DOCKETED	
Docket Number:	19-MISC-03
Project Title:	The Natural Gas Infrastructure and Decarbonization Targets
TN #:	228827
Document Title:	NRDC Comments Docket 19-MISC-03
Description:	N/A
Filer:	System
Organization:	Olivia Ashmoore
Submitter Role:	Public
Submission Date:	6/21/2019 3:51:55 PM
Docketed Date:	6/21/2019

Comment Received From: Olivia Ashmoore
Submitted On: 6/21/2019
Docket Number: 19-MISC-03

NRDC Comments Docket 19-MISC-03

Additional submitted attachment is included below.

Comments of the Natural Resources Defense Council (NRDC) on the Staff Workshop on The Natural Gas Distribution Infrastructure and Decarbonization Targets

Docket Number 19-MISC-03

June 21, 2019

Submitted by: Olivia Ashmoore and Merrian Borgeson

oashmoore@nrdc.org, mborgeson@nrdc.org

The Natural Resources Defense Council (NRDC) appreciates the opportunity to offer these comments on the "The Natural Gas Distribution Infrastructure and Decarbonization Targets" staff workshop held on June 6, 2019. 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.

I. Summary

Natural gas use to heat buildings, power industry and vehicles, and generate electricity is a significant contributor to California's greenhouse gas emissions and air pollution. Reducing the use of fossil gas is critical to achieve our climate goals, but while California has succeeded in adopting policies that promote a clean electricity grid, there is no plan to strategically eliminate the climate impact of pipeline gas. Without planning early to mitigate these emissions, continued reliance on gas could undermine California's goals of reducing greenhouse gas emissions 40 percent by 2030 and 80 percent by 2050. The California Energy Commission's (CEC) draft report, "Future of Natural Gas Distribution in California," builds upon the 2018 study "Deep Decarbonization in a High Renewables Future" that found that building electrification is the lowest cost and lowest risk pathway to decarbonizing California's building sector.[1] The report examines the implications of building decarbonization on the gas distribution system and provides a useful set of information for guiding state policy.

---

[1] Mahone A. et. Al, Energy and Environmental Economics for CEC, June 2018, https://efiling.energy.ca.gov/GetDocument.aspx?tn=223785

The report compares two approaches for reducing gas emissions: 1) primarily through the use of biomethane, hydrogen, and synthetic methane gas (and depending more heavily on other sectors for emission reductions), referred to as the "No Building Electrification" scenario; or 2) primarily through electrifying end uses that currently depend on fossil gas, referred to as the "High Building Electrification" scenario. The study's preliminary results find the costs and risks of No Building Electrification to be much higher than the alternative. There is not enough technically available or economically viable bio- or synthetic gas to displace fossil gas. Further, this analysis shows that the retail cost of gas is *already* increasing, largely due to safety upgrades unrelated to climate policy, and will become increasingly unaffordable even with aggressive assumptions about cost and availability of biomethane, hydrogen, and synthetic methane gas.

In contrast, the High Building Electrification scenario is the most cost effective and technically feasible approach. Electrification would rely on adoption of super-efficient heat pumps, building energy efficiency, and grid demand management. A key finding of the study is that adopting electric equipment and transitioning away from gas will require careful planning. Without a long-term gas transition strategy, high utility bills would burden low- and middle-income customers and gas assets could become stranded.

The CEC has an important role to play in providing guidance, direction, and research that will support a managed gas transition and increased building electrification at the pace and scale needed to support an affordable transition. NRDC appreciates the CEC's effort to hold a productive and informative workshop on the future of gas distribution in California. NRDC supports the findings and assumptions in the draft "Future of Natural Gas Distribution in California" report. Below, we recommend some key improvements for the final version of the report, along with our perspective on the significance of these findings.

To further improve findings, we recommend the following, specific issues are addressed in the final report:

1. Develop a low-cost High Building Electrification scenario to provide a best-case scenario for policymakers to aim for.
2. Quantify and include the impact of economic electrification (i.e. electrification that is already and will increasingly occur outside of the direct influence of state policy due to economic drivers) and electrification driven by local government climate action in the No Building Electrification and Reference scenarios.

3. Emphasize and further detail the relationship between avoided stranded assets and reducing transition costs.
4. Provide estimates of greenhouse gas emissions associated with in- and out-of-state methane leakage in all scenarios.
5. Discuss ability of each scenario to meet carbon neutrality goals by 2045.
6. Provide annual and cumulative estimates of public health cost savings associated with each scenario.

II. This Analysis Shows Clearly and Accurately That Biomethane, Hydrogen, and Synthetic Methane are Limited and Expensive

Assumptions underlying the No Building Electrification scenario demonstrate the limited capacity and barriers to acquiring cost-effective bio- and synthetic gas. At the June 6th workshop, a couple public stakeholders expressed concern that E3 underestimates biomethane gas potential. NRDC contends that the opposite is more likely true. Estimates of technical biomass from the DOE 2016 Billion Ton Update, which are used by this study along with other estimates, likely overstate the biomethane resources that will be available due to economic constraints. Biomethane feedstocks also have competing end-uses; biogas can be used to produce electricity or power vehicles, and organic feedstocks may be better managed through composting, recycling, or consumed as other economically beneficial products. For example, food scraps from municipal solid waste may be best used to generate compost that could be applied to soils. Even biomethane resources that are available for gas use can be extremely expensive and difficult to collect. For example, forestry residue may be technically available but physical constraints could make it inaccessible, for example if collecting forest residue requires building new, remote roads or gathering it from very steep terrain. This report presents the most optimistic scenario, in which we could access and use all technical biomass potential for gas creation. Even this best-case-scenario finds biomethane sources are insufficient to meet gas demand.

E3 places realistic assumptions on the base-case scenario for synthetic natural gas (SNG) generation and leverages the low-cost SNG scenario to identify a threshold for imagining the lower limit of SNG costs. The "base case" analysis of synthetic natural gas potential portrays the substantial cost impacts of relying on gas production. To produce synthetic natural gas, electricity

would have to be produced off-grid, methanation facilities would need access to carbon sources, and rapid technology learning would need to bring down costs. The low-cost scenario imagines the least-cost inputs available, like Midwest wind energy and bio-CO_2 from the Midwest, and still finds that costs would significantly exceed the High Building Electrification scenario. These findings underscore that any approach relying primarily on "alternatives" to fossil gas will be uncertain and expensive.

The report accurately conveys the severity of rising gas costs on utility customers by accounting for new infrastructure investments, safety costs, and declining gas throughput. As the gas customer base shrinks, fixed infrastructure costs will be distributed across fewer and fewer customers. Additionally, bio- and synthetic gas commodity prices are far higher than market-rate, conventional gas which would contribute to the increase in gas rates. Stakeholders at the CEC's June 6th workshop suggested rising gas costs are overestimated in E3's model and electricity costs are underestimated, but future gas costs could be even *higher* than modeled in this report. Other factors that were not included in the model, like local government- and economically-driven electrification, will accelerate costs for gas customers by reducing the gas customer base. In contrast, electricity demand will grow with electric vehicle adoption and building electrification, allowing fixed electric infrastructure costs to be distributed over more per-unit consumption. Electric appliances can also help reduce peak electricity demand by offering opportunities for load management. E3's analysis of the future of gas and electricity costs accounts for key rate impacts and highlights the risk to utility customers if California continues to rely on gas in buildings.

III. NRDC Recommends Several Additions to Improve the Analysis

A. Include Base Case and Low-Cost Sensitivities in High Electrification Scenario

The report currently compares a base-case scenario for High Building Electrification to two No Building Electrification scenarios, base case and low-cost SNG, which makes it difficult to accurately compare the two approaches and does not show the potential benefits of state policy enabling a carefully planned and executed strategic transition. The report uses a base-case scenario and a low-cost scenario to benchmark the No-Building Electrification model. In the Low-cost, No Building Electrification scenario, E3 considers aggressive technology learning rates, low-cost electricity, and low-cost CO_2 sources. A similar low-cost model should be developed to present

the range of projected costs associated with High-building Electrification scenario. This low-cost model could include targeted gas infrastructure retirements, technology learning rates, demand response, and increasing heat pump efficiencies. Bounding the costs of each scenario will better reflect uncertainty in each estimate. NRDC recommends the final report present both the High Electrification and No Electrification scenarios as a range of low- to base-case costs.

B. The Report Underestimates Gas Throughput Decline in the No Building Electrification Scenario and Reference Scenario

Current analysis neglects influential drivers of electrification, including local government climate action and voluntary, economic electrification. Over 50 local governments are pursuing or considering reach codes that promote electrification to meet climate action plan goals, irrespective of state policy action. Analysis should consider that the share of new construction and existing buildings that are all-electric will grow significantly over the next decade even without state policy action. Additionally, there will be economically-driven electrification as home and commercial building owners capture cost savings associated with electric appliances. As a result, the No Building Electrification scenario should reflect that a growing portion of gas customers will switch from gas to electric appliances. A smaller customer base will increase costs for remaining gas customers, beyond what is currently estimated in the analysis. Including these two critical drivers of electrification and associated shrinking customer base is essential to compare options available to state policymakers.

C. Emphasize Early Action to Transition Away from Gas is Critical

The report underemphasizes the need to rapidly avoid stranded gas assets and rising rates by avoiding additional investment in new, gas infrastructure. This study confirms that managing gas affordability is a vital issue under the Reference, High Building Electrification, and No Building Electrification scenarios. Fixed gas infrastructure costs are already increasing due to safety upgrades and system reinvestments, leading to substantial rate increases for gas customers, ranging from 15-30% (real) increases by 2022. Rising gas costs will both burden low-income customers and accelerate economic electrification. This will further reduce the gas rate base and in turn, drive up rates for remaining customers. The presentation appropriately represented the urgent need to avoid burdening low-income customers with high gas rates through a carefully executed gas transition strategy. As middle- and high-income customers electrify thermal end-uses

in their homes, it will be necessary to support low-income customers through this transition. To minimize new stranded costs, findings should more definitively present the link between limiting new gas hook-ups and targeting gas infrastructure retirements and future gas customer cost burdens. Aggressive market development of electric appliances, including incentives, will be critical to enable an affordable transition from gas use in buildings. The final report should emphasize this conclusion and quantify cost savings associated with early electrification. We recommend the analysis estimate costs associated with each year of delayed electrification. Estimating annual losses from new stranded assets would better reflect the urgent need to avoid adding gas infrastructure and to rapidly deploy electrification.

D. Account for Climate Impacts of Methane Leakage

This study ignores the climate impacts of out-of-state methane leakage associated with gas used in California. California imports the vast majority of the gas it uses. In the No Building Electrification scenario, continued reliance on conventional gas would result in significant additional climate impacts from gas production. Under the No Building Electrification scenario, 56 percent of California pipeline gas would remain fossil gas in 2050 and its extraction and transmission would still cause significant out-of-state methane leakage. Assembly Bill 2195 requires ARB to report emissions associated with fugitive natural gas from out-of-state sources. Studies have already identified that methane leakage from conventional natural gas production is significantly higher than U.S. Environmental Protection Agency estimates.[2] Understanding the impact of gas reliance—conventional, bio or synthetic gas—is crucial when determining the direction of California's decarbonization strategies. The full climate impacts of continued gas reliance must be included in the analysis, including methane leakage that occurs throughout the production and distribution process.

NRDC recommends E3 report estimated fugitive methane associated with in- and out-of-state gas imports, and conventional, bio-, and synthetic gas use. There is limited information on leakage rates associated with bio- and synthetic gas production pathways, but leakage could potentially undermine climate benefits. Much of the proposed bio- and synthetic gas capacity

[2] Alvarez, R. et al. "Assessment of methane emissions from the U.S. oil and gas supply chain." *Science: 13 July 2018, pp. 186-188.* https://science.sciencemag.org/content/361/6398/186

would be produced using processes that create new methane where none would have otherwise existed. At a certain threshold, methane leaks from biomethane feedstock storage, anaerobic digestion, and gasification could significantly reduce, and potentially completely eliminate the climate benefit of these sources over fossil fuels. Quantifying leakage in terms of CO_2 equivalent is crucial because of methane's high global warming potential. Over 20 years, methane has 84-87 times the greenhouse gas impact of CO_2. The report should identify realistic leakage estimates for bio- and synthetic gas sources and incorporate fugitive methane impacts. Analysis should calculate total methane leakage and align with the scope defined in AB 2195.

E. Assess Ability to Meet Carbon Neutrality Goal

The current report analyzes California's ability to meet a target of 80% reduction in greenhouse gas emissions by 2050. These strategies should also be assessed on their ability to enable achievement of climate targets set by Governor Brown's Executive Order B-55-18, calling for carbon neutrality by 2045.[3] NRDC recommends that the report discuss the feasibility and cost effectiveness of compressing these strategies to meet 2045 goals. Achieving carbon neutrality by 2045 with bio- and synthetic gas may be even more costly than currently estimated because technology learning rates are, in part, a function of time. And continued reliance on fossil gas for half the gas pipeline would make carbon neutrality more difficult to achieve. In comparison, High Building Electrification is more easily scalable to achieve carbon neutrality by 2045 because of its lower cost and technology uncertainties.

F. Clarify Air Quality Findings and Provide Annual Estimates of Public Health Savings

The study currently provides analysis of air quality benefits and public health costs based on two-week periods instead of annual benefits, which makes it difficult to assess potential policy implications. Looking only at the high-impact, 2-week periods in winter and summer does not convey air quality health cost impacts and makes it difficult to assess state-wide reductions in criteria air pollutants. Presenting annual impacts of ozone and particulate matter would better align with how air pollution effects public health. Pollutants have both acute and cumulative impacts.

---

[3] Governor Brown. "Executive Order B-55-18 to Achieve Carbon Neutrality." *Executive Department, State of California.* 10 September 2018. https://www.gov.ca.gov/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf

The study's air quality data analysis should be updated to demonstrate the annual health costs of different scenarios in order to better inform policy development. Reporting annual pollution and public health costs would provide policymakers with a more actionable understanding of these strategies. Another recent report, "Air Quality Implications of an Energy Scenario for California Using High Levels of Electrification," reported total benefits of economy-wide electrification in terms of annual dollars per year in health cost benefits. Monetized, total benefits for reductions in ozone and $PM_{2.5}$ were estimated to be $108 billion per year in 2050.[4]

Results presented on June 6th compared High Building Electrification, No Building Electrification, and High Building Electrification with Trucks. Both the No Building Electrification and High Building Electrification with Trucks scenarios assume high adoption of low and zero emission trucks, but scenario labels do not convey this. The No Building Electrification label should be updated to "No Building Electrification with Trucks." In addition, to accurately compare No Building Electrification and High Building Electrification, the report should graphically isolate air quality impacts of these strategies without truck measures and identify air quality impacts of truck mitigation separately. Graphs presented on June 6th were confusing and had unclear policy implications.

As noted in the presentation, further research in this area should address air quality impacts of biorefineries and demonstrate the distribution of benefits in disadvantaged communities. Research findings should identify the equity implications of different scenarios, calling attention to the spatial distribution of criteria pollutants. Findings should also present how air quality benefits are distributed among the California population; building electrification offers air quality benefits in dense, urban areas. The final report should also discuss indoor air quality benefits for the California population and disadvantaged communities. The report should explicitly reference the public health impacts of improving indoor air quality through electrification as an additional benefit to pursuing High Building Electrification.

---

[4] Alexander, Marcus, et al. "Air Quality Implications of an Energy Scenario for California Using High Levels of Electrification." *California Energy Commission.* June 2019.

IV. Conclusion

NRDC supports the CEC's leadership in addressing natural gas emissions. The workshop findings were clear—without early and strategic action to transition away from gas use in buildings, rising gas costs will burden customers and undermine climate goals. Gas infrastructure is expensive and long-lasting, so minimizing new gas infrastructure development now will provide substantial savings. Electrification is the most cost-effective strategy to reduce building greenhouse gas emissions and offers essential public health benefits. Acting now to electrify buildings, ensuring new construction uses electricity, and planning for careful decommissioning of gas infrastructure is essential to meet climate goals and minimize costs. The CEC should move forward with developing a plan to transition away from gas and aggressively drive the adoption of electric appliances in buildings through incentives and market development.