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NRDC et al Comments on 45-Day Language

Additional submitted attachment is included below.

May 9, 2024

California Energy Commission
Re: Docket No. 24-BSTD-01
715 P Street
Sacramento, CA 95814
docket@energy.ca.gov

Re: Comments on 2025 Building Energy Efficiency Standards, Express Terms, 45-Day Language

Dear Commissioners and CEC Staff,

The Natural Resources Defense Council (NRDC), Earthjustice, Rewiring America, Sierra Club, and Peninsula Clean Energy Authority submit the following comments on the California Energy Commission's (CEC) 45-Day Language Express Terms for the 2025 Title 24 Building Energy Efficiency Standards ("2025 Building Code") published March 28, 2024.[1] We appreciate the CEC's work in developing the 45-Day Language for the 2025 Building Code. The Building Code is instrumental in decarbonizing buildings throughout the state and helping achieve California's climate and air quality objectives.

We strongly support critical advances to the Building Code in the 45-Day Language that further building electrification, including expanded heat pump baselines for residential and non-

[1] CEC, 2025 Building Energy Efficiency Standards, Title 24 Parts 1 and 6, 45-day Language ("45-Day Language") (Mar. 28, 2024), https://efiling.energy.ca.gov/GetDocument.aspx?tn=255315-2&DocumentContentId=90996.

residential new construction and provisions that strongly encourage replacement of single-zone packaged rooftop units ("RTUs") used in commercial buildings with heat pumps. These and other energy efficiency and electric-ready updates will save Californians money, increase comfort, and reduce the state's dependency on fossil fuels.

However, with California falling behind on meeting its climate goals, it is incumbent on the CEC to maximize the emission reductions achievable under the Building Code. Rather than do so, the 45-Day Language eliminates key provisions contained in an earlier draft that would have substantially accelerated heat pump deployment and the corresponding climate, air quality, and public health benefits. These provisions included requirements for replacement of existing central air conditioning ("A/C") units in residential buildings with heat pumps and use of solar and heat pumps for pool heating in existing non-residential and multi-family buildings. Indeed, the 45-Day Language does not even contain provisions to encourage the installation of heat pumps in major alterations where the full A/C system and ductwork are being replaced. We urge the CEC to restore these important measures as it moves to 15-Day Language.

Detailed Comments and Recommended Improvements to the Proposed 2025 Building Code

1) ***Residential HVAC Additions and Alterations:*** **New and full replacement air conditioning systems as part of additions and major alterations to existing buildings should be required to be heat pumps under the prescriptive path.**

The Draft Express Terms included provisions that would have strongly encouraged replacement residential air conditioners to be heat pumps at the time of equipment changeout as well as for new systems serving additions.[2] The 45-Day Language now only proposes that systems serving additions be required to be heat pumps when using the prescriptive path.[3] While we strongly support the application of the provision to additions, the 45-Day Language misses a major opportunity to encourage the installation of heat pumps cost-effectively in alterations and in particular in major renovations, where both the air-conditioning equipment and duct system are being replaced.

At a minimum, the CEC should include a prescriptive heat pump requirement in the 15-Day Language for major alterations where both the full HVAC system and ductwork are being replaced or newly installed as part of an alteration that triggers Section 150.2(b)(1)(C).[4] This section applies to "entirely new or complete replacement space-conditioning systems" that include both new or replacement space-conditioning equipment and an "entirely new or

[2] CEC, 2025 Draft Energy Code Express Terms ("Draft Express Terms") § 150.2(a) at PDF p.435, § 150.2(b)(1)(F)(ii) at PDF p.440, (Nov. 3, 2023), https://efiling.energy.ca.gov/GetDocument.aspx?tn=252915&DocumentContentId=88051.
[3] 45-Day Language § 150.2(a) at p.488.
[4] 45-Day Language § 150.2(b)(1)(C) at p.494.

replacement duct system."[5] This type of comprehensive installation project is a major upgrade and represents a significant opportunity to switch to a heat pump for a minimal incremental cost that is a small percentage of the total project cost. These incremental costs will be even smaller than those estimated by the CEC in most cases, as consumers will likely choose to install tax-incentive eligible heat pumps. The existing federal tax-incentives more than cover the incremental equipment cost compared to a minimum efficiency unit, and additional rebates and programs are also available in California. A recent RMI analysis found that after the tax incentive was taken into account, a high efficiency heat pump would be between $100 cheaper and $900 more than a standard efficiency air conditioner.[6] While the Building Code can only set standards based on minimum efficiency equipment, in considering what the likely cost impacts will be on homeowners, the CEC should assume homeowners will follow the lowest cost path, which in this case is a high efficiency heat pump that is tax credit eligible and will lead to even greater operational savings over time.

Moreover, major alterations subject to Section 150.2(b)(1)(C) are also already subject to significant additional code requirements compared to equipment replacements alone, because of the major opportunity they represent, including duct insulation per Table 150.2-D[7] and ceiling insulation per 150.2(b)(1)(J). These insulation requirements further reduce any incremental costs of heat pump deployment as a percent of total project costs and reduce operational costs by reducing the home's heating load. Accordingly, the CEC should require that air conditioners installed in entirely new or complete replacement systems under Section 150.2(b)(1)(C) be heat pumps under the prescriptive path and revise Section 150.2(b)(1)(C) as follows (edits in red):

> Entirely new or complete replacement space-conditioning systems installed as part of an alteration, shall include all the system heating or cooling equipment, including but not limited to: condensing unit cooling or heating coil, and air handler for split systems; or complete replacement of a packaged unit; plus entirely new or replacement duct system (Section 150.2(b)1Diia). Entirely new or complete replacement space-conditioning systems shall meet the requirements of Sections 150.0(h), 150.0(i), 150.0(j)1, 150.0(j)2, 150.0(m)1 through 150.0(m)10; 150.0(m)12; 150.0(m)13, 150.1(c)6, 150.1(c)7, 150.2(b)1Fii, 150.2(b)1G, and TABLE 150.2-~~A~~D.
>
> Exception 1 to Section 150.2(b)1C: Compliance with Section 150.1(c)6 is not required if the addition of the heat pump exceeds the existing main service panel capacity according to the requirements of California Electrical Code Article 220.83 or 220.87. Documentation of electrical load calculations in accordance with Article 220 must be

[5] *Id.*

[6] RMI's analysis compared wholesale price data of 88 standard efficiency A/C units gathered from various wholesaler websites with 65 IRA eligible heat pumps at varying system capacities levels. The underlying data and results of this analysis are available at https://bit.ly/HeatPumpAnalysis

[7] This table reference needs to be updated from Table 150.2-A to 150.2-D due to table renumbering in the 45-Day Language.

submitted to the Authority Having Jurisdiction for both the heat pump and proposed air conditioner.

Exception 2 to Section 150.2(b)1Fii: Compliance with Section 150.1(c)6 is not required if the addition of the heat pump would result in the selection of equipment that exceeds the existing cooling load by 12,000 Btu/h or more. Documentation of heating load calculations in accordance with 150.0(h).

Additionally, the CEC should require that entirely new or full replacement duct systems[8] installed in alterations be sized to accommodate heat pump air delivery temperatures, regardless of whether a heat pump is installed. Since the recommendations above would still allow for the installation of an air-conditioner and furnace, this recommendation is important to future proof all new duct systems installed today to ensure that they are designed for a future heat pump retrofit. This will ensure that all future furnace replacements can easily accommodate a heat pump without costly duct system upgrades. Specifically, we recommend modifying the airflow requirement in 150.0(m)(13)(B) from the current value of 350 CFM/ton to 400 CFM/ton. This change will help ensure that newly installed ductwork is adequately sized for future heat pump installation, preventing the uncommon but significant cost of fully replacing the duct system when a heat pump is installed in the future.

If the CEC determines that the reference to Section 150.1(c)6 in Section 150.2(b)(1)(C) is not feasible, at a minimum the CEC should require entirely new or replacement systems to meet the heat pump space heater ready requirements of Section 160.9. These should be replicated in Section 150.2(b)(1)(C) as follows:

Systems using gas or propane furnaces shall include the following:

1. A dedicated 240 volt branch circuit wiring shall be installed within 3 feet from the furnace and accessible to the furnace with no obstructions. The branch circuit conductors shall be rated at 30 amps minimum. The blank cover shall be identified as "240V ready". All electrical components shall be installed in accordance with the *California Electrical Code*.
2. The main electrical service panel shall have a reserved space to allow for the installation of a double pole circuit breaker for a future heat pump space heater installation. The reserved space shall be permanently marked as "For Future 240V use".

[8] Those that trigger Sections 150.2(b)(1)(C) and Section 150.2(b)(1)(D)(ii)(a).

Finally, we urge the CEC to reconsider its decision to omit the language in the Draft Express Terms that would have encouraged heat pumps at the time of air-conditioner replacement (in the scenario where only the equipment is being replaced, not the ductwork). As submitted in multiple previous comments on the docket, encouraging replacement air-conditioners to have reversing valves (i.e. be a heat pump) is a low-cost policy that leverages a critical opportunity to install heat pumps in the state.[9] Because heat pumps provide both heating and cooling, replacing a central A/C unit with a properly sized heat pump will ultimately save Californians more money by avoiding the future need for furnace replacement. Moreover, because state and local zero-emissions appliance standards will require future furnace installations to be heat pumps by 2030, requiring replaced A/C units to be heat pumps now avoids situations where a homeowner replaces an A/C with another A/C unit only to find out a few years down the road that they are required to replace their gas furnace and new A/C with a heat pump. If the CEC does not include this common-sense 'A/C to heat pump' provision in the 15-day language, it should commit to reevaluating its inclusion in an interim code update.

2) ***New Construction Baselines:*** **Maintain proposed updates to prescriptive baselines for residential and nonresidential buildings and expand prescriptive options for multi-zone systems for schools and office buildings.**

The CEC has proposed to expand on the existing heat pump space and water heating prescriptive baselines established in the 2022 Building Code by setting heat pump space and water heating baselines for homes in all climates, expanding the heat pump space heating baselines for nonresidential buildings to large, multi-zone systems in schools and offices, and setting heat pump water heating baselines for individual water heaters serving multifamily buildings. We strongly support these expanded baselines, which will encourage building electrification while continuing to provide builders options under the performance path.

For non-residential buildings, the proposed expansion of heat pump baselines for space heating to multi-zone systems serving schools and office buildings (Section 140.4(a)(3)) will send a critical decarbonization signal for these common building types. For offices, the proposed baseline offers three prescriptive system choices as well as the performance path, where any system type can be utilized. For schools, there is a single prescriptive option in addition to the performance path. These options provide for flexibility while setting an energy performance budget. While we strongly support the measure as proposed, we recommend further expanding this list of choices by adding the following modifications:

- Allow schools to use the same system types as offices

[9] *See, e.g.,* Docket #22-BSTD-01, Comments of 40+ Orgs Requesting Residential AC to HP in Part 6 (Aug. 9, 2023), https://efiling.energy.ca.gov/GetDocument.aspx?tn=251557&DocumentContentId=86431; Earthjustice, NRDC, RMI and Sierra Club Joint Comments on AC to HP Replacement Opportunity (Apr. 5, 2023), https://efiling.energy.ca.gov/GetDocument.aspx?tn=249551&DocumentContentId=84193.

- Allow for water-source heat pumps (including ground-source systems) prescriptively in addition to air-source heat pumps
- Add a provision that allows for the addition of additional prescriptive paths with equivalent energy use at the discretion of the CEC

Expanding the options available as recommended above will better represent the typical systems in all-electric schools and offices, while continuing to set a strong all-electric baseline. To better assess the systems typically installed in all electric buildings, we researched the installed HVAC system types for relevant projects with information available in the Electrified Buildings database.[10] We also examined data available from a recent assessment by BPA of HVAC systems in newly constructed buildings in the Pacific Northwest using permit data.[11] While both of these datasets represent a snapshot of construction, we found across both datasets that for schools VRF was a commonly used system type, as was hydronic slab heating served by a heat pump. Multiple projects identified used water-source heat pump systems (most commonly ground-source). We identified one school project that used an air-source heat pump, but the zone level system was not specified. Similarly, for large office buildings we found projects designed with ground-source heat pumps, radiant systems, and no space conditioning at all (only ventilation), with one project identified using an air-source heat pump in combination with a VAV reheat system.

For single-family residential buildings, we strongly support the expansion of the electric baselines to both space and water heating for all climate zones (Sections 150.1(c)(6) and (8)). This will send a strong decarbonization signal for builders, while providing flexibility to choose fuel type under the performance path, while resulting in cost-effective savings for Californians. For multifamily residential buildings, we strongly support the heat pump baseline for water heaters serving individual units (Section 170.2(d)), which will similarly send a cost-effective decarbonization signal while providing builders flexibility under the performance path.

3) ***Nonresidential HVAC Retrofits*: Maintain and clarify requirements for replacement single-zone packaged rooftop units.**

We strongly support the proposed requirements in Section 141.0(b)(2)(C) that encourage new or replacement single-zone packaged rooftop units (RTUs) under 65,000 Btu/hr to be heat pumps at the time of equipment replacement or failure. As submitted in previous comments on the docket, these equipment changeouts represent a critical opportunity to encourage the adoption of heat pumps, which are essentially drop-in replacements for the existing equipment. As written, the

[10] https://electrifiedbuildings.org/

[11] https://www.bpa.gov/energy-and-services/efficiency/market-research-and-momentum-savings/hvac-market-research

proposed requirements offer flexibility by requiring a heat pump RTU or gas RTU with additional efficiency options under the prescriptive path, depending on the climate zone.

While we support the CEC's proposal, the language as proposed needs clarification as currently the text conflicts with the proposed requirements in Table 140.0-E-1. For example, the text includes a proposed gas furnace requirement for climate zone 16 that conflicts with the requirement proposed in Table 140.0-E-1 which would allow for a heat pump or a furnace. While our understanding is that the CEC's intent is the requirements as proposed in Table 140.0-E-1, the language as written currently is contradictory. Importantly, the language in the text is not aligned with the current trend in Truckee, Tahoe, South Lake Tahoe, and other high elevation regions which are moving towards decarbonization and the installation of all-electric, heat pump systems. Disallowing heat pumps prescriptively in this climate zone would be a major impediment to these decarbonization efforts.

We recommend editing the language as follows (with edits in red):

> ii. New or replacement of single zone packaged rooftop systems with a direct expansion cooling with rated cooling capacity less than 65,000 Btu/hr shall meet the applicable requirements in ~~Items a through d below~~ Table 141.0-E-1 or shall meet the performance compliance requirements of Section 141.0(b)3.
>
> ~~a. Retail and grocery buildings:~~
> ~~1. In Climate Zones 3 through 13 and Climate Zone 15 shall have a heat pump or comply with the requirements specified in Table 141.0-E-1.~~
> ~~2. In Climate Zones 2 and 14 shall have an air conditioner with furnace and economizer or a heat pump with economizer.~~
> ~~3. In Climate Zone 1 and 16 shall have an air conditioner with furnace.~~
>
> ~~b. School buildings:~~
>
> ~~1. In Climate Zones 1 through 15 shall have a heat pump or comply with the requirements specified in Table 141.0-E-1.~~
> ~~2. In Climate Zone 16 shall have an air conditioner with furnace.~~
>
> ~~c. Office and financial institution buildings:~~
>
> ~~1. In Climate Zones 3 through 13 and 15 shall have a heat pump or comply with the requirements specified in Table 141.0-E-1.~~
> ~~2. In Climate Zone 2 and 14 shall have an air conditioner with furnace or a heat pump with economizer.~~
> ~~3. In Climate Zone 1 shall have an air conditioner with furnace or a heat pump.~~
> ~~4. In Climate Zone 16 shall have an air conditioner with furnace.~~

~~d. Library buildings:~~

~~1. In Climate Zones 1, 3 through 15 shall have a heat pump or comply with the requirements specified in Table 141.0-E-1.~~
~~2. In Climate Zone 2 shall have an air conditioner with furnace and economizer or a heat pump with economizer.~~
~~3. In Climate Zone 16 shall have an air conditioner with furnace.~~

Table 141.0-E-1 – NEW OR REPLACEMENT SINGLE ZONE AIR CONDITIONER OR HEAT PUMP REQUIREMENT

Building Type	CZ 1	CZ 2	CZ 3	CZ 4	CZ 5	CZ 6	CZ 7	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15	CZ 16
Retail and grocery	NR	SZHP1 or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP1 or SZAC1	SZHP or SZAC3	NR
School	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC2	SZHP or SZAC1	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	NR
Office, financial institution	NR	SZHP1or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC2	SZHP or SZAC1	SZHP or SZAC1	SZHP1 or SZAC1	SZHP or SZAC2	NR
Library	SZHP or SZAC1	SZHP1 or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC1	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	SZHP or SZAC2	NR

Footnotes to Table 141.0-E01

- SZHP – Single Zone Heat Pump
- SZAC – Single Zone Air Conditioner with furnace
- SZAC1 – Single Zone Air Conditioner with furnace + Economizer
- SZAC2 – Single Zone Air Conditioner with furnace + Economizer + Demand Controlled Ventilation
- SZAC3 – Single Zone Air Conditioner with furnace + Economizer + Variable Frequency Drive
- SZHP1 – Single Zone Heat Pump + Economizer
- NR – No Requirement

We also note that Subsection iii to Section 141.0(b)(2)(C) is confusing as written, since 140.4(e) directs certain projects to have an economizer and then the exceptions in Subsection iii direct certain projects to include an economizer. While we don't have specific proposed edits, we question the purpose of this section and whether it is necessary.

4) ***Pool and Spa Heaters:*** **Restore Draft Express Terms provisions extending solar and heat pump pool heating requirements to permanent spas and alterations of non-residential and multifamily pools.**

The Draft Express Terms included new requirements that pools be heated by solar energy, other renewable or site-recovered energy, or a heat pump water heater.[12] This requirement would have applied to new pools and spas across all sectors as well as replacement of non-residential and multifamily pools and spas. This proposal represented the single measure with the largest gas savings identified by the CASE Team and would have saved an estimated 61,293 metric tons CO2e in the first year alone and already represented a compromise by exempting pool heating in existing single family homes.[13] Yet in the 45-Day Language, the CEC has significantly weakened its proposal by now also exempting alterations to non-residential and multifamily pools and by adding exceptions for permanent spa applications. In doing so, the 45-Day Language significantly diminishes the potential energy and emissions reductions from this

[12] Draft Express Terms at § 110.4(c) at PDF p.189.
[13] Gutierrez et al., 2025 CASE Report Swimming Pool and Spa Heating, p. 85

measure and locks in polluting pool heating technologies for years to come. Continuing to burn fossil fuels to heat swimming pools in hotels and apartment buildings is an excess that needlessly undermines California's ability to meet its climate objectives. The CEC should restore the Draft Express Term provisions and only permit fossil-fueled pool heating where solar and heat pump alternatives do not meet the CEC's cost-effectiveness requirements.

5) ***Heat pump water heater ventilation:*** **Make additional changes to heat pump water heater ventilation requirements to avoid unnecessarily hindering their installation.**

The CEC has proposed requirements to ensure that integrated heat pump water heaters are installed with adequate ventilation to achieve optimum performance (Section 110.3(c)(7)). While we generally support the intent of this requirement and appreciate the changes that have been made to date to ensure that the right balance is struck between feasibility and water heater performance, there are still a few provisions included that serve to unnecessarily impede deployment of heat pump water heaters. These provisions include:

➢ Section 110.3(c)(7)(B): The requirements state that compressor capacity shall be determined using AHRI 540 Table 4 reference conditions for refrigeration with the "High" rating test point. Manufacturers do not currently test to or publish the "High" rating test point in their product literature. Because compressor capacity is used to determine minimum HPWH space requirements, there would be no way for a contractor to document the compressor capacity to calculate the installation space required. We recommend removing the reference to these specific test conditions in the description of compressor capacity.

➢ Section 110.3(c)(7)(B)(3)(iv): The ducted inlet configuration should only require a net free area (NFA) of 20 square inches (same as ducted exhaust). Requiring the NFA to be the same size as the duct is not supported by the research and is significantly more than what is needed for adequate ventilation.

➢ Section 110.3(c)(7)(B)(4): This provision does not provide any relief for alternate configurations as is. There is no way to meet the requirements of 110.3(c)(7)(B) without meeting one of the three specific requirements listed. As submitted previously, we continue to recommend that this language be changed to "Installed per manufacturer's instructions for ventilation requirements." If this language is not acceptable an alternative could be, "Installed using a method certified to the Energy Commission by the manufacturer to provide adequate ventilation to achieve within 15 percent of rated energy performance."

6) ***Residential Windows:*** **Restore residential windows requirements to levels proposed in Draft Express Terms.**

The 45-Day Language takes a step back from the window efficiency requirements proposed in Table 150.1-A of the Draft Express Terms by removing updated window U-value requirements in climate zones 6 through 10 and 15. We strongly urge the CEC to revert to the language proposed in the Draft Express Terms by requiring a U-factor of 0.27 in all climate zones.[14] The levels proposed in the Draft Express Terms represent a modest improvement in energy efficiency that will improve comfort, reduce load, and provide energy savings. While the CASE report[15] found small life cycle costs (all less than $100 per home) for climate zones 6 through 10, we do not think that these costs are accurate. As submitted previously, the incremental costs for windows found in the CASE report are exaggerated and even more stringent U-factors than those proposed would likely be cost-effective. The cost analysis also does not take into account reduced heating equipment sizing and, therefore, cost that is enabled by more efficient windows, or the cost reductions that will be achieved by manufacturer economies of scale in meeting a single state standard. Due to these unaccounted for costs and the very minimal incremental life cycle cost found in climate zones 6 through 10, we urge the CEC to set a single state standard at 0.27. This will increase energy savings and reduce the overall cost of this measure in all climate zones (due to the economies of scale across the state). We also note that climate zone 15 was exempted in the 45-Day Language but appears to be cost-effective in the CASE report.

Windows are an incredibly important component to the building envelope that are expensive to replace and likely to be in place for longer than the 30-year measure analysis period considered. They affect HVAC system sizing and home comfort, especially during extreme weather events, as well as increasing the number of hours per year in moderate climate zones where heating is not needed at all. Windows meeting the U-factor 0.27 levels recommended here are readily available and as described above, cost-effective in all climate zones. A U-factor of 0.27 roughly aligns with the Energy Star windows levels which range from U-factors of 0.26 to 0.28 depending on the California climate zone. Energy Star windows make up the vast majority of the windows replacement market due to the incentive provided by the 26 USC 25c tax incentive,[16] and their low incremental cost. Failing to update the U-factors in climate zones 6 through 10 and 15 would be a major missed opportunity and we urge the CEC to reconsider this proposal.

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[14] While the Draft Express Terms included a U-factor of 0.28 in climate zone 7, we suggest a statewide standard of 0.27 for consistency.

[15] https://efiling.energy.ca.gov/GetDocument.aspx?tn=255321-7&DocumentContentId=91029

[16] Notably, the 26 USC 25c tax credit required a U-factor of 0.30 in 2009 (Energy Star requirements were less stringent at the time and represented over 90 percent of the market, so the tax credit was amended to avoid free ridership). Since 2009, Energy Star has updated its requirements and the tax credit has been modified to reference Energy Star again.

7) ***Residential HVAC Design and Control:*** **Maintain and strengthen requirements for residential HVAC design and control.**

The 45-Day Language includes important edits to Section 150.0(h) relative to residential space conditioning equipment design and control. Overall, we strongly support these updates, which will help ensure proper sizing and field performance of heat pumps. We recommend that the language be strengthened in the following ways:

- ➢ *Require supplementary heating control for all climate zones and building sizes.* Section 150.0(h)(7) contains language limiting the use of electric resistance or gas supplementary heat, but exempts climate zones 7 and 15, as well as buildings with conditioned floor space less than 500 square feet. Given the low cost of these controls and the high potential energy use if supplementary heat is not controlled effectively (which may not be fully represented by the average costs determined in the CASE report), we strongly encourage that the CEC require this provision for all homes, regardless of size or climate zone. Furthermore, climate zones 7 and 15 should not require backup heat, so including this provision is likely to help encourage installers to design these systems properly without backup heat, at a significantly lower first cost, rather than installing uncontrolled backup heat.
- ➢ *Require load calculations to be submitted to the enforcement agency.* We recommend that the CEC reinstate the provision from the Draft Express Terms that would have required load calculations to be submitted to the enforcement agency. Without this provision, there is no documentation that load calculations were actually performed and no way to verify that the system selection is in compliance.

8) ***Nonresidential Lighting:*** **Restore the stringency required for nonresidential lighting to the levels required by the 2022 Building Code.**

The 45-Day Language proposes to eliminate the tailored lighting method in Section 140.6(c)(3) and makes expansions to the allowable lighting power densities under the area category method as proposed in Table 140.6-C.While we support the effort to clarify and streamline the lighting power requirements, we are concerned that the additional space types and power allowances proposed in Table 140.6-C will unnecessarily increase energy use compared to the 2022 Building Code.[17] We urge the CEC to remove the additional lighting power categories proposed in Table 140.6-C.

[17] As discussed in detail in comments submitted of the Draft Express Terms by Jim Stewart, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253537&DocumentContentId=88765

9) **Maintain critical efficiency and electric-ready measures.**

We strongly support the following provisions, which will result in energy savings, reduce load, and ensure that buildings not built all-electric today will have the necessary infrastructure for future electrification. All of these measures help support the state's goal of emissions reductions. We specifically support the following measures:

- Section 120.2(l) - which sets mandatory requirements that zone hot water design supply temp shall be no greater than 130 F. This provision both saves energy and enables future electrification.

- Section 120.3 - which requires increased mandatory pipe insulation in nonresidential buildings.

- Section 120.6 (h) - which sets horticultural lighting efficacy to 2.3 micromoles/joule.

- Section 120.6 (k) - which requires electric readiness for commercial kitchens.

- Section 120.7 - which requires vestibules on public entrances for certain commercial building types.

- Sections 140.4 (d), (e), (f), and (r) - which require the use of Guideline 36 control sequences.

- Section 140.4 (s) - we support the requirement for mechanical heat recovery for systems with large simultaneous heating and cooling loads which will harness this important energy efficiency opportunity.

- Section 160.1(b) - which updates the mandatory wall insulation levels for multifamily buildings.

- Section 160.4(e) - which increases the mandatory pipe insulation requirements for multifamily buildings.

- Section 160.9 (f) - which expands the electric ready requirements to require multifamily buildings with central hot water systems to be heat pump water heater ready.

We appreciate the opportunity to comment and welcome discussion on any of the above submitted comments.

Sincerely,

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Appendix

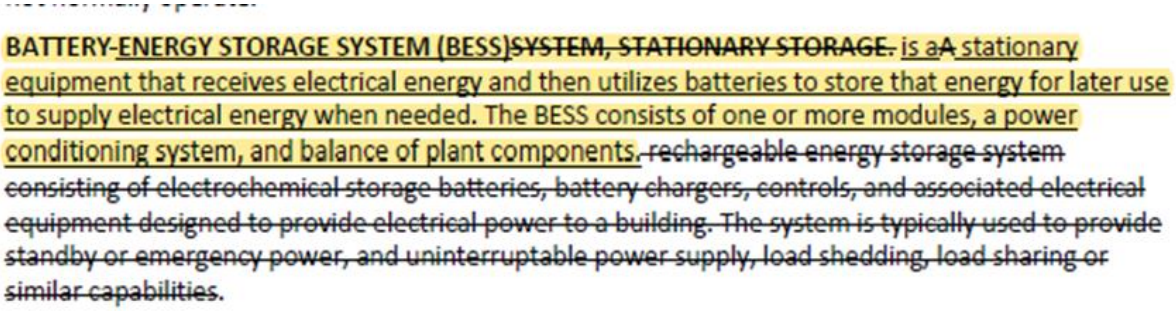
Non-Substantive/Editorial Comments

The following comments are suggested non-substantive edits to the 45-day language:

- Section 100.1, page 130: Suggested edit as follows:

"AIR-TO-WATER HEAT PUMP (AWHP) is a factory-made packaged heat pump system containing one or more compressors, and heat exchangers for transferring heat between refrigerant and air, as well as between refrigerant and water, and various other components. Its primary purpose is to generate heated and/or cooled water to meet space conditioning and/or domestic hot water load."

- Section 100.1, page 137: Recommend further editing BESS definition for specificity and clarity. Many of the terms used in this definition are not elsewhere defined - battery, modules, power conditioning system, balance of plant components - and so seem to leave ambiguity as defined.



BATTERY ENERGY STORAGE SYSTEM (BESS)~~SYSTEM, STATIONARY STORAGE.~~ is a~~A~~ stationary equipment that receives electrical energy and then utilizes batteries to store that energy for later use to supply electrical energy when needed. The BESS consists of one or more modules, a power conditioning system, and balance of plant components. ~~rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls, and associated electrical equipment designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, and uninterruptable power supply, load shedding, load sharing or similar capabilities.~~

- Section 110.2(b), page 155. Exception 3 is confusing and doesn't seem to be necessary as this section does not appear to apply to single family residential buildings

(b) **Controls for heat pumps with supplementary ~~electric resistance~~ heaters, for non-residential and multifamily buildings.**

Controls for heat pumps with supplementary heaters for single family residential buildings are provided in Section 150.0(h)7. For non-residential and multi-family buildings ~~H~~heat pumps with supplementary electric resistance heaters shall have controls:

1. That prevent supplementary heater operation when the heating load can be met by the heat pump alone; and
2. In which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.

Exception 1 to Section 110.2(b): The controls may allow supplementary heater operation during:

A. Defrost; and

B. Transient periods such as start-ups and following room thermostat setpoint advance, if the controls provide preferential rate control, intelligent recovery, staging, ramping or another control mechanism designed to preclude the unnecessary operation of supplementary heating.

Exception 2 to Section 110.2(b): Room air-conditioner heat pumps.

Exception 3 to Section 110.2(b): Heat pump controls in single family residential buildings compliant with Section 150.0(h)7 without the use of exceptions or compliant with Section 150.0(i)2 without the use of exceptions.