DOCKETED	
Docket Number:	19-BSTD-03
Project Title:	2022 Energy Code Pre-Rulemaking
TN #:	232710
Document Title:	NRDC Comments - NRDC Comments on 2022 Energy Code Compliance Metrics
Description:	N/A
Filer:	System
Organization:	NRDC
Submitter Role:	Public Agency
Submission Date:	4/10/2020 12:12:27 PM
Docketed Date:	4/10/2020

Comment Received From: NRDC
Submitted On: 4/10/2020
Docket Number: 19-BSTD-03

NRDC Comments on 2022 Energy Code Compliance Metrics

Additional submitted attachment is included below.

Comments of the Natural Resources Defense Council (NRDC) on
March 26, 2020 Staff Workshop on 2022 Energy Code Compliance Metrics
Docket Number #19-BSTD-03
April 10, 2020
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 Compliance Metrics Update on behalf of its more than 450,000 members and activists in California who have an interest in receiving affordable energy services while addressing the climate crisis and reducing the environmental impact of California's energy consumption.

I. Executive Summary

CEC's own analyses have found that electrification is the lowest-cost, lowest-risk pathway to decarbonize California's building sector. CEC's draft study on the Future of Gas Distribution in California also shows a significant decline in gas demand in all scenarios, leading to exponential increases in rates unless the transition is carefully managed and we stop any new gas infrastructure investments that will be stranded before the end of their 50-year life. Under these conditions, any new building built with fossil fuels over the next code cycle will lock occupants into higher gas bills, and Californians into higher climate and air pollution. To have a chance to decarbonize buildings at the pace, scale, and affordability needed to avert the climate crisis, we cannot continue to build new buildings with fossil fuels. New construction is an urgent and cost-effective first step toward the decarbonization of California's buildings. By avoiding gas infrastructure, all-electric new construction is also a critical opportunity to reduce the cost of new housing in California, helping mitigate the housing affordability crisis in the state.

NRDC strongly supports the 2022 building code update priorities that staff reiterated from the previous workshop of building decarbonization, a resilient building envelope, and a strong demand flexibility signal. The main challenge is in how to implement these priorities in the 2022 code.

The Time Dependent Valuation (TDV) and Time Dependent Source Energy (TDS) compliance metrics are generally going in the right direction, with some enhancement opportunities discussed later in these comments. The compliance metrics provide a useful tool to align the code with decarbonization, but they are only one leg of the stool to achieve decarbonization objectives: the other two legs are: 1) the set of standard designs, i.e. the baselines that proposed designs will be compared to in the performance path. Compliance metrics aligned

with the above priorities will have little effect if the baselines continue to allow high-emissions fossil-fueled designs; and 2) the removal of remaining modeling barriers for some electric systems. These hurdles range from the inability to model certain electric system types, to giving systems lower performance credit than the benefits they actually provide. This removes cost-effective pathways for builders to build all-electric and can make compliance challenging as designers are forced to model inefficient dummy systems in lieu of the actual system type.

We urge the commission to rapidly lay out a comprehensive approach for achieving the 2022 code cycle's building decarbonization goals including both baseline and modeling changes, by building type.

II. Compliance Metrics

1. Retail Rate Adjustment in TDV

The "retail rate adjustment" is an adjustment factor that scales the other components of the TDV metric to match the projected retail costs of electricity over the next 30 years. This is done so that TDV is representative of the retail cost of electricity and can be used as a customer cost-effectiveness metric. The problem is that this retail rate adjustment scaling factor represents more than half of the overall value of TDV, and it has historically been added as a flat (constant) value over every hour of the year. This significantly dampens the TDV price signal, particularly at times when wholesale electricity costs are low or even negative, when it would be beneficial for the electric grid to shift demand from peak periods to these low-demand periods. TDV fails to provide a meaningful price signal for load shifting, including energy storage and demand flexibility.

In response to stakeholder comments, CEC proposed a "15%-scaled" retail rate adjustment which make 15 percent of the adjustment scale proportionally to the other components of TDV and keeps the remaining 85 percent flat. This is a step in the right direction, although it still falls short of providing a strong enough price signal for load flexibility measures. Load flexibility is as important for building decarbonization as photovoltaic generation and energy efficiency. TDV should provide a GHG performance-based price signal that rewards all decarbonization measures based on their GHG reduction outcome over the life of the building. This requires a stronger load flexibility price signal than is currently proposed. However, we understand the potential impacts on clean energy industry stakeholders of an abrupt transition, and support 15 percent as a first step in the right direction but urge the commission to continue to better value energy storage and demand flexibility technologies in future code cycles. For the 2022 code, the adoption of the 15-percent option instead of the non-scaled initial proposal is critical to better value load flexibility and decarbonization measures.

2. *Methane Leakage*

Gas use in buildings impacts the climate in two ways: 1) from combustion emissions, primarily CO2; 2) from leakage of unburnt gas, primarily methane at all stages of its lifecycle, from production, to processing, transmission, distribution to homes, and behind-the-meter leaks in building piping and at the burner tip, particularly every time a burner starts and stops as tankless water heaters do frequently. CEC proposes to include the impacts of leakage in TDV for the first time. We support this move but note that the proposal underestimates the climate impact of fugitive methane emissions in several ways, resulting in significantly underestimating these impacts.

The proposed TDV only includes behind-the-meter leakage (0.7% of gas used) with a 100-year global warming potential (GWP). This underestimates the climate impacts of methane in three ways:

1. **Out-of-state upstream leakage**: studies show that methane leakage at the production well and processing stage dwarf behind-the-meter leakage.[1] The California Air Resources Board (CARB)'s tracking of upstream leaks only covers the 10-percent of in-state gas production, not the 90-percent of the gas that California imports and that is driven by gas demand in California. The 10-percent in-state production should not be included in TDV to avoid double-counting, but the other 90-percent must be accounted for, consistently with out-of-state electricity emissions that are accounted for in TDV.

2. **Attribution:** how much would a reduction in California's gas demand reduce upstream leakage? Arguments can be made that production wells and pressurized pipes still leak even if demand is reduced. However, over the long-run the large-scale reduction in gas demand from the building decarbonization policies we need to achieve California's climate goals would result in many fewer gas wells drilled (including super-polluting events at those sites), less storage facilities such as Aliso Canyon, fewer and lower pressure pipelines, and therefore reduced fugitive emissions. Over the long-run and at scale, gas demand reduction will lead to avoiding the vast majority of upstream emissions, this must be reflected in metrics that drive fuel choice.

3. **Global warming potential (GWP):** The proposed TDV uses a 100-year GWP, which is aligned with CARB's GHG inventory, but not with the agency's Short-Lived Climate Pollutants (SLCP) strategy which exclusively relies on 20-year GWP values for determining the most effective strategies to reduce SLCPs.[2] 20-year better reflects the urgency of the climate crisis and the timeframe over which fugitive methane emissions

[1] Alvarez R. et. al., "Assessment of methane emissions from the U.S. oil and gas supply chain," Science, July 2018

[2] https://ww2.arb.ca.gov/sites/default/files/2018-12/final_slcp_reduction_strategy_w_appx_march2017%20Final%202017.pdf

from building fuel choice impact the climate. CEC should use 20-year GWP in alignment with CARB's SLCP strategy.

III. Compliance Baselines

The prescriptive designs used as baselines for evaluating the performance of proposed designs, are a critical component of the toolkit that is necessary to align the building code with GHG emissions outcomes. Compliance metrics alone will have little effect if the baselines continue to allow high-emissions fossil-fueled designs. We urge the commission to rapidly propose a strategy for baseline development for each building type that provides a strong decarbonization signal in a flexible, GHG performance-based manner. As discussed in the summary of these comments, the 2022 code is the time to shift the vast majority of the market to all-electric new construction. Californians cannot afford another three years of fossil-fuel based construction that would saddle them with unaffordable gas bills over the life of these buildings and lock them into the impacts of the climate crisis.

This is particularly critical in the multi-family sector, which houses a disproportionate share of low-income Californians. These disadvantaged communities can least afford the escalating gas bills that we now know will come, due to the large investments that gas utilities are currently making to bring gas pipelines up to safety standards, while gas demand is projected to decline sharply due to a warming climate, the state's energy efficiency policies, and customers switching to cleaner and more affordable electricity for heating and hot water. The combination of declining demand and rising costs sets the state for an exponential price spiral that will hurt Californians, and particularly low-income communities who spend a disproportionate share of their income on energy bills. The CEC must ensure that all or most of multifamily new construction is all-electric and highly-efficient starting January 1, 2023. This will also reduce first costs from avoided gas connections and gas infrastructure within the buildings, helping mitigate California's housing affordability crisis in an equitable manner.

3. Share Baseline and Other Modeling Data

We respectfully request that CEC makes the non-residential baseline systems used by Noresco accessible to all stakeholders to allow them to evaluate these models and help inform the commission's code development work, particularly over the next six months that are critical to lead to a timely adoption of the 2022 code in May 2021. This should include the prototype models, appropriate software versions, and the raw TDV data.

IV. Removing Remaining Modeling Barriers

In addition to compliance metrics and baselines, the third leg of the stool for a GHG-aligned building code is the removal of remaining modeling barriers for some electric systems, that remove cost-effective pathways for builders to build all-electric. These barriers range from the inability to model certain electric system types, to giving some systems lower performance credit than the decarbonization benefits they actually provide.

The commission has been making major progress in removing or reducing electrification barriers over the past few years, including better credits for some variable-capacity heat pumps, developing modeling capabilities for central heat pump water heating systems, and updating the baseline for high-rise residential heating, ventilation, and cooling (HVAC) systems. We strongly support these efforts, but let us not lose sight of the remaining barriers that are hindering the move to decarbonized new construction in California.

We include here a summary of the primary modeling limitations in the performance software that continue to make it more challenging for all electric buildings to comply with the code. This may not be exhaustive, we provide this as a starting point for prioritization, and urge the commission to prioritize the removal of these barriers for the 2022 code development.

1. Residential: Increase the credit given for variable capacity ductless and short-ducted systems and variable-speed packaged terminal heat pumps to better reflect field performance.

We greatly appreciate the work of the CEC to date to give credit to these systems in the residential software. However, the credit given remains a very conservative estimate of potential energy savings based on field performance and does not apply to **high- and mid-static short-ducted systems** or **variable-speed packaged terminal heat pumps (PTHP)**, which continue to be rated as minimum efficiency. These systems are a key decarbonization technology and should be credited in the software to better reflect their performance.

We urge the CEC to continue to improve the credit given to these systems to fully reflect field performance. Crediting ductless HPs, short-ducted variable capacity systems, and PTHPs closer to field performance would likely be attractive to builders, as these systems can improve building layout options through removal of ducts, in addition to saving energy.

2. High-rise multi-family: Allow central heat pump water heaters to be modeled for domestic hot water.

Allowing efficient central heat pump water heating systems to be modeled and appropriately credited for their decarbonization benefits is critical to enable the transition to all-electric high-rise multifamily buildings, which is a key equity and affordability consideration for the 2022 building code.

We appreciate the work that has been done by the CEC and utility teams to date to conduct the necessary research to integrate these systems and to offer an interim prescriptive compliance approach for Sanden systems. While the work to date is a significant step in the right direction, it is critical to expand software modifications to allow for multiple types of central heat pump water heaters to be modeled. Our understanding is that this will be integrated into the software by the end of 2020, which we strongly support.

3. Non-residential: Add capability for heat pumps serving space heating water loops to be modeled and improve ability to model thermal storage with these systems.

All electric non-residential buildings, particularly large buildings and campus-scale projects, often use specific system types such as heat recovery chillers, air to water heat pumps, geothermal heat pumps, and large-scale thermal storage. Allowing the modeling and appropriate crediting of these systems is necessary to enable non-residential construction to transition to all-electric.

While good progress has been made to date to integrate heat pump water heaters serving domestic hot water loops, there has been limited progress to integrate heat pumps serving space heating loops, to provide a high-efficiency electric alternative to gas boilers in non-residential buildings. Specifically heat recovery chillers, air to water heat pumps, and geothermal heat pumps all must be modeled using work arounds such as electric resistance boilers, which often drastically undervalue the system's efficiency.

Additionally, the ability to model thermal storage in conjunction with these systems is needed to properly account for their performance. We strongly recommend that the CEC in coordination with the IOUs and other stakeholders work to begin gathering any data necessary to integrate these systems into the software, and ensure they can be modeled and appropriately credited in the 2022 code.

4. Non-residential: Allow credit for photovoltaic (PV) in lieu of solar thermal requirement and in combination with variable air volume (VAV) systems with electric reheat.

Currently PV cannot be credited in the non-residential software, despite its ability to directly offset usage of key electrification technologies. We recommend allowing limited credit for PV in high-rise residential and non-residential buildings when used in combination with systems that have coincident usage which the PV can directly offset (e.g. VAV with electric reheat, central heat pump water heaters).

Thank you for the opportunity to comment on the 2022 Energy Code compliance metrics.

Respectfully,

Pierre Delforge
Senior Scientist
Natural Resources Defense Council
111 Sutter Street, 21st Floor, San Francisco, CA 94104
Email: pdelforge@nrdc.org