

**DOCKETED**

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California Energy Commission  
Efficiency Division, Flexible Demand Appliance Standards  
Docket No. 20-FDAS-01  
1516 9th Street  
Sacramento, CA 95814

**Re: Pacific Gas and Electric Company Comments on Staff Paper Senate Bill (SB) 49 Flexible Demand Appliance Standards (Docket No. 20-FDAS-01)**

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to provide feedback on the California Energy Commission (CEC) Staff Paper, "Introduction to Flexible Demand Appliance Standard," published in November 2020.

PG&E supports the CEC in setting flexible demand appliance standards and labeling requirements that promote technologies to schedule, shift, and curtail appliance operations to support grid reliability, benefit consumers, and reduce greenhouse gas emissions associated with electricity generation. PG&E adheres to the investor owned utilities (IOUs) joint comments provided through the statewide team in a separate letter.

In addition to the above-mentioned joint comment letter, PG&E provides the following comments to respond to the CEC questionnaire on pages 10 and 11 of the Staff Paper, which states that the CEC seeks information on specific topics including: flexible appliance demand response modes; flexible demand appliance standards; cost-effectiveness and avoided greenhouse gas emissions; cybersecurity; and compliance assistance and enforcement.

**Flexible Appliance Demand Response Modes**

- *What demand response mode signals are accepted by flexible appliances? And why should this standard be considered as a priority?*

PG&E defines flexible appliances based on its interpretation on the CEC Staff Paper, "Introduction to Flexible Demand Appliance Standards."

PG&E's definition of a flexible appliance is that it should have the capability to schedule, shift, or curtail appliance operations in response to a signal (i.e., price, program, greenhouse gas (GHG) emissions, etc.)

to support grid reliability, benefit consumers, and reduce GHG emissions associated with electricity generation.

For flexible appliances to support the capabilities above, the appliances or the appliance manufacturers' cloud need to be able to receive demand response (DR) event signals or price signals. The DR events and prices can be triggered by temperature, wholesale market price, GHG, grid emergency, etc.

As the joint IOUs comment letter stated, PG&E proposes to use the OpenADR 2.0 a or b standard for appliances to receive these signals. This recommendation is aligned with the requirements outlined on the Title 24 2019 Residential Compliance Manual Appendix H Demand Responsive Controls and with PG&E's 14 years of operational experience with the standard. PG&E has been using this standard for automated DR event and price communication since 2006 and has sent DR events and price signals to various end-use measures including but not limited to energy management systems for commercial buildings, factories, retail stores, warehouses and manufacturer plants, residential and commercial electric vehicle (EV) charging stations, and smart thermostat manufacturers.

- *What responses are provided by the flexible appliance?*

Currently, the type of responses provided by the flexible appliances will vary depending on the type of signals (e.g., event, GHG, price, direct load control, etc.), appliances (e.g., pool pump vs. refrigerator) and—more importantly—the customer's elastic or inelastic behavior.

PG&E believes the flexible appliance should allow customers to set a different level of response based on their preferences. This function will allow the customer to choose their schedule. For example, incentive (bill savings, DR incentives) vs. comfort level for a specific flexible appliance. In addition, manufacturers should have the flexibility to design how their appliances will respond to DR events and price signals.

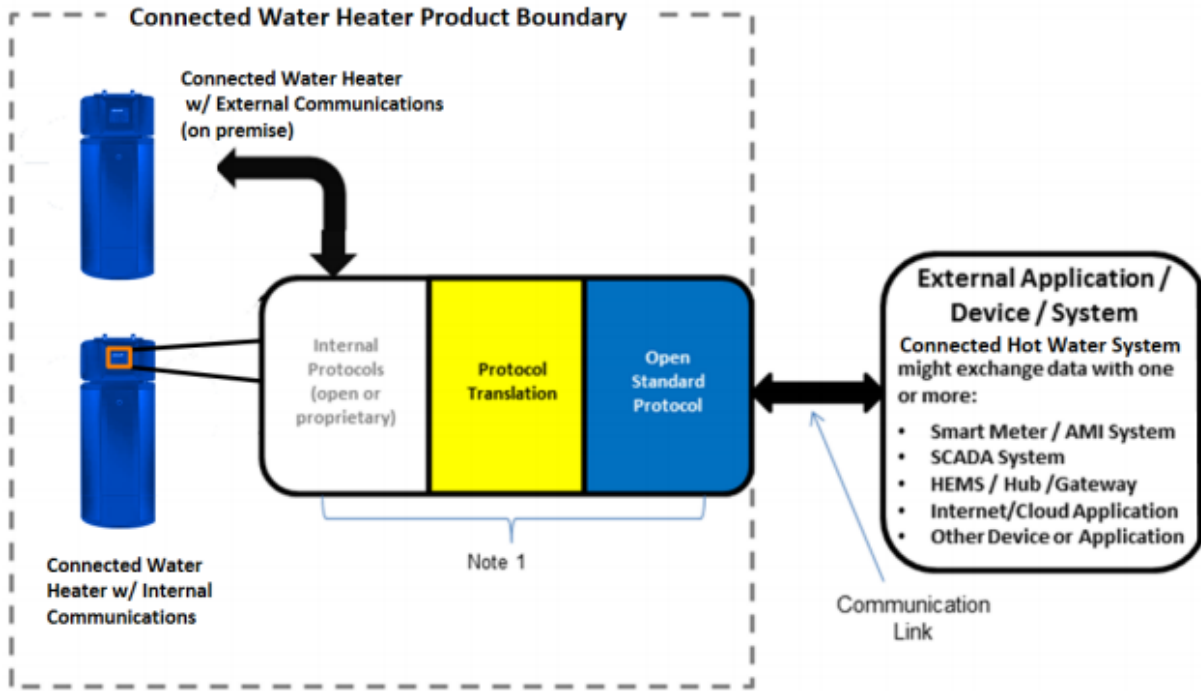
- *Can an appliance react to a price or a GHG signal to modify its operation? If so, describe the modification to the operation.*

A flexible appliance should have the capability to respond to a DR event, GHG emissions, and price signal (e.g., time-of-use (TOU), dynamic pricing, etc.) by modifying its operation if it is going to be defined as a flexible appliance. The modification to the operation would depend on the type of flexible appliances (pool pump vs. refrigerator).

- *Identify communication and load control requirements to enable flexible demand in appliances.*

The communication and load control requirements to enable flexible demand in appliances should be aligned with requirements on the Title 24 2019 Residential Compliance Manual Appendix H Demand Responsive Controls.

In addition, PG&E recommends the CEC to reference the Energy Star Connected appliance communication and load control requirements as indicated in the diagram below (connected water heater was demonstrated, but the requirements can apply to all flexible appliances):



**Figure 1: Connected Water Heater Product (CWHP)**

**Note 1:** Communication device(s), link(s) and/or processing that enables Open Standards-based communication between the CWHP and external application / device / system(s). These elements, either individually or together, could be within the water heater/controller, and/or an external communication module, a hub/gateway, or in the Internet/cloud.

Source: Draft 2 Version 3.3 Water Heaters Specification

([https://www.energystar.gov/sites/default/files/Draft%202%20Version%203.3%20Water%20Heaters%20Specification%20\\_0.pdf](https://www.energystar.gov/sites/default/files/Draft%202%20Version%203.3%20Water%20Heaters%20Specification%20_0.pdf))

- Describe the benefits and costs to the consumer, and to the manufacturer, of an internal vs. an external communications module that accepts signals for flexible demand modes.

The table below demonstrates some of the potential costs and benefits PG&E identified for each party. A more thorough study with all stakeholders is required to identify a complete list of costs and benefits on internal vs. external communications modules for flexible appliances.

Party	Communication Module Location	Cost	Benefit
Manufacturer	Internal	May not meet state requirement (if exist)	Cheaper to manufacture May have less physical constrain on hardware design
Manufacturer	External	More expensive to manufacture May have more physical constrain on hardware design	Meet state requirement (if exist)

Consumer	Internal	If connectivity is an issue, customer may not be able to enroll in a load management program	The flexible appliance may be at a lower price point
Consumer	External	The flexible appliance may be at a higher price point	Consumer have more options to be connected when enroll in a load management program
Utility/DR aggregator	Internal	N/A	N/A
Utility/DR aggregator	External	Potential higher costs – example: hardware distribution, maintenance, customer education	More communication options to connect to the flexible appliance

**Flexible Demand Appliance Standards**

- *What flexible demand appliance standards would you propose?*

As mentioned above, PG&E proposes to require OpenADR 2.0 a or b standard as the communication requirement to enable flexible demand in appliances.

PG&E understands certain parties support the Consumer Technology Association (CTA)-2045 as a requirement in the SB49 proceeding. PG&E supports the exploration of using this standard for load management, however, it would be premature to require CTA-2045 on flexible appliances. Even though other states such as Oregon and Washington have required all heat pump water heaters sold in these states, these need to be equipped with a CTA-2045 module, the technical potential and benefits have not been widely tested and validated for other end-uses such as air conditioners, pool pumps and EV charging stations.

Furthermore, CT-2045 is a physical device standard and does not specify capabilities associated with flexible demand business processes. A standard such as OpenADR 2.0 a or b will still be required even if CTA-2045 were to be required, since flexible demand commands will need to be transmitted through the CTA-2045 compliant implementations, and such commands would be OpenADR 2.0 a or b as one of the most mature and robust flexible demand standards in existence.

- *Would the standard proposed rely on appliance design or performance criteria?*

OpenADR 2.0a or OpenADR2.0b in the context of flexible demand appliance would feature first and foremost appliance design specifications to enable such appliances to respond to OpenADR 2.0a or OpenADR2.0b signals. If we take the example of designed for OpenADR 2.0a or OpenADR 2.0b, a flexible demand appliance would be expected to have the following features (not meant as a complete list or in any order of importance):

- Ability for the flexible demand appliance to receive requests and respond to a signal according to OpenADR 2.0a or OpenADR 2.0b either directly or indirectly. When indirect, the requests and responses may be handled by some intermediary service capable of processing OpenADR 2.0a or OpenADR 2.0b communications to make it processible by the flexible demand appliance.

- Ability for the flexible demand appliance, either directly or indirectly, to act upon the OpenADR 2.0a or OpenADR 2.0b commands and data transmitted to it as a flexible demand resource to accomplish the intended business purpose of that command and data.

• *What flexible demand compliance or test procedures for appliances would you propose for design standards criteria?*

A flexible demand appliance will be expected to feature standards-compliant implementation of OpenADR2.0a or OpenADR2.0b capability. The flexible demand appliance shall have a defined scope of implementation of OpenADR2.0a or OpenADR2.0b feature set, and show not only proof of ability to receive and respond to the command and data, but also to perform the requested business process of the command and data. The following requirements on testing and compliance shall apply (not meant as a complete list):

- A certified implementation of OpenADR 2.0a or OpenADR2.0b Virtual End Node.
- An implementation statement for the Flexible Demand Appliance to help map OpenADR2.0a or OpenADR2.0b command and data to the appliance physical energy performance.
- A test result of flexible demand appliance to help map OpenADR2.0a or OpenADR2.0b command and data to the appliance physical energy performance.

• *What flexible demand appliance test procedures would you propose for performance criteria?*

A flexible demand appliance will be expected to perform according to the implementation statement of OpenADR2.0a or OpenADR2.0b virtual-end-node and to the declared test results. Depending on a particular flexible load program, a flexible demand appliance may be required to be subject to and submit proof of how test results show the ability of the appliance to achieve energy performance required by a particular flexible load program through the use of OpenADR 2.0a or OpenADR 2.0b.

### **Cost-Effectiveness and Avoided Greenhouse Gas Emissions**

• *Identify framework and cost-effectiveness studies on flexible demand appliance standards.*

Please refer to Joint IOUs Comment Letter on this question.

• *Identify costs of a flexible demand appliance compared to a standard appliance including purchase price, installation, operation, and communications technology costs.*

Please refer to Joint IOUs Comment Letter on this question.

• *Identify benefits of participating in flexible demand appliance programs including rebates, utility bill savings, and environmental and health impacts.*

PG&E offers rebates for flexible demand appliance purchases such as smart thermostat and OpenADR-certified or compliant technologies. Many of these flexible demand appliances also provides energy efficiency (EE) benefits, which would save on customers' utility bills. Since most of these rebates also require the customers to enroll in a DR program, which would provide environmental and society benefits when customer reduce electricity use during DR periods.

• *Identify needs of disadvantaged communities and how proposals may affect these communities.*

PG&E proposes two key aspects as it relates to flexible appliance standards and the needs of disadvantaged communities:

1. **Technologies:** Incentives for deployment of flexible demand technologies may be necessary, especially for customers in disadvantaged and low-income communities. Varying technology roll out without the consideration of how these communities would adopt the flexible appliances could lead to equity issues. To maximize TOU and DR program incentives, customers may choose to install larger and possibly more expensive devices with greater amounts of flexible demand (e.g., water heaters, heating, ventilation and air conditioners – HVAC), and may receive greater benefits through rates and programs than customers that can install technologies with less load flexibility. PG&E recognizes that the utility, CEC and the California Public Utility Commission (CPUC) will need to consider how best to assist disadvantaged and low-income communities to adopt flexible appliances with greater amounts of flexible demand. In addition, PG&E recommends identifying how best to communicate these signals to these customers when they may not have adequate communication capability such as Wi-Fi access.
2. **Marketing, education, and outreach:** The CEC must consider in what ways these technologies are purchased, adopted and utilized for their intended purpose. Both the outreach to customers and the targeting of customers may need to be updated to reach low-income customers. Outreach will be critical and will be challenged by competing demands and limited time to educate customers and will depend in part on how these customers monetize their flexible demand. For example, flexible demand on a real-time rate could also introduce a greater risk of bill volatility without adequate education. This group of customers would be more severely impacted by the burden of increased rates.

Programs such as the San Joaquin Valley Pilot is an example of how PG&E helps disadvantaged communities to adopt new technologies that provide EE and DR benefits. PG&E will continue to work with disadvantaged communities to provide education, outreach and rebates to help them to adopt flexible demand appliances.

- *Identify types of flexible demand programs offered by government, utilities, and third parties.*

Flexible demand programs directed by the CPUC involve utilities and, in some cases, third parties. The ultimate goal of a load management is to pair technologies with the appropriate signals. Current signal pathways that seek flexible demand include, but are not limited to:

1. **Rates:** Examples of rates that incentivize flexible demand include time differentiated rates like time-of-use, temperature triggered rates like critical peak pricing, or real-time rates such as PG&E's recently proposed commercial electric vehicle day-ahead-rate.
2. **Programs:** Examples of customer programs that incentivize flexible demand include energy efficiency pay for performance or the EE solicitations.
3. **CAISO Market Integrated Dispatchable Distributed Energy Resources:** Examples of supply side programs that incentivize flexible load include demand response such as PG&E's capacity bidding program or third party offered demand response such as the demand response auction mechanism.

- *Benefits related to improved resiliency of California's electric grid including better response to extreme weather events and wildfire, and lower rates to consumers.*

PG&E agrees that the flexible demand appliance standard, if implemented in an effective manner, can potentially improve resiliency of California's electric grid including better response to extreme weather events and wildfire (e.g., using flexible load to lower the amount of temporary generation used to energize customers), and lower rates to consumers.

### **Cybersecurity**

- *What minimum cybersecurity protocols should be required?*

A flexible demand appliance will be expected to operate under a cybersecurity framework that is implemented in part by OpenADR2.0a or OpenADR2.0b, and conforms with national standards and methods referenced in the National Institute of Standards and Technology (NIST) Special Publication 1108R2, and NIST Internet Report 7628 Rev1. The particular transport layer security required is TLS 1.2, per IETF RFC 5246, RFC 8846, RFC 6347, utilizing SHA256 ECC or RSA cypher suites (TLS\_ECDHE\_ECDSA\_WITH\_AES\_128\_CBC\_SHA256 or TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA256). Digital certificates shall be used under mutual server-client authentication and conform with X.509v3 certificate standard per required by the OpenADR Alliance. This cybersecurity framework shall be applicable for direct utility Virtual Top Node (VTN) and flexible demand appliance direct or indirect Virtual End Node (VEN) communications. When an indirect communication is established between the VTN and the flexible demand appliance by way of a proxy VEN, it is important that EACH individual flexible demand appliance nevertheless maintain the capability to be addressable via the OpenADR 2.0a or OpenADR2.0b protocol as an independent target resource in addition to being addressed on aggregate through a VEN. When more than one VEN is used to aggregate flexible demand appliances, it is important that each individual VEN possess its own client digital certificate in order to establish an individual secure link to the VTN.

When proxy VEN is used to represent a flexible demand appliance, the connection between the VEN and the appliance shall apply the cybersecurity framework based on the two above-mentioned NIST documents.

- *What cybersecurity standards would you propose?*

For flexible demand appliances, there are no new cybersecurity standards required beyond what is required by implementing the OpenADR 2.0a or OpenADR 2.0b appliance design under the cited NIST cybersecurity documents above.

### **Compliance Assistance and Enforcement**

- *Staff believes the current Appliance Efficiency Enforcement regulations provide a good template for the Flexible Demand Appliance Standards (Title 20, Sections 1608 and 1609) and seeks comments on approach to enforcement of new flexible demand appliance standards.*

Please refer to Joint IOUs Comment Letter on this question.

- *What unique considerations should be given for enforcement of flexible demand appliance standards as compared to the existing appliance efficiency enforcement approach?*



Please refer to Joint IOUs Comment Letter on this question.

PG&E appreciates the time and effort that the CEC took to organize the workshop and prepare the Staff Paper, "Introduction to Flexible Demand Appliance Standard," and the opportunity to comment on this. Please do not hesitate to contact me if you have any questions.

Sincerely,

Licha Lopez