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NRDC Comments on August 28th Title 24 2028 Energy Code Accounting Workshop

Additional submitted attachment is included below.

September 12, 2025

California Energy Commission
Re: Docket No. 25-BSTD-03
715 P Street
Sacramento, CA 95814
docket@energy.ca.gov

Re: Comments on the 2028 Building Energy Efficiency Standards Energy Accounting Methodologies

Dear Commissioners and CEC Staff,

The Natural Resources Defense Council (NRDC) submits the following comments on the CEC's August 28, 2025 workshop on energy accounting methodologies for the 2028 Building Energy Efficiency Standards ("2028 building code").[1] This workshop kicked off the 2028 code development process and covered some of the key underlying analytical methods and inputs that will affect the rest of the code development process. This included proposed updates to the structure of the code, the implementation of future weather files, updated long-term system cost (LSC) and source energy metrics, updated prototype files, and updated equipment power densities. Due to the limitations imposed by AB130, the workshop focused specifically on nonresidential buildings and covered processes.

The Building Code is instrumental in decarbonizing buildings throughout the state and helping achieve California's climate and air quality objectives. The development of systemwide cost and source energy metrics and the underlying weather files is foundational to the development of the 2028 Code. These inputs metrics will affect which prescriptive measures and baseline system types will be cost-effective and therefore how much the 2028 code will be able to promote decarbonized building designs that are aligned with the state's requirement to reduce greenhouse gas emissions 40 percent below 1990 levels by 2030, as well as its objective to achieve carbon neutrality by 2045. Similarly, the changes to prototypes and equipment power densities are foundational to the analysis that will determine which measures are cost-effective. We appreciate the CEC's work to prepare these important foundational components of the 2028 building code.

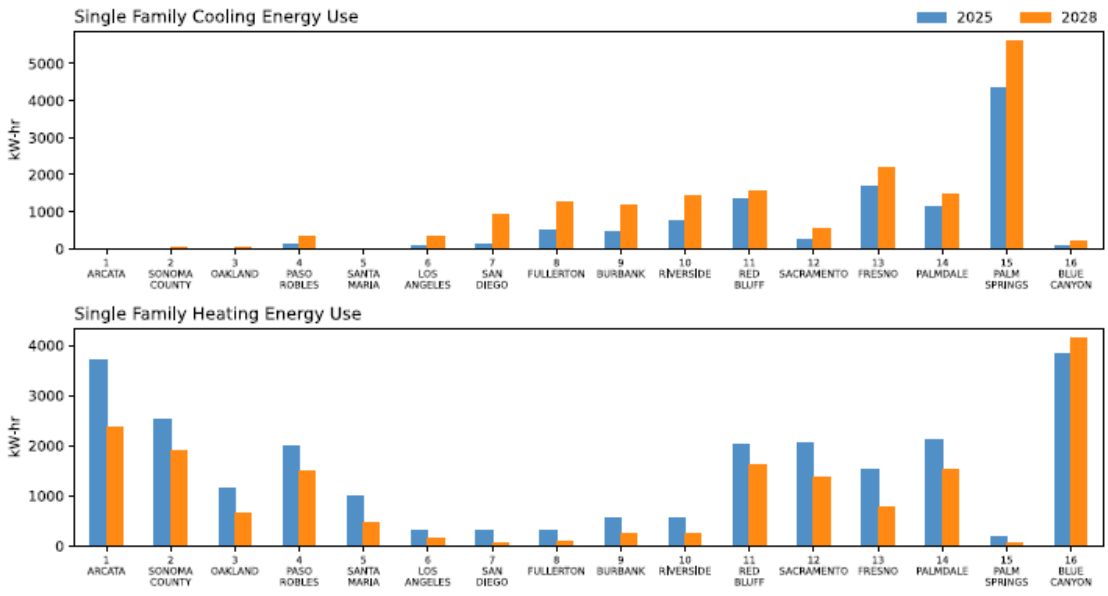
NRDC offers the following specific comments on the proposed changes:

[1] https://efiling.energy.ca.gov/GetDocument.aspx?tn=265222&DocumentContentId=102153

1) NRDC supports the proposal to update weather files to better represent future weather.

NRDC strongly supports the California Energy Commission's proposal to update weather files to better represent future climate conditions. Weather files are a foundational input to the energy code, influencing both weather-dependent measures and the LSC and source energy metrics. For the first time, the CEC is developing future weather files that reflect the projected future climate conditions that buildings are likely to experience, rather than relying solely on historic data. These new files, based on LOCA2 climate model projections, select representative past months from California's historic TMY dataset that best align with likely future conditions. The resulting future TMYs preserve realistic hourly weather patterns while reflecting the broader climate trends expected for 2030–2059. The future weather files show that California buildings will face more cooling degree days and fewer heating degree days. These changes impact energy use, equipment sizing, and measure selection and it is therefore important to have representative weather data underlying these analyses. We note that the reduced number of heating degree days does have the potential to reduce savings available for heat pumps (due to lower heating loads). However, we continue to support the use of future weather files since they are more representative of the conditions buildings affected by the code are likely to experience. The following figure shows how the updated weather files are likely to impact single family cooling and heating energy. As expected, heating energy decreases in almost all climate zones and cooling energy increases under overall warmer future weather conditions.

Figure 14 - Energy Use Comparison (Single-Family Prototype)



NRDC has advocated for multiple code cycles that building code decisions should be grounded in the future weather that buildings are likely to encounter during their lifetimes, rather than in the historical climate. The use of the updated future weather files will provide a more accurate assessment of efficiency measures and technology choices, ensuring that the building code continues to deliver real-world benefits under changing climate conditions. We

encourage the Commission to move forward with this approach and to continue refining the methodology in future code cycles as climate models and future weather file creation techniques improve.

2) *NRDC supports the continued use of the long-term system cost (LSC) and source energy metrics. We continue to encourage CEC to update these metrics using the latest scenarios that are in line with California's policy goals.*

Over the last several code cycles, the CEC has evolved the metrics by adding the use of the source energy metric and changing the name of the time-dependent valuation (TDV) metric to long-term system cost (LSC) to better reflect the actual meaning of this metric. NRDC continues to support the use of both metrics for building code development and compliance. Together these metrics capture both the source energy impacts of building energy use, taking into account the use of clean energy sources, as well as the cost implications, which are both critical for informing code change decisions and compliance.

Based on the information available in the workshop and supplementary report, it is not entirely clear what underlying scenarios were chosen for the electricity and gas demand scenarios. The report indicates that a hybrid scenario was chosen but based on our review of the report and the referenced scenario documents we were unable to find clear documentation of the underlying assumptions used to develop the demand scenarios that underpin the LSC and source energy metrics. We request the CEC provide clear documentation of these underlying assumptions and scenarios, in particular the assumptions underlying the future gas demand forecast. In general, we continue to urge the CEC to update the metrics each cycle to reflect the most recent forecasts that are in line with the state's emissions reductions and clean energy goals.

3) NRDC supports the proposed restructuring of the code and encourages the CEC to use the exceptions to AB130 to avoid challenging implementation scenarios for mixed-occupancy buildings.

NRDC supports the proposal to restructure the building code to align with the I-Code order and formatting. This restructuring does not change the requirements or stringency of the code in any way, but rather makes the code easier to understand and reduces compliance burden. This change has been sought by industry for many years to streamline the understandability of the code. We argue that this restructuring of the building code falls within the exceptions to AB130 as it does not fundamentally change the residential provisions of the code.

We also encourage the CEC to utilize the exceptions to AB130 to avoid scenarios where completely avoiding the residential section of the code would impose compliance burdens. Specifically, we recommend that the CEC continue to update the underlying weather files and metrics for all building types, as these metrics do not constitute updated building standards and failing to update them will lead to real compliance burdens. For example, for

mixed-occupancy buildings, if the residential portions of a building must continue using the 2025 weather files, designers will have to create two separate energy models—one for the residential portion and one for the nonresidential portion—and produce a separate compliance report for each. An exemption can also be justified under the "health and safety" exemption provided by AB 130, in that building for likely future weather conditions will directly impact the health and safety of the occupants of these buildings.

4) *NRDC supports efforts to update prototype models and recommends the CEC make further changes to the occupancy schedule for schools. NRDC also recommends updating the baseline system type for large hotels.*

The CEC is proposing to update the prototype models for schools, assembly buildings, and hotels. These prototype models are important because they affect what measures are cost-effective and also their baseline HVAC systems can greatly determine what types of HVAC systems can be readily installed under the performance path. It is therefore important that these prototypes represent typical buildings (including both new construction and the existing building stock, since the prototypes are used for both). While it is impossible to represent all buildings with the prototypes, we support the CEC's efforts to make the prototypes more representative of typical construction for schools, assembly buildings, and hotels.

In reviewing the *Proposed Updates to Building Prototypes for the 2028 Energy Code* report,[2] there are two areas where we recommend the CEC continue to make additional changes:

- *Update school occupancy schedule to reflect hours that the HVAC and lighting systems are likely to be operational even if classroom activities are not scheduled.* The CEC has proposed updates to the school occupancy schedules (which underpin building energy load and cost-effectiveness analysis) to be more reflective of current school schedules. However, in doing this, the CEC has been overly aggressive in assuming that school occupancy goes to zero or near zero to align with those school schedules. An example of this is the following schedule, which assumes the classroom goes to an occupancy fraction of 0.05 at 3 PM, 0 by 4 PM, and 0.1 for an hour at lunch.

[2] https://efiling.energy.ca.gov/GetDocument.aspx?tn=265691&DocumentContentId=102542

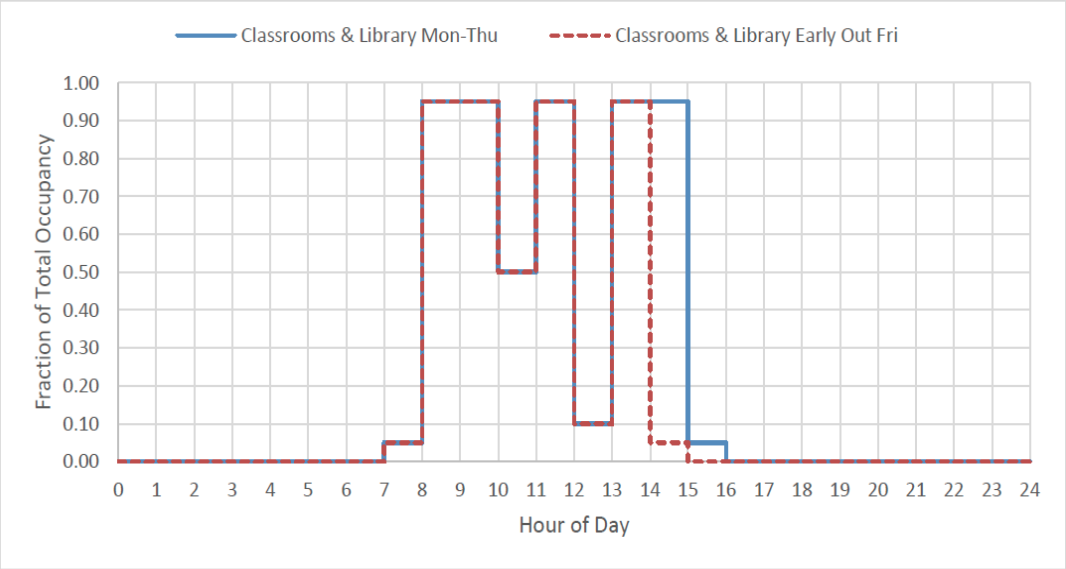
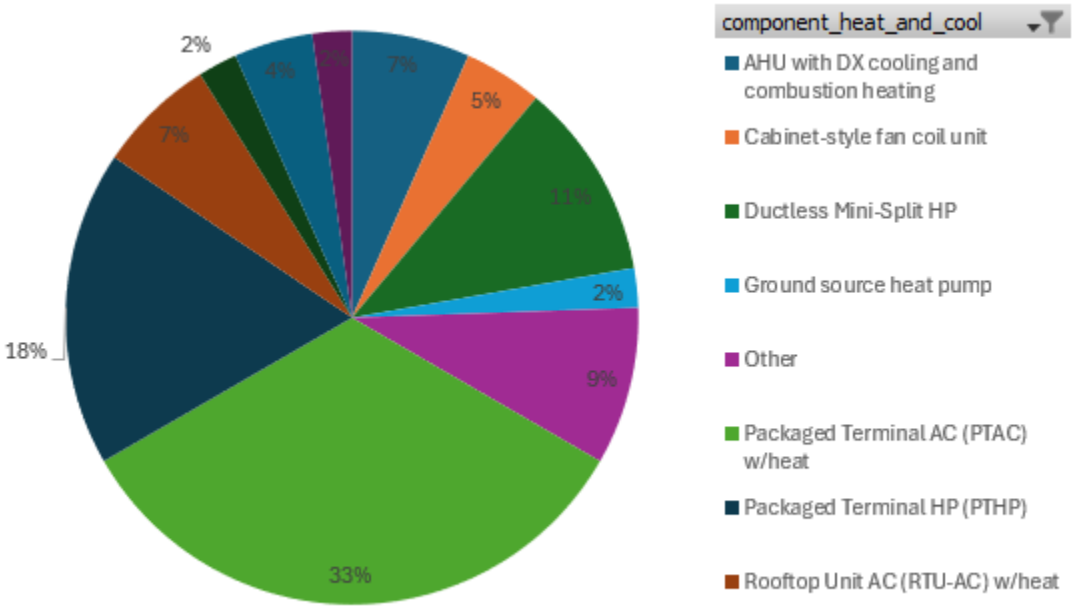


Figure 1: Proposed Typical Classroom Occupancy Schedule

This schedule does not reflect the fact that schools are rarely fully off during business hours – janitors and maintenance staff work during this time, after school programs run for parents who work until the end of the typical business day, teachers do work in their classrooms when students aren't present, student activities or clubs meet in classrooms, and after-hours events are held. These extended hours are particularly true for high schools, where many after-hours activities are occurring. During the summer, summer school, camps, and other secondary uses can also lead to additional occupancy. While the CEC has attempted to account for these events, assuming the schedule goes to 0 or 0.1 before the end of the typical business day is overly aggressive. Similarly, assuming the occupancy fraction goes to 0.1 at lunch time does not reflect the fact that students and teachers may still be present in the classroom during lunch time and therefore the loads in those spaces are unlikely to drop so significantly. We recommend that the CEC make adjustments to the occupancy fraction for schools to better reflect partial use of school facilities during business hours. In the absence of better data, an occupancy fraction of somewhere between 0.25 to 0.4 for all standard business hours during the school year would seem more reasonable.

➢ *Consider changing the baseline system type for large hotels to something more representative.* The CEC proposes using a four-pipe fan coil system with central gas boiler and chiller as the baseline system type for the new large hotel prototype. While the report states that this decision is based on review of the California End-Use Survey (CEUS), there do not appear to be publicly available results from the CEUS indicating end-use HVAC system type for hotels (although the survey does collect this information). From our experience, four-pipe fan coils are a less common system type

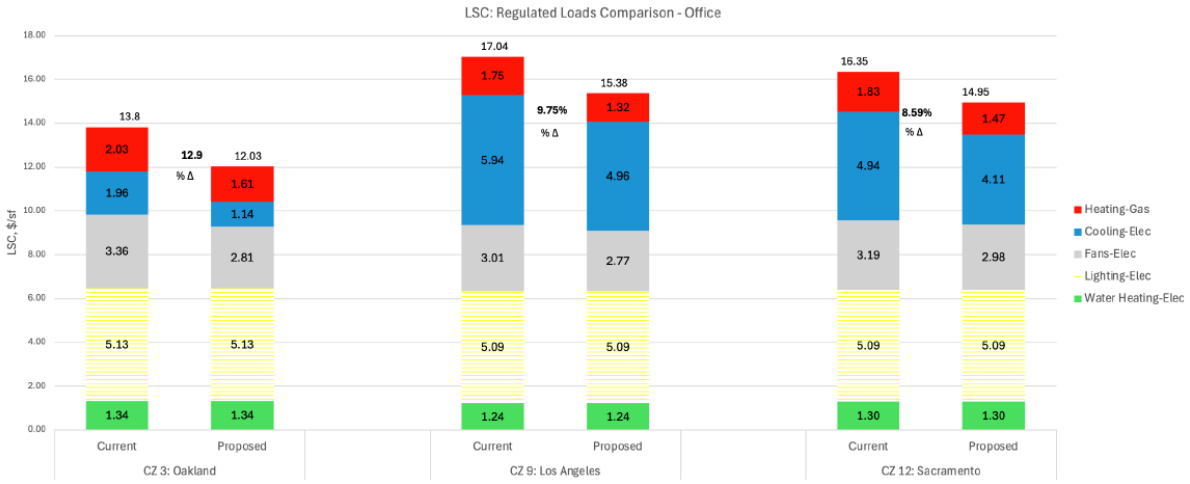
for lodging facilities. From a review of the Northwest Energy Efficiency Alliance's (NEEA) 2019 Commercial Building Stock Assessment (CBSA), packaged terminal air conditioners and heat pumps (PTACs/HPs) appear to be much more common for large hotels. The following chart summarizes the penetration of each system type found in the CBSA data by number of buildings for lodging greater than 59,000 square feet and shows fan coil units representing just 5 percent of buildings. We recommend that the CEC update the baseline HVAC system type to something that is representative of typical construction and ensure that the chosen baseline does not inhibit the installation of all electric HVAC systems in large hotel buildings.



5) *NRDC supports the efforts to improve equipment power densities and plug load usage profiles, but recommends that the CEC continue to modify certain assumptions.*
NRDC supports the CEC's efforts to update the equipment power densities (EPDs) and corresponding usage profiles for select building types. These plug loads are important as they are a key component of building heating and cooling loads – overestimating plug loads leads to overvalued cooling savings and undervalued heating savings. Underestimating plug loads does the opposite. Given that the current EPDs are based on a 2011 COMNET report that utilized older data and the fact that there have been large increases in plug load efficiency over the last two decades, we strongly agree that these EPDs are due for an update. In general, we agree with the proposed updated values with the following caveats:

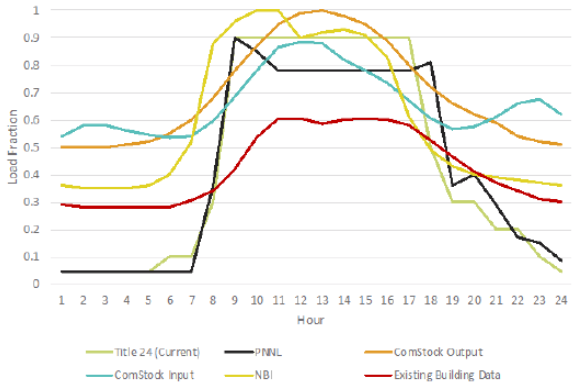
- The office EPDs decreased significantly, which we support – plug load energy use has decreased significantly since these assumptions were developed. However, the CEC's modeling indicated that this reduced both heating and cooling energy use as shown in the graph below. This result is counterintuitive as we would expect reduced office EPDs to decrease cooling energy and increase heating energy, rather than decreasing both. Our understanding is that this may be because while EPDs have gone down, the off-hour load fraction has increased, increasing nighttime loads and decreasing heating use. While this result makes sense, it does not seem correct that overall heating loads would have decreased in buildings over the last 20 years due to an increase in plug load energy (i.e. even though EPD has gone down, total cumulative load has gone up). This is important because underestimating this heating energy load could affect the cost-effectiveness of heat pumps. We recommend that the CEC evaluate this impact, particularly how it might affect the implementation of heat pumps.

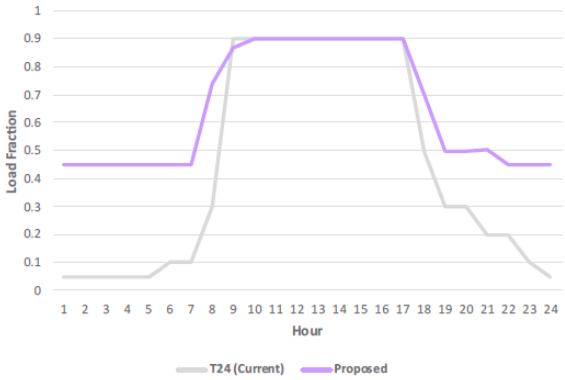
Figure 13: Office - Impacts of Proposed Changes on LSC



- We are concerned that the off-hours load fraction for office receptacles shown in the figure below is too high. The CEC has proposed increasing this load fraction from 0.05 to 0.45. While we agree an increase is warranted, almost 50% seems high for an after-hour load fraction, especially given that most office workers bring computers home on a daily basis, particularly in a hybrid work environment. While we agree that updating these values based on the latest data makes sense, we are concerned that the revised ComStock schedules (shown in blue and orange in the left-hand chart below) are over inflating these numbers and think that relying on the PNNL and/or existing building data profiles would be more representative.

Figure 18: Analysis and Proposed Updates to Office Receptacle Schedule (Weekdays)





We appreciate the opportunity to submit these comments and welcome discussion.

Sincerely,

Merrian Borgeson
Policy Director, California, Climate & Energy
Natural Resources Defense Council (NRDC)

Meg Waltner, PE
Associate Director
Energy 350 on behalf of NRDC