July 1, 2024

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RE: Comments on BSC 03/24 and HCD 04/24 proposals to amend the 2025 edition of the California Green Building Standards Code, Part 11, Title 24

Thank you for the opportunity to comment on proposed code changes to amend the 2025 edition of the California Green Building Standards Code, Part 11, Title 24 (CALGreen) submitted by California's Buildings Standards Commission (BSC) and Department of Housing and Community Development (HCD), BSC 03/24 and HCD 04/24.

ChargePoint and SWTCH applaud BSC and HCD for proposing changes to CALGreen that will advance EV charging access in multifamily dwellings (MFD) by requiring every dwelling unit with a parking space to have at least one space with EV charging infrastructure.

However, we are deeply concerned by several elements of the proposals that will unnecessarily increase the cost of construction and thereby impact housing affordability, while also increasing strain on the utility grid and negatively impacting utility ratepayers and the EV drivers that will live in these buildings. We have previously expressed many of these concerns to BSC and HCD as part of our comments on the Draft Initial Express Terms for CALGreen. We are raising them again here with hopes they will be considered.

Notably, we believe the proposed code changes should be updated to:

- Eliminate the mandates that EV charging spaces have dedicated circuits and be directly connected to a dwelling unit's electrical panel or meter;
- Allow EV circuits to terminate in junction boxes rather than only receptacles, especially for hotels/motels; and
- Reduce the provisions for on-site distribution transformer capacity.

Moreover, instead of the proposed changes, **we believe the EV charging infrastructure requirements in the 2024 International Energy Conservation Code Appendix will best meet California's public policy objectives. We encourage consideration of adopting this best-practice language in CALGreen.**

Finally, we urge BSC to revisit language regarding J1772 and J3400 connector standards in the next triennial code cycle.

Background

About ChargePoint
Since 2007, ChargePoint has been committed to making it easy for businesses and drivers to go electric with one of the largest electric vehicle (EV) charging networks and a comprehensive portfolio of charging solutions. ChargePoint's cloud subscription platform and software defined charging hardware is designed internally and includes options for every charging scenario from home and multifamily to workplace, parking, hospitality, retail, corridor, and fleets of all kinds. ChargePoint's primary business model is to sell our integrated charging software and hardware solutions directly to site hosts and provide services that enable them to provide charging services that align with their specific needs.

About SWTCH
SWTCH is a leading provider of electric vehicle (EV) charging and energy management solutions for multifamily, commercial, and workplace properties in California and across North America. Our end-to-end solution optimizes EV charging usage and manages load to benefit drivers, property owners, and the grid. SWTCH has deployed more than 15,000 chargers, with a strong focus on equitable access. SWTCH's charging management platform is built upon a foundation of open communication standards and interoperability to prevent stranded assets and to ensure future flexibility, scalability, and innovation.

About Automatic Load Management Systems (ALMS) / Energy Management Systems (EMS)

EV energy management systems (EMS) monitor and control EV supply equipment (EVSE). EV EMS are referred to as "automatic load management system[s]" (ALMS) in section 625.42 of the 2020 NFPA 70 National Electrical Code (2020 NEC), and the 2022 CALGreen refers to ALMS. However, the 2023 NEC instead references EMS.

EV EMS encompass different electrical configuration and control schemes, including:[1]

Load Sharing: Sharing one branch circuit between multiple EVSE, and/or overloading an electrical panel with multiple EVSE, with an EV EMS that controls each EVSE such that the total circuit capacity is not exceeded. Figure 1 illustrates load sharing across a branch circuit. Many commercially available EV charging management systems and EVSE are capable of load sharing at the branch circuit and/or panel level.

[1] For a detailed summary of various EV EMS configurations and control schemes, see CSA Group. 2019. *Electric Vehicle Energy Management Systems.* https://www.csagroup.org/wp-content/uploads/CSA-RR_ElectricVehicle_WebRes.pdf

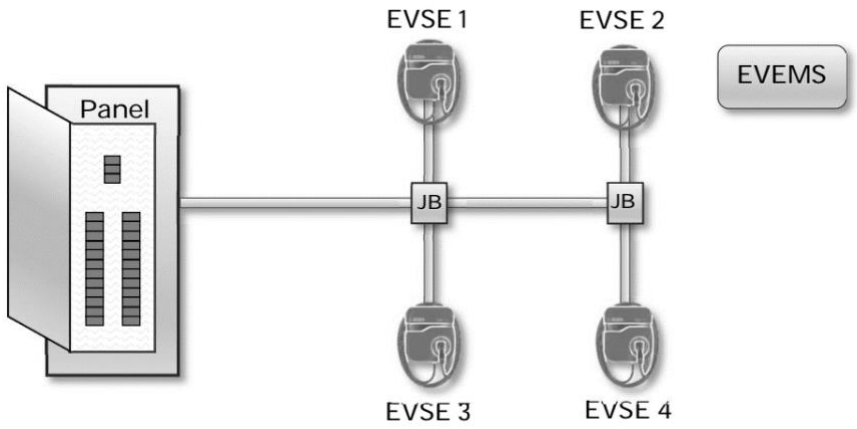


Figure 1: Load sharing across a branch circuit. Source: AES Engineering.

Service/Feeder Monitoring: An EV EMS monitors the load on the service or feeder supplying the EVSE and other loads, and controls EVSE loads so that they do not exceed the capacity of the service or feeder. There are commercial feeder monitoring products appropriate for use in e.g. single family homes or small apartments (see Figure 2 for schematic). There are also a few commercial products applicable to all multifamily apartments (see Figure 3).

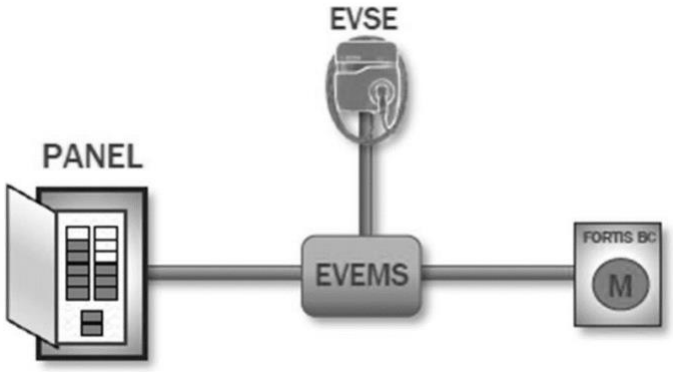


Figure 2: Feeder monitoring. Source: AES Engineering.

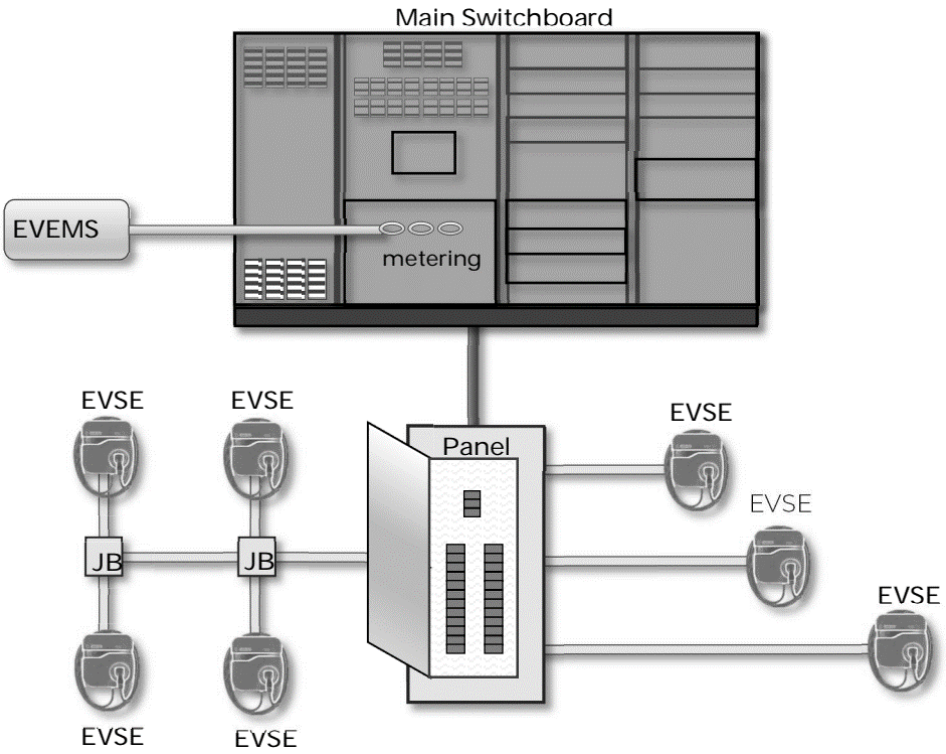
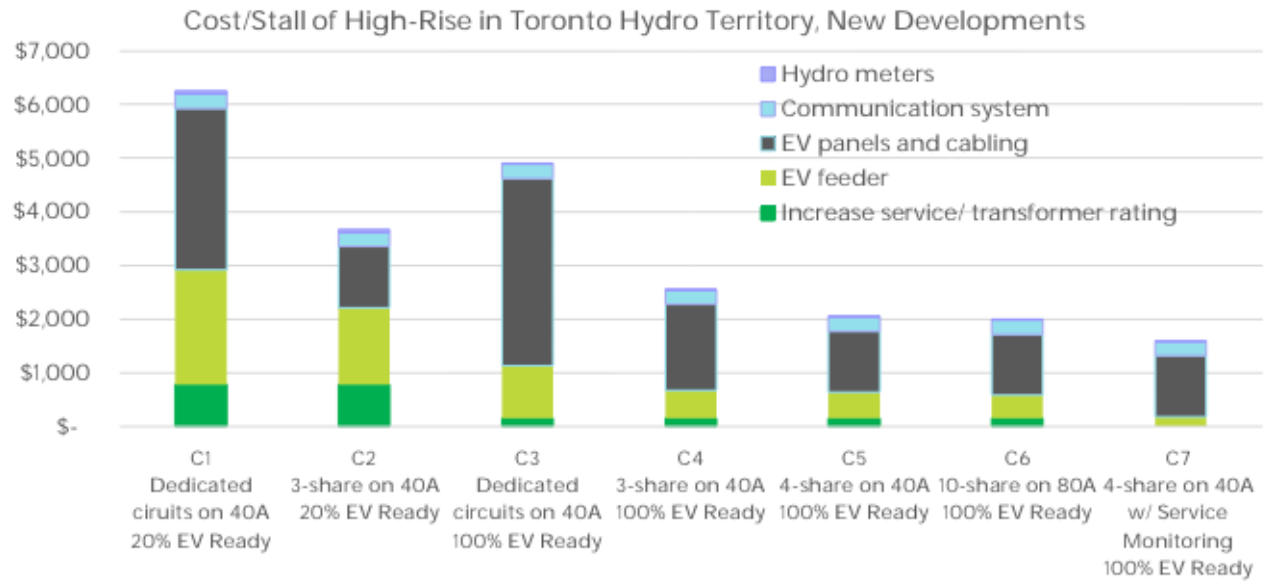


Figure 3: Service monitoring EV EMS. Source: AES Engineering

If EVSE are not controlled by an EMS, they must be treated as a continuous load with limited or no derating factors. Especially in multifamily buildings, this can substantially increase the electrical capacity that must be provided for EV charging, resulting in substantial costs in new and existing buildings. However, designing for use of EV EMS can substantially reduce this capacity and associated costs. Moreover, by load sharing between branch circuits and panels, EV EMS can reduce the amount of electrical infrastructure that must be deployed, again reducing costs. Finally, in smaller buildings (e.g. single family homes), use of EV EMS can avoid panel/service upgrades and associated costs.

Figure 4 below illustrates the cost savings that can be realized by designing for use of EV EMS in buildings with significant amounts of EV charging. It summarizes results from a 2021 study by AES Engineering of the cost to make all (100%) of parking in a new multifamily family high-rise "EV Ready" (EV Ready in this case defined as an adjacent junction box or receptacle).[2] Figure 4 demonstrates that implementing dedicated circuits will be significantly more expensive to construct than reasonable levels of load-sharing across branch circuits (e.g. 3-share or 4-share on 40A branch circuits).

[2] https://council.cleanairpartnership.org/wp-content/uploads/2021/10/2-21-050-GTHA-EV-Ready-Costing-Study-2021.10.14.pdf



HCD Recommendations

Below, we note key elements of the HCD 04/24 proposal that should be revised for inclusion in CALGreen.

Eliminate the mandates that EV charging spaces have dedicated circuits and be directly connected to a dwelling unit's electrical panel or meter. Requiring dedicated circuits will result in significantly greater costs for new construction, as noted above. Requiring dedicated circuits for each EV parking space precludes the use of power sharing at chargers serving dedicated parking spaces. Power sharing is possible only with shared branch circuits that allow a load management system to allocate the appropriate amount of power to each space. Power sharing is a strategy to serve more EV spaces at least cost by reducing the size of upstream infrastructure – the on-site panel and transformer – without affecting the drivers' ability to receive the charge they need. We are concerned that the requirement for dedicated circuits will unintentionally increase the cost of multifamily housing construction in California.

Furthermore, requiring wiring directly from a dwelling unit's panel or meter in all buildings will further increase costs by a significantly greater amount. While this is a reasonable solution in some buildings where the meters are close to parking, and may be technically possible in many multifamily buildings, it would be exceedingly expensive in many buildings (e.g. many thousands of dollars per parking space), particularly if the meters are located on upper floors or otherwise not proximate to parking. The proposed amendments seem to anticipate this cost challenge, noting they will apply "unless determined as infeasible by the project builder or designer and subject to concurrence of the local enforcing agency." However, this provision will inevitably lead to a lack of clarity and

uncertainty regarding what level of additional expense should be deemed "infeasible" by the local enforcing agency.

Allow EV circuits to terminate in junction boxes rather than only receptacles for hotels and motels. The current proposal amends 4.106.4.2.6(1)(a) to specify that:

> "**Hotels and Motels.** Forty (40) percent of the total number of parking spaces shall be equipped with low power Level 2 EV charging receptacles."

Requiring receptacles precludes use of load sharing across branch circuits. Termination in a junction box should be allowed especially for newly constructed parking facilities serving hotels and motels, as the Code Advisory Committee (CAC) recommended in response to public comment submitted by ChargePoint, SWTCH, and other stakeholders. However, HCD declined to accept the CAC's recommendation in the Initial Statement of Reasons (ISOR):

> "It is also unclear how the termination of conductors in a junction box, in lieu of an actual EV charging receptacles or chargers, would allow for EV charging or how it will harmonize with all other associated perceptive provisions in CALGreen, chapter 4. This also negates the purpose of CALGreen Section 4.106.4.2.6(1)(b), intended to standardize the receptacles so EV users can have confidence in the needed cord set or adapter when charging in a newly constructed parking facilities serving hotels and motels."

It seems that HCD is opting for a "one size fits all" approach to code language across residential and hotel/motel properties. We are very concerned with this strategy. Hotels and motels, while governed by the residential building code, are not a typical residential charging use case. Charging services at hotels and motels are commercial services, akin to the charging offered at convenience stores, shopping areas, and entertainment venues. By prioritizing "harmonizing" code language, this code proposal squeezes hotels and motels into EV Ready requirements that other stakeholders intend to apply to the multifamily use case. The unintended impacts of doing so will increase costs for hotels and motels and fail to serve the best interests of EV drivers.

> <u>The code proposal will unintentionally and negatively disrupt the business case for EV charging at hotels and motels.</u>

Hotels and motels are businesses that offer charging services for the same reason they may offer a gym, pool, or free breakfast – as an amenity to attract guests. As EV adoption increases, our companies' experience in the market indicates EV charging will be an essential offering for hotels and motels to compete with other lodgings and accommodate long distance travelers driving EVs. EV drivers using charging services at a hotel or motel will generally be guests or visitors of the hotel, expect to pay for the fuel they consume, and typically don't carry their own charging equipment.

The code language would require parking facilities at new hotels and motels to either install chargers directly or install receptacles for a certain number of EV Ready spaces. While

ChargePoint and SWTCH strongly support increasing requirements for EV Readiness for new construction, we are concerned that the requirement to either install a charger or install or receptacle will contribute a significant cost and/or create a business dilemma for many new hotels and motels. This is an issue that could be resolved with code language that allows termination of EV ready spots in a junction box.

Our companies support EV Ready codes because they eliminate the friction associated with adding more chargers over time, which can be a significant barrier to charger deployment for a business. Even so, at this early stage of EV adoption, a hotel may only need a few charging stations to meet customer demand, as not every hotel guest uses charging. Hotels often rely on networked chargers to track charging usage, manage load, and process payments. This technology allows hotels to manage the charging services on their property, and each additional charger adds operational cost. We generally advise customers to use a stepwise approach, adding chargers as utilization of existing chargers increases, to cost-effectively scale charging services.

We do not expect hotels/motels to install EV chargers at every EV Ready spot upfront, as this would be costly and likely unnecessary to accommodate driver needs. Under Item 3 of the 45-day express terms, the only alternative to comply with EV Ready requirements would be to install a receptacle. This option would cost less than installing a charger but presents its own issues to the hotel's business:

1. A receptacle is essentially free electricity. If any visitor can pull up and plug in their cordset, the hotel has no or very limited ability to track usage, bill users, or manage overall energy costs. This dynamic would undermine the business of offering chargers at the hotel, especially if the hotel already offers charging with a per-kilowatt-hour fee to recoup costs.
2. It is not guaranteed that receptacles will be used solely for EV charging. Anyone with access to the receptacle could plug in an RV, backup generator, or another high-power appliance. These are not appropriate uses of the receptacle and would put the hotel in the position of monitoring for improper usage.
3. As noted earlier, receptacles preclude load sharing across branch circuits. That means a hotel interested in installing chargers capable of load management a few years after initial construction would have to rip out the receptacles to hardwire chargers capable of load sharing. This would result in a waste of financial resources and time.

   <u>The code proposal will not improve driver access to EV charging and will diminish the driver experience.</u>

HCD justifies its code language because it is intended to give drivers "confidence in the needed cord set" when charging at a hotel or motel. However, this claim is predicated on a false premise— that drivers travel with their own cord sets when staying at hotels and motels. While EV drivers may rely on their own charging equipment at home, it typically stays plugged in at home. The norm for public or shared private charging services in North America (such as those offered at hotels) is to offer a station with cables. Drivers today

typically do not expect to carry a portable charging cable with them to use charging services on-the-go, especially when traveling and using a hotel as lodging. This means the presence of a receptacle at a hotel/motel does not actually increase driver confidence that charging will be available when they need it. Presuming that the presence of receptacles at hotels and motels increases charger access indicates a fundamental misunderstanding of EV driver behavior and the way charging services are offered today. Given current driver expectations and charging norms in California, the "bring your own cable" style of public charging at hotels and motels is not in the best interest of drivers and should not be forced to fruition with this code language.

ChargePoint and SWTCH greatly appreciate HCD's commitment to increase charger access at hotels and motels in California by increasing the percentage of spaces required to be EV Ready. However, the receptacle language as proposed will have many unintended impacts on the business of charging services at hotels and motels without meaningfully improving driver access to charging. Hotels and motels must have the optionality to use junction boxes for placeholders for future EV charging spots, and we urge HCD to amend its proposal according to the CAC's recommendation.

Reduce the provisions for on-site distribution transformer capacity. The current proposal amends 4.106.4.2.2(2)(c) to specify that:

> "An automatic load management system (ALMS) may be used to reduce the maximum required electrical capacity to each space served by the ALMS. The electrical system and any on-site distribution transformers shall have sufficient capacity to deliver at least 3.3 kW simultaneously to each EV charging station (EVCS) served by the ALMS."

This 3.3kW value is too high – very roughly, it might increase the average nominal capacity of new multifamily buildings by approximately 50%. This can have very significant and costly implications for new multifamily developments' electrical services from distribution utilities, with associated negative impacts on constructability and affordability of housing.

It would be far better to not specify any minimum additional capacity requirement for distribution transformers. This will allow for the use of service monitoring EV EMS to be deployed when increasing multifamily buildings' utility service sizes would result in high costs.

Instead, a better alternative approach would be to specify limits on branch circuit and branch panel sharing - e.g. no more than 3-share or 4-share on a 40A branch circuit. This allows for the cost savings and energy management benefits associated with dynamically managing charging. This can be achieved using language found in the 2024 IECC Appendix:

> "The capacity of each branch circuit serving multiple EVSE spaces and EV ready spaces … spaces designed to be controlled by an energy management system providing load management in accordance with NFPA 70, shall comply with the following:

1. Have a nameplate capacity of 6.2 kVA per space.
2. Where an EVSE serves three or more EVSE spaces and is controlled by an energy management system in accordance with Section R404.7.5, the nameplate charging capacity shall be not less than 2.1 kVA per EVSE space served.

See Appendix B for the 2024 IECC language.

Adopt the provisions in the 2024 IECC Appendix. We suggest that rather than continuing with incremental amendments to the structure of CALGreen, adoption of the EV charging infrastructure requirements in the 2024 IECC Appendix should be considered. These requirements were developed through a consensus-based process with expert input. They notably do not entail the short-comings documented above with the current code language and proposed amendments. The 2024 IECC requirements should result in significantly lower average costs of new construction, and associated lesser impacts on housing affordability.

Likewise, it will likely allow for inherently less "peaky" EV charging electrical systems than the proposed CALGreen amendments, and associated lesser impacts on the electrical grid and electrical rate affordability. The 2024 IECC language can still achieve 100% EV Ready futureproofing for new construction and will best enable the transition of California's passenger vehicle fleet to EVs in the coming two decades. Please reference Appendix A and Appendix B submitted alongside these comments for the commercial and residential code language, respectively, from the 2024 IECC Appendix.

Codify Level 2 chargers as eligible in place of low-power Level 2 chargers. HCD Items 2, 4, and 7 allow sites to install low-power Level 2 chargers, however, the code does not explicitly state that standard Level 2 chargers can be installed in place of lower powered chargers. Jurisdictions or other stakeholders may not interpret the code as allowing Level 2 chargers to substitute for low-power Level 2. For this reason, ChargePoint and SWTCH maintain that BSC and HCD should state Level 2 chargers can substitute low-power Level 2 throughout the code. This clarity will increase customer awareness of product optionality, resulting in optimized charger selection based on site needs.

BSC Recommendations

Revisit requirements regarding J3400 and J1772 connector types in the next code cycle. BSC 45-day Express Terms Items 4-2 and 6-2 set the expectation for EV charging connectors to be standardized using the following language:

> "When using level 2 SAE J3400 SAE connectors, supplied by a 480 V 3-phase service, at least 20 percent of the EV charger connectors shall be SAE J1772 with a maximum output 240 Volts AC."

It is our understanding that the intent of this language is to prevent compatibility issues associated with the difference in operating voltages between the two connector standards,

as there is a concern that new construction that is built to supply 480 V 3-phase service for J3400 could potentially preclude the use of the J1772 port type. The J3400 connector type has not yet completed the standardization process. While we understand the desire to avoid a compatibility issue for drivers of J1772 vehicles, we have concerns with the CALGreen process getting ahead of the J3400 standardization process. We are also concerned that this language establishes an arbitrary percentage of ports that must offer J1772 connectors, a target that is likely to require revision over time to accommodate the changing proportions of vehicle port types in California's EV stock. We strongly recommend BSC review and revisit this language in the next triennial code cycle to better balance the goals of allowing new construction to take advantage of 480 V 3-phase service to reduce costs, ensuring interoperability, and allowing site hosts to select the right proportion of connector types that best suits the needs of EV drivers.

Conclusion

ChargePoint and SWTCH greatly appreciate the opportunity to submit comments on HCD's and BSC's 45-day express terms for the 2025 CALGreen code cycle. Please do not hesitate to reach out with any questions.

Respectfully Submitted,

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