend of enabling demand responsive devices in the manufacture's cloud requires the use of Wi-Fi at the device to connect to the customer's Wi-Fi network. This approach unnecessarily discriminates against populations without broadband access. As an example, it is estimated that 15% of the Californian's do not have Wi-Fi access.[4]

2. Additionally, customer Wi-Fi networks can be problematic. It is estimated that intermittent customer Wi-Fi links to connected devices will reduce the responsive resource by at least 10%.[5] In addition to this cost, the cost to maintain loss at only 10% requires providers to ask customers to take corrective action; the average maintenance cost is estimated at $0.80 per connection per month. Embedding Wi-Fi in the device means the option to use more reliable methods supporting the internet-of-things, like 4G and 5G connections from mobile carriers, are prevented. Prices for this approach are reaching parity, and in the typical life of a demand responsive device, this will likely become the preferred connection method. Connections in the cloud will prevent this more reliable, and ultimately, lower cost method of communication.

[4] https://www.statista.com/statistics/185535/us-household-broadband-internet-connection-usage-by-state/

[5] In BPA's regional pilot with 8 utilities and 240 water heaters connected by Wi-Fi, most weeks off line water heaters exceeded 10%.

3. Open access in the cloud is not open in the modern sense of the word. The best way to understand this is by analogy. Imagine if a mobile phone manufacturer controlled access to 3rd party apps via the cloud. Scenario: As a customer, I want to add a transit app from my local transit provider, Metro1, to my phone made by "Acme Mobile Devices (AMD)." The app space on my AMD phone is "open" via AMD's cloud. So to download the transit app, Metro1 must have: (1) a bi-lateral agreement with AMD; and (2) a VPN[6] connection to AMD to ensure that Metro1 only has access to AMD phones authorized by the respective customers. As a customer, now I get to download the app from Metro1's cloud, and in use of the app, all data from Metro1 flows thru AMD's cloud. There are both legal and IT costs in both companies associated with setting up and maintaining this link. Metro1 reserves the right to change the interconnect details and/or terminate Metro1 rights at any time (i.e. standard terms of a bi-lateral agreement). To recover the legitimate costs of their [unnecessary[7]] service, AMD could rightfully charge a monthly fee to Metro1 to maintain this "service." Now instead of a free app that improves the customer experience provided by Metro1, the customer is now paying a recurring fee. This will likely discourage usage of the app.

   Now realize that this process must be repeated thousands of times for every single app provider, not just between Metro1 and AMD but also between Metro1 and every other phone maker. Thousands of free apps would never come to customers because of the costs of this process. In the energy industry, Metro 1 represents not a transit agency but 2,000 utilities and/or aggregators, and we are not talking about five major phone makers but 50 unique manufacturers of responsive load devices such as HVAC, automotive, thermostats, water heaters, photovoltaic inverters, battery inverters, and pool pumps. If you need 0.1 FTE on each end of one transaction path, we are talking about 20,000 FTEs on payroll just to maintain "open" access in the cloud.

   This analogy explains why valuable applications will not be possible. Suppose the local utility company who wants to send price signals directly to refrigerators so they know when is the best time to expend 0.2 kWh to defrost the refrigerator once day. The cost will be 0 cents when there is excess renewables, and maybe 4 cents/kWh (24 cents per month on average), if the defrost occurs randomly. It will not occur as 24 cents per month is not enough to cover the "service" cost describe above, much less create a net value to the participant customer and non-participant customers. As an example, with 16 million refrigerator freezers in California, 3,200 MWh of free storage per day will not happen because there is no "free" open access method. This is a lost present value to California of $450 million over the 20-year life of a refrigerator without even placing a value on reduce greenhouse gas emissions.[8]

4. Open access in the cloud will also make it harder for more advanced applications to develop. For example, in 2030, there will be an estimated 50 to 100 days per year with excess solar energy.[9] To help address these periods of excess solar, additional back-up battery storage will

[6] VPN = Virtual private network a common method used between business to keep data transaction between the two companies secure. See also https://en.wikipedia.org/wiki/Virtual_private_network.
[7] "Unnecessary" is evident because there is an alternative, open market that exists today.
[8] This is based on the present value of 16 million water heaters shifting 0.2 kWh for a daily defrost cycle over 20 years. The average daily benefit savings is assumed to by $20/MWh escalating at 2% per year. Discount rate is 3.5%.
[9] 50 to 100 days is extrapolated from 25 days in 2017 when real time prices in California were at or below $0/MWh.

likely be deployed. These systems are likely to be between 5 and 10 kW and many will also be integrated with solar to provide value during prolonged outages (e.g. a major earthquake). The question is, during a prolonged outage, who will manage the loads in the house so that the most important resources in the home have a 24x7 energy supply in a week-long outage? It will likely not be the customer. It will be a "device" (and there are already expensive commercial systems today) that has perfected the control logic required to manage all loads in the house. With open access in the cloud, this would not be an option during a prolonged outage with a likely loss of internet connection. However, with an open access standard, the device can communicate directly to the loads and thus manage the loads for the customer.

Thank you again for the opportunity to comment on the draft rulemaking. PGE truly believes that the advancement and adoption of demand response at the residential level is a major component of a decarbonized future and wants to ensure that the precedent that the CEC may be setting in this rulemaking is consistent with that future. For any follow-up communications, please contact Elysia Treanor at (503) 464-8528 or at Elysia.Treanor@pgn.com (Government Affairs) or Conrad Eustis as (503) 464-7016 or at Conrad.Eustis@pgn.com (Technical Lead).