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REVISED NRDC Comments: Achieving Zero Emissions Buildings

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Additional submitted attachment is included below.

Comments of the Natural Resources Defense Council (NRDC) on the
2018 Integrated Energy Policy Report (IEPR)
Commissioner Workshop on Achieving Zero Emissions Buildings
Docket Number 18-IEPR-09
June 14, 2018
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The Natural Resources Defense Council (NRDC) appreciates the opportunity to offer these comments on the 2018 IEPR Commissioner Workshop on Achieving Zero Emissions Buildings on June 14, 2018. NRDC is a non-profit membership organization with more than 95,000 California members who have an interest in receiving affordable energy services while reducing the environmental impact of California's energy consumption.

Summary

The electricity, natural gas, and propane used in California buildings are responsible for a quarter of California's climate emissions, and are also significant contributors to air pollution. However, while the state has made great strides in promoting clean electricity from the wind and sun, thanks to policies like the Renewable Portfolio Standard and the California Solar Initiative, the state lacks comprehensive policies that ensure deep reductions in emissions from space and water heating in buildings. Reducing these emissions, or "decarbonizing California's buildings," is essential to help achieve the state's goal to reduce economywide emissions by 40 percent by 2030.

A range of technologies exist today that can cut those heating emissions dramatically, including: super-efficient heat pumps, solar thermal, energy storage, energy efficiency, renewable gas, and grid-responsive demand controls. These technologies can also reduce air pollution and lower Californians' utility bills, helping to make housing more affordable. However, market barriers and the lack of policy support has limited the market development of clean heating solutions to date – these technologies can cost more to install, both customers and contractors are not familiar with them, and product distributors often don't stock them.

The California Energy Commission (CEC), in collaboration with the California Public Utilities Commission (CPUC), the California Air Resource Board (CARB), and the California Independent System Operator (CAISO), have a major role to play in removing these barriers and

unlocking the potential for cleaner, healthier, more affordable buildings. Specifically, NRDC recommends CEC takes the following actions:

1) Assess the potential to reduce emissions in the state's building sector by 40 percent by 2030, in line with SB 32's economywide target. Assess the benefits and potential impacts on customer bills and on the electricity grid;
2) Develop a plan to implement cost-effective building decarbonization strategies;
3) Evolve the building energy code to move new construction practices toward cost-effective *GHG emissions* reductions in addition to cost-effective energy savings;
4) Update the building code software to remove barriers that hinder the use of low-emissions technologies in new buildings today;
5) Convene a market development collaborative with industry, utility, and other stakeholders to bring higher performance and lower cost clean heating technologies to market in California;
6) Assess the potential for load management to help reduce GHG emissions and integrate renewable energy on the grid at a lower cost; develop strategies to accelerate the adoption of load management technology in the market;
7) Develop GHG emissions factors that represent the long-term effects of building decarbonization policies, and appropriately value lower-emissions solutions including demand flexibility. Ensure that the impacts of fossil fuels are appropriately accounted for, including fugitive emissions of methane from out-of-state fossil fuel imports.

Building Decarbonization is Essential to Achieving California's Greenhouse Gas Reductions Goals

Buildings contribute a large fraction – a quarter – of California's greenhouse gas emissions and have potential for large reductions. NRDC appreciates the CEC's effort to hold a productive and informative workshop on this understudied component. NRDC encourages the CEC's further leadership on this issue in its 2018 Integrated Energy Policy Report Update and future policies.

Under the guidance of California's Renewable Portfolio Standards and energy efficiency policies, significant improvements in energy efficiency and the development of more renewable electricity resources are underway. This will significantly reduce building electricity emissions.

However, the state's energy efficiency policies alone are not sufficient to reduce the emissions from natural gas and propane used for space and water heating, according to E3's PATHWAYS analysis. Thus, the state must look to lower-carbon heating options, such as high efficiency electric heat pumps, solar thermal, and renewable natural gas. E3's presentation showed that renewable gas has a contribution to make, but cannot provide the majority of the solution because of limited supply and high cost. The best-case *technical* potential for biomethane, the main option for renewable natural gas, can only provide a fraction of California's 2050 heating demand. Additionally, E3's Cost Mitigation graph also shows biofuels as one of the most expensive measures to reduce carbon dioxide.

Instead, reducing heating emissions will require a significant amount of electrification, switching from fossil fuel heating fuels to electricity. Low-emission buildings will depend on electricity, efficiency, and flexibility. Electricity in California continues to grow cleaner as more renewables come on line. Installing more efficient appliances like electric heat pumps for space heating and water heating will reduce energy use and emissions. Electric heat pumps are 2-3x more efficient than standard natural gas water heaters and furnaces. Paired with more efficient building envelopes, electrifying appliances can reduce customer bills and minimize effects on peak electricity demand. Furthermore, electric appliances can be flexible to consume when electricity is cheapest and cleanest, when there is a surplus of solar, and paired with smart energy management and communication components.

Testimonies from engineers and architects at the workshop, with hundreds of completed projects, confirm that low-emission buildings are feasible and cost-effective – though they are not yet the market norm in California. E3's Cost of Mitigation graph shows that heat pumps are one of the cheapest measures to decarbonize buildings. Furthermore, Professor Roland-Holst's macro-economic analysis illuminated that the societal benefits from low-emission buildings are immense with decreased medical costs, job growth, and income growth.

Building decarbonization should be California's next major energy transition. The power and transportation sectors are rapidly transitioning, led by targeted and coordinated policies. The building sector lacks a comprehensive set of policies in line the state's 2030 and 2050 greenhouse gas reduction goals. "Zero-emission" buildings can become commonplace with a readjustment of policies to remove regulatory and market barriers.

Policy Recommendations to Spur Building Decarbonization

The CEC can implement policies that are technology-neutral to unlock market demand. The workshop panel of engineers and architects stated California has not sent a market signal to manufacturers and builders for its desire for low-emission buildings. Without this signal, there is a lack of access to products that are available internationally, under-investment in retrofit products, and a lack of training in low-emission technologies in the installer community. **The CEC should set market adoption goals, provide incentives, offer training, and convene a market development collaborative to jump start the market in California.**

The CEC can start by assessing the potential to reduce emissions in the state's building sector by 40 percent by 2030, in line with SB 32's economywide target. Importantly, this would include the benefits and potential impacts on customer bills and the electricity grid. Much of this analysis can be based on the existing CEC-funded E3 work presented at the workshop. Based on this assessment, NRDC encourages the CEC to develop a plan to implement cost-effective and equitable building decarbonization strategies. This should include market adoption goals, incentives, and training. NRDC also recommends examining the potential for load management to help reduce GHG emissions and integrate renewable energy on the grid at a lower cost. Similarly, from the results, the CEC should develop strategies to accelerate appropriate load management technology in the market.

NRDC encourages the CEC to convene a market development collaborative with building owners, builders, installers, product manufacturers, and utilities, to address the multiple market barriers. In this collaborative, for example, large apartment owners can clarify end-user needs and price points, and utilities can describe incentive levels to the equipment manufacturers. This information exchange provides manufacturers with information that can give them confidence to invest in bringing already existing low-emissions products available in Europe and Japan to the California market. It also can encourage and inform the manufacturers of the need for products targeted at retrofits from gas to electric, for example, low-amperage heat pumps. The collaborative could also provide installers with best practices on how to install low-emission products cheaply and signal there is a demand for them to increase their capacity to install these products.

NRDC encourages the CEC to collaborate with the California Public Utilities Commission to adjust utility rates to more accurately reflect the cost of electricity throughout the day, and to

enable an increase in electric end-uses. The CEC could create guidelines on rates that would properly incentivize flexible electric loads.

The engineer and architect panel also raised regulatory barriers that impede their efforts to build low-emission buildings. NRDC encourages the CEC to consider updates to the building code and the modeling software based on the suggestions from the engineers and architects at the workshop. Multiple firms mentioned that there are low-emission technologies that are unable to be represented in the building code modeling software, preventing them from knowing if their design will satisfy code. NRDC also encourages the CEC to evolve the building energy code to move new construction industry practices toward cost-effective emissions reductions, in addition to cost-effective energy savings. This could include adding alternative compliance pathways in building code that specify high-efficiency heating equipment with grid-connectivity capability. Such additions provide more space for creative design by builders, and signals to manufacturers the type of equipment that could best serve the California market.

Lastly, NRDC encourages the CEC to uptake the greenhouse gas accounting method advised by the California Air Resources Board, the Total Equipment Warming Index, with one addition. This method considers the methane leakage of natural gas equipment and refrigerant leakage of heat pump technologies, but does not consider the out of state fugitive methane emissions from natural gas transmission. It is especially important to uphold this accounting method as a recently released study from Science showed that leakage from the natural gas supply chain is 60% higher than the U.S. Environmental Protection Agency inventory estimates.[1] In addition to the methane leakage, there are also efficiency losses due to the embedded energy to extract, process, compress and pump natural gas. American Society of Heating, Refrigerating and Air-Conditioning Engineers estimate source to site efficiency losses, from extraction to site, at 9 percent.[2]

It is important to account for these emissions and losses in the same way that power plant efficiency, and transmission, and distribution losses are accounted for in the electricity sector.

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[1] Alvarez, R. et al. Science http://dx.doi.org/10.1126/science.aar7204 (2018)

[2] ASHRAE. 2014. ANSI/ASHRAE Standard 105-2014: Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emissions. Atlanta, GA: ASHRAE.

Fugitive emissions occur along all stages[3,4] of the natural gas lifecycle. These total emissions should be considered when developing a leakage rate to accurately determine the GHG reduction impact of fuel-substitution. A comprehensive leakage rate estimate of natural gas should include leakage that occurs at the well (exploration and production), including out-of-state leakage for the 90% of California's gas supply that is imported from other states, processing, storage and transmission, distribution within the city gates, and on-site leakage in the building.

Determining an accurate leakage rate is essential because natural gas (methane) has 84 to 87[5] times the global warming potential of CO_2 over a 20-year horizon.[6] Not accounting for this benefit leads to sub-optimal GHG reduction strategies.

Conclusion

NRDC supports the CEC's leadership in reducing emissions from buildings. The workshop presentations were clear – we have much of the information we need to **act now** to dramatically reduce emissions from buildings. The CEC should be aggressively using every tool that it has available to transform the building market. The "life times" of buildings are long – we need to build every new building in California right the first time, with climate and clean air in mind. And for our existing buildings, we replace major equipment every 10 to 20 years – we don't have many cycles of replacement before 2050. We need to influence every new equipment purchase in the state as soon as possible, so that we are building toward a healthy and prosperous 2050 for all Californians.

[3] Stages include: exploration, production, processing, transmission, storage, distribution, and end-use. For a description of these stages see Basic overview of stages in the NG system or US EPA GHG Inventory
[4] The California Air Resources Board (CARB) presentation at the recent IEPR meeting provided an overview of potential gas leakage that could occur at different stages of the natural gas production and distribution system.
[5] https://www.epa.gov/ghgemissions/understanding-global-warming-potentials
[6] A 20-year horizon is more appropriate than a 100-year horizon for SB 350 given the SB 350 planning timeframe and the need to reduce GHG emissions within the next decade in order to achieve the Paris Accord targets.