

DOCKETED

Docket Number:	19-BSTD-03
Project Title:	2022 Energy Code Pre-Rulemaking
TN #:	231010
Document Title:	Sierra Club Comments - Comments from Sierra Club on Docket #19-BSTD-03 2022 Energy Update for Title 24 Building Energy Efficiency Standard
Description:	N/A
Filer:	System
Organization:	Sierra Club
Submitter Role:	Public
Submission Date:	12/5/2019 5:22:57 PM
Docketed Date:	12/5/2019

*Comment Received From: Sierra Club
Submitted On: 12/5/2019
Docket Number: 19-BSTD-03*

**Comments from Sierra Club on Docket #19-BSTD-03 2022 Energy Update
for Title 24 Building Energy Efficiency Standard**

Additional submitted attachment is included below.



December 5, 2019

California Energy Commission
1516 9th Street
Sacramento, CA 95814

Re: Comments on 2022 Energy Update for Title 24 Building Energy Efficiency Standards

Dear Commissioners and Staff,

Sierra Club supports the California Energy Commission’s (“CEC”) goal to focus the 2022 Title 24 Building Code Standards on decarbonization and electrification.

California faces a climate and a housing affordability crisis, where Californians face wildfires, droughts, and heat waves, and many are not able to afford to buy or rent suitable homes for their families. At the same time as this mounting crisis, a wave of local government solutions is building across the state. Over twenty cities have adopted ordinances that require or strongly encourage all-electric new construction, which both cuts greenhouse gas emissions and reduces the cost of new construction and energy bills. **We urge the CEC to follow this local government leadership and to ensure that the 2022 building standards require all-electric new construction to reduce emissions and costs for all Californians.**

Several studies, including several authored or commissioned by the CEC, find that electrification of new construction is needed to achieve both California’s climate goals and to shield ratepayers from escalating gas costs.¹ Decarbonizing and electrifying new construction is a key

¹ See, e.g., 2018 Integrated Energy Policy Report Update, *available at* https://ww2.energy.ca.gov/2018_energypolicy/; CEC, *Natural Gas Distribution in California’s Low-Carbon Future*, (Oct. 2019) (prepared by Energy & Env’tl. Economics (“E3”) and UC Irvine), *available at* <https://ww2.energy.ca.gov/2019publications/CEC-500-2019-055/CEC-500-2019-055-D.pdf>; E3, *Draft Results: Future of Natural Gas Distribution in California* (June 26, 2019) (commissioned by CEC), *available at* <https://www.ethree.com/at-cec-;e3-highlights-need-for-gas-transition-strategy-in-california/>; Gridworks, *California’s Gas System in Transition: Equitable, Affordable, Decarbonized, and Smaller* (Sept. 2019), *available at* https://gridworks.org/wp-content/uploads/2019/09/CA_Gas_System_in_Transition.pdf; E3, *Deep Decarbonization in a High Renewables Future* (June 2018) (commissioned by CEC),

precautionary measure for protecting the climate, lowering energy bills, facilitating renewable energy integration, and improving public health and safety. Sierra Club respectfully offers the following comments for your consideration on how to update the 2022 Title 24 Building Energy Efficiency Standards to align with the state’s climate, energy efficiency, and affordability goals.

Sierra Club is the nation’s oldest and largest grassroots environmental organization which has nearly over 3.5 million members and supporters nationwide, with approximately 400,000 members and supporters in California.² Sierra Club is dedicated to the protection of public health and the environment and has long been a leading voice for reducing our greenhouse gas emissions by eliminating the use of fossil fuels.

Sierra Club’s comments focus on improving the 2022 building standards to support lower emissions and more affordable buildings for all Californians. At a high level, the California Energy Commission (“CEC”) should: (1) establish an all-electric baseline for building code compliance; (2) adjust the signal from the Time Dependent Valuation (“TDV”) to encourage buildings with flexible loads and demand response; (3) use the new time dependent source energy metric and establish a stringent carbon budget for all building types; (4) update inputs in the metrics to align with current climate science; (5) update non-combustion emissions assumptions to reflect available data and market transformation.

I. The CEC should establish a single all-electric baseline for code compliance for all building types to align with the CEC and state’s building decarbonization goals

The CEC has historically used a mixed-fuel baseline, which when combined with TDV has biased the building code to favor mixed-fuel and penalize all-electric new construction. In the 2019 Energy Update Standards, CEC introduced a fuel neutral approach with both an all-electric and a mixed fuel-baseline for low-rise residential. This effectively leveled the playing field and allowed new designs to be all-electric or mixed-fuel.

For the 2022 Standards, the CEC must go a step further in order to align the building energy efficiency code with the state’s building decarbonization and climate goals, and to protect ratepayers and builders from higher costs from mixed-fuel buildings. The CEC should establish an all-electric baseline for code compliance. This does not necessarily prohibit new gas hookups but requires that all new mixed-fuel buildings achieve the same level of low-emissions as all-electric building designs.

available at https://www.ethree.com/wp-content/uploads/2018/06/Deep_Decarbonization_in_a_High_Renewables_Future_CEC-500-2018-012-1.pdf.

² As of October 2019, there are nearly 800,000 Sierra Club members nationwide and approximately 170,000 in California. The above-referenced figures also include Sierra Club supporters, in addition to members.

A fuel-neutral approach where the CEC introduces baselines for both mixed-fuel and all-electric building types does not send a strong enough market signal needed to yield lower-emission building designs that can achieve zero-emissions as the grid moves towards 100% clean energy, as set out in SB 100. Rather, this approach risks locking in new mixed-fuel construction out until 2026, in new buildings that will last at least 30 years-- a risk that California cannot afford.

Similarly, **the CEC’s proposed approach of a mixed-fuel and an all-electric baseline will not protect residents and businesses from the higher costs of mixed-fuel buildings.** Numerous studies, including the E3 Future of Gas study commissioned by the CEC and the Gas System in Transition Gridworks study, find that California must halt new gas hookups, lest the state face a number of stranded gas assets, a \$20 billion/ year higher decarbonization bill, and leave a legacy for ratepayers that includes escalating gas rates.³ The state should “require[e] all new residential and commercial construction to be all-electric as quickly as possible, to mitigate future stranded gas infrastructure costs and to avoid committing to decades of future greenhouse gas (“GHG”) emissions from gas combustion in buildings. Consider elimination of gas line extension allowances as a first step in that direction.”⁴ Eliminating gas line extensions alone, to start, would save “more than \$150 million dollars of new utility capital ... every year.”⁵ Longer term, a “no building electrification” scenario would cost the state \$32 billion/year as opposed to a high building electrification scenario that costs \$13 billion/year, a difference of nearly \$20 billion/year for a no building electrification scenario.⁶

Utilities’ gas revenue requirement is increasing, while gas throughput is expected to decrease. This means that residential and commercial ratepayers using gas will be subject to quickly escalating gas bills. That phenomenon is borne out in E3’s PATHWAYS current policy reference scenario, where gas rates increase for all customer classes.⁷ The utility bills in the no-building-electrification scenario increase over time because of a combination of decreased gas system throughput and an increased share of costly electrolytic fuels that are blended into the pipeline.⁸ **By 2040, a typical mixed-fuel customer could pay between \$35 to \$50 more per month than a typical all-electric customer in this scenario.**⁹ California’s biomethane supply is limited and cannot alone reduce the GHG intensity of pipeline gas enough to achieve an 80 percent reduction.¹⁰ Once the biomethane portion of the renewable natural gas supply curve is exhausted, then the state must turn to hydrogen, a more expensive option, and synthetic natural gas, which is

³ Gridworks, *California’s Gas System in Transition*, at 9. See also E3, *Draft Results: Future of Natural Gas Distribution in California*, at slides 29-30.

⁴ Gridworks, *California’s Gas System in Transition*, at 3, and 11-12.

⁵ *Id.* at 11.

⁶ *Id.* at 9.

⁷ CEC, *Natural Gas Distribution in California’s Low-Carbon Future* at 53.

⁸ *Id.* at 62.

⁹ *Id.*

¹⁰ *Id.* at 79.

even more expensive than hydrogen.¹¹ Ultimately by 2050, the commodity cost of blended pipeline gas will be more than 4 to 7 times that of natural gas today.¹²

Ultimately, building electrification lowers the total societal cost of meeting California’s long-term climate goals.¹³ The High Building Electrification scenario has a lower cost than the No Building Electrification scenario in 2050 by \$5 billion to \$20 billion per year.¹⁴

While there are forces that will increase the cost of maintaining the electric grid, including the costs of wildfires and upgrades to the electric grid to prevent future wildfires, these costs will be experienced in all future scenarios, even those scenarios with low building electrification.¹⁵ The CEC study finds that the addition of new electric loads, in the form of electric vehicles and building electrification, actually helps to mute these cost impacts on electric rates.¹⁶

Furthermore, with the right building codes and regulations in place, these new electric loads offer the possibility to provide flexibility to the grid, which could help to reduce the cost of decarbonized electricity.¹⁷ **In short, all-electric new construction is a key climate and affordability measure and is a foundational way for the CEC to adhere to the Warren-Alquist Act’s requirement of cost-effective energy efficiency improvements.**¹⁸

II. The CEC should adjust the signal from TDV to encourage building designs with flexible loads/demand response resources

The CEC’s Time dependent valuation (TDV) metric does not currently send the appropriate signals to encourage new buildings to have demand response resources. In a time period of increasing renewable energy penetration and constrained grids, it is necessary for new buildings to self-utilize rooftop solar and to employ load flexibility resources.

The proposed TDV metric does not give proper weight to load shifting, demand response, pre-cooling, energy storage, and other load flexibility measures, which are important for moving towards decarbonization, integration of renewable energy, and ultimately achieving the state’s

¹¹ *Id.* at 27 and 79.

¹² *Id.* at 79.

¹³ *Id.* at 4.

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ *See generally* Warren-Alquist Act, Public Resources Code, § 25000, et seq. (The metric of cost-effectiveness is woven throughout the Act.); *See e.g., id.* § 25403(2), (“The cost-effectiveness of strategies to reduce emissions of greenhouse gases from space heating and water heating in both new and existing residential and commercial buildings.”); *id.* § 25000.1(c) (“In calculating the cost effectiveness of energy resources, including conservation and load management options, the commission shall include a value for any costs and benefits to the environment, including air quality.”)

climate goals in the most cost effective way. CEC’s enabling statute requires that the standards adopted or revised “shall be cost-effective when taken in their entirety and when amortized over the economic life of the structure compared with historic practice.”¹⁹ The statute further explains that when determining cost-effectiveness, the CEC shall consider: (1) value of energy saved, (2) impact on product efficacy for the consumer, and (3) the life cycle cost of complying with the standard.²⁰ The CEC must also make considerations of relevant factors as required by the Health and Safety Code, which include, but are not limited to: (1) the impact on housing costs, (2) total statewide costs and benefits of the standard over its lifetime, (3) economic impact on California businesses, and (4) alternative approaches and their associated costs.²¹ The CEC should make clear that it has addressed all of these required considerations during its development of the 2022 Energy Update. To fulfill the above statutory requirements, the 2022 standards should encourage demand response and load flexibility which will lower the cost of energy bills for California residents and businesses, lower the statewide costs, and increase the statewide benefits of the 2022 standards.

As currently proposed, the TDV metric holds the total cost of energy constant at forecasted retail price levels and then gives slightly more weight to on-peak hours and less to off-peak hours. The CEC’s included flat adder is in the form of a constant value for every hour of the year, which in turn dampens the price signal for flexible loads rather than facing a near-zero or even negative TDV price in the middle of the day on some days (“belly of the duck”). This makes it more difficult or impossible to achieve near-zero or negative TDV.

We recommend that a retail rate adjustment adder should be proportional to other TDV components to encourage deployment of load flexibility resources that are critical to the smooth and cost-effective operation of California’s grid.

III. **The CEC should use the new metric time dependent source energy and establish stringent carbon budget for building types**

Sierra Club strongly supports the proposed addition of the new Source Energy Metric to help the 2022 standards align with building decarbonization and climate goals.

We note that the Source Energy Metric for renewable natural gas and blended hydrogen in the pipeline should not be zero due to methane leakage from the gas system. When biomethane and synthetic gas leak, they have the same global warming potential as methane from fossil gas. Similarly, hydrogen that is blended with fossil or synthetic gas can also leak, and the methane leakage here must similarly be accounted for. The CEC should factor in methane leakage into

¹⁹ *Id.* § 25402(b)(3).

²⁰ *Id.*

²¹ *Id.*

any decarbonized gas assumption for mixed-fuel buildings. We discuss methane leakage rates below.

Sierra Club notes that the new Source Energy Metric will send a strong signal for low-emission buildings *only if* the carbon budget per building type and climate zone is stringent. **These carbon budgets should be based on the all-electric lower-emission designs to encourage builders to design buildings for lowest emissions in order to meet the state goals for emission limits.**

IV. **The CEC should update inputs in the TDV and Source Energy Metrics to align with climate science and California’s climate goals**

A. **CEC should use the 2045 carbon neutrality goal set out by Executive Order B-55-18, not 80% below 1990 emission levels by 2050.**

The proposed TDV metric includes improper assumptions that ignore the urgency and cost effectiveness of moving to zero-emission all-electric buildings. The CEC is currently not planning on incorporating Executive Order B-55-18, which outlines the state’s goal to reach carbon neutrality by 2045, into the 2022 Energy Code. As such, by basing the building code on outdated standards (80% reduction by 2050), the CEC is more likely to overlook necessary GHG savings and cost savings benefits of all-electric designs. A conservative approach to building codes would be based on the 2045 carbon-neutrality goals to ensure we align policies appropriately with ratepayers and the climate in mind.

B. **The CEC should adjust the assumptions for renewable natural gas potential to reflect its scarcity and high cost.**

The renewable natural gas (“RNG”) assumptions included in the Title 24 2022 presentation materials are too high and not realistic. The E3 Building Decarbonization assumptions project that “Renewable Natural Gas is blended in the pipeline, with 10% biomethane blended by 2030 and 19% by 2050.”²² However, multiple estimates for California biomethane potential suggest that full, incentivized development of existing biomethane resources would meet only a miniscule fraction of California’s demand.

The U.S. Energy Information Administration (“EIA”) estimates that California consumed 2,137 billion cubic feet (“Bcf”) of natural gas in 2018.²³ But the estimates of biomethane potential are far lower. The National Renewable Energy Laboratory (“NREL”) estimates that there are potentially 58 Bcf of biomethane available per year in California from landfills, wastewater,

²² Title 24 2022 TDV Factors Background and Updates, slide 14, *available at* <https://efiling.energy.ca.gov/GetDocument.aspx?tn=230303&DocumentContentId=61847>.

²³ *See* U.S. EIA, *Natural Gas Consumption by End Use*, *available at* https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm.

animal manure, and other sources of waste.²⁴ A University of California, Davis research team estimates the state’s economically viable biomethane production potential to be 14 Bcf annually through 2030, assuming a \$120 per credit incentive under the Low Carbon Fuel Standard (“LCFS”).²⁵ If significant additional incentives were provided, the researchers estimate that a total of 82 Bcf of biomethane could be captured annually in California. Other research entities have estimated the total biomethane potential from waste in California as follows.

Source	Estimate of potential biomethane from waste in California (Bcf/year)	Percentage of California’s total 2018 natural gas use that biomethane could replace	Percentage of California's total 2018 gas use in residential and commercial buildings that biomethane could replace
UC Davis with LCFs incentives	14	0.7%	2.08%
American Gas Foundation ("non-aggressive" estimate)	41	1.9%	6.10%
Union of Concerned Scientists	45	2.1%	6.70%
NREL	58	2.7%	8.63%
UC Davis with LCFS and RFS incentives	82	3.8%	12.20%

²⁴ NREL, *Biogas Potential in the United States*, at 3 (Oct. 2013), <http://www.nrel.gov/docs/fy14osti/60178.pdf>. The report’s estimate of 1.1 million tonnes of potential biomethane in California was converted into cubic feet using methane’s density of 0.0424 pounds per cubic feet at 14.73 pounds per square inch of pressure and 60 degrees Fahrenheit.

²⁵ Amy Myers Jaffe *et al.*, *The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute*, Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-16-2 (2016), available at <https://steps.ucdavis.edu/the-feasibility-of-renewable-natural-gas-as-a-large-scale-low-carbon-substitute/>.

American Gas Foundation ("aggressive" estimate)	94	4.4%	13.99%
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The E3 TDV Factors Background and Updates presentation assumed that RNG would be blended into the pipeline, with 10% biomethane blended by 2030 and 19% by 2050. In order to align these estimates with the most aggressive identified biomethane potential above, the state’s pipeline gas consumption would have to fall to 940 Bcf by 2030 and to 494 Bcf by 2050. In its recent “Future of Gas” study, E3 emphasized the significant technical obstacles and the projected shortfall in availability, noting “Biomethane supplies within California are limited, and on their own fall short of meeting the long-term demand for low-carbon gaseous fuel in the state’s buildings and industries, without electrification.”²⁶

Even assuming access to out of state biomethane potential, E3 expects that there is “insufficient biomethane to displace the necessary amount of building and industry fossil natural gas consumption to meet the state’s long-term climate goals.”²⁷ Given the minimal availability of biomethane potential, Sierra Club recommends that the biomethane assumptions be reduced to be in line with more conservative and realistic estimates of biomethane availability.

Furthermore, in the context of building codes, building electrification poses a cost-effective alternative to reliance on biomethane, and the limited biomethane resources should be reserved for other, more difficult to electrify sectors. The first and central conclusion of the “Future of Gas” study is that RNG is “an expensive strategy” and that the “high cost of RNG would likely encourage economic electrification.”²⁸ Under a high building electrification scenario, E3 estimates that most of the remaining gas output would serve the industrial sector.²⁹ As noted by E3 staff at the workshop, biomethane in the pipeline means that there is less biomethane available for industrial use, thereby pushing up costs in other sectors—there is a direct tradeoff.³⁰ Due to the scarce availability of biomethane resources and the need to decarbonize multiple sectors with the same set of resources, Sierra Club recommends that the CEC revise down their assumptions for biomethane availability in future years.

²⁶ E3, *Deep Decarbonization in a High Renewables Future*, at 33.

²⁷ *Id.*

²⁸ E3, *Draft Results: Future of Natural Gas Distribution in California*, at slide 6.

²⁹ *See, e.g., id.* at slide 52.

³⁰ Title 24 2022 pre-rulemaking, Docket #19-BSTD-03 and #19-BSTD-04, Lead Commissioner Workshop, October 17, 2019, Workshop Transcript at 129, *available at* <https://efiling.energy.ca.gov/getdocument.aspx?tn=230736>.

V. **The CEC should update non-combustion emissions assumptions to reflect available data and market transformation.**

We agree that California must account for non-combustion emissions to track these emissions and create mechanisms to incentivize non-combustion emission reduction.

The methane leakage assumptions put forth by E3 are too low and do not accurately reflect what is contained in scientific peer-reviewed literature. A literature review shows a large range of leakage rates from the very low end (EPA 1.5 percent) to mid-range (EDF/Alvarez 2.3 percent) to higher end (Howarth upwards of 6 percent). Accounting for methane leakage is especially important, as the use of natural gas in buildings carries with it much more than the combustion burden, and in most estimates can double the emissions from straight combustion emissions. The proposed 0.7 percent rate for methane leakage assumes there is only a rate of 0.2 percent leakage upstream. This value is less than 10 percent of the widely accepted rate of 2.3 percent. We recommend estimating methane leakage at 2.8 percent to account for 2.3 percent upstream leakage and 0.5 percent leakage behind-the-meter.³¹

In developing the 2022 building code standards, the CEC should be doing so with current climate science in mind. For global warming potential (GWP), a 20-year GWP should be used rather than the proposed 100-year GWP. This is especially important for gas since methane has a 12-year life in the atmosphere. Although other state agencies may also be in the process of updating their own GHG standards and inventories, the CEC needs to undertake its own independent analysis of the latest climate science. The CEC need not delay the 2022 code standards development awaiting the climate analysis of other state agencies. There is an imminent climate crisis and proper methane accounting makes a significant difference in whether California meets its climate goals.

VI. **The CEC Should Follow local government leadership with Building Electrification ordinances**

Several cities and counties across the state are leading the way on an all-electric and/or zero-emission building codes. As of early December, over twenty cities or counties have passed some

³¹ See Science, *Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain*, (July 13, 2018), available at <https://science.sciencemag.org/content/361/6398/186> (noting 2.3% methane leakage in gas production); Lawrence Berkeley National Laboratory, *A Survey of Methane Emissions from the California Natural Gas System*, at 51 (Oct. 2017) (noting 0.3-0.5% methane leakage), available at <https://ses.lbl.gov/sites/default/files/pdf.pdf>; CEC, *Natural Gas Methane Emissions from California Homes*, at 2 and 38 (Aug. 2018), available at <https://www.energy.ca.gov/2018publications/CEC-500-2018-021/CEC-500-2018-021.pdf>.

sort of electric-preferred or electric-required building code. And dozens more cities and counties in California are considering similar measures.³²

The CEC should follow the lead of these cities and counties to help provide a consistent approach statewide. Patchwork codes do not work well for builders in the long-run, and the growing consensus, as described in the CEC’s 2018 IEPR, is that all-electric buildings are the primary strategy to decarbonize California’s buildings.

California Cities and Counties That Have Passed All Electric Codes³³

All-electric only	Electric-Preferred	Other Approaches
<ul style="list-style-type: none"> ● Berkeley ● Menlo Park[^] ● Morgan Hill ● Mountain View ● Pacifica[^] ● Palo Alto ● San Jose ● Santa Rosa ● Windsor 	<ul style="list-style-type: none"> ● County of Marin ● Davis ● Milpitas ● San Jose ● San Mateo ● San Luis Obispo ● Santa Monica 	<ul style="list-style-type: none"> ● Carlsbad (Electric Water Heating) ● Sunnyvale (Density Bonus) ● Oakland (Electric Vehicles)

[^]Electric Clothes Drying, Space and Water Heating Required, Non-Residential All Electric Requirement

³² Matt Gough, *Forward Looking Cities Lead the Way to a Gas-Free Future* (Dec. 4, 2019), available at <https://www.sierraclub.org/articles/2019/11/forward-looking-cities-lead-way-gas-free-future>.

³³ See *id.*; see also Building Decarbonization Coalition, *Decarbonization Code Comparison Matrix as of 12/05/2019*, available at <http://www.buildingdecarb.org/active-code-efforts.html>.

Conclusion

Sierra Club appreciates the opportunity to provide comments on the Title 24 2022 Building Energy Efficiency Standards.

Sincerely,

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