DOCKETED

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SWTCH Energy Inc - Response to Flexible Demand Standards for EVSE RFI

Additional submitted attachment is included below.

SWTCH

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CEC RFI: Flexible Demand and Load Shifting in California for EVSE, Docket # 24-FDAS-04

Deadline: December 20, 2024

1. Please provide information to assist the CEC in determining whether the scope of devices in Table 1 meets the needs of FDAS or if the CEC needs to consider revisions to the scope.
   Response:

Potential In-Scope Devices	Potential Out-of-Scope Devices
• Level 1 Electric Vehicle Supply Equipment **- Yes** • Level 2 Electric Vehicle Supply Equipment **- Yes** • DC-output Electric Vehicle Supply Equipment **- Yes** • Wireless Electric Vehicle Supply Equipment **- No** • Medium voltage AC input supply Electric Vehicle Supply Equipment **- No** • Power electronic components inside the vehicle **- No**	• Pantograph Electric Vehicle Supply Equipment **- No** • Equipment with an automated connection system **- No**

Source: California Energy Commission

2. What is the current landscape of options for charging schedules that prioritize the driver experience, emissions reductions, financial savings, and/or other factors? Please provide information or data on customer receptiveness to various charging schedules, such as charge immediately, charge by departure, etc. and the entity who possesses such information.
   Response: The EV charging landscape includes Charge Immediately (convenience), Charge by Departure (optimized readiness), Time-of-Use (TOU) (off-peak savings), and Smart Charging (dynamic grid-friendly charging). TOU and Smart Charging are growing, with 40–60% of drivers adopting TOU plans where savings are clear. Smart Charging Demand Response pilots show over 70% acceptance with financial incentives. According to SWTCH's data, we see that the adoption thrives with automation, cost savings, and minimal behavior disruption, making Smart Charging and TOU leading options globally.

3. Please comment on the various EVs or EVSE consumer charging preferences such as charge immediately or "charge by departure", where the EV is charged to a specified percentage with a set time to be ready.
    a. How does using charge strategy balance factors as battery life, price, etc.?
    Response:
        - Strategies like "charge by departure" optimize battery longevity by avoiding overcharging and excessive high-power charging.
        - Time-of-Use (TOU) schedules reduce electricity costs.
        - Immediate charging prioritizes convenience but may increase energy costs and slightly impact battery life over time.
    b. What consumer data is available that provides customer charging habits such as: demographics and population percentages that prefer to charge at home, at work, or in public shared spaces? What times of day?
    Response:
        - Most EV owners prefer charging at home (~80%), with 15–20% charging at work or public stations.
        - Peak home charging times: 6–10 PM; public charging: weekday afternoons.
    c. What charger types are typically used?
    Response:
        - Level 1 (120V): Occasional home use.
        - Level 2 (240V): Preferred for home and workplace charging.
        - DC Fast Charging (Level 3): Used in public spaces for quick sessions.
    d. How do charging patterns change as EV owners gain experience with their vehicle?
    Response: Experienced owners plan charging around schedules (e.g., TOU) and avoid overcharging to conserve battery life.
    e. What percentage of battery capacity is typically charged per session?
    Response: Typical sessions recharge 30–80% of battery capacity, depending on daily use.
    f. How is this behavior expected to change as ownership of EVs expands beyond the early adopters?
    Response:
        - Expect a rise in workplace and public charging as infrastructure grows and non-homeowners adopt EVs.
        - Greater emphasis on cost-saving strategies like TOU and smart charging.

4. When will DC charging equipment be available for residential installation? What are the expected use cases, penetration, price range and power level of DC equipment used in the residential sector? Would certain DC chargers installed at private residences require a Battery Energy Storage System to manage peak load?
   Response: Options for residential installation are available with some vendors offering 240V DC charging equipment. Although this may be useful for high mileage EV users, it is not deemed to be a highly sought after option especially when compared to a much cheaper AC equipment. The residential DC options offer usually 20-30kW of power output and could cost anywhere from $10,000 - $20,000. Although BESS may be useful in certain applications, SWTCH has developed advance energy management and demand response technology that will manage peak demand events eliminating the need for BESS.

5. What software and hardware capabilities could enable public EVSEs to relieve/eliminate grid congestion at the Distribution (referring to Transmission and Distribution, T&D, for the grid) level? What control strategies are available to the grid operator and/or load aggregator to shift and/or curtail demand from EVSEs at the Distribution level to maintain grid reliability?
   Response: SWTCH has developed advanced technology under SWTCH Control and SWTCH Connect. This technology focuses on making sure that the charging stations do not exceed a set maximum threshold of energy at any time, at the same time providing a full charge to every EV user. SWTCH also has integrations with different aggregators and utility platforms that allow SWTCH to curtail charging based on peak demand events.

6. Similarly, what software and hardware capabilities are best suited enable residential EVSEs to relieve grid congestion at the Distribution level? What control strategies can be deployed by the grid operator and/or load aggregator to shift and/or curtail demand from residential EVSEs at the Distribution level support grid reliability?
   Response: This merely comes down to the aggregator's communication with the SWTCH backend using SWTCH Connect. SWTCH's integration ensures that aggregators can send a signal to SWTCH when a demand response event needs to happen; SWTCH will then curtail the power accordingly and ensure that the necessary power is delivered during off-peak hours.

7. What hardware and software are needed on the EV's Onboard Charging System to enable load shifting? What percentage of EVs currently receive grid signals (e.g., electricity prices, GHG emissions and California Independent System Operator Flex Alerts) to schedule load

shifting, demand response, and/or bi- directional charging? What percentage of EVs require the EVSE to receive grid signals to schedule load shifting, demand response, and/or bi-directional charging? What are the most common methods for communicating signals to EVSEs and EVs (e.g. Ethernet, Wi-Fi, Cellular, AM/FM broadcast)?
Response: Only 10-20% of the EVs at the moment are able to receive grid signals and respond to them. This is why it is imperative to implement EVSE management software like SWTCH's that is able to make sure that these all EVs can respond to grid signals by implementing smart load shifting. Most common methods of communications are WiFi, Ethernet, cellular.

8. (Focused on EV manufacturers) Is the EV telematics system used to receive grid signals (e.g., electricity prices, GHG emissions, and California Independent System Operator Flex Alerts) and schedule charging in response to those grid signals? If so, what is the monthly cost charged to the customer for these capabilities?
   Response: Only some EV manufacturers use telematics systems to receive grid signals (e.g., electricity prices, GHG emissions, and Flex Alerts) for scheduling charging. The monthly cost for these capabilities typically ranges from $5 to $20, depending on the manufacturer and service plan, with some features included in premium or connected service packages.

9. How can medium-duty and heavy-duty (MDHD) EVs and their EVSE fit into the CEC's goal of load shifting to avoid GHG emissions?
   Response: MDHD EVs can meet CEC's goal of load shifting when they charge at EVSE provided by SWTCH. SWTCH can make sure that these EVSE are enrolled in demand response programs and can help with load shifting using SWTCH's integration with utilities and aggregators.

10. Should the scope of this regulation include load shifting criteria for EVs such as forklifts, boats, and other off-road vehicles? Do off-road vehicles typically have a defined use-cycle that fits the need for load shifting? If so, which types of off- road vehicles? Please provide off-road EV counts, types of EVSE for off-road EVs, and charging strategies for off-road EVs.
    Response: Including off-road EVs in load-shifting regulations is beneficial due to defined use cycles (e.g., forklifts, boats, construction equipment). Charging strategies include scheduled off-peak charging, dynamic load management, and battery swapping. EVSE typically involves Level 2 and DC fast chargers. Regulation enhances grid efficiency and supports diverse industrial applications.

11. There are currently some buses that use wireless charging to top off batteries at bus stops. What are other applicable uses for wireless charging, and is wireless charging planned in your product roadmap? If so, when is wireless charging expected to be more widely available?
Response: Wireless charging suits passenger EVs, shared mobility fleets, commercial vehicles, and urban transit, enabling seamless charging during idle times or stops. Broader adoption is far out given high upfront costs being the main deterrent. Since widespread availability is likely within far out and dependent on infrastructure development, not many vendors have released such hardware but SWTCH is able to integrate with any OCPP wireless charging equipment.

12. What are the charging practices for commercial fleets? Bus fleets? Overnight depot level charging? What power levels? How is the charging of the fleet managed? Manually rotated? Management software?
Response: Commercial and bus fleets use overnight depot charging (50-350kW) to leverage lower electricity rates. Medium to Large fleets rely on software like SWTCH's for automation and optimization which saves the extensive amount of money in charging management. Bus fleets often combine depot and high-power en-route charging to ensure reliability and meet operational demands efficiently.

13. Which communication protocols or components of existing communication protocols are used to enable load shifting capabilities for EVs and EVSE? What is the implementation status of these communication protocols? Are industry-wide standard communications and control protocols currently in use or planned? Are there remaining gaps to enabling load shifting capabilities?
Response:
    - Full implementation OCPP 1.6J/OCPP 2.0.1
    - Industry wide standard is OCPP 1.6J. Network Certification by the OCA determines it's complete language capability. Gaps in the industry include a lack of certification of OCPP from the hardware itself. It is up to the OEM to verify the full software scope

14. Does data exist on the effect of bidirectional charging on EV battery life? How is battery capacity affected by the frequency and level of bidirectional charging (for example, power level, total energy discharge, and so on)? Does this affect the warranties or insurance of the EV owner? If so, can the loss in value, if any, be quantified over the life of the battery?
Response: Bidirectional charging impacts EV battery life through added cycles, discharge depth, and power levels, potentially accelerating degradation. Effects depend on battery management, use cases, and

frequency. Some manufacturers limit warranties for extensive use, while insurance policies remain unaffected. Value loss is minimal but varies, requiring detailed modeling for precise quantification. Overall, demand response and current curtailing efforts present a better solution.

15. Can a load shift program work with EVSEs/EVs responding to generic signals, or must signals be tailored for each EVSE/EV?
    Response:
    Load shift programs as long as the two-way communication is capable of OCPP and Open ADR

16. What data or information is needed from the EV and/or EVSE to enable load shift while ensuring driver mobility and range needs are not compromised (for example, kWh needed by the vehicle)? How could this data or information be communicated across all vehicle and supply equipment models, regardless of the manufacturers' involvement?
    Response:
    - Standard communication protocols:
        - ISO15118/PnC
        - OCPP 1.6J/2.0.1
        - OpenADR

17. What is the energy consumption impact from adding flexible demand capability to existing EVSE?
    Response: Overall energy consumption does not necessarily increase; rather, it becomes more efficient and sustainable. Flexible demand adjusts the timing of energy usage, aligning EV charging with grid requirements, renewable energy availability, and cost optimization. Effective management and smart systems are crucial to avoid demand peaks.

18. Please discuss strategies for EVSE to best utilize the CEC's Market Informed Demand Automation Server (MIDAS) which provides access to utilities' time- varying rates, GHG emission signals, and California Independent System Operator (California ISO) Flex Alerts? More detail can be found here: Market Informed Demand Automation Server (MIDAS) (ca.gov).
    Response: EVSE operators can leverage the CEC's Market Informed Demand Automation Server (MIDAS) to optimize charging by integrating time-varying rates, reducing GHG emissions, and responding to California ISO Flex Alerts. Strategies include dynamic pricing, scheduling based on emission signals, enabling demand response, and enhancing user communication. Standardized communication protocols (e.g., OCPP, ISO 15118), cybersecurity measures, and

participation in demand response programs ensure seamless integration, grid reliability, cost efficiency, and support California's environmental goals.

19. What are the cybersecurity challenges and needs associated with communicating signals from the grid, or a third-party, to accomplish supplying energy to electric vehicles?

    Response:
    - Privacy Risks during data transfer for both systems. Ensuring SOC2 and PCI compliance on the network as well as the third-party syste to prevent malware and unauthorized access
    - Real-Time Sync: network issues that may stop signal communication
    - Appropriate Standards: ISO15118, PnC, must ensure hardware+software+thirdparty operator have validated all functionalities

20. Are there any considerations to ensure equity when developing a load shifting strategy for supplying energy to electric vehicles? For example, are there concerns that flexible demand will be disproportionately accessible based on income level?

    Response:
    - Ensuring the same EV Charging Hardware in installations for all owners
    - Configuring load management so that each hardware has the same minimum and maximum load thresholds
    - Consideration: Electric Vehicles vary in battery sizes, and the larger the battery size comes with a higher cost. In more expensive cars, we can expect the car to be able to charge at a higher rating than a smaller car. For example, a Nissan LEAF can charge at 32A maximum, even if it was on a 48A L2 Charger. In this case, a more expensive car will be able to receive the 48A of the hardware rating.