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NRDC Comments on 2022 Code Update Objectives and Metrics

Additional submitted attachment is included below.

Comments of the Natural Resources Defense Council (NRDC) on
2022 Building Energy Standards Life Cycle Costing, Metrics, and Weather Files
Docket Number #19-BSTD-03
November 30, 2019
Submitted by: Pierre Delforge, NRDC, pdelforge@nrdc.org

The Natural Resources Defense Council (NRDC) appreciates the opportunity to comment on the California Energy Commission (CEC)'s 2022 Building Energy Standards Life Cycle Costing, Metrics, and Weather Files on behalf of its more than 450,000 members and activists in California who have an interest in receiving affordable energy services while reducing the environmental impact of California's energy consumption.

I. Executive Summary

Decisions made regarding energy efficiency and energy systems at time of building construction and renovation will impact customer bills and the environment for decades. Therefore, construction and renovation are critical opportunities to improve the affordability and minimize the environmental and particularly the climate impacts of buildings. New construction is also a key market to support California's building decarbonization policy goals because it plays an outsized role in developing market capacity for low-emissions building practices such as high-performance envelopes, and technologies such as heat pumps. Every new building needs new heating, cooling, and water heating equipment, whereas existing buildings only need equipment replacements every 15 to 20 years.

NRDC strongly supports building decarbonization as the primary goal of the 2022 and future building code updates. This is consistent with the state's decarbonization goals (SB 32, EO B-55-18, AB 3232), as well as clean air and housing affordability policy priorities. This is also aligned with the Paris Climate Accords' goal of mitigating global temperature rise to 1.5 degrees Celsius to avoid the worst effects of the climate crisis.

The 2022 code update should aim to move the market toward all-electric zero-emission new construction, to align with its primary objective of building decarbonization. The 2018 Integrated Policy Report noted that "there is a growing consensus that building electrification is the most viable and predictable path to zero-emission buildings." This is particularly true for new construction where all-electric buildings cost less to build due to avoiding gas connection and plumbing costs, and less to operate due to the much higher efficiency of heat pump equipment combined with rooftop photovoltaic requirements.

The majority of CEC's proposed updates for 2022 are well-aligned with building decarbonization. NRDC supports the CEC's proposal to prioritize multifamily and commercial buildings, incorporate a new source energy metric, a dual-metric compliance approach, value

demand flexibility, methane leakage and refrigerant global warming potential (GWP), and update weather files.

To further improve the direction for 2022 code updates, NRDC's top recommendations include the following:

1. Provide a **meaningful compliance incentive for all-electric buildings**, reflecting their much lower greenhouse emissions relative to gas-heated buildings;
2. Update the **time dependent valuation** (**TDV) methodology** to better reflect the value of, and therefore accelerate market adoption of load shifting and other demand flexibility technologies.
3. **Multi-family chapter**: provide uniform requirements across low-, mid-, and high-rise multifamily buildings in a dedicated chapter and compliance software package.

A. Provide a meaningful compliance incentive for all-electric buildings, reflecting their much lower greenhouse emissions relative to gas-heated buildings

CEC staff indicated that it is considering keeping separate baselines for gas and electric heating in the 2022 code, as is the case for low-rise residential in the 2019 code, and only moving to a single baseline and fuel-neutral performance-based standard in the future. We are concerned that this would let the market build another three years' worth of gas-heated buildings. These buildings will stand for decades, locking in high emissions levels that are incompatible with California's climate goals. They would also cost more and take longer to build, and commit occupants to high gas bills as highlighted by a recent Gridworks study,[1] or to costly future conversions. In a time of dual housing affordability and climate crises, California cannot afford another three years of higher-cost, higher-bill, and higher-emissions new construction. More than 20 California cities have already adopted local energy codes that limit or eliminate the use of fossil-fuels in new construction. It is time for the state to follow suit.[2]

CEC should set performance-based standards for new buildings in the 2022 code update in alignment with California's carbon and air pollution reduction goals. NRDC recommends the 2022 code use a single baseline and fuel-neutral performance standard. CEC staff proposed using two independent baselines for gas and electric heating in the 2022 code. While this was a useful approach in the 2019 standards because of the limitations of the TDV metric, the updated TDV metric and new source energy metric should resolve this problem and enable a performance-based approach using a single baseline. Using independent gas and electric baselines may fail to meaningfully shift the market to all-electric construction, and

[1] "California's Gas System in Transition", Gridworks, September 2019

[2] https://www.sierraclub.org/articles/2019/11/forward-looking-cities-lead-way-gas-free-future

enable another three years or longer of new, gas-fueled buildings that would stand for decades and lock in high emissions that are incompatible with California's climate goals.

B. Update the time dependent valuation (TDV) methodology to better reflect the value of, and therefore accelerate market adoption of load shifting and other demand flexibility technologies.

NRDC strongly supports CEC's proposed approach to adopt a two-step lifecycle cost test using metrics that address both decarbonization and grid harmonization objectives. The hourly source energy methodology is robust and appears to be an appropriate proxy for the greenhouse emissions impact of buildings over their lifetimes. This metric appropriately considers the long-run marginal carbon intensity of energy at the time the energy is used. Long-run, or "build" margin, means accounting for how the marginal grid mix will change to serve increased or reduced demand, as power plants are added or retired. This is more representative than the short-run approach which assumes that demand changes have no impact on which power plant is on the margin. CEC's proposed approach will enable a performance-based approach, if combined with a single baseline across gas- and electric-heated buildings.

CEC should improve the TDV metric to better reflect marginal grid costs by making the retail adjustment adder variable by time of day.

The marginal costs to deliver electricity to customers can vary by orders of magnitude between midday and peak demand hours. The proposed TDV incorporates some variation in transmission and distribution costs per hour, but is uses a flat "retail adjustment adder" to scale the variable cost components to the average retail rate. The adder represents roughly 60 percent of the total value of TDV over the year, and is therefore a major component of the price signal.

Using a constant (flat) adder severely dampens the price signal for flexible loads and load shifting. Instead of facing a near-zero or even sometimes negative TDV price around noon, the lowest TDV price is only about half the peak price and only marginally lower than the average price. This fails to appropriately value load shifting, demand response, pre-cooling, energy storage, and other load flexibility measures which are critical to decarbonize buildings and integrate renewable energy while maintaining affordability. This also isn't reflective of utility cost recovery through rates, which is mostly volumetric, with only a small share of cost recovery through fixed charges.

Load flexibility technologies, such as demand response, pre-cooling, and energy storage, are critical to a decarbonized future and should be properly rewarded for their benefits to the grid. The Energy Commission should consider making the retail adjustment adder proportional to other TDV components in order to better reward the advantages of load

flexibility technologies, to support California towards achieving its ultimate goal of carbon neutrality by 2045, and better reflect customer cost recovery.

If this approach provides too much credit to short-life measures like equipment efficiency and flexibility over long-life measures such as envelope efficiency, CEC could account for measure life and certainty in crediting measures. This would help avoid trade-offs between long-life, high-certainty measures for short-life, low-certainty measures. For example, building envelope energy efficiency has a long life and provides benefits largely independently of occupant behavior. Solar also has a long life and minimal dependence on occupant behavior. In contrast, measures like pre-cooling, which depends on occupant behavior, and efficient appliances have shorter lives and their benefits depend significantly on occupant behavior. A proportional adder, combined with appropriate measure life and certainty factors, would better value all measures without incentivizing unwarranted tradeoffs.

Additionally, **NRDC recommends the assumptions underlying the TDV are updated to reflect recent policy and studies**. The proposed TDV includes several assumptions that result in underestimating the urgency of moving to zero-emission all-electric buildings and the financial benefits of doing so. First, the analysis assumes an eighty percent emissions reduction goal by 2050 below 1990, based on EO's S-03-05, instead of the more recent goal of carbon neutrality by 2045.[3] While the implementation of EO B-55-18 has not yet been fully determined, it is clear that it will require significantly deeper and faster decarbonization of the building sector than previously envisioned. This goal should be reflected in the 2022 TDV analysis to provide the market with the best possible price signal as early as possible.

The analysis also assumes a slower building electrification scenario and a higher bio- and synthetic gas share than the lowest cost option identified it the 2018 study, "Deep Decarbonization in a High Renewables Future."[4] For example, the scenario used to model the current TDV assumes ten percent of pipeline gas will be from biological sources by 2030. This quantity of bio- and synthetic gas is unrealistic given that current sources provide less than one percent of gas demanded, biogas is very expensive, supply is limited, and there are no policies in place to achieve ten percent bio- and synthetic gas penetration. These unrealistic assumptions result in a muted price signal which may lead building designers and customers to choose the more expensive and higher emissions option.

Finally, NRDC strongly supports the inclusion of both refrigerant and methane fugitive emissions, but the methane leakage assumptions are unrealistically low. 0.7 percent leakage for methane means only 0.2 percent from upstream sources, which is only one tenth of the

[3] "California Climate Change Executive Orders." *State of California.* https://www.climatechange.ca.gov/state/executive_orders.html

[4] "Deep Decarbonization in a High Renewables Future – Updated Results from the California PATHWAYS Model, CEC 2015-2018." *E3.* June 2018. https://www.ethree.com/wp-content/uploads/2018/06/Deep_Decarbonization_in_a_High_Renewables_Future_CEC-500-2018-012-1.pdf

widely accepted 2.3 percent lifecycle emissions leakage estimate.[5] While a reduction in gas consumption will not necessarily result in an equal share of upstream emissions, one tenth is likely far too low. Given uncertainties and the absence of unequivocal data, NRDC recommends using the middle of the range, i.e. 1.4 percent upstream, added to 0.5 percent behind the meter, for a total of 1.9 percent. A middle-of-the-road estimate will lead to better policy results than an artificially low estimate.

C. Reorganize multi-family requirements into a single multifamily chapter, providing uniform requirements across low-, mid-, and high-rise multifamily buildings, and create software to specifically analyze multi-family buildings

NRDC supports CEC's intent to make multifamily buildings a priority of the 2022 update. To facilitate implementation and remove many of the barriers that are hindering energy efficiency and decarbonization progress in the multifamily sector, CEC should reorganize multifamily requirements into a specific chapter and compliance software package. NRDC's recommendation for a separate software package is also consistent with the requirements of AB 1088 Multifamily Residential Housing: Energy Programs.[6]

Multi-family units constitute roughly half of all new construction, yet building energy standards have not advanced as quickly as for single-family homes to reflect the state's energy, affordability, and equity goals.[7] Residents of multifamily units are disproportionally lower-income and renters. These residents can least afford high energy bills and making structural upgrades to improve building energy efficiency. They're also often renters and have no control over capital investment decisions for their homes. As a result, multi-family residents miss out on benefits of efficient low-emission buildings, including lower bills, better comfort, and healthier homes.

Multi-family building standards lag behind other building types in part because they are split between the residential chapter (1 to 3 stories) and the non-residential chapter (4 stories and above). This creates two essential problems: (1) neither code is specifically focused on the needs of multi-family buildings; (2) separate chapters confuse building designers and

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[5] Alvarez et al. "Assessment of methane emissions from the U.S. oil and gas supply chain." *Science: Vol 361, Issue 6398, pp. 186-188.* 13 July 2018.

[6] "*(c) The commission shall perform analysis to support a compliance and performance-based pathway, including software, specific to multifamily residential properties in time for the 2022 update to the building energy efficiency standards for multifamily residential properties, pursuant to Sections 25402 and 25488.5 of the Public Resources Code.*" From: "AB 1088 Multifamily residential housing: energy programs." *California Legislative Information.* 21 August 2017. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB1088

[7] Data from: "Annual data, from 1975." *State of California Department of Finance.* http://www.dof.ca.gov/Forecasting/Economics/Indicators/Construction_Permits/

building departments. Code requirements should, as much as possible, provide uniform requirements irrespective of building height.

Splitting multi-family building codes across two chapters is inefficient: low-rise residential multifamily buildings are currently covered with single-family homes, although measures that are highly effective in single-family units may be less effective in multi-family buildings. Conversely, mid- and high-rise multifamily buildings are covered together with commercial buildings, although measures appropriate for commercial buildings may not be optimal for high-rise housing units. Creating a new code chapter specifically for multi-family buildings would increase multi-family building performance. This would also create space to introduce innovative requirements specifically for multi-family buildings.

Developers, designers, and local official tasked with code enforcement are confused by having two multi-family codes. For example, developers construct apartment complexes that include both one to three story buildings as well as four-plus story buildings. To meet building code requirements, they need to consider two separate code chapters within the same construction project. Additionally, the separate chapters are confusing to building departments, who have to reference both the residential and non-residential Compliance Manuals. This leads to reduced compliance and enforcement.

Designers and developers struggle to reconcile multi-family code requirements using CEC software, which produces different results for buildings whose only difference is height. In the 2022 code update, the CEC should consider providing updated software packages that are specifically designed for multi-family buildings and unify results over building height.

D. NRDC supports the use of updated weather data to model building energy consumption.

NRDC strongly supports the CEC's proposal to use updated weather files for energy calculations in the 2022 code update. It is important to design buildings to better reflect current and future conditions. Heating and cooling loads will shift with climate change and using the most recent weather files supports effective planning. Additionally, in future updates, NRDC encourages the CEC to consider using forward-looking weather data that take into account forecasted heating and cooling loads over the lifetime of the building.

Thank you for the opportunity to comment on the 2022 Energy Code Pre-Rulemaking workshop.

Respectfully,

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