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Building Standards Commissioners
Department of Housing and Community Development Staff
California Building Standards Commission
Attention: Public Comments
2525 Natomas Park Drive, Suite 130
Sacramento, CA 95833
Via Email: cbsc@dgs.ca.gov

Re: STA Comments on NOPA and ISOR for 2022 CALGreen Intervening Code Cycle

Commissioners and Staff:

Summary

Sven Thesen & Associates (STA) is writing to express interest in the Housing and Community Development (HCD) upcoming changes to Title 24, Part 11 of the CALGreen intervening code cycle, specifically relating to Electric Vehicle (EV) infrastructure in new multifamily residences. As stated in the Notice of Proposed Action ([NOPA](#)), page 7, "...HCD's proposal includes an optional method of complying with voluntary standards that may result in reduced costs under some conditions." We request HCD clarify, in Item 5 of the Express Terms, that a developer may follow the optional Tier 1 or Tier 2 standards in lieu of the standards included in the mandatory section.

STA highlights that the relevant NOPA and Initial Statement of Reason (ISOR), both dated March 13, 2023, fail to follow Government Code Section 11346.5(a)(13) requirements as to consideration of alternatives, and neglects to consider the economic benefits to EV drivers, state agencies and California these proposed standards. STA also raises questions as to calculations, methodology and base data in NOPA and ISOR supporting data.

Sven Thesen & Associates

Sven Thesen has a degree in chemical engineering and over 35 years of experience in the energy/ environmental space with close to 20 years focusing on electric vehicles and the electric utility nexus. As Senior Consultant with Sven Thesen & Associates, he assists local

and regional governments, private employers, and nonprofits in deploying electric vehicle infrastructure, EV related policy and EV charging infrastructure building codes. He has published numerous papers on estimating emissions, electric vehicle charging and related topics.

While at PG&E, Sven and his team's work on reducing stationary source diesel and gasoline emissions via electrification was awarded the 2006 Governor's Environmental and Economic Leadership Award. His work on sulfur hexafluoride emission estimates from electrical equipment also shares the 2007 Nobel Peace Prize with 2200 other engineers and scientists in support of the IPCC climate guidelines.

This analysis shared in this letter has been completed pro-bono in honor of those who are living in apartments and condominiums with access to parking but not to electric vehicle EV Ready charging infrastructure.

Consideration of Alternatives

Per Government Code Section 11346.5(a)(13), HCD is required to consider and evaluate reasonable alternatives (including a cost-effectiveness analysis).

In the last several years, HCD has received multiple comment letters and presentations regarding CALGreen standards urging universal access to equitable, low-cost EV Ready charging for every newly-built multifamily residential unit that has access to parking. Yet HCD's ISOR and NOPA for the 2022 CALGreen Intervening Code Cycle have failed to consider these universal access proposals.

Environmental, electric vehicle and environmental justice organizations have submitted comment letters, for example the EV Charging for All Coalition's letter dated February 19, 2022, which was signed by over 130 organizations including environmental organizations (e.g. Sierra Club, Acterra, etc.), electric vehicle organizations (Plug In America, Electric Auto Associations, etc.), environmental justice organizations (EarthJustice, GreenLatinos, etc.), religious organizations (Interfaith Power & Light, Green the Church, etc.) as well as by industry groups (CALSTART, EVCA, etc.) and individual corporations (Tesla, Lyft, etc.). Further, the Legislature has become involved and submitted multiple letters, for example their letters dated August 17, 2022 and May 15, 2023 from Senator Becker's office. In addition, both the state Assembly and Senate in 2022 advanced SB 1482 (the EV Charging Equity bill) to the Governor's desk.

Each of these proposals focused on universal, equitable, low-cost EV Ready charging for every newly-built multifamily residential unit that has access to parking. Some trade organizations

requested EV supply equipment (EVSE) or EV chargers over receptacles, as did the California Electrification Coalition (CalETC), made up of primarily utilities but also some automobile manufacturers and EV charging infrastructure providers in their letter dated February 16, 2021. Others, for example, the Alliance for Automotive Innovation in their letter of September 30, 2022, prefer 40 ampere circuitry for charging. However, in all cases, the focus is providing **every unit that had access to a parking space access to some form of EV Ready charging.**

Further, in September 2021, STA completed and submitted a detailed economic and environmental study that found that providing low-power EV Ready charging access to each dwelling unit that has access to parking has the potential to provide significant cost and environmental benefits, including direct cost savings to the residents who will be able to adopt EVs because their dwellings include access to at-home charging.

The above concept has been discussed in detail with HDC in the various stakeholder meetings, working groups, and Code Advisory Committee meetings as well as the most recent California Building Standards Commission hearing.

Further, it appears that HCD did not evaluate the economic benefits of a universal access option in the NOPA or ISOR. All that is included is the estimated environmental benefits and estimated developer cost. Without completing a cost-benefit analysis that includes the resulting health benefits, the greenhouse gas reduction benefits, the avoided retrofit costs, the direct economic benefits accruing to EV-driving MFH residents, and other benefits, the State cannot analyze the benefits of the universal alternative.

STA notes that the consideration of universal-access alternatives analysis may not have been undertaken, given that HCD appears committed to taking an incremental approach to updating the standards for the CALGreen Code, as shown in the following slide from HCD dated October 2022.

HCD's Slide Detailing Their Planned Incremental Regulatory Approach, 2023 to 2030
[Removed since not visually-accessible]

Economic Analysis

STA is concerned that the NOPA and ISOR significantly underestimate the cost savings to residents and to State Agencies from meeting the mandatory and optional compliance standards.

Cost Impacts on Representative Private Person or Business

In this section, HCD appropriately includes the additional costs to the builders as a result of having to install additional EV charging infrastructure. However, HCD fails to acknowledge or address the significant direct cost savings to the residents who are now able to adopt EVs due to the presence of inexpensive, convenient, reliable, safe, at-home charging. STA estimates the cumulative savings over a ten-year period from 2026 to 2035 to be on the low side at approximately \$15M and on the high side at approximately \$45M. Calculations and associated assumptions are included in Appendix 1.

It should be noted that the above savings are on par with or greater than the incremental costs to implement this regulation listed in the ISOR, page 6, Table 1.

Further, because these cost savings are accrued to the EV-driving resident on an individual basis, these savings will likely be spent in ways that support the California economy.

Likewise this section omits the cost savings as a result of improved air quality, greenhouse gas reductions and other environmental and economic benefits for the State as a whole.

Without including these estimates, the NOPA understates the overall benefits of adopting these regulations.

Estimate of Cost or Savings, State, Local Agency or School District

This section of the NOPA inadvertently fails to recognize that there are multiple statewide programs including those by California Air Resources Board (CARB), California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) plus local programs¹, that provide funding to retrofit existing multifamily dwellings.

The proposed increase in the mandatory requirements to 50%² and the conversion of the EV Capable (40 amperes) requirements to EV Ready (minimum of 20 amperes) incrementally reduce the retrofitting burden that the above agencies will need to address. This benefit should be included in the cost/benefit analysis of the NOPA and ISOR.

Using both HCD's ISOR and NOPA documents, based on the mandatory requirement increase from the current requirement (40% of parking) to the proposed 50%, STA calculates the additional State Agencies' savings to be in the range of \$68M to \$203M. These estimated values appear representative given that completing the same retrofitting by an investor-owned utility under a CPUC-approved program yields costs on the order of \$153M. Note,

¹ by community choice energy companies, local utilities, Air Districts and others

² From the current 40% Requirement (40%=10% EV Capable+25% LPL2 EV Ready+5% L2 EVSC) to 50% (50%=40% LPL2 EV Ready+10% L2 EVSC)

these savings only address the avoided retrofitting costs over the 1.5 years that this proposed code is in effect. Calculations and associated assumptions are included in Appendix 1.

Cost Benefit Analysis

In addition to the issues regarding cost savings discussed below, STA is concerned that an appropriate cost-benefit analysis is missing. This would include comparing the economic costs and benefits of HCD's proposal to those of universal access. It would include (but not be limited to) calculating the upfront additional construction cost accrued by the builder and associated ongoing cost savings by the enabled EV driver, the avoided retrofitting costs, health and greenhouse gas reduction benefits, economic benefits, etc. From this, a payback period, plus cost per ton of greenhouse gas reductions and other metrics, can be determined and multiple scenarios compared using the same methodology.

Understanding that this additional analysis is not possible in this intervening code cycle, STA offers to support both HCD and CARB, pro bono, to develop a thorough cost-benefit analysis that includes all relevant costs and benefits for the upcoming triennial cycle.

NOPA, ISOR Supporting Results, Methodology, Data

In a preliminary review of the numbers listed in the NOPA and the ISOR documents, STA has a number of questions and concerns regarding the results (including possible typographical mistakes), the estimation methodology, and the base data. The intent is not to slow the regulatory process but to request in the future a more "collegial" development of the NOPA and ISOR such that these errors could be addressed earlier. STA directly emailed HCD staff with a number of these issues earlier during the 45-day comment period and was directed to submit them as part of the 45-day comment period. Here are some example concerns:

1a) ***Calculation or Typographical Mistake:*** In the ISOR, Table 1, in the second column titled "# Spaces added (+) or subtracted (-)" might the listed 5,093 increase in EVSE be a calculation error or typographical mistake? This value is intended to show how many EVSEs would be added if CALGreen includes an increase of 5% in the number of EVSE stations required. The amount of 5,094 would imply there are 101,880 total parking spaces ($5,093/5\% = 101,880$). However, Table 1, second column, notes that 8,742 spaces will be impacted by removing the EV Capable requirement. The EV Capable requirement is 10% of the total number of parking spaces. This indicates there are 87,420 total parking spaces ($8,742/10\% = 87,420$). That same column indicates that there will be an increase in EV Ready by 13,113 spaces from a 15% increase of the total number of parking spaces which likewise indicates there are 87,420 total parking spaces ($13,113/15\% = 87,420$). This 87,420

number is also calculated from data on page 8 which notes that 34,968 is 40% of the total parking spaces (34,968/40%= 87,420).

1b) **Calculation or Typographical Mistake?:** On page 5 of the NOPA, FINDING OF NECESSITY FOR THE PUBLIC'S HEALTH, SAFETY, OR WELFARE: it states: “CARB has estimated an annual greenhouse gas emissions reduction of 194,000 to 246,000 metric tons of CO2 equivalent in newly constructed multifamily dwellings. In newly constructed hotels and motels, CARB staff estimates an annual greenhouse gas reduction of 57,000 to 90,000 metric tons of CO2 equivalent...” This is compared to Tables 1 and 2 in the ISOR that likewise list CO2 reductions. As noted in Table 1 below, the numbers listed in the ISOR do not match the above numbers contained in the NOPA, even when taking into account that the NOPA details annual values and the ISOR 1.5 year code cycle values.

Table 1: Discrepancies in GHG Emission Reductions in the NOPA & ISOR Documents

Document	Multifamily, GHG Emission Reductions, Metric Tons CO2	Hotels & Motels, GHG Emission Reductions, Metric Tons CO2
NOPA, pp. 5-6 (annual)	194,000 - 246,000	57,000 - 90,000
ISOR, pp. 6-7 (1.5 year code cycle)	99,000 - 124,500	25,500 - 43,500

1c) **Results/ Typographical Mistakes:** On page 5 of the NOPA, INITIAL DETERMINATION OF NO SIGNIFICANT STATEWIDE ADVERSE ECONOMIC IMPACT ON BUSINESSES, it states: “HCD has determined that these proposed amendments would marginally increase costs to California business enterprises, representing 0.33 percent to 1.40 percent of the total new construction costs of multifamily dwellings and hotels and motels” and likewise on pages 6 and 7, ESTIMATED COST OF COMPLIANCE OF STANDARDS THAT WOULD IMPACT HOUSING: “The additional cost for installing more low-power Level 2 charging receptacles and Level 2 EVSE is 0.44 percent to 1.58 percent of the total construction costs for hotels, motels and multi-unit dwellings..”

STA requests clarification of the above values listed in the NOPA and ISOR addressing the percentage of construction costs, multifamily dwellings, hotels & motels. Table 2, below, details these discrepancies.

Table 2: Discrepancies in Percentage of Construction Costs, Multifamily Dwellings; Hotels & Motels in the NOPA

Document	Percentage of construction costs, multi-unit dwellings; Hotels & Motels
NOPA, p. 5	0.33 percent to 1.40 percent
NOPA, pp. 5-6	0.44 percent to 1.58 percent

2a) **Estimation Methodology:** STA is concerned that the methodology used to estimate both the Statewide benefits (\$M) and the GHG emission reductions (metric tonnes CO₂) may be in error. For example, again from the ISOR Table 1, given that the increase in EVSE chargers is 5% and the increase in EV Ready is 15% (three times more), this would typically indicate that the associated benefits and emission reductions for EV Ready would be on the order of three times that listed for the EVSE, yet this is not what the ISOR estimate shows. There could be other rationales for this such as the EVSE are shared (which would generate more economic and environmental benefits) but without knowing the estimation methodology, this is impossible to discern.

2b) **Estimation Methodology:** STA requests the calculation methodology for the values listed in the NOPA page 7 addressing the estimated retrofit costs over the 18-month period of \$84.6 million to \$101.2 million and the associated sentence noting that the “retrofit cost is approximately three to six times larger than the construction cost.” Given that the low-end range of the overall construction cost is noted as \$22.4M and the low-end retrofit cost multiplier is 3, this yields a value of \$67.2 million, and respectively for the high-end, \$40.4M multiplied by 6 yields \$242.4 million. There could be other rationales for this such as retrofits at scale but without knowing the estimation methodology, this is impossible to discern.

3) **Base Data:** Based on the low purchase cost of the EVSE listed in the ISOR, STA is concerned that these EVSE are not representative of the types of EVSE that would be installed in common or shared spaces in multifamily housing. Specifically, in the ISOR, the listed average purchase costs for Level 2 EV charger (EVSE) range \$1,597.80 to \$2,054.89 from page 13. This is an average of \$1,826. Compare this to PG&E’s Charge Now program where 4,827 EVSE were installed in multifamily housing and the workplace with an average EVSE purchase cost of \$2,413, which is 32% higher than the average of \$1,597 listed in the ISOR. https://www.pge.com/pge_global/common/pdfs/solar-and-vehicles/your-options/clean-vehicles/charging-stations/program-participants/EV-Charge-Network-2021-Q4-Report.pdf

Conclusion

In closing, thank you for considering STA's comments. Please do not hesitate to contact Sven Thesen at SvenThesen@gmail.com to discuss any of the above. STA looks forward to being of further assistance in the ongoing regulatory process and welcomes the opportunity to work with HCD to update its cost benefit analysis.

Cordially,
Sven Thesen
Senior Consultant, STA

See Appendices 1 and 2 below

APPENDIX 1

COST SAVINGS BY EV USERS OVER INTERNAL COMBUSTION ENGINE VEHICLES

Likely both the CEC and CARB have multivariable models that integrate EV adoption rates by income, housing status (single-family versus multifamily housing) vehicle class/cost, new and used EV adoption rates, projected electricity and gasoline/diesel use and prices, maintenance, insurance, annual mileage and much more to estimate the annualized total cost savings per California EV driver.

However, the following is a very simplistic model. It uses PG&E's EV Cost Savings Model to determine the cost savings (a Hyundai Kona Battery Electric for the low side and Tesla Model Y and Chevrolet Bolt for the high side) and then integrates both EV adoption and car replacement rates over the next ten years for the impacted parking spaces at multifamily housing to calculate both the annual and cumulative savings.

[Graphics removed since not visually-accessible]

APPENDIX 2

AVOIDED AGENCY COSTS FROM PROPOSED REGULATION

This screenshot shows calculations involved to determine avoided Agency costs based on the number of impacted parking spaces multiplied by the cost to retrofit per space.

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