DOCKETED	
Docket Number:	24-FDAS-02
Project Title:	Load Flexibility Policy & Planning
TN #:	257601
Document Title:	CaliCA IOUs Comments to RFI on RFI Expanding Flexible Demand
Description:	N/A
Filer:	System
Organization:	California Investor Owned Utilities
Submitter Role:	Public
Submission Date:	7/3/2024 5:01:32 PM
Docketed Date:	7/5/2024

Comment Received From: California Investor Owned Utilities
Submitted On: 7/3/2024
Docket Number: 24-FDAS-02

CA IOUs Comments to RFI on RFI Expanding Flexible Demand

Additional submitted attachment is included below.

July 3, 2024

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Topic: Request for Information and Feedback: Expanding Flexible Demand in California through Statewide MIDAS Data Delivery: A Comparison of Signaling Options

Docket Number: 24-FDAS-02
TN Number: 256581

Dear Commission Staff,

This letter comprises the comments of the Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric (SDG&E), and Southern California Edison (SCE), collectively referred to herein as the California Investor-Owned Utilities (CA IOUs), in response to the California Energy Commission Request for Information and Feedback on Expanding Flexible Demand in California through Statewide MIDAS Data Delivery: A Comparison of Signaling Options.

The CA IOUs comprise some of the largest utility companies in the nation, serving over 32 million customers in the Western U.S. We are committed to helping customers reduce energy costs and consumption while striving to meet their evolving needs and expectations. Therefore, we advocate for standards that accurately reflect the climate and conditions of our respective service areas.

We respectfully submit the following comments to the California Energy Commission (CEC).

1. **In regard to communication standards, what reliable alternative communication technologies exist to communicate directly to or with appliances?**

The CA IOUs note that there are additional reliable communication technologies not addressed in detail in the report scenarios. Although Wi-Fi is the predominant technology currently used for home appliance communication, many smart home devices can also communicate using Bluetooth or Zigbee technology. For example, utility advanced metering infrastructure (AMI) smart meters support Zigbee communication. Bluetooth and Zigbee reliably enable two-way communication with packet error rates in low single digits, and they employ retry mechanisms. More in-depth consideration should be given to these proven communication technologies.

2. **Do you see any opportunities for CEC to mitigate the challenges associated with a 24/7/365 signal that have historically limited broadband/Wi-Fi as a preferred communication pathway?**

The report discusses using technologies other than Wi-Fi to mitigate challenges with Wi-Fi connection reliability. Aside from the technologies described in the report, another technology option could be to program Zigbee-capable utility smart meters to broadcast demand flexibility signals to compatible devices. The report advises against using utility AMI to convey demand flexibility signals, citing the inconsistent implementation of AMI technology across various California utility companies. However, the CA IOUs have fully deployed smart meters across their service territories, and given the widespread availability of utility smart meters and the presence of Zigbee radios in many appliances,[1] leveraging existing utility metering infrastructure could be an option to achieve 24/7/365 signaling. Further research is needed to confirm the feasibility of this option, including investigation of bandwidth availability, potential costs, cybersecurity, and data sharing limitations. If leveraged, this technology pathway could specifically target appliances found in low-income households without broadband internet access rather than appliances typically coincident with households more likely to have access to the internet.[2]

Furthermore, the CA IOUs will need to replace aging smart meters in the near future. The newest generation of smart meters offer advanced capabilities, including but not limited to:

- The ability to detect major appliances on the meter, including distributed energy resources.
- The ability to provide local Wi-Fi networks for households without internet access to receive and respond to demand flexibility signals.
- The ability to target demand flexibility signals to local areas or specific segments of the distribution grid as needed, unlike AM or FM radio broadcast options.

Therefore, it is crucial to acknowledge the capabilities of modern smart meters and for the CEC to collaborate with the California Public Utilities Commission (CPUC) when the CA IOUs propose smart meter replacement plans, to ensure alignment with flexible demand appliance standards implementation.

3. **Given the report's conclusion that broadcast delivery of MIDAS data is more cost-effective than point-to-point delivery for the volume of appliances envisioned under FDAS, what are the main concerns with a statewide FDAS signaling system that relies on a broadcast, and what cost-effective solutions might mitigate these concerns?**

Of the scenarios considered, the consultant report concludes that the broadcast delivery of data from the CEC's Market Informed Demand Automation Server (MIDAS) via radio data system (RDS) is the most cost-effective option to maximize flexible demand resource benefit. Furthermore, the report promotes the concept of "MIDAS plug-and-play," wherein default appliance settings would automatically respond to MIDAS signals upon installation. For several reasons detailed in this letter, at this time the CA IOUs do

[1] According to the Connectivity Standards Alliance (formerly the Zigbee Alliance), nearly 4 billion Zigbee chipsets were expected to ship by 2023, making Zigbee one of the world's most popular IoT standards. For more information, see: https://csa-iot.org/newsroom/zigbee-momentum/

[2] A 2021 update to a PEW Research Center survey that tracks Americans' internet usage and access found that only 57% of households with incomes less than $30,000 per year have access to home broadband, while 92% of households with incomes greater than $100,000 per year have access to home broadband. Source: Pew Research Center, "Internet, Broadband Fact Sheet," January 31, 2024, https://www.pewresearch.org/internet/fact-sheet/internet-broadband.

not support the widespread adoption of MIDAS plug-and-play functionality via RDS. We believe that significant additional research is needed to prove the feasibility of this concept and note several concerns with the report's recommended approach.

Appliance-Specific Signaling

A primary concern with the proposed statewide flexible demand appliance signaling system is the lack of signal differentiation by appliance. The report and proposed framework of MIDAS plug-and-play via RDS do not address whether a single communications technology or broadcast signal is appropriate for the range of products likely to be covered by a flexible demand appliance standard in California. Appliance load flexibility can depend on factors including but not limited to behavioral preferences, local climate, the presence of energy storage, and a customer's motivation based on their electricity rate. For example, electric storage water heaters (ESWH) can store energy and therefore can shift energy use over extended periods of time, while thermostats may be more suitable for reducing demand during short, targeted events since reducing cooling system operation could significantly impact user comfort. Due to user behavior patterns and rate plans that incentivize behavior, to shift load, electric vehicles might be better suited to charge overnight when users have access to home charging, rather than in the morning or afternoon when vehicles are more likely to be in use and without access to a charger. Programs that target load shifts by appliance can account for different appliance capabilities and consumer amenity requirements, unlike a blanket statewide signal that would treat all appliances the same.

Bidirectional Communication

The CA IOUs do not support the proposed framework's reliance on one-way communication. We support open and secure bidirectional communication signals for appliances regulated under FDAS. The report notes the potential benefits of one-way communication, such as maintaining consumer data privacy, and details the costs associated with bidirectional communication, but it does not provide a complementary assessment of the increased benefits that bidirectional communication can provide. Additionally, the report does not differentiate between the value of the demand flexibility resource resulting from one-way signaling versus that of a framework that uses bidirectional communication. It does not address whether fleets of FDAS-compliant devices signaled using one-way communication can even be considered resources for grid planning purposes. Without assurance that signaled devices can be relied upon for grid planning or knowledge of which devices are responding to signals, utilities will not be able to accurately account for the impact of appliance demand flexibility signaling when developing demand forecasts. Unlike the proposed one-way communication via RDS, bidirectional communication will help ensure quantifiable load flexibility that can be used for grid resource planning.

Bidirectional communication allows utilities and program operators to confirm if a device is connected, if it has received a signal, and if the signal is correct. It also aids in troubleshooting communication issues that could arise regardless of communication technology. For example, for several years, PG&E employed one-way communication to signal devices in the SmartAC switch program, leading to numerous operational challenges, such as the inability to troubleshoot signals when customers reported issues. For this reason, PG&E has moved to two-way communication for this program to improve program operation and reliability. The report failed to include the operations and maintenance cost required to manage a one-way communication network for demand flexibility signaling, such as the cost to visit customers' homes for troubleshooting.

The proposed framework assumes that one-way communication is sufficient for all appliances considered. However, many appliances may benefit from demand flexibility signaling using bidirectional communication to ensure user comfort and to reduce user opt-outs or consumer backlash due to negative experiences. ESWH are one appliance that benefits from bidirectional communication for demand flexibility signaling. Regional and statewide policy initiatives[3] that prohibit the installation of new water heaters that emit nitrogen oxides are likely to significantly increase the market share of ESWH in California. ESWH could significantly contribute to California's daily residential electric peak load when adopted on a large scale. Although these products can shift load, their demand flexibility depends on household hot water usage patterns, which differ drastically depending on occupancy and user preferences. Bidirectional communication allows these devices to provide information to a program operator that would help operators (or programmatic algorithms employed by operators) tailor signals based on customer needs. In water heater load shifting programs, such as PG&E's WatterSaver program and SCE's SmartShift Rewards program, water heaters transmit information about water heater energy storage capacity and hourly water heating energy use to program operators. In regions with colder climates or for households that consume a significant amount of hot water in the evening, program operators can use this information to schedule a longer or more energy-intensive 'load up' period before reducing the load during peak hours, ensuring that these customers have sufficient hot water supply during peak periods. For customers in warmer climates or those whose data transmission shows minimal water heating energy use during peak times, operators can schedule a shorter load up period, preventing unnecessary energy expenditure.

Pool pump controls can turn a pool pump motor on or off or throttle down pool pump operation. Unlike ESWH, pool pump control demand flexibility does not depend on energy storage. Rather, the duration of pump operation is critical, and pump operation is determined by factors that include the pool's volume, the pump's capacity, pool water temperature, and pump speed options (for example, single versus multi-speed operation). Achieving dispatchable demand flexibility from pool pump controls while maintaining user amenities would also benefit from two-way communication to ensure adequate daily pump operation for signaled devices. As new technologies are regulated under FDAS including smart thermostats, electric vehicle chargers, and behind-the-meter batteries, two-way communication to enable load management should be a requirement, not an option.

Technical Feasibility

The CA IOUs also note concerns with the technical feasibility of the proposed statewide FDAS signaling framework. The appliances considered in the report analysis are not typically sold with technology enabling receipt of signals via RDS. This functionality is not yet commercially available. Requiring a wide range of appliances to support this functionality without the availability of demonstrated commercially viable products is premature and likely not supported by smart appliance manufacturers. Further research on the technical feasibility of using radio broadcasts to transmit load flexibility signals to different types of appliances is critical to avoid the creation of stranded assets.

Economic Modeling

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[3] These initiatives include the California Air Resources Board's consideration of Zero-Emission Space and Water Heater Standards, the Bay Area Air Quality Management District's Rule 9-6, and the South Coast Air Quality Management District's Rule 1146.2.

Finally, the report falls short in quantitatively modeling a robust case for demand flexibility signaling via RDS broadcast. The response to Question 11 provides more detail on these concerns.

4. **How should the CEC prioritize broadcast options presented in Chapter 3 (FM, AM, Cellular) and why? Are there more appropriate and cost-effective broadcast options not listed here?**

The CA IOUs do not support integrating radio broadcast system technology into all devices regulated under FDAS for several reasons. Instead, the CEC could consider other communications technologies for broadcasting demand flexibility signals to appliances as an initial step.

Wi-Fi

The report presents embedded Wi-Fi technology as the "business as usual" option, enabling participation in third-party programs. It assumes consumers would bear the hardware costs and that Wi-Fi costs exceed the costs associated with RDS. While consumers demand Wi-Fi for convenience and advanced amenities beyond demand flexibility capability, they currently do not demand RDS, and manufacturers do not provide it. The incremental cost of adding Wi-Fi for specific appliance types, such as smart thermostats or electric vehicle supply equipment, may be zero or minimal if these products already typically include Wi-Fi for user convenience and manufacturer insights. Some Wi-Fi-based appliance interfaces (for example, smart thermostats) already prompt users to opt into load flexibility programs during setup.[4] Therefore, the assumption of a low participation rate for all appliances that use Wi-Fi communication technology is not well substantiated. Not all California households have access to Wi-Fi, so this solution is not universal. However, it could be a low-cost way to enable demand flexibility for many appliances without burdening consumers with the costs of integrating RDS technology into all FDAS-regulated appliances. Wi-Fi also enables data exchange via open standards (for example, OpenADR) as well as via manufacturer proprietary platforms. For the latter case, it is important for the demand flexibility signaling framework to consider standardizing the type of data that would be required to be transmitted since each manufacturer would have its own proprietary data interface. Standardization would streamline communication integration and data reporting across appliances and manufacturers.

Cellular

For cellular technology, the report presents fixed costs for cellular service per appliance. However, these costs would typically be subject to negotiation in a large-scale deployment, potentially resulting in more favorable rates. For example, if FDAS communication utilizes two-way narrowband Internet of Things (NB-IoT) low-power, wide-area network communication delivered through the existing cellular infrastructure, California would quickly become a major deployer of this technology, allowing for preferential pricing negotiations for hardware and software. This could increase the cost effectiveness of cellular service as an option for demand flexibility signaling. Moreover, the percentage of low-income households that rely on smartphones for internet access doubled between 2013 and 2021, while the percentage of these households with access to home broadband remained flat.[5] Given this trend, the

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[4] For example, Ecobee smart thermostats prompt users to enable "Community Energy Savings" upon setup, connecting users to demand response programs in their area. For more information, visit: https://www.ecobee.com/en-us/eco-plus/community-energy-savings/

[5] Pew Research Center, "Internet, Broadband Fact Sheet," January 31, 2024, https://www.pewresearch.org/internet/fact-sheet/internet-broadband.

CEC could assess the feasibility of using customers' cell phones to deliver demand flexibility signals to their appliances, leveraging existing technology.

Communication Ports

The report indicates that integrating a communication port into an appliance can facilitate third-party program participation that may better align with users' preferences. ESWHs are increasingly including communication ports to comply with state regulations and incentive program requirements. Many heat pump water heaters (HPWHs), including base models, have a communication port.[6] California water heater load shifting programs use these ports and universal communication modules to shift load. For certain technologies like HPWHs, communication ports may be the most cost-effective option for demand flexibility signaling because the incremental cost of adding this feature may be lower than the report suggests. Also, the ability to standardize the content and method of data exchange (for example, via the CTA-2045 protocol) is an added benefit. However, for other appliances where this port is not already being included and where space on the appliance is limited, the cost to redesign the appliance to support an easily accessible communication port may be higher than estimated in the report. Consequently, the communication port option may not be suitable for all appliances and the option should be treated with nuance and targeted to appliances for which it is most feasible. Appliance requirements benefit from a customized approach that addresses individual needs rather than a broad, uniform strategy.

Emerging Communication Technologies

Finally, the CEC could consider exploring other emerging communication technologies or platforms that could enable low-cost, widespread demand flexibility signaling. Examples include new free-to-connect-to, low bandwidth, low-power community networks facilitated by extensive IoT devices,[7] or low-bandwidth satellite connectivity that allows for affordable IoT device operation in even the most remote locations.[8] These networks could transmit demand flexibility signals to appliances with Wi-Fi capability without requiring users to have a dedicated home broadband network and without requiring the appliances to also support RDS.

5. **What message content options (e.g., GHG, price, or some combination) do you suggest being sent using the default FDAS Rate Identification Numbers discussed in Chapter 2, and why?**

The CA IOUs do not recommend including a default Rate Identification Number (RIN) in appliances or automatically opting consumers into a program in which their appliance responds to default RIN demand flexibility signals at installation. Instead, consumers should be able to decide whether to opt in to receive and respond to demand flexibility signaling and to choose the type of signal they receive.

The report recommends establishing a single statewide default RIN for the average statewide greenhouse gas (GHG) emissions data stream, plus an additional default RIN for each of the ten

[6] For a list of HPWHs with communication ports, see for example the Northwest Energy Efficiency Alliance's Advanced Water Heating Specification Residential HPWH Qualified Product List. This resource is available at: https://neea.org/img/documents/residential-HPWH-qualified-products-list.pdf

[7] An example is the Amazon Sidewalk network. For more information, visit: https://www.aboutamazon.com/news/devices/everything-you-need-to-know-about-amazon-sidewalk.

[8] An example is the Swarm satellite network. For more information, visit: https://swarm.space/.

California default load aggregation points.[9] This recommendation does not account for locational variability in the need for demand flexibility. It would also result in many appliances responding to the same signals simultaneously, which could create more uniformity in appliance operation schedules and could ultimately harm the grid. Grid demand flexibility needs often vary by location, and circuits with constrained capacity that could benefit from targeted load shifting may be in close geographical proximity to unconstrained circuits. Within a given day, there could be a mismatch between default signals based on average statewide or regional prices or emissions and conditions on constrained circuits. For example, these default signals could indicate low prices or low GHG emissions, leading to increased electricity demand, but such an increase in demand would have adverse effects on constrained circuits. Locational variability is not addressed if all customers receive a default signal and respond simultaneously. FDAS signaling requirements should prioritize dispatchability and the ability to target demand flexibility where it is needed most.

The proposed default RINs could lead to millions of consumer appliances responding to signals that may not align with the consumer's actual electricity rates or preferences without the consumer explicitly opting in to this operation. Electricity rates do not always align with GHG emissions signals. As a result, a default RIN-based signal could lead to increased electricity costs for some households. Signals should incorporate price and/or GHG emission information based on customers' preferences, ensuring that appliance response is in sync with consumer costs.

6. **Voluntary utility and third-party programs for load flexibility (shifting) have typically had very low participation from end users. What alternate Load Flexibility program(s) would you recommend that maximize participation while being ubiquitous, cost-effective, equitable, and technically feasible without requiring or precluding participation from third parties?**

The CA IOUs recommend that the CEC review recent related proceedings for alternate load flexibility program options. Utilities and community choice aggregators continue to develop new load management programs to maximize customer participation. These programs aim to be ubiquitous, cost-effective, equitable, and technically feasible. The CEC should refer to recent related proceedings for more information, including CPUC demand response and demand flexibility rulemakings, such as R.22-07-005.

7. **Assuming a statewide broadcast signal were to be deployed, would a default appliance setting that automatically initiates response to MIDAS signals at installation allow for ease in initiating flexibility of the appliance? What issues or concerns would you anticipate with such a plug-and-play functionality?**

The report asserts that "consumers are more likely to accept plug-and-play options, as opposed to strategies requiring active involvement."[10] Consumer acceptance of widespread default opt-in device signaling has not been demonstrated in California and would benefit from more research, including for example consumer surveys. The report details a previous attempt to establish a common statewide

[9] Herter Energy Research Solutions, *Expanding Flexible Demand through Public Broadcast of Greenhouse Gas Emissions and Electricity Prices: Costs and Benefits of Potential Appliance Standards,* (California Energy Commission, 2024), 36.

[10] Ibid., 32.

signaling infrastructure for mandatory emergency air conditioning response that was derailed due to a lack of consumer acceptance. Without an implementation plan to avoid the same pitfalls, the report's proposed framework may draw similar concerns. The CEC could bolster consumer acceptance by allowing consumers to affirmatively opt-in to demand flexibility signaling and response instead of a "plug-and-play" framework. A consumer education campaign would also help ensure that consumers understand that they have control over their participation and response to signals and that they understand how to change participation preferences by updating the RIN in the device. Consumer education and outreach activities could reduce the participation rate of appliances in demand flexibility programs compared to the 72 percent participation rate the report assumes for plug-and-play scenarios. These activities could also increase the administrative costs of programs. However, they would ensure that households responding to demand flexibility signals are well-informed and comfortable with their participation, reducing the opt-out frequency and potentially leading to more reliable long-term participation.

8. **The report proposes a hybrid communication architecture that incorporates both plug-and-play MIDAS response and third-party program enabling technology, represented by the Plug-and-Play Port scenario, as the most cost-effective solution to enable demand flexibility for an appliance. What do you think are some pros/cons of this approach?**

The response to Question 7 details our concerns with "plug-and-play" functionality. Furthermore, the response to Question 4 details considerations for the use of communications ports for demand flexibility signaling.

9. **The consultant report suggests that a gateway architecture cannot support plug-and-play flexibility. Is this accurate from your perspective? If not, describe how a gateway solution could enable both intrabuilding load optimization and plug-and-play flexibility for appliances without sacrificing cybersecurity.**

The CA IOUs do not agree that gateway architecture cannot necessarily support demand flexibility signaling. A gateway architecture could allow a home's smart appliances to optimize appliance operation across the home based on a customer's electricity rate or dynamic price. For example, a customer may be willing to defer electric vehicle charging to later in a day in exchange for operating their air conditioner immediately. With more smart appliances that can employ smart optimization strategies, a customer can increase their load flexibility. It is premature to assume that a smart appliance should respond to a signal without the opportunity to communicate with other smart appliances. Product manufacturers and industry should be allowed to develop secure solutions in this area, including hardware and software options. If secure solutions are developed, gateway architecture could offer a cost-effective method of amplifying demand flexibility signals across devices and meeting customer expectations at the same time.

10. **Are there equity issues related to a MIDAS plug-and-play architecture that remain unaddressed by the report?**

The report proposes using a greenhouse gas intensity signal as the default demand flexibility signal. With plug-and-play architecture, appliances subject to FDAS would be programmed to respond to this signal upon installation, without manual setup or user intervention. As previously noted, a default greenhouse gas signal may not align with actual consumer rates, resulting in inadvertent utility bill increases for some customers, which would be especially harmful to low-income customers with high energy burdens.

Additionally, the report should address other methods to reach households without internet access. One option is to use communication ports with universal communication modules that can communicate through various methods, including Wi-Fi, cellular, and radio broadcasts. The modules would facilitate signaling for these households without requiring every appliance regulated by FDAS to include RDS technology.

The report's proposed functionality will increase appliance costs when they are first introduced, which may prevent target demographics from adopting demand flexible appliances. The CEC should consider that the report does not factor in the impact of consumer price sensitivity on adoption of demand flexible appliances. Consumers who are mindful of prices might choose to repair their existing appliances or purchase secondhand or refurbished models instead of new ones. If modeling shows that demand flexible product adoption only occurs with middle-to-high-income customers, broadband or Wi-Fi-based solutions may be the most cost-effective approach initially.

The report should compare the cost of radio broadcast signaling options targeted at households without broadband internet access to the cost of internet-based signaling to households that can support this option with existing appliance capabilities and infrastructure. This comparison should use the projected adoption rate of RDS-enabled appliances among price-sensitive households. This analysis would determine the incremental cost burden on all consumers to add radio technology that many households do not need to be able to respond to demand flexibility signals.

11. **Provide a summary of your support for and/or rejection of any of the recommendations and conclusions offered in the report, along with a brief description of why for each.**

The CA IOUs provide other general comments on assumptions and recommendations in this report.

Cost-Benefit Analysis
In its cost-benefit analysis, the report assumes that consumers and load serving entities (LSEs) would bear all costs for demand flexibility signaling implementation. The analysis does not consider the potential increase in costs to ratepayers due to the assignment of costs to LSEs. The proposed framework should aim to minimize costs to LSEs, thereby limiting ratepayer costs. Additionally, the report assumes that manufacturers would incur negative costs in all scenarios and transfer all product compliance costs to consumers. This assumption understates the required product modification and manufacturing costs for new features, such as integrating RDS into appliances. Manufacturers must invest in research, development, design, and testing to deploy new product features, and these costs likely exceed the simple mass production per-appliance component costs assumed in the report. Existing product features, such as Wi-Fi or communication ports in HPWHs, may not require significant incremental costs to use these features for demand flexibility signaling. Introducing new features that do not exist in most appliances, such as RDS, HD Radio, and communication ports in non-water heating

appliances, may require substantial incremental costs to source components, update product design, and deploy new products. The report's assumptions for the cost analysis are not fully supported by evidence, leading to potentially underestimated incremental costs for RDS ($10/appliance) compared to Wi-Fi ($135/appliance). Note that many factors are based on the author's estimates. A more thorough analysis of technology costs is needed to substantiate the report's conclusions. The assumption that device manufacturers would transfer 100 percent of incremental costs to consumers is also inconsistent with assumptions for other standards, such as Department of Energy efficiency regulations. The analysis should consider how changing this assumption would affect the report's conclusions.

Furthermore, bringing new appliance features to market will involve introduction costs, as appliance manufacturers must update their existing products. These costs can make such features only available in higher-end models upon product introduction, making it difficult to reach 100 percent of the population, including low-income households who cannot afford premium appliances. The report's framework aims to include all customers, but it does not address the economic realities of these households.

The report presents the estimated flexible demand resource attributable to various signaling scenarios. It concludes that establishing broadcast MIDAS plug-and-play connectivity standards could increase California's flexible demand resources by 6 gigawatts. The reported benefits need more substantial evidence and should not be the sole basis for policy decisions. The report's accompanying analysis spreadsheet does not provide sources to substantiate annual appliance sales and notes that annual sale values are preliminary. For example, the analysis assumes California sales of 1 million electric water heaters per year starting in 2026 continuing flat through 2035. This anticipated high volume of water heater sales with flexible demand features will likely only occur once regulations requiring the sale of electric water heaters are effective. The CA IOUs recommend reviewing the accuracy of the sales estimates, as these figures are essential for estimating the flexible demand resource potential. Furthermore, the analysis lacks evidence for the flexible capacity of each appliance. It does not clearly define the nature of the flexible demand resource, making it unclear when, for how long, and how often these demand flexibility benefits could accrue.

Alignment with Other State Efforts

Aligning the report's methodology with other CEC efforts would improve the credibility of its conclusions. Per the CEC's Senate Bill (SB) 846 Load-Shift Goal Report,[11] for electric system planning the CEC classifies load flexibility resources into three categories: load-modifying, resource planning and procurement (resource adequacy), or incremental and emergency. The consultant's report should identify the load flexibility resources attainable via MIDAS signaling. It should present findings in similar terms as the SB 846 report such as net peak demand reduction to define what type of load shifting is proposed and to make the proposal comparable to the goal established by the SB 846 effort. For transparency, the analysis should detail how the individual appliance types contribute to net peak demand reduction or to other clearly defined demand flexibility resource metrics. It should also present the timeline for benefits to accrue based on realistic product development and deployment estimates. These actions would align with the SB 846 report's assertion that "to realize the load-shift goal, California must define a comprehensive accounting methodology that is consistent across load flexibility resources."[12] The SB 846 report estimates statewide demand flexibility resource potential by identifying

[11] California Energy Commission, *Senate Bill 846 Load-Shift Goal Report,* (California Energy Commission, 2023).

[12] Ibid., 4.

hourly gross and net load, determining the net peak period, and calculating the impacts for net peak reduction based on dynamic pricing and event-based demand response.[13] Ideally, the CEC consultant report would discuss the differences in assumptions and methodologies for this report compared to the SB 846 report. The report should align with the SB 846 report or provide a clear rationale for using a different methodology. Such alignment would also support the usability of this effort's data for related purposes, such as the CEC's California electricity demand forecasts.

In the report's recommended plug-and-play framework, customers are by default opted in to demand flexibility signals and must act to opt out of participation. Other proposals like the CalFUSE roadmap proposed by CPUC staff in the 2022 "Advanced Strategies for Demand Flexibility Management and Customer DER Compensation" white paper[14] propose that solutions should initially be available to customers on an opt-in basis, with exploration of moving solutions to an opt-out or default basis "at a later date following a conclusive evaluation."[15] The California Public Utilities Code § 745 includes requirements that the CPUC must consider when establishing a mandatory or default time-variant pricing tariff for residential customers.[16] Statutory requirements include the following:

- Customers with medical baseline allowances must affirmatively consent before being defaulted into time-of-use rates.
- Time-of-use rate schedules must not cause unreasonable hardship for senior citizens or economically vulnerable customers in hot climate zones.
- There must be a consideration of hardship to customers in areas with hot summer weather before employing default time-of-use rates.

Although the CEC consultant report deals with demand flexibility signals and not time-varying rates, similar considerations could be made for the report's proposed framework before defaulting FDAS-regulated appliances into MIDAS plug-and-play. This would include starting with an opt-in framework and evaluating the comfort and cost impact on vulnerable customers that may not be able to shift appliance operation.

Timeline Feasibility

The report projects savings beginning in 2026; however, implementing the recommended next steps will require significant time and effort to study and address the stakeholder concerns and implement a statewide demand flexibility signaling framework. The CEC should consider the feasibility of the timeline for the report's recommended actions and solicit more detailed stakeholder feedback, including from those who would be required to implement various components of the framework, if the report's recommendations are to be incorporated into FDAS.

Cybersecurity and Customer Privacy

The report did not address the cybersecurity of signaling via a widespread broadcast. Because the proposed framework would broadcast demand flexibility signals with data originating from a single point (MIDAS) to a large swath of consumer appliances programmed to respond by default, it is critical to prioritize the security of the signaling infrastructure. The risks stated in Table 15 of the consultant report

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13 Ibid., 19.

14 California Public Utilities Commission, *Advanced Strategies for Demand Flexibility Management and Customer DER Compensation: Energy Division White Paper and Staff Proposal*, (California Public Utilities Commission, 2022).

15 Ibid., 2.

16 CA Pub Util Code § 745 (2023)

are all possible for both one-way and two-way communication scenarios. Signal manipulation is a key concern. If the broadcast signaling infrastructure were compromised such that a malicious or faulty signal was sent to disrupt consumer appliance operations, it could cause widespread chaos among consumers and the power grid. This could occur for example via a “man-in-the-middle” attack, wherein a malicious actor could intercept an appliance signal and manipulate or fail to forward the signaling information. The CEC should thoroughly investigate these risks as well as other cybersecurity risks not mentioned in the report.

The report mentions common actions to prevent unauthorized access to flexibility systems, but these actions are less applicable for cloud-based IoT devices. These devices may not be sophisticated enough to support remote firmware or software patching, are not likely to be behind a well-managed firewall, and are unlikely to have advanced logging or monitoring capabilities. The CEC should consider cybersecurity requirements appropriate for the level of sophistication of IoT devices. The cybersecurity measures used for utility smart meters could guide the development of flexible demand appliance cybersecurity.

Prioritizing cybersecurity also protects customer privacy by preventing the unauthorized access of bidirectional customer data by third parties. In future research, the CEC should address other customer privacy and consent issues, including methods for ensuring customer consent and processes for revoking consent, customer notification procedures, and data protection and use guidelines.

Distributed, non-uniform, appliance-specific signaling to customers that explicitly opt in to participation reduces the risk of widespread harm due to a security incident. The CEC should test and demonstrate the security of the proposed framework before considering its implementation at scale.

12. **How do you foresee electricity price, GHG, and grid signals being used in an appliance, e.g., an electric storage water heater’s logic command and controls, whether through broadcast or internet connections?**

Further investigation is needed to determine how appliances can use demand flexibility signals. Most appliances cannot yet effectively receive and respond to demand flexibility signals using the device alone, and the suitability of hosting this intelligence within a device when shipped (as opposed to in a cloud platform) is an open question. Today, demand flexibility signals are often sent via an intermediary platform (for example, a distributed energy resource management system) that can consider customer preferences, such as time-of-use rates, opt-out preferences, appliance amenities, and comfort considerations when signaling devices. The information sent to devices is not price or greenhouse gas emission information that an appliance must parse and act upon. Instead, it may include demand response event timing or device schedule and operation criteria based on an external assessment of consumer preferences and the appliance capabilities, minimizing the risk of large-scale consumer opt-out. Customers with various demand flexibility program options can choose a provider offering the optimization and level of service that they desire. Direct-to-appliance signaling of price and greenhouse gas emissions information also requires the device to have increased computing power and may not be an appropriate solution for all appliances. The CEC should conduct further research to determine the suitability, costs, and benefits of direct-to-appliance signaling for various appliances.

The CA IOUs appreciate the opportunity to provide these comments regarding the Request for Information and Feedback on Expanding Flexible Demand in California through Statewide MIDAS Data Delivery. We thank the California Energy Commission for its consideration.

Sincerely,

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