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**Comments of the Natural Resources Defense Council (NRDC) on the
Workshop on the Draft 2018 Integrated Energy Policy Report (2018 IEPR), Volume II
Docket Number 18-IEPR-01**

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I. Introduction and Summary

The Natural Resources Defense Council (NRDC) appreciates the opportunity to offer these comments on the Workshop on the Draft 2018 Integrated Energy Policy Report Update (“IEPR Report”). 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.

II. Discussion

NRDC appreciates the Energy Commission staff’s efforts in developing this Report in a thorough and transparent manner. NRDC’s comments focus on:

- *Comments on Decarbonizing Buildings (Chapter 1):* NRDC strongly supports the Report’s emphasis on decarbonizing buildings as a key strategy to achieve California’s climate and clean energy goals. Moreover, NRDC offers the following suggestions to further improve the decarbonizing buildings chapter:
 - Add NRDC-commissioned Synapse Energy Economics study to policy studies section
 - Building energy efficiency remains critical to achieve climate goals in an affordable manner
 - Building energy policies should account for out-of-state fugitive methane emissions associated with in-state gas use
 - NRDC strongly supports CEC’s goal and proposed approach to align the California Building Energy Code with the state’s climate goals and recommends revising the state’s zero net energy goals to be better aligned with California’s GHG reduction policy.

- *Comments on Doubling Energy Efficiency (Chapter 2)*: CEC leadership, guidance, and partnership with other agencies are necessary to understand how to effectively close the gap between SB350’s doubling energy efficiency target and the current statewide energy efficiency efforts’ trajectory. NRDC recommends that the CEC, in addition to the thoughtful recommendations in the IEPR Report,
 - Provide guidance on how to close the gap between available cost-effective and programmatic projections of energy savings;
 - Lead the charge in developing accurate estimates of agricultural and industrial sector potential;
 - Continue to be involved and provide guidance on the investor owned utility (IOU) and publicly owned utility (POU) potential study development process;
 - Track new programmatic endeavors and accomplishments against CEC’s recommendations in the draft IEPR and Doubling Energy Efficiency Reports to ensure that CEC recommendations are being acted upon.

These recommendations are explained in detail in the following sections.

A. NRDC Comments on Decarbonizing Buildings

NRDC Strongly Supports the Report’s Emphasis on Decarbonizing Buildings as a Key Strategy to Achieve California’s Climate and Clean Energy Goals

The Report rightly identifies the need to pivot from Zero Net Energy to Zero Emissions buildings to align with the state’s 2030 and 2050 climate and clean energy goals, including SB 32, AB 3232, SB 100 and Executive Order B-55-18.

NRDC’s own analysis, performed in partnership with E3,¹ suggests that reducing economywide GHG emissions by 80 percent by 2050 will require a deep decarbonization of the building sector, potentially as much as 95 percent in residential buildings, to compensate for other sectors that may be harder to decarbonize, such as industry and transportation.

NRDC also agrees with the Report that electrification is a key strategy to achieve deep reductions on GHG emissions in the building sector. Energy efficiency remains critical to both

¹ Gowrishankar, V. & Levin, A., NRDC, September 2017, “America’s Clean Energy Frontier: The Pathway to a Safer Climate Future”, <https://www.nrdc.org/resources/americas-clean-energy-frontier-pathway-safer-climate-future>

GHG reductions and to California’s energy affordability and equity priorities, but it is only one of the strategies needed to achieve the level of GHG reductions necessary in an affordable manner. Other strategies must include a shift to using zero-carbon energy in buildings.

NRDC agrees with CEC that efficient and flexible electrification needs to be a primary decarbonization strategy, because the technology exists today, and several analyses suggest that it will be much more affordable than relying primarily on renewable gas.^{2,3,4}

NRDC supports the Report’s assessment that renewable gas can be a part of the solution to reducing GHG emissions from buildings, but its role is likely to be constrained by limitations on renewable gas availability, cost, and ongoing methane leakage concerns. While we see the use of renewable gas as a complementary strategy where it can be produced in an affordable and sustainable manner, current renewable gas supply is limited and very high cost. There is little evidence that supply could be scaled affordably and sustainably to the levels necessary to be the primary pathway to decarbonize buildings. Scarce and high-cost supplies of renewable gas may be better used in sectors that are more difficult to electrify efficiently than the building sector. Given the limitations and high uncertainty regarding the renewable gas pathway, it is prudent to 1) develop the electrification pathway; 2) scrutinize any new investments in gas infrastructure that are not essential for public safety and fugitive methane mitigation, as those will likely become superfluous and stranded before the end of their life as more buildings transition to electric heat. However, NRDC supports research and development on the renewable gas pathway because we believe that state policy should remain technology-neutral, performance-based, and

² Mahone, Amber, Zachary Subin, Jenya Kahn-Lang, Douglas Allen, Vivian Li, Gerrit De Moor, Nancy Ryan, and Snuller Price. 2018. Deep Decarbonization in a High Renewables Future: Updated Results from the California PATHWAYS Model. California Energy Commission. Publication Number: CEC-500-2018-012.

https://www.ethree.com/wpcontent/uploads/2018/06/Deep_Decarbonization_in_a_High_Renewables_Future_CEC-500-2018-012-1.pdf.

³ Billimoria, Sherry, Leia Guccione, Mike Hennen, and Leah Louis Prescott. 2018. The Economics of Electrifying Buildings: How Electric Space and Water Heating Supports Decarbonization of Residential Buildings. Rocky Mountain Institute. <https://www.rmi.org/insight/the-economics-of-electrifying-buildings/>.

⁴ Hopkins A. et al, Synapse Energy Economics, October 2018, “Decarbonization of Heating Energy Use in California Buildings”, <https://www.synapse-energy.com/California-Building-Decarbonization>.

consider long-term benefits and costs in an evolving market to determine what investments should be made to comply with our environmental goals in a least cost manner.

1. NRDC Offers the Following Suggestions to Further Improve the Decarbonizing Buildings Chapter

- a) **Add Synapse Energy Economics Study to Policy Studies Section:** Synapse Energy Economics recently release a new study commissioned by NRDC: “Decarbonization of Heating Energy Use in California Buildings - Technology, Markets, Impacts, and Policy Solutions”.⁵

The study finds that transitioning to efficient electric heat and hot water will have a significant impact on reducing gas use and overall emissions associated with energy use in California’s buildings. If a third of California’s buildings switched to clean electric heating technology by 2030, emissions from these end uses would fall by 7 million metric tons per year. That’s the equivalent of zeroing out emissions from 1.5 million cars annually or avoiding the climate pollution from nearly four 500-megawatt gas power plants running around the clock. As California’s electric grid continues to shift toward clean, renewable energy sources, emissions from electric heat will continue to drop.

Switching from gas to efficient electric heat and hot water will also reduce the energy bills for consumers over the life of the equipment, particularly if the installation of these new systems is a part of broader improvements in energy efficiency and utility policies that help customers take advantage of time-dependent (off-peak) electric rates. In new homes equipped with cost-effective solar photovoltaic (PV) panels, in line with California’s new building code, highly efficient electric heat will cut energy bills by several hundred dollars annually. In older homes without solar PV, electric heating would be cost-competitive with gas when combined with simple energy efficiency improvements, such as attic insulation and air sealing. Consumer bill savings vary depending on climate, building type, and especially utility rates. Electric rates with a significant difference in peak and off-peak pricing offer opportunities for customers to set their heat pumps to operate when electricity is cheapest and cleanest.

Efficient and smart electrification could have significant grid benefits. Without additional energy efficiency measures, the widespread use of electric heat could increase California’s overall electricity use by approximately 19 percent, while decreasing gas use by a third. But done right, with energy efficiency and prioritizing operation of additional electric-load to off-peak hours (when renewable energy is plentiful), electrification can reduce electric system costs. This smart use of electric heat would spread fixed grid

⁵ Hopkins A. et al, Synapse Energy Economics, October 2018, “Decarbonization of Heating Energy Use in California Buildings”, <https://www.synapse-energy.com/California-Building-Decarbonization>.

infrastructure costs over higher electricity sales and would help absorb surplus renewable energy during periods of low demand, helping achieve California’s goal of a 100-percent carbon-free grid in an affordable manner.

In conclusion, a thoughtfully implemented building decarbonization strategy can provide major affordability, quality of life, and public health benefits to Californians. But reaping these benefits requires massive market transformation, on the scale of the renewable electricity and electric vehicle revolutions. The decarbonization of California’s buildings will take decades, but it must start now to avoid unnecessary stranded costs and set in motion the virtuous cycle of declining equipment, installation, and operating costs that will make clean and affordable buildings accessible to all.

California can also have an outsized influence on the rest of the world, which is looking at the Golden State for clean energy leadership. Addressing California’s building decarbonization challenge in a way that benefits customers, the grid, and the environment is critical to achieving our climate and clean energy goals globally.

- b) **Building energy efficiency remains critical to achieve climate goals in an affordable manner** – The Report rightly recognizes that the benefits of electrification are contingent on the use of high-efficiency electric appliances. The Synapse Energy Economics study shows that ensuring adequate energy efficiency of the building envelope is also important when converting to electric heat for two reasons:

- 1) To ensure that electrification reduces customer utility bills; and
- 2) To avoid increasing electric system peak load and therefore system costs and electric rates for all customers.

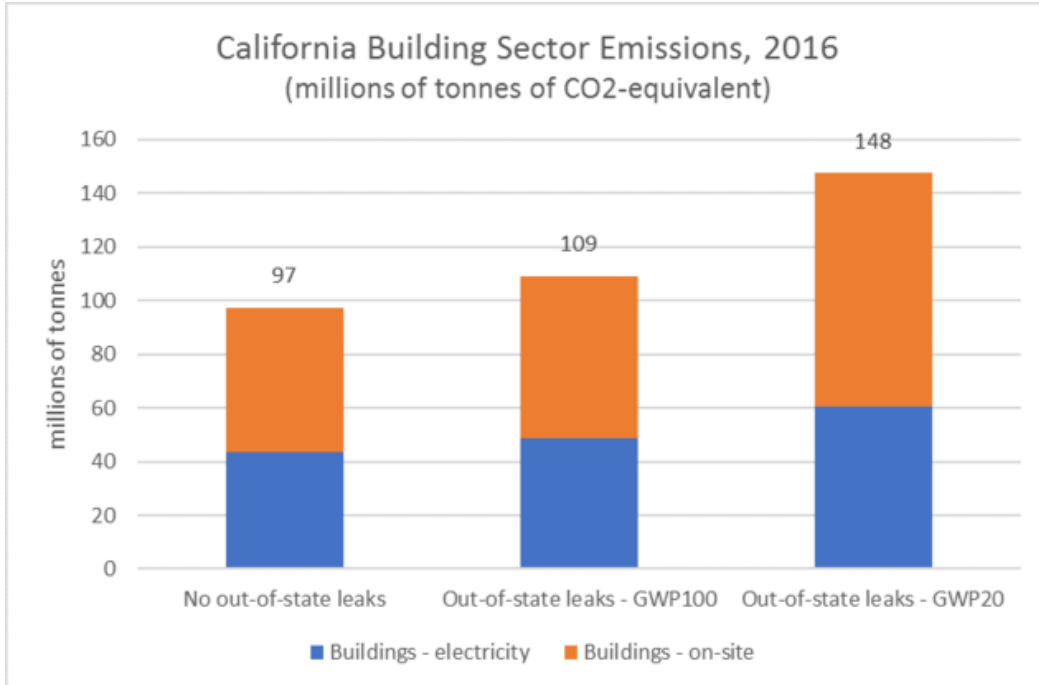
We recommend clarifying that the benefits of electrification are also contingent on building envelope efficiency in the “Benefits of Building Electrification”, page 22.

- c) **Building energy policies should account for out-of-state fugitive methane emissions associated with in-state gas use** – The Report rightly recognizes that methane leaks from the production, transmission, and distribution of gas is an important contributor to the climate impacts of gas use. However, these emissions are not currently accounted for in California policies that consider the climate impacts of the use of gas in buildings, such as the building code and CPUC cost-effectiveness cost tests. The Air Resource Board does not currently include out-of-state fugitive methane emissions in its annual GHG emissions inventory, but Assembly Bill 2195 (Chau) signed into law in 2018 requires ARB to do this starting January 2020.

California imports 90 percent of the gas it uses. A recent study by the Environmental Defense Fund estimates that 2.3 percent of gas production leaks in the atmosphere before

combustion, not including behind-the-meter leakage.⁶ NRDC’s analysis shows that this corresponds to between 12 and 51 million tons of unaccounted annual GHG emissions associated with energy use in California buildings, most of them from gas use, as shown in Figure 1.⁷

Figure 1 – Effect of Including Fugitive Methane on CA Building Sector Emissions



CEC and CPUC building energy policies should account for out-of-state fugitive emissions associated with in-state gas use once this information is reported by ARB, so that rules and incentives that affect fuel choice can be aligned with the state’s climate goals based on the best available data.

- d) **Customers may be more open to induction cooking than current gas cooktops and ranges market shares suggest** – The Report states that while consumers are unlikely to express a preference regarding fuels used for space and water heating, consumers may have a preference for gas cooking. In NRDC’s opinion, this may be due to a lack of awareness of induction cooking technologies. At the June 14, 2018 IEPR workshop, Sonoma Clean Power (SCP) indicated that the clear majority of customers who had been

⁶ Alvarez R. et al, Science, June 2018, “Assessment of methane emissions from the U.S. oil and gas supply chain”, <http://science.sciencemag.org/content/early/2018/06/20/science.aar7204>

⁷ Vukovich, J., September 2018, “The Real Climate Impact of California’s Buildings”, <https://www.nrdc.org/experts/joe-vukovich/real-climate-impact-californias-buildings>

able to try induction cooktops on loan from SCP preferred induction.

Leading commercial kitchens and chefs are now turning to all-electric cooking technology, which is safer, healthier, and generates less heat (and therefore more comfortable and require less air conditioning).⁸ Electric equipment is widely available for commercial kitchens.⁹ All restaurants in the recently renovated Thomas Bradley terminal at Los Angeles airport LAX use electric kitchens, including Wolfgang Puck, Panda Express and a dozen others.

In June 2018, NRDC commissioned FM3 to survey 700 California residents on environment-related questions. They found that **60 percent** of respondents supported transitioning from natural gas to electricity to power cooktops and ranges, if it reduced their utility bills.¹⁰

This suggests that the dominant market share of gas cooktops today can be reversed. With appropriate information, market development, and financial incentives to make induction cooking an economically beneficial choice, we are confident that consumers and commercial users will embrace electric cooking technologies, just like they are embracing other clean energy technologies such as LEDs, solar, and electric vehicles.

2. NRDC strongly supports CEC’s Goal and Proposed Approach to Align the California Building Energy Code with the State’s Climate Goals, and Recommends Revising the State’s Zero Net Energy Goals

- a. **NRDC strongly supports CEC’s plan to adopt an energy performance metric that aligns more fully with GHG emissions** –While new buildings represent a small share of the building stock annually, at less than 1 percent, over time they add up, and buildings built between today and 2045 will represent a substantial share of the built environment in 2045. It’s also much more cost-effective to build them right in the first place than to retrofit them later. Finally, new buildings constitute an important opportunity to develop the market for clean heating technologies and pave the way for their adoption in existing buildings.

⁸ Janssens, H, Interface Engineering, “Building Scale Electrification”, presentation at the Symposium on the Changing Face of ZNE and Responsible Grid Citizenship (October 17, 2018), <http://cbe.berkeley.edu/centerline/wp-content/uploads/Hormoz-Janssens-building-electrification-October-2018.pdf>

⁹ <http://www.alabamapower.com/business/services-by-industry/architects-engineers/technical-library/cooking.html>

¹⁰ Borgeson, M., June 2018, “California Attitudes Toward Building Decarbonization, Memo on Survey from FM3 Research”, <https://www.nrdc.org/resources/california-attitudes-toward-building-decarbonization-memo-survey-fm3-research>

The metric currently used to evaluate the performance of new buildings in the California building code was designed to optimize for operational costs based on projected retail rates over a 15- to 30-year period. This values efficiency more highly on the more expensive source of energy, electricity, than on lower-cost gas. However, this does not adequately account for the environmental costs of GHG emissions and air pollution from fossil fuel combustion. CO2 costs are only accounted for in as much as their cap and trade action price is reflected in retail rates, which is a small share of their societal impacts, and methane emissions and air pollution impacts are not included.

In addition, electrification with appropriate demand management can help achieve California’s goal of a 100-percent clean electricity grid at a lower cost, which also provides societal value in the same way as energy storage solutions.

CEC’s proposal would address this issue; the CEC-proposed hourly source energy metric is a good proxy for greenhouse gas emissions, and it is an energy metric which CEC can apply to the building code within their existing statutory authority from the Warren-Alquist Act.

- b. **In the 2019 IEPR, CEC should evolve the Zero Net Energy (ZNE) definition and goals that were adopted by CEC and CPUC in 2008** – The goals of achieving ZNE by 2020 in residential buildings and by 2030 in commercial buildings provided very useful guidance and policy momentum in California, and the 2019 building code is close to achieving the first goal by adopting “zero net electricity” standards. However, California’s current clean energy policy goals (SB 100, SB 32, AB 3232) are very different from what they were in 2008. SB 100 requires 100-percent carbon-free electricity by 2045, whereas the Renewables Portfolio Standard was just 20 percent in 2008.

With a much cleaner electricity supply and a trajectory to 100-percent carbon-free, stronger GHG reduction commitments, and a better understanding of the climate impacts of gas leakage, continuing to pursue the current ZNE goals as originally defined no longer fully aligns with the state’s climate goals, and would not be the best use of customer, builder, utility, and state resources.

CEC and CPUC should evolve these goals to better align with the state’s climate goals of 40 percent GHG reduction both economywide (SB 32) and in the building sector (AB 3232) by 2030, and carbon neutrality by 2045 (Executive Order B-55-18).

We suggest that the ZNE goals be redefined as Zero Emissions (Zero Emissions Buildings or ZEB, in alignment with Zero Emissions Vehicles or ZEV). Zero Emissions Buildings could be based on Architecture 2030’s ZERO Code™,

which defines the amount of onsite or offsite renewable energy necessary for a building to be zero-net-emissions. In addition, we recommend CEC sets energy efficiency requirements for ZEB and for various near-ZEB targets, to ensure that cost-effective energy efficiency remains the cornerstone of ZEB goals.

B. NRDC Comments on Doubling Energy Efficiency: Closing the Gap Between SB350 Targets and Current Statewide Energy Efficiency Efforts

The CEC has successfully implemented the challenging task of accurately defining SB350's target doubling energy efficiency target and comparing it with the current trajectory of forecasted savings from existing efforts in California. The CEC's analysis shows that the state is currently not on track to meet the SB350 target, the state's current energy efficiency efforts (electric and gas combined) will fall 10 percent short of the SB350 goal in 2030.¹¹

NRDC urges the CEC to build upon the recommendations in their "*Senate Bill 350 Doubling Energy Efficiency Savings by 2030*" report and continue to provide actionable recommendations to stakeholders (including program planners, the California Public Utilities Commission, implementers, and others). In addition to the thoughtful recommendations stated at the end of Chapter 2 of the IEPR Report, NRDC recommends the CEC do the following:

- The CEC should, as a part of its forthcoming Statewide Energy Efficiency Savings Action Plan,¹² analyze the difference between economic and market potential estimates in the IOU and POU potential studies. The economic potential estimates for energy efficiency programs in both sets of studies are much greater than estimates of achievable potential. CEC leadership is critical to ensure that this gap between available cost-effective energy savings and projected programmatic savings is minimized.

¹¹ Pages 2 - 4; "*Senate Bill 350: Doubling Energy Efficiency Savings by 2030 (8/28/2017)*" available [here](#).

¹² This is an upcoming report set to be released by January 1, 2020. Per page 75 of the IEPR Report "This report will combine the required updates under the overlapping energy efficiency targets that were established by Assembly Bill 758 (Skinner, Chapter 470, Statutes of 2009) and Senate Bill 350 (de León, Chapter 547, Statutes of 2015) and will begin the process of establishing explicit carbon reduction goals for buildings as called for by Assembly Bill 3232 (Friedman, Chapter 373, Statutes of 2018). (Assembly Bill 3232's full report is due January 1, 2021.)"

- The CEC should lead the charge in developing accurate estimates of energy savings potential in the agricultural and industrial sectors. Estimates of potential energy savings estimates in both sectors are uncertain due to the lack of data and understanding of the types of measures that could be implemented in these sectors. As a result, the energy efficiency potential estimates for these sectors remain uncertain and underestimated. The CEC should provide guidance on best practices to develop estimates on energy savings potential in these sectors such that future potential studies commissioned by the California Public Utilities Commission (CPUC) and Publicly Owned Utilities (POUs) can apply these best practices.
- Continued involvement of the CEC as a stakeholder in the development of IOU and POU energy efficiency potential studies is necessary to ensure that all of the sources of savings identified by the CEC in their SB350 doubling energy efficiency analysis are identified and appropriately analyzed. Several aspects of energy efficiency have so far been ignored or under-analyzed such as conservation voltage reduction, agricultural & industrial sector savings, and low income-savings potential.
- As a part of their forthcoming Statewide Energy Efficiency Savings Action Plan, the CEC should continue to track and compare existing statewide energy efficiency program plans (and future programmatic accomplishments) against the recommendations in the CEC doubling energy efficiency report. This will enable the CEC to understand how their recommendations are being applied by program planners and gather feedback from program planners to refine these initial recommendations.

III. Conclusion

We appreciate CEC's thoughtful and inclusive leadership on California's energy policy and thank the CEC for its consideration of our comments.

