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SoCalGas Comments on the 2022 Energy Code Pre-Rulemaking Express Terms

Additional submitted attachment is included below.

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March 9, 2021

California Energy Commission
Docket No. 19-BSTD-03
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Subject: Comments on the Pre-Rulemaking Express Terms for the 2022 Update to the Energy Code

Dear Chair David Hochschild, Commissioners Karen Douglas, Siva Gunda, J. Andrew McAllister, and Patty Monahan,

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide public comments on the Pre-Rulemaking Express Terms for the 2022 Update to the Energy Code (2022 Energy Code). SoCalGas supports the development and deployment of decarbonized building solutions that further the State's climate goals without impacting access to affordable and resilient energy supplies. Our extensive modeling and analysis affirm the conclusion that electrification has a role in the State's decarbonization strategy. Electric appliances may be one pathway to pursue within the Title 24 context and more broadly on an economy-wide basis. Analysis suggests that policy choices and the relative efficacy of various options must be considered within a range of cost data and rate impacts in order to develop optimized approaches. Moreover, a holistic examination of greenhouse gas (GHG) reductions and environmental impacts in assessing various policy options assures the broader public interest and diminishes the risk of unintended consequences.

In assigning GHG values, analysis must recognize the symbiotic relationship between renewable supply in the electric market, with the indispensable role of the gas grid infrastructure to support it. Currently, electricity storage is minimal for renewable sources of energy (i.e. wind and solar). As such, the electricity generated from renewable sources must be used **or** exported instantaneously. If it is not used or exported, the excessive renewable energy source will be curtailed (i.e., it is wasted). Conversely, when diurnal renewable output expands with sunlight, the gas grid infrastructure allows gas-fired generation to ramp down and be displaced by zero emitting solar. To enable renewable dispatch, excess energy from the gas generator is taken and stored in the form of gas molecules at a storage facility and in the link pack (i.e., increase volume of gas stored in the pipeline). This innate characteristic of gas molecules - storage - enables renewable electricity to be both used **and** exported. Rather than burning gas to generate electricity (and displace renewable generation), gas is stored for later use when renewables are no longer able to serve the load.

In the absence of gas storage, gas generators would need to generate electricity 24-hours a day, at minimum hourly burn levels,[1] leaving virtually no gas to meet demand during system peak hours in which renewable generation cannot serve the load. The gas system does not merely dissipate when renewables are online, but rather it is silently working in the background receiving gas from imports statewide and preparing to meet demand during those hours of the day when Californians most rely on the electricity system. Therefore, the more reliance on intermittent renewables at any given hour, the more beneficial gas storage is to the integration of electricity resources. Analysis and assignment of GHG values for appliances should appropriately consider the symbiosis between zero emissions renewables and a capable gas grid.

In this regard, State law specifically requires the development and publication of specific rulemaking documents and analysis that justifies that "…the cost to the public is reasonable based on the overall benefit to be derived from the building standards…"[2] For example, the Administrative Procedure Act requires a notice of proposed action and an initial statement of reasons, which explains the rationale for the proposed changes to the building code as well as a description of reasonable alternatives.[3] While we recognize the California Energy Commission's (CEC's) efforts to solicit public feedback by providing draft express terms in the pre-rulemaking phase, given the short comment period and comprehensive 571 page draft, meaningful stakeholder engagement is impeded in the absence of published reasoning, rationale for code changes, or identified areas for public input. Given these implied constraints, the following comments provide input on costs and energy equity that SoCalGas presumes to be of interest, based on the proposal.

Cost-effectiveness of Building Decarbonization Measures

To date, there has been little public vetting and there is a marked lack of consensus on the projections of electric and gas rates when evaluating measures proposed in the 2022 Energy Code. During the 2021 CPUC Energy Rate and Costs En Banc, CPUC Staff stated that although gas and electricity are priced using different units, projected gas rates are higher and will outpace electricity rates in the future.[4] We respectfully request that the CEC consider the response of Severin Borenstein, PhD, University California (UC) Berkeley Professor and Director of the Energy

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[1] The instantaneous rate that gas flows into the system because there is no place to store it.

[2] *See e.g.* Cal. Health and Safety Code section 18930; Cal. Gov't Code section 11346.2.

[3] *See e.g.* Cal. Health and Safety Code section 18930; Cal. Gov't Code section 11346.2.

[4] *See* California Public Utilities Commission Report on Utility Costs and Affordability of the Grid of the Future: An Evaluation of Electric Costs, Rates, and Equity Issues Pursuant to P.U. Code Section 913.1, 2021 February, at 81. Available at https://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/Utilities_and_Industries/Energy/Reports_and_White_Papers/Feb%202021%20Utility%20Costs%20and%20Affordability%20of%20the%20Grid%20of%20the%20Future.pdf.

Institute at Haas and member of the California Independent System Operator (CAISO) Board of Governors, who responded that such assumptions are “not consistent with our calculations considering today’s rates.”[5] Rates are fundamental to the cost effectiveness of building decarbonization measures (i.e. energy efficiency, behind the meter supply, electrification, and/or demand side management).

According to researchers at the Energy Institute at Haas and at the nonpartisan nonprofit organization Next 10, Californians pay some of the highest electricity rates in the country.[6] Energy rates are material to decarbonization policy choices as well as the rate of energy consumption. It has been a long and proud motto for California that although we may have some of the highest electricity rates in the country, we have among the lowest energy bills in the Nation. Table 1 from the U.S. Energy Information Administration (EIA) shows that despite a higher electricity price (19.15 cents/kWh), on average California’s residential customers have relatively low electrical bills because customers consume less electricity (532 kWh).[7]

1 **2019 Average Monthly Bill- Residential**

2 (Data from forms EIA-861- schedules 4A-D, EIA-861S and EIA-861U)

3	State	Number of Customers	Average Monthly Consumption (kWh)	Average Price (cents/kWh)	Average Monthly Bill (Dollar and cents)
4	Hawaii	438,352	525	32.06	168.21
5	**California**	**13,707,126**	**532**	**19.15**	**101.92**
6	Vermont	316,180	549	17.71	97.18
7	Alaska	289,290	555	22.92	127.29
8	Rhode Island	444,216	560	21.73	121.62
50	Texas	11,366,639	1,140	11.76	134.07
51	Alabama	2,249,425	1,201	12.53	150.45
52	Mississippi	1,293,419	1,206	11.27	135.87
53	Tennessee	2,914,916	1,217	10.87	132.33
54	Louisiana	2,095,466	1,232	9.80	120.70

Table 1. The table shows the top five states (Hawaii, California, Vermont, Alaska, and Rhode Island) with the lowest average monthly consumption (kWh); and the bottom five states (Texas, Alabama, Mississippi, Tennessee, and Louisiana) with the highest average monthly consumption (kWh).

For the most part, California’s low monthly electric bills are attributable to the great success of energy efficiency measures as well as to the temperate climate benefiting most residential customers. The lower electric bills can also be attributed to the fact that most household’s thermal energy supply comes from gas. In 2020, about half of a building’s energy supply came from gas

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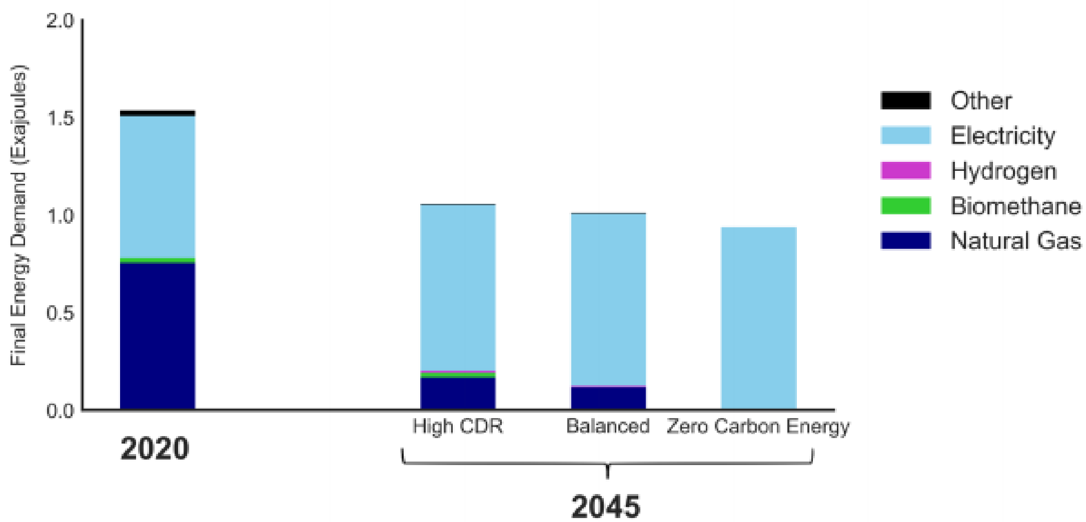
[5] *See* California Public Utilities Commission Energy Rates and Costs En Banc Recording, 2021 February 24. Available at http://www.adminmonitor.com/ca/cpuc/en_banc/20210224/.

[6] *See* Next 10 and Energy Institute at Haas, UC Berkeley Report on Designing Electricity Rates for An Equitable Energy Transition, 2021 February 23. Available at https://www.next10.org/sites/default/files/2021-02/Next10-electricity-rates-v2.pdf.

[7] *See* U.S. Energy Information Administration Data on Electricity: Sales (consumption), revenue, prices & customers: Average retail price of electricity to ultimate customers: Average monthly bill: Residential average monthly bill by Census Division, and State. Available at https://www.eia.gov/electricity/data.php#sales.

and half from electricity as shown in Figure 6 (below) from E3's Pathways Report.[8] This is not to suggest or urge adherence to the status quo. But rather to express the need for thorough analysis and development of future decarbonization pathways based on diverse energy sources, and a realistic publicly vetted cost and rate analysis.

Figure 6. Final energy demand in buildings in 2020, and in 2045 across the three scenarios



As other commenters have pointed out in the docket, there are certain areas in the country with all-electric homes. Many of these locations are in Southern States, such as Texas, where climate temperatures generally do not drop below 40 degrees Fahrenheit and residential customers benefit from very-low electric rates. The E3 study figure also shows an all-electric building scenario by 2045, assuming residential customer's electricity consumption will reduce due to high building efficiency assumptions and fuel substitution appliances.[9] For illustrative purposes, if we replace gas consumption with electric consumption on a one for one basis, then California's residential customers will pay the highest average electricity bills in the country. (See Table 2).

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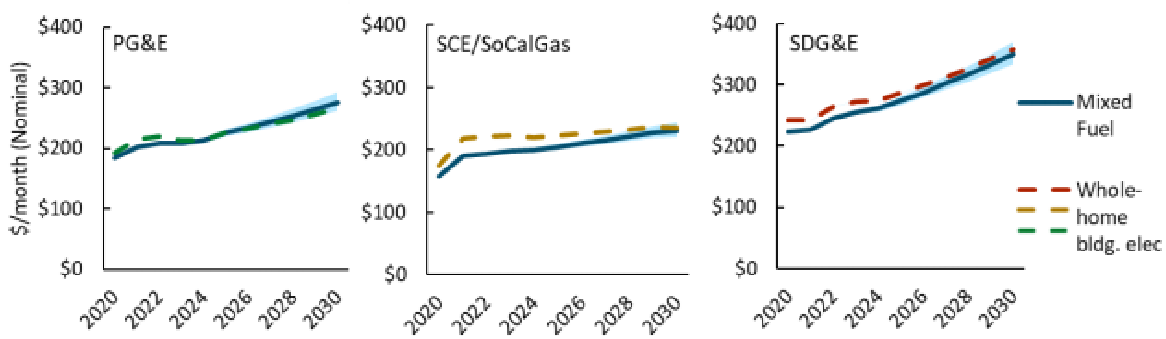
[8] Energy+Environmental Economics, DRAFT: Achieving Carbon Neutrality in California: PATHWAYS Scenarios Developed for the California Air Resources Board, 2020 August, at 36. Available at https://ww2.arb.ca.gov/sites/default/files/2020-08/e3_cn_draft_report_aug2020.pdf.
[9] Energy+Environmental Economics, DRAFT: Achieving Carbon Neutrality in California: PATHWAYS Scenarios Developed for the California Air Resources Board, 2020 August, at 35. Available at https://ww2.arb.ca.gov/sites/default/files/2020-08/e3_cn_draft_report_aug2020.pdf.

1	2019 Average Monthly Bill- Residential				
2	(Data from forms EIA-861- schedules 4A-D, EIA-861S and EIA-861U)				
3	State	Number of Customers	Average Monthly Consumption (kWh)	Average Price (cents/kWh)	Average Monthly Bill (Dollar and cents)
44	Florida	9,565,846	1,108	11.70	129.65
45	Georgia	4,411,521	1,121	11.76	131.84
46	Tennessee	2,914,916	1,217	10.87	132.33
47	Texas	11,366,639	1,140	11.76	134.07
48	Virginia	3,464,677	1,122	12.07	135.46
49	Mississippi	1,293,419	1,206	11.27	135.87
50	South Carolina	2,330,903	1,114	12.99	144.73
51	Alabama	2,249,425	1,201	12.53	150.45
52	Connecticut	1,510,966	689	21.87	150.71
53	Hawaii	438,352	525	32.06	168.21
54	**California**	**13,707,126**	**1,064**	**19.15**	**203.80**

Table 2. The table projects the hypothetical assumption of replacing gas consumption with electric consumption on a one for one basis. The California Average Monthly Consumption (kWh) doubled from 532 kWh to 1,064 kWh. The Average Monthly Bill was derived by multiplying 1,064 kWh by 19.15 cents/kWh.[10]

Further, Figure 41 (below) from the CPUC's Report presented at the 2021 CPUC Energy Rate and Costs En Banc shows that energy costs for mixed-fuel and all-electric homes are similar over the decade and in SoCalGas and SCE territory, mixed fuel homes pay less on average for their monthly utility bill.[11] However, trends in gas and electric rates, as well as policy decisions or incentives, can ultimately determine whether all-electric customers see net bill savings or costs. The customer cost-effectiveness of all-electric new homes represents an important policy consideration for achieving GHG emissions reductions in buildings.[12]

Figure 41: Monthly Energy Bills (Electricity Plus Natural Gas) for a New Mixed-Fuel Home and a New All-Electric Home in a Hot Climate Zone in Three IOU Service Territories



[10] See U.S. Energy Information Administration Data on Electricity: Sales (consumption), revenue, prices & customers: Average retail price of electricity to ultimate customers: Average monthly bill: Residential average monthly bill by Census Division, and State. Available at https://www.eia.gov/electricity/data.php#sales.
[11] See CPUC Report on Utility Costs and Affordability of the Grid of the Future, at 82.
[12] See CPUC Report on Utility Costs and Affordability of the Grid of the Future, at 83.

Energy bills matter to **all** residential customers because utility bills reduce the total amount of a household's monthly discretionary spending. It is in the public's best interest for CEC Staff to provide robust evaluations of gas and electric rates as well as energy consumption. Careful, integrated planning and sequencing of decarbonization policies and programs are necessary to avoid costly unintended consequences.

Impacts on Affordable Housing

A recent study published by the University of California, Los Angeles (UCLA study) evaluated the hourly variations in the intensity of residential household's natural gas use within a low-income portion of SoCalGas' service territory.[13] Researchers found that the aggressive electrification of residential end-use appliances has the potential to exacerbate daily peak electricity demand, increase total household expenditures on energy, and, in the absence of a fully decarbonized electrical grid, will likely result in limited GHG emissions abatement benefits. Using templates based on temporal usage data for specific communities can help to distinguish low-income households from wealthier households within the same climate zone. This will also ensure GHG emissions reductions are occurring given the time dependent nature of the carbon intensity of the electric grid (see Figure 3 below).

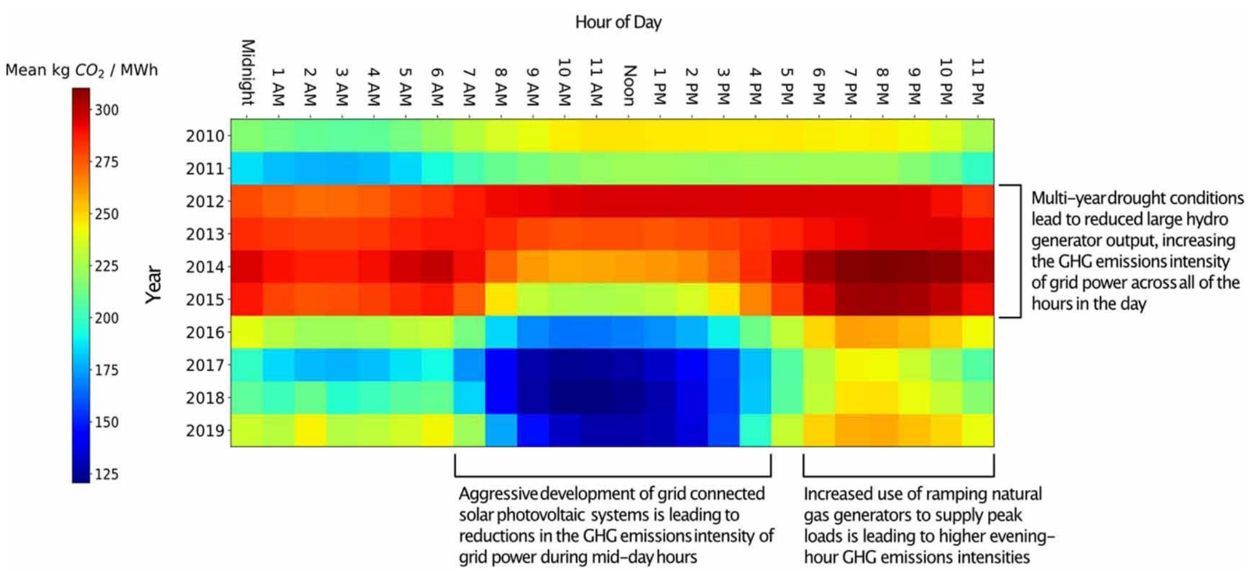


Figure 3. Carbon Intensity Heat Map of California's Electric Grid from 2010-2019[14]

SoCalGas shares California's goals of eliminating the State's GHG emissions; however, the cost should not disproportionately impact our most vulnerable and disadvantaged households. According to the Greenlining Institute, California "communities continue to experience high energy costs and energy insecurity, as well as high rates of disconnection when households

[13] Eric Daniel Fournier, et al. "Implications of the timing of residential natural gas use for appliance electrification efforts." Environmental Research Letters 15, no. 12 (2020): 124008. Available at https://iopscience.iop.org/article/10.1088/1748-9326/aba1c0/pdf.

[14] Fournier, "Implications of the timing of residential natural gas use for appliance electrification efforts," at 5.

[cannot] afford their bills."[15] These higher energy burdens are not only because of lower incomes, but also because of energy inefficiencies in the home and the time-of-use of energy. For most households, there is very little flexibility in the time-of-use of their energy consumption. Most households use their appliances in the early morning hours when preparing to depart from home and in the evening hours when returning home. Under the existing electricity rate structures, switching from a low energy cost appliance (gas appliance) to a higher energy cost appliance (electric heat pump) will increase a household's expenditure on energy. This is because a household's time-of-use coincides with periods of peak-electricity demand when electricity rates are up to four times or more than gas rates on an energy equivalent basis. In fact, Figure 4[16] (below) from the UCLA study shows that "the price premium for electrical energy can grow to a factor of 12 times during peak hours (4PM-9PM)."[17]

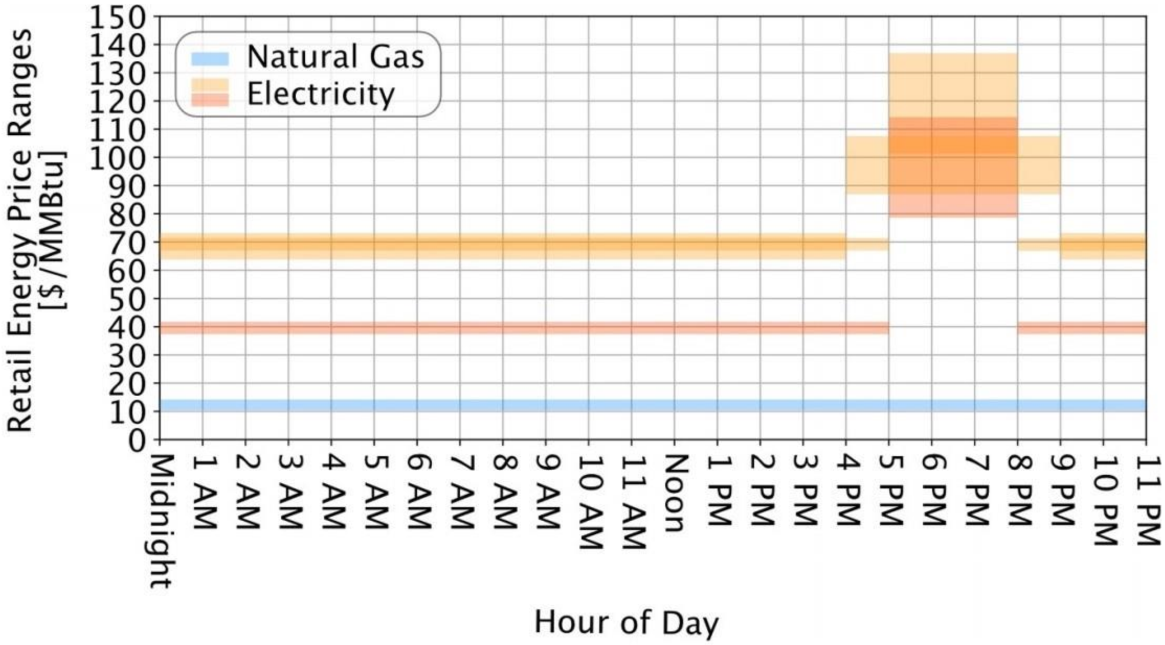


Figure 4. Comparison of local retail price ranges for electricity (red & orange) and natural gas (blue) using standardized energy units ($/*MMBtu*), by hour of day throughout the course of a year. These figures assume current residential rate tariff schedules and within-baseline-tier consumption levels. Note: the two different electricity rate tariffs depicted (red & orange) have different daily basic charges, minimum daily charges, and baseline credits. Thus, the range of values plotted only reflect the marginal cost of energy procurement.

The electric rate projections provided in previous 2022 Energy Code workshops reflect the 2019 Integrated Energy Policy Report (IEPR) forecast.[18] The CEC's electric retail rate forecasts show a modest increase of roughly two-percent per year from 2020 to 2030 for the three major Investor

[15] See Greenlining Institute, Affordable Clean Energy webpage. Available at https://greenlining.org/our-work/energy/affordable-clean-energy/.
[16] Fournier, "Implications of the timing of residential natural gas use for appliance electrification efforts," at 6.
[17] Fournier, "Implications of the timing of residential natural gas use for appliance electrification efforts," at 6.
[18] The 2020 IEPR forecast of electric rates is very similar to the 2019 IEPR.

Owned Utilities (IOUs).[19] Yet, a February 2021 CPUC Report[20] showed from 2019 to 2021, the residential rates for the three IOUs increased by 20 percent.[21] It is important to note that key investments during this period were wildfire mitigation and system modernization costs. The CPUC also examined recent trends and expected spending on major capital investment to develop a rate forecast from 2020 through 2030. The CPUC Report used a 10-year baseline forecast of steady growth in customer rates (nominal $/kWh) and projected electric rates as follows:

> "PG&E: $0.240 to $0.329, or about an annual average increase of 3.7 percent;
> SCE: $0.217 to $0.293, or about an annual average increase of 3.5 percent; and
> SDG&E: $0.302 to $0.443, or about an annual average increase of 4.7 percent."[22]

The CPUC electric rate projections highlighted that, for energy price sensitive households, bills are expected to outpace inflation over the coming decade. The implication is that, if household incomes are expected to generally increase at the rate of inflation, bills will become less affordable over time. CPUC President Marybel Batjer found this discovery "very troubling" as affordability impacts communities across California differently. Continuing to say "increases in energy bills by $1 or $2 can be absorbed by some households but can be detrimental to low-income households."[23] In fact, lower- and middle-income households bear a far greater cost for the State's power system.[24] Lower to middle-income households also tend to pay a higher percentage of their discretionary income for energy bills than wealthier households.[25]

Given the concern of the affordability of California's clean energy programs and recent projected rate increases forecasted in the UCLA study and the CPUC Report, SoCalGas strongly encourages the CEC to re-examine the rate assumptions and forecasts for electricity and natural gas, because these assumptions are the foundation for the cost effectiveness assessment for any of the energy efficiency, renewable supply, or electrification measures of the code. Moreover, these considerations should extend to critically looking at the impacts of the 2022 Energy Code on new affordable housing. Also, attached please find an Appendix that outlines discrepancies between the CASE Reports and the Pre-Rulemaking Express Terms. SoCalGas asks that CEC Staff also take these findings into consideration.

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[19] These IOUs are Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas and Electric (SDG&E).
[20] *See* CPUC Report on Utility Costs and Affordability of the Grid of the Future.
[21] Most increases in PG&E's rate occurred in 2020, while increases in SCE and SDG&E's rates occurred in 2021.
[22] See CPUC Report on Utility Costs and Affordability of the Grid of the Future, at 8.
[23] *See* CPUC En Banc Recording.
[24] *See* Next 10 and Energy Institute at Haas Report on Designing Electricity Rates for An Equitable Energy Transition.
[25] *See* American Council for an Energy-Efficient Economy Report on How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the U.S., 2020 September 10. Available at https://www.aceee.org/research-report/u2006.

Respectfully,

/s/ Tim Carmichael

Tim Carmichael
Agency Relations Manager
Southern California Gas Company

cc: Peter Strait, Manager, Building Energy Efficiency Office
Mazi Shirakh, PE, Building Decarbonization Project Manager
Payam Bozorgchami, PE, Building Energy Efficiency Standards Project Manager

APPENDIX

Discrepancies Between the CASE Reports and the Pre-Rulemaking Express Terms

Nitrogen dioxide (NO_2) emissions from gas ranges have not conclusively been shown to contribute to concentrations in excess of health-based standards. Further justification is warranted for the higher proposed minimum range hood capture efficiency (CE)/airflow requirements over gas ranges compared to those for electric ranges (presented in Tables 120.1-F, 150.0-G, and 160.2-G). These proposed requirements are based on gas range use simulations performed by the Lawrence Berkeley National Laboratory (LBNL), focused on NO_2 emissions, which rely on NO_2 emission rates that are likely biased high. Specifically, the NO_2 emission rates used by LBNL[26] are based on NO_2 emission measurements collected by Singer et al.[27] which are likely biased high due to nitrous acid interference with the ozone-based chemiluminescence monitors used to measure NO2. Singer et al.[28]specifically noted that the measured NO_2 amounts likely included "non-negligible amounts of nitrous acid" (given that ozone-based chemiluminescence monitors "respond linearly and quantitatively" to nitrous acid [Spicer et al.[29]], meaning that concentrations of nitrous acid are interpreted by the monitor as NO_2 and therefore not differentiated from NO_2), but did not specify the magnitude of the potential interference. Others have measured up to 50 parts per billion nitrous acid in a kitchen after operating a gas stove (Collins et al. 2018[30]; Zhou et al. 2018[31]), which would be a potentially significant level of interference within the context of the NO_2 measurements presented by Singer et al..[32] Given the potential significance of the nitrous acid bias, it is likely that the proposed minimum range hood CE/airflow requirements over gas ranges are higher than they need to be to specifically control for NO_2 emissions.

In addition, cooking-related emissions and the long-term and short-term indoor air concentrations associated with these emissions can vary greatly in real-world situations. The type and mass of emissions and associated indoor air quality varies with type and age of home, type of food, cooking

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[26] Chan, W.R., Sangeetha, K., Johnson, A., and B.C. Singer. 2020. Simulations of Short-Term Exposure to NO_2 and $PM_{2.5}$ to Inform Capture Efficiency Standards, Sustainable Energy and Environmental Systems Department, Lawrence Berkeley National Laboratory. March 30. Available at https://escholarship.org/content/qt6tj6k06j/qt6tj6k06j.pdf.

[27] Singer, B.C., Delp, W.W., Lorenzetti, D.M. and R.L. Maddalena. 2016. Pollutant Concentrations and Emission Rates from Scripted Natural Gas Cooking Burner Use in Nine Northern California Homes, Ernest Orlando Lawrence Berkeley National Laboratory. Available at https://escholarship.org/content/qt9bc0w046/qt9bc0w046.pdf.

[28] Ibid., 28.

[29] Spicer, C.W., Kenny, D.V., Ward, G.F., Billick, I.H., and N.P. Leslie. 1994. Evaluation of NO_2 Measurement Methods for Indoor Air Quality Applications. J. Air & Waste Manage. Assoc. 44: 39-47. Available athttps://www.tandfonline.com/doi/abs/10.1080/1073161X.1994.10467245.

[30] Collins, D.B., Hems, R.F., Zhou, S., Wang, C., Grignon, E., Alavy, M., Siegel, J.A., and J.P.D. Abbatt. 2018. Evidence for Gas-Surface Equilibrium Control of Indoor Nitrous Acid. Environ. Sci. Technol. 52 (21):12419-12427. Available at https://pubs.acs.org/doi/abs/10.1021/acs.est.8b04512.

[31] Zhou, S., Young, C.J., VandenBoer, T.C., Kowal, S.F., and T.F. Kahan. 2018. Time-Resolved Measurements of Nitric Oxide, Nitrogen Dioxide, and Nitrous Acid in an Occupied New York Home. Environ. Sci. Technol. 52 (15):8355-8364. Available at https://pubs.acs.org/doi/abs/10.1021/acs.est.8b01792.

[32] Ibid., 28.

style, and duration of cooking as well as energy source.[33] Evidence of specific correlations between different types of cooking-related emissions and health effects is not well-established. Proposing differential CE/airflow requirements based on stove fuel source alone suggests more certainty in the understanding of the specific correlations between real-world cooking-related emissions and potential health effects than actually exists.

[33] O'Leary, C., Kluizenaar, Y., Jacobs, P., Borsboom, W., Hall, I., and B. Jones. 2019. Investigating measurements of fine particle ($PM_{2.5}$) emissions from the cooking of meals and mitigating exposure using a cooker hood. Indoor Air 29, 423–438. Available at https://onlinelibrary.wiley.com/doi/abs/10.1111/ina.12542.