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NRDC comments on Cost of Residential Electrification

Additional submitted attachment is included below.

Comments of the Natural Resources Defense Council (NRDC) on the Cost of Residential Electrification
Docket Number 18-IEPR-09
August 24, 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.

NRDC is offering additional comments to our July 19, 2018 comments on the study conducted by Navigant and docketed by the California Building Industry Association on August 16, 2018 (The Study).

The study misrepresents the opportunity for high-efficiency electric appliances to help reduce customer utility bills and pollution from California's buildings. It uses worst case assumptions and cherry picks some findings while ignoring others.

The reality is that electrification is already cost-effective today in many cases, such as homes that don't require electrical upgrades, or that use propane or electric resistance heat, or have solar panels. High-efficiency electric heating will become cost-effective for more Californians over time as technology and rates continue to evolve. New technologies are often more expensive when they just emerge in the market, but just like solar costs plummeted with large-scale market adoption, clean heating technologies offer the potential for significantly lower utility bills that will help mitigate California's housing affordability crisis, and for cleaner, healthier and safer buildings for all Californians.

Topline "Findings" Are Misleading

The report's topline findings supposedly show that electric options for water heating, space heating, cooking, and clothes drying are significantly more expensive than natural gas appliances. But in fact, **the analysis shows that electric appliances *today* are already cheaper than gas models in three out of four categories** – a finding not highlighted in the summary of results.

The one more expensive appliance identified is a heat pump water heater (HPWH), where the costs assumed are not supported by any credible data. The study prices the water heater at $4,529 (equipment and installation, not including any electrical work required) based on "SoCalGas data." In an online search, we could not find a similar model as expensive or as *inefficient* as the one used in this analysis.

The most comparable model we found was a Rheem 50-gallon tank with three times the efficiency of a standard water heater priced at $1,199 from Home Depot. We polled several utilities, contractors, and energy efficiency program implementers in California and the Pacific Northwest, and the average cost they gave was $2,000 to $2,600 for equipment, installation, and mark-up. The lower end of this range puts the total costs for all four electric appliances on par with the gas appliances – not massively more expensive as this study purports. **Swapping out these appliances alone reduces emissions from buildings by almost 40 percent** (and that is using the electric grid mix for 2020, which will be even cleaner by 2030 given California's 50 percent renewables portfolio standard). In addition, heat pump models on the market today are at least 20 percent more efficient than what was modeled, which would lower a consumer's monthly energy bill.

The study uses worst case installations costs

The study reports a $4,600 cost for upgrading electrical wiring and panel as if this cost applies to all customers. However, many customers can already install a HPWH today without upgrading their electrical panel or service. Moreover, new HPWH models on the market since late 2017 (Rheem 15-amp models, Sanden SanCO2) now require only half the electric capacity of typical 30-amp water heaters, allowing many additional customers to install a HPWH without upgrading their panel. Finally, stakeholders are currently working with manufacturers to further

reduce this installation barrier by developing a specification for a 115-volt, plug-and-play HPWH that can be plugged into an existing outlet.

If done right, starting with customers who do not require panel upgrades, electrification can be very cost-effective. The pool of customers where electrification is cost-effective will expand to the majority of Californians as new retrofit-ready HPWH models are introduced on the market and the price of heat pump technology drops with increased sales volume. Getting to the "last mile" customers who require major upgrades will be easier and less costly once the heat pump market is fully developed, and when the cost of panel upgrades is shared with EV charger, air conditioner, and solar installations that often also require panel upgrades.

Electrification can significantly decrease, not increase, customer utility bills

The report's claim that electrification would increase customer costs by $388 annually is misguided for multiple reasons:

1. **This cost estimate is based on much lower efficiency HPWH than current mainstream models**: the study uses a 2.78 Energy Factor when mainstream HPWH currently on the market have Energy Factors in the 3.3 to 3.7 range.[1]
2. **Most electric rates in California currently penalize electrification** by not increasing the baseline quantity for electric water heating and not providing a low off-peak rate in the middle of the day that better reflects the actual cost of generating and distributing energy when solar production peaks in California. As these hurdles are removed from future rate updates, the cost advantage of heat pumps will further increase.
3. Over the longer-term, transportation and building electrification done right, with efficiency measures and load shifting to operate off-peak and avoid adding to peak load, will increase the utilization of existing grid assets without requiring additional

[1] https://www.energystar.gov/productfinder/product/certified-water-heaters/?scrollTo=600&search_text=&fuel_filter=&type_filter=Heat+Pump&brand_name_isopen=&input_rate_thousand_btu_per_hour_isopen=&markets_filter=United+States&zip_code_filter=&product_types=Select+a+Product+Category&sort_by=uniform_energy_factor_uef&sort_direction=DESC&currentZipCode=94804&page_number=0&lastpage=0

grid investments. **This will put downward pressure on electric rates, benefitting all electric customers.**

4. **The efficiency of heat pumps has been improving steadily over the last decade**, from an energy factor of 2.3 for HPWHs a decade ago to 3.7 today. This trend is expected to continue and to improve the cost advantage of HPWH vs. gas water heaters.
5. Last, customers with **solar photovoltaic (PV) generation**, both in existing buildings retrofitted with PV and in new buildings that will be required to have PV by California's building code by January 2020, benefit from lower cost electricity, which makes electric heating much lower cost than gas alternatives. In fact, a housing developer in West Oakland advertises 80 percent bill reductions from its highly efficient, all-electric, and solarized town homes.[2]

By systematically using worst case assumptions and ignoring cost-effective opportunities for electrification, the study misrepresents the cost saving opportunity for customers and for the grid from heat pump adoption.

The study ignores the co-benefits of clean heating technologies

High-efficiency electric heating technologies provide several benefits beyond energy savings and emissions reductions: the elimination of gas combustion in furnaces and water heaters **improves indoor air quality** reducing asthma and other illnesses related to indoor air pollution by combustion gases, **reduces outdoor air pollution** which is particularly important as 93% of Californians live in regions that fail federal ozone pollution standards, **improves public safety** through reduced risk of fires and explosions, and **improves resiliency** because in earthquake situations, restoring gas service can take months while restoring electric service typically only takes days.

These co-benefits translate into significant avoided costs for residents and California's general population, from reduced hospital visits and mortality, higher workforce productivity,

[2] City Ventures, Station House, https://www.liveatstationhouse.com/#content_02b

and lower accident costs, as presented by Pr. Roland-Holst of UC Berkeley at the June 14, 2018 IEPR workshop.

Conclusion

NRDC urges the Energy Commission to consider our comments in its analysis of electrification costs and benefits. The use of up-to-date and balanced data clearly shows that clean heating technologies have the potential to significantly reduce Californians' utility bills, cut carbon and air pollution, and make homes and buildings safer and healthier.