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ecobee Comments on the Flexible Demand Appliance Standards

ecobee thanks the California Energy Commission (CEC) Commissioners and Staff for this opportunity to comment on the development of Flexible Demand Appliance Standards. In these comments, ecobee – a leading developer of smart thermostats and other smart home products and services that facilitate cost-effective load management – focuses on urging the CEC to develop Flexible Demand Appliance Standards in a manner that will maximize customer participation by prioritizing the customer experience and comfort through optimal load shifting. With a technology such as smart thermostats, which is customer-facing and has a significant impact on customer comfort, it is paramount that the CEC consider the experience of the customer first and foremost in the development of these standards and associated labeling requirements. Additionally, ecobee's comments will respond to the statutory priorities covered in Senate Bill 49 as well as staff's request for information to identify proposals for flexible demand appliance standards.

Section 2 of Senate Bill 49 directs the Commission to adopt, and periodically update, "standards for appliances to facilitate the deployment of flexible demand technologies" that "shall be based on feasible and attainable efficiencies or feasible improvements that will enable appliance operations to be scheduled, shifted, or curtailed to reduce emissions of greenhouse gases associated with electricity generation.[1] Section 2(f)(5) of the bill provides the following description of statutory priorities for these standards:

> The flexible demand appliance standards shall prioritize all of the following:
> (A) Appliances that can more conveniently have their electrical demand controlled by load-management technology and third-party load-management programs.

[1] To be codified at Pub. Res. Code 25402.

(B) Appliances with load-management technology options that are readily available.
(C) Appliances that have a user-friendly interface and follow a straightforward setup and connection process, such as remote setup by means of an internet website or application.
(D) Appliances with load-management technology options that follow simple standards for third-party direct operation of the appliances.
(E) Appliances that are interoperable or open source.

Smart thermostats are unique in this context in that the federal U.S. Environmental Protection Agency's ENERGY STAR program in fact already addresses these priorities through its 2016 "Connected Thermostat" specification – the only ENERGY STAR certification available for thermostats – as reviewed in Ms. Daken's presentation at the Commission's December 14, 2020 workshop. We strongly urge the Commission to leverage the robust effort that went into developing that standard in delineating "feasible improvements" to thermostat technology that facilitate flexible demand.

Now five years old, the ENERGY STAR standard for connected, or "smart," thermostats has already successfully fostered a market where the current generation of smart thermostat technology, including all of ecobee's thermostat products, are in fact readily available to customers to provide cost-effective load management technology options. There are currently dozens of ENERGY STAR-certified smart thermostats[2] available from a range of manufacturers and at a range of price points, which are broadly used for flexible demand management across the country in utility and third-party programs. This vibrant ecosystem of products provides an existing illustration of what SB 49 aims to achieve: a standardized product certification and labeling system that provides customers and industry with clear, cost-effective choices for purchasing flexible demand appliances. ecobee therefore recommends that the Commission leverage the ENERGY STAR standard for connected thermostats as the most sensible way to incorporate this success story as a building block in California's efforts to foster cost-effective flexible demand technology.

[2] https://www.energystar.gov/productfinder/product/certified-connected-thermostats/results

A. ENERGY STAR Connected Thermostat Requirements

The ENERGY STAR smart thermostat specification already provides detailed demand response protocols:

Demand Response

a. Grid Communications – The CT [Connected Thermostat] product shall include a communication link that facilitates the use of open standards, as defined in this specification, for all communication layers to enable DR functionality.
Note: CT products that enable direct, on-premises, open-standards based interconnection are preferred, but alternative approaches, where open-standards connectivity is enabled only with use of off-premise services, are also acceptable.

b. Open Access – To enable interconnection with the CT product over the communication link, an interface specification, application programming interface (API) or similar documentation shall be made available that, at a minimum, enables DR functionality.
Note: While EPA encourages broad availability of the interface spec or API, CT service providers may elect to limit dissemination of these documents to certified/qualified developers, integration partners and the like.

c. Consumer Override – Consumers shall be able to override their CT product's response to any DR signal.

d. Capabilities Summary – A ≤ 250-word summary description of the CT product's and/or associated CT service provider's DR capabilities/services shall be submitted. In this summary, EPA recommends noting the following, as applicable:

- DR services that the CT product has the capability to participate in such as load dispatch, ancillary services, price notification and price response.
- Whether the CT device can be directly addressed via the interface specification, API or similar documentation.
- Support for locational DR, e.g. to ZIP code(s), feeder(s), or to CT device endpoints specified by the Load Management Entity.
- List open communications supported by the CT device and/or CT service, including applicable certifications.
- Feedback to Load Management Entity, e.g. verification/M&V, override notification.
- Measures to limit consumer comfort impacts, if any.
- DR response configurability/flexibility by the consumer and/or Load Management
- Entity.
- Whether the CT device and/or the CT product comply with the 2016 California Energy Commission Title 24, Part 6 Joint Appendix 5. [3]

[3] https://www.energystar.gov/sites/default/files/ENERGY%20STAR%20Program%20Requirements%20for%20Connected%20Thermostats%20Version%201.0_0.pdf

These protocols can be utilized to apply to price or greenhouse gas-related signals with at most minor modifications. ecobee therefore recommends that the CEC leverage, this existing model to enhance demand flexibility in California. The ENERGY STAR specification enables vendors to optimize the customer experience and comfort, protect customer data and privacy, and maximize the overall effectiveness of load management programs. There are different models that comply with the specification, such as receiving signals through a vendor's cloud via OpenADR or standard REST API, as long as the vendor maintains the control of its product to allow for an effective, customer-oriented interface and experience. Notably, this specification is already compatible with the Commission's standards for Demand Responsive Controls, including Occupant Controlled Smart Thermostats, under section 110.12 of the 2019 Building Energy Efficiency Standards and accompanying Joint Appendix 5.

From ecobee's perspective, these existing standards can fully address the aims of SB 49. And perhaps most importantly, as described in the next section, they have in fact fostered a robust smart thermostat marketplace with clearly labeled consumer options for cost-effective flexible demand technology.

B. Existing Smart Thermostat Flexible Demand Technology

ecobee approaches this proceeding as a vendor of automation technology that already offers demand flexibility. In 2019, ecobee introduced a new software platform within its thermostats to facilitate cost-effective customer load management in response to time-varying or time-of-use (TOU) price signals. This platform, eco+,[4] is a software upgrade for consumers that has been pushed out to ecobee smart thermostats to improve the energy performance of residential HVAC systems[5]. The platform consists of algorithms for personalized time-of-use, demand response, and energy efficiency optimization:

> Time-of-Use Optimization (TOU) – For ecobee owners whose retail electricity rate varies by hour of the day, the TOU algorithm shifts energy use from high price hours to lower price hours while maintaining the desired comfort levels through customized pre-cooling and temporary temperature setbacks.
>
> Demand Response (DR) – Presented to users as Community Energy Savings (CES), this feature shifts cooling loads away from peak hours when the electrical grid is most

[4] https://www.ecobee.com/en-us/eco-plus

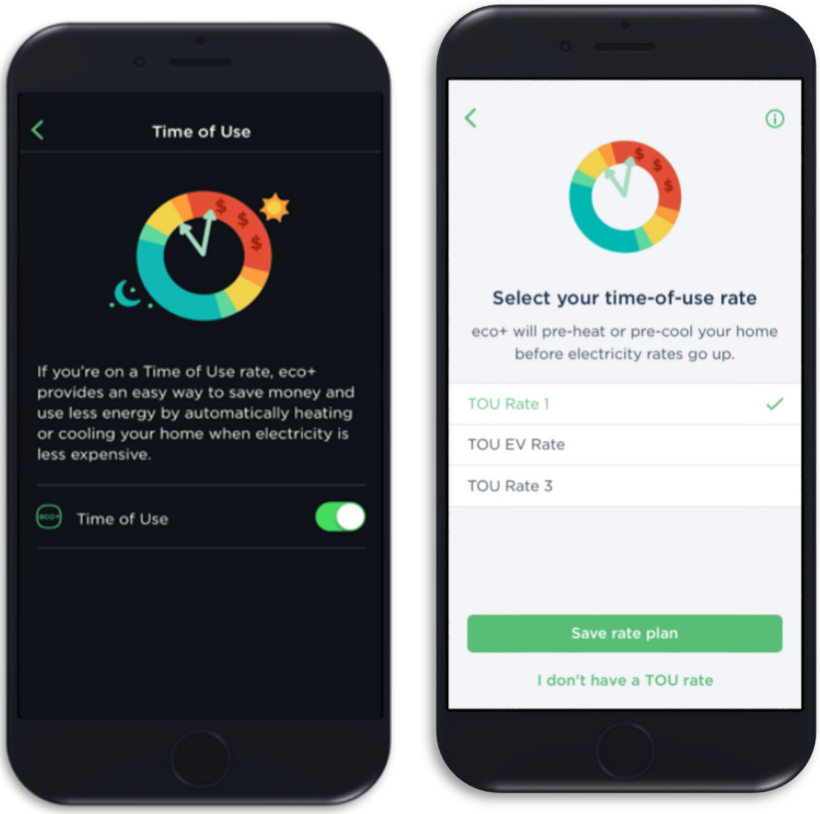
[5] All ecobee 3 or newer models are eligible for the eco+ upgrade. Over 90% of ecobee customers have an ecobee3 or newer.

constrained through customized pre-cooling of the home and temporary temperature setbacks during system peak hours.

Energy Efficiency (EE) – Features like Enhanced Smart Away, Schedule Assistant, and Feels Like are designed to help ecobee owners further lower their overall heating and cooling energy consumption beyond the standard smart thermostat savings, for example by adjusting for vacancy faster, recommending updates to users' thermostat schedules, and accounting for indoor humidity fluctuations to ensure user comfort.

The eco+ software upgrade is presented to users through an in-app interstitial. The time-of-use optimization enrollment screen is depicted below in Figure 1. Customers are presented the option of turning on the time-of-use feature by selecting their appropriate rate from a list of eligible TOU rates available to their home address. The customer's rate selection can then be made available to ecobee's utility partners via the ecobee Utility APIs.

Figure 1 - eco+ Time-of-Use Optimization enrollment screen



A third-party evaluator, Demand Side Analytics, measured the incremental energy, demand and bill impacts resulting from the eco+ platform using a randomized encouragement design (RED)

that included approximately 240,000 ecobee thermostats with results stratified by US Building America Climate Zone[6]. The RED provides a robust experimental design against which to measure the impacts of the eco+ platform because the control group experiences all of the same weather and other external factors as the experimental group. The experimental group consisted of ecobee thermostat customers that were offered the eco+ upgrade, and the control group consisted of ecobee thermostat customers that were not offered the eco+ upgrade. Therefore, the measured impacts are incremental to the savings from an ecobee thermostat alone. Comparing the HVAC runtime characteristics of the experimental group to the control group after the rollout of eco+ produces estimates of the impact of the eco+ upgrade.

The California-specific results depicted in Figure 2 below show that eco+ is the exact type of tool, available in the marketplace now, that offers cost-effective demand flexibility at scale to California residents. The California-specific results, which span both the marine and the dry climate zones by covering the Pacific Gas & Electric and Sacramento Municipal Utility District service territories, demonstrate the following levels of incremental savings through automated response to price signals offered from TOU rates:

- Incremental bill savings of 7-19% on customer cooling expenditures
- Incremental demand savings ranging from .10-.25 kW per device
- Incremental on-peak savings ranging from 20-28%
- Incremental overall energy savings ranging from 3-9%
- Savings were achieved with minimal impacts to customer comfort. When surveyed about their experience, 76% of respondents in the study who observed an impact related to comfort indicated that their comfort remained the same or improved.

[6] ecobee.com/ecoplusEMV

Figure 2- eco+ TOU optimization results for summer 2019 & 2020

Rate	Year	Climate Region	Peak Duration (hours)	Price Ratio (Peak: Off-Peak)	Average kW Savings During Peak Period	On-Peak Percent Savings	Overall Percent Energy Savings	Percent Savings On Cooling Costs
Hydro One Residential TOU	2019	Canada	6	2	0.18	36%	3%	8%
FPL RTR-1	2019	Hot Humid	9	5.8	0.22	13%	5%	10%
SMUD Residential TOD	2019	Hot Dry	3	2.4	0.25	23%	4%	8%
PG&E EV-A	2019	Mixed Dry	6	3.7	0.18	28%	9%	19%
PG&E EV-A	2019	Marine	6	3.7	0.1	20%	4%	11%
Duke Energy RT	2020	Mixed Humid	6	1.2	0.25	20%	8%	9%
PacifiCorp Residential Service EV-TOU	2020	Cold	5	3.3	0.43	33%	15%	23%
SMUD Residential TOD	2020	Dry	3	2.4	0.28	21%	3%	7%
Tucson Electric Power Residential Demand TOU	2020	Dry	4	1.7	0.46	25%	6%	9%

Demand Side Analytics

These results demonstrate significant impact that eco+ may have as a tool for automated customer load management in response to price signals. This example also shows how the ENERGY STAR specification for smart thermostats can be leveraged to fulfill the identfied statutory priorities under SB 49:

> (A) Appliances that can more conveniently have their electrical demand controlled by load-management technology and third-party load-management programs.
> (B) Appliances with load-management technology options that are readily available.
> (C) Appliances that have a user-friendly interface and follow a straightforward setup and connection process, such as remote setup by means of an internet website or application.
> (D) Appliances with load-management technology options that follow simple standards for third-party direct operation of the appliances.
> (E) Appliances that are interoperable or open source.

ecobee urges the Commission to consider the success of the existing ENERGY STAR standard and the resulting development of a robust smart thermostat market in determining the outcome of this proceeding. While standards for other appliances may be more nascent or even non-existent, the thermostat sector has standardized, clearly labeled, flexible demand options for consumers that are also being actively utilized for demand management across the country.

C. Intersection with Other Load Flexibility Efforts

We believe this docket represents an important component of California's larger efforts to use flexible demand as a system resource, whether in conjunction with time-varying pricing as

in the Commission's ongoing Load Management Standards rulemaking or through California Public Utilities Commission consideration of Integrated Demand-Side Management programs that can "stack" the multiple value streams and applications of flexible demand technologies like smart thermostats. These proceedings are vital to highlight the overall cost-effectiveness of a single appliance that can provide these multiple benefits, and to standardize the value proposition of appliances that can turn customer load into an active part of the grid, able to respond when needed to lower peak demand and energy use, shift load from periods of carbon-intensive generation to times when renewable resources are most available, or support reliability and resiliency.

However, given the advanced stage of flexible demand technology in the thermostat sector, we urge the Commission to also consider the next step of deployment. There are two other important aspects of actually promoting utilization of smart thermostats and other flexible appliances that the Commission can work with other stakeholders to address in parallel with this proceeding:

Maximizing Enrollment in Rate Optimization. Broad enrollment in time-varying rate optimization is not something that will happen automatically. ecobee's experience thus far with eco+ has revealed an important issue that needs to be addressed to maximize the potential of demand flexibility to benefit consumers and the grid: making the connection between an individual customer's rate and the device that can automatically respond to it. The eco+ software will work with whatever time-varying rate a customer might be on. However, to accomplish that, a customer using eco+ is prompted to select the utility rate that they are on from a list of available options in their zip code as a key input to the software's optimization algorithms. But how many customers know and can correctly identify the applicable utility tariff, even from a prepopulated list of options? The answer seems to be: not the majority. Both data from a third party evaluation study of eco+, along with publicly available data regarding California's roll-out of default time-of-use rates, show that many customers can't identify what rate they're on or can only generically state that they're on a rate that varies by time.[7] Therefore, the standards should

[7] For example, Southern California Edison (SCE) recently presented an analysis to the California Public Utilities Commission Time of Use Market Education & Optimization Workgroup indicating that close to half of residential customers are not sure what rate they're on. Additionally, the eco+ evaluation report filed confidentially with the Commission in the Load Management

also include a mechanism for load management vendors to match customers with their applicable rates to maximize the potential for customers to seamlessly and accurately automate their response to time-varying rates in a manner that optimizes both their comfort and grid impacts. That is a vital step that the CEC should not overlook in ensuring that any time-varying utility rate results in automated and optimized load management at scale for customers and the electric grid.

Retrofits. While Title 24 standards provide for price-responsive thermostat technology to be incorporated in new construction or renovation, the fact is that is a slow, incremental process. Promoting flexible demand appliances as a default offering alongside any rate or program intended to leverage those appliances is also a key step to maximize cost-effectiveness and penetration by lowering barriers to adoption. At a minimum, there should be a broad retrofit incentive program to support rapid adoption of flexible demand appliances. Funding to encourage retrofits for this program should be appropriately matched to the objective of promoting greater demand flexibility and therefore should evaluate cost-effectiveness based on load shifting ability or reduction of GHG emissions. Otherwise, it could be decades before consumers broadly embrace even a readily available price-responsive technology like smart thermostats.[8] Until then, the benefits of flexible demand technology may remain largely theoretical to many Californians.

Smart thermostats constitute an important focus for flexible load efforts because heating and cooling is such a significant portion of variable customer load – for example, California's peak demand on the hottest days of the year is about 50% higher than on a typical summer day, with

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Standards docket shows that in regions with default TOU like SMUD, only 41% of customers identified and selected their rate. Of the 59% that did not identify their rate, 73% clicked, "I don't have a TOU rate." This demonstrates a general lack of customer awareness around rates even in jurisdictions with widespread deployment of and customer education on TOU rates. This lack of knowledge and/or lack of specificity is a significant obstacle to maximizing the benefits of automation technology, given that a utility like SCE has three separate TOU rate plans alone. (https://www.sce.com/residential/rates/Time-Of-Use-Residential-Rate-Plans).

[8] Market research shows that as of year-end 2019 market penetration of smart thermostats in the United States was 13.8%. The measure life of smart thermostats is listed at 10-11 years in most technical reference manuals. Assuming a similar measure life for non-smart thermostats, it could take decades to realize the potential of price responsiveness demand flexibility technologies that aleady exist in the market without robust retrofit programs.

much if not all of that difference likely due to cooling load.[9] A coordinated effort involving not just standard-setting, but a comprehensive set of efforts as outlined above, could help California make significant progress toward realizing the real-world benefits of flexible demand.

D. ecobee Response to Staff's Request for Proposals

In addition to the above recommendations, we offer the following responses to Staff's specific questions regarding flexible demand appliances:

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?*
    - DR Signals: API or OpenADR. This is maximal load shed that the customer is willing to provide for emergencies or economic scarcity events.
    - Pricing Signals: Day-ahead pricing or seasonal/annual pricing. Since these signals are delivered daily to customers, the comfort impacts must be minimal or non-existent to avoid customer fatigue and opt-outs.
    - In general, there are different models that would suffice, including receiving signals through a vendor's cloud via OpenADR or standard REST API, as long as the vendor maintains the control of its product to allow for an effective, customer-oriented interface.

- *What responses are provided by the flexible appliance?*
    - With respect to the possibility of having appliances shift load to lower cost/lower GHG emission times: ecobee via eco+ is currently capable of this functionality and over 120,000 ecobee customers are experiencing this feature today throughout North America. The eco+ platform accomplishes this by intelligently pre-cooling a home ahead of a high priced intervals and customizing a savings protocol during the pricing peak.
    - Customers want a personalized response that balances savings, comfort and GHG impact, rather than a "one-size-fits-all" approach where the customer experience is defined in a standard. ecobee's eco+ platform is able to provide a tailored approach incorporating information about the "thermal model" of the home through the thermostat, for example by creating personalized optimizations using data about real-time occupancy patterns, a home's specific thermodynamic properties and HVAC system performance, and indoor humidity conditions, in order to maximize thermostat setbacks with minimal impacts to customer comfort. Establishing a flexible framework that allows for this type of curated experience is key to fostering customer adoption and utilization of flexible demand appliances.

[9] See CAISO, 2019 Annual Report on Market Issues & Performance at 33-34 (June 2020) (comparing average Q3 load with summer peak).

- *Can an appliance react to a price or a GHG signal to modify its operation? If so, describe the modification to the operation.*
    - Yes, ecobee thermostats can react to either signal using eco+, through pre-cooling or pre-heating of a home and through temperature setbacks.

- *Identify communication and load control requirements to enable flexible demand in appliances.*
    - Any such requirements should leverage the ENERGY STAR Connected Thermostat standard.
    - ecobee supports a central database of utility/load-serving entity (LSE) rates as contemplated in the Load Management Standards. We also recommend that the Commission establish a mechanism for load management vendors to match posted rates with customers via API or other commonly accepted secure HTTP protocol, per the discussion above on customer confusion regarding rate and tariff identification.
        - Posting rates is significantly cheaper and does not require complex integrations between LSEs and manufacturers, and leverages cloud infrastructures generally in place for connected devices without necessitating that the utility have any direct access to devices. This approach also leaves room for the device manufacturer to innovate with respect to its customer interface.
        - Currently, ecobee maintains its own database of time-varying rates, but would be able to connect our database to a publicly available source such as the database being creating through the Load Management Standards.
        - The Commission should not rely on or require the customer to have individual knowledge of applicable rates/tariffs, since many don't know this currently. Instead, device manufacturers should be provided:
            - the flexibility to connect to a hosted rate database that is maintained and updated; and
            - a mechanism to match customers to their applicable tariff to perform personalized, optimal energy optimization.
    - Wi-Fi
        - WiFi is commonly used by customers for connected devices in the home, and customers need internet/wifi for many basic household functions (communications, entertainment, etc) and have an incentive to maintain wi-fi connections. In contrast, there may be little or no incentive for customer to reconnect devices that are only connected to the utility via non-consumer centric protocols (CTA2045).
        - With WiFi, devices are generally controlled via app.
        - Note that manufacturers do not need consistent connectivity to implement demand response; this can be pre-programmed and executed at the correct times and updated upon reconnection.
        - The bulk of U.S households have internet and a critical value proposition of Smart Thermostat (connected devices) is app-based control which uses WiFi. People who buy these devices generally have WiFi.

- Low Income Communities: The current administration has committed to a $20 billion investment in rural broadband deployment via the Digital Equity Act. There is tremendous value to provide internet to low income communities given the tremendous economic benefits especially visible right now with remote learning and working where WiFi accessibility is essential.

- *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.*
    - Benefits to consumer of an internal module (utilizing WiFi communication):
        - An internal module can integrate with overall device operations to provide savings while maintaining comfort as demonstrated in the eco+ measurement and verification study. As consumers utilize wi-fi for many in-home uses, it's reasonable to believe they will have an incentive to maintain internet and wi-fi connectivity vs. other standards such as CTA2045.
        - In ecobee's experience, this integration of demand response as part of the eco+ software platform has resulted in significantly higher participation levels, lower opt-outs and greater overall impacts versus traditional utility demand response program strategies and enrollment tactics. Since launching eco+ into utility Bring Your Own Thermostat DR programs in December 2019, ecobee has seen a 150% increase in enrolled thermostats compared to cumulative enrollments from the previous five and a half years. ecobee believes similar results can be achieved in getting customers on rate optimization if the Commission establishes a mechanism for load management technology vendors to match customers with their applicable rates. That is a vital step that the CEC should not overlook in ensuring that any time-varying utility rate results in automated and optimized load management for customers at scale to maximize benefits to the electric grid.
        - Using an internal module facilitates machine learning and AI to provide customized optimization protocols that balance savings and comfort – and thus promote continued customer participation through a positive user experience.
    - Currently, eco+ optimizes around price and the price signals and optimization protocols are delivered through the cloud and in-home wi-fi connection, requiring no additional communications module between ecobee and the customer and also avoiding added cost for a separate communications framework.

Flexible Demand Appliance Standards

- *What flexible demand appliance standards would you propose?*
    - For smart thermostats, the voluntary ENERGY STAR Connected Thermostat specification has provided a clear and robust industry standard. Establishing straightforward criteria and verification protocols provides needed standardization while leaving room for innovation, and preservation of the business models which fund this innovation. ENERGY STAR also provides a national standard that is easier for device manufacturers to invest in, as they

have been doing since the Connected Thermostat specification was established in 2016.

- Any standard should focus on achieving a basic definition of a flexible demand appliance as one that "allows a customer to opt in to an automated price or greenhouse-gas optimization for that end use or device."
- As detailed above, the ENERGY STAR standard provides a robust template for California's Flexible Demand Appliance Standards for smart thermostats. To the extent any additional provisions are necessary, the state's Building Energy Efficiency Code (Title 24 Joint Appendix 5) already defines how a smart thermostat must be able to respond to price signals. With minor amendments, ecobee believes that JA5 could be adapted to satisfy the intent of the Commission for the Flexible Appliance Standards. Below are the sections which ecobee recommends should be adjusted to enable flexible appliances:
    - JA5.2.4(b): expanded to allow for an appliance to respond to price signal without requiring a customer to specify a price threshold where the appliance would modify its operation. Preferably, the pricing signal would be provided on a forward-looking basis to allow for energy optimization (i.e. load shifting) and not real-time only.
    - JA5.2.4(f): Where a "Demand Response Signal" is a pricing signal, the appliance will respond to the signal to optimize between customer savings and other objectives. For thermostats, this could include actions such as pre-cooling in anticipation of a peak price period.
    - JA5.2.4(g): The price signal should only contain a discrete pricing element (e.g. $/kWh for specific time periods) and the appliance and OEM cloud infrastructure can use its proprietary algorithms to optimize energy consumption and appliance utility. The receipt of a price signal in and of itself should not be a trigger for the modification of the appliance's operating characteristics. This is important to allow for device manufacturers to provide a platform that incorporates customer comfort and other considerations to promote customer participation.

- *Would the standard proposed rely on appliance design or performance criteria?*
    - ecobee would oppose a standard requiring specific uniform performance on a kWh/kW basis or setpoint degree changes, etc. Such an approach would undermine device manufacturers' ability to provide a tailored experience suited to the needs and environment of the customer, which in ecobee's deployment of eco+ has been important to maximize customer participation and overall impacts. A more flexible approach would allow the device manufacturer to balance savings and the customer experience for that technology, incorporating available information about unique variables such as customer comfort preferences, real-time occupancy patterns, a home's specific thermodynamic properties and HVAC system performance, and indoor humidity conditions. The ENERGY STAR Connected Thermostat specification represents a successful example of performance standards that prioritize the customer's comfort and experience.

- *What flexible demand compliance or test procedures for appliances would you propose for design standards criteria?*
    - N/A.

- *What flexible demand appliance test procedures would you propose for performance criteria?*
    - ecobee proposes that the procedure require a demonstration that the device modifies its operating parameters based on pricing inputs and that the changes are net positive for the relevant desired outcome (savings/GHG emissions) comparing operation without and with the optimization protocol.

Cybersecurity

- *What minimum cybersecurity protocols should be required?*
    - Generally manufacturer cloud to device communications will be secure, since device manufacturers have significant incentives to maintain security in order to protect brands, customer experience, customer privacy and data. This approach eliminates the vulnerability created from having a central point of attack for intrusions and malice. This approach also eliminates the need for utilities or the CEC to operate a distributed system with millions of end nodes, providing cost savings to consumers. Therefore, ecobee recommends that the Commission leverage that existing secure relationship for these standards.
    - Device manufacturers can update device security and patch vulnerabilities via cloud firmware updates, whereas third parties are unable to do this because the firmware is designed and maintained by the device manufacturer.
    - The device manufacturer can provide Cloud-to-Device encryption to limit communications to the device from manufacturer clouds.
    - Where applicable, Two-Factor Authentication for device access and control can be utilized in order for the user to validate their identity before their device configurations can be altered.

- *What cybersecurity standards would you propose?*
    - ecobee supports the National Institute of Standards and Technology Cybersecurity Framework Version 1.1. Further, manufacturers who sell products in California must already comply with California SB-327 Ch. 886 Information privacy: connected devices.
    - The CEC should not require a direct connection from utilities in order to decrease vulnerabilities that could occur from having a single point of failure or intrusion for malicious attacks. In addition to reducing attack points, this will allow reliance on the existing secure connection through the device manufacturer.
    - Added standards can increase the cost of innovation and compliance for device manufacturers, inhibiting innovation. At times, new standards can also conflict with each other, causing issues with product development and ultimately challenging the commercial viability of products.
    - We suggest that no direct connection from utilities be required,

We appreciate the opportunity to offer these comments, and look forward to engaging further with the Commission regarding this important effort to provide the benefits of flexible demand appliances to California residents.

Respectfully submitted,

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