Kevin Barker
Senior Manager
Energy and Environmental Policy
555 West 5th Street
Los Angeles, CA 90013
Tel: (916) 492-4252
KBarker@socalgas.com

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Senator Vanessa Delgado, Chair and
Honorable Governing Board Members
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Subject: Comments on Proposed Amendments to Rule 1111 and Rule 1121

Dear Senator Delgado and Honorable Members of the Governing Board:

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide public comments on the South Coast Air Quality Management District (South Coast AQMD) Proposed Amendments to Rule (PAR) 1111 and Rule (PAR) 1121. If adopted, the proposed amendments will require millions of residents within the South Coast Air Basin to replace approximately 10 million affected units once the existing appliance requires replacement and will require all new buildings to install fully electric space and water heating appliances. These rules create significant burdens for consumers and will cost billions of dollars to reduce overall nitrogen oxide (NOx) emissions within the South Coast Air Basin by just 2.8% or 10 tons per day out of the total 351 tons per day of NOx emitted by all sources within the territory[1]. Even if all sources regulated by the California Air Resources Board (CARB) and South Coast AQMD were zero emission, federal sources alone would emit substantially more than the 60 tons per day NOx limit the District must achieve to comply with federal ozone standards.[2] SoCalGas supports policies to achieve NOx reductions, provided such policies are feasible, permitted by federal law, cost-effective, and commercially available. However, SoCalGas has numerous concerns with the proposed rule, including a concern that it is preempted by federal law.

[1] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," September 2024, Page 5-1, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18*.

[2] South Coast AQMD, "2022 Air Quality Management Plan Executive Summary," December 2022, Page ES-6, *https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/03-es.pdf?sfvrsn=6*.

SoCalGas's comments highlight the following concerns: 1) The proposed rules effectively ban certain appliances covered by the federal Energy Policy and Conservation Act (EPCA); 2) It is imperative that South Coast AQMD inform residents and business owners of the impacts of PAR 1111 and 1121 prior to Board consideration, as it appears that the majority of residents and business owners in the South Coast AQMD jurisdiction are wholly unaware of these significant changes; 3) South Coast AQMD staff need to provide the datasets and assumptions used to perform cost-effectiveness calculations to allow stakeholders to better assess the impacts of the proposed amendments; 4) Several assumptions within the cost-effectiveness analysis are inconsistent and should be revaluated by staff; 5) Among other issues, the Draft Subsequent Environmental Assessment does not sufficiently explain why energy impacts from PAR 1111 and 1121 are less than significant; 6) Staff should clarify why they plan to perform a technology check-in after rule implementation; and 7) The financial impact of the proposed amendments has not been adequately evaluated and will be burdensome to the everyday customer**.**

1. The proposed rules effectively ban certain appliances covered by EPCA

Under a recent ruling by the Ninth Circuit Court of Appeals, *California Restaurant Association v. City of Berkeley*, 89 F.4th 1094 (9th Cir. 2024), the Court held that EPCA preempts all regulations "that relate to 'the quantity of [natural gas] directly consumed by' certain consumer appliances at the place where those products are used." *Id.* at 1101. "[A] regulation on 'energy use' fairly encompasses an ordinance that effectively eliminates the 'use' of an energy source." *Id.* at 1102. Here, similar to the Berkeley ordinance, the effect of the proposed rules is to reduce the quantity of gas consumed by EPCA-covered appliances to zero. Under *Berkeley*, States and localities cannot avoid EPCA's preemption provisions "by doing *indirectly* what Congress says they can't do *directly*." *Id.* at 1107 (emphasis in original).

2. It is imperative that South Coast AQMD inform residents and business owners of the impacts of PAR 1111 and 1121 prior to Board consideration, as it appears that the majority of residents and business owners in the South Coast AQMD jurisdiction are wholly unaware of these significant changes

It is incumbent upon regulatory agencies to ensure affected parties of any rulemaking process know and have an opportunity to understand the proposed changes to rules before the rule amendments are adopted. While staff held six (6) working group meetings and one public workshop, most attendees were manufacturers, contractors, and environmental justice leaders. Given this, it is our impression that the majority of residents and business owners in the South Coast AQMD territory are wholly unaware of the significant changes being proposed.[3]

[3] This was evident at the California Air Resources Board's (CARB) August 22, 2024, Virtual Listening Session on CARBs similar Zero-Emission Space and Water Heating Standard. This listening session intended to engage residents of Southern California. While the meeting was co-hosted by Climate Action Campaign (CAC) with CARB and attended by South Coast AQMD staff, unfortunately the public was not informed about this opportunity to learn about these proposed regulations. As such, the meeting was attended by fewer than 45 people in a region of 17 million and the majority of attendees were government agency staff, members of CAC, and SoCalGas staff.

It is essential that the public is made aware of these proposed amendments, since the requirements and impacts are far reaching. When the Board adopted its most recent amendments to Rule 1146.2 in June 2024, which regulates NOx emissions from large water heaters, small boilers and process heaters, two members emphasized the need for an immediate outreach campaign to inform those affected by that regulation.[4] While it's crucial to notify impacted parties about rule changes and implementation timelines, it's even more vital for the regulatory body to engage in public awareness efforts before adoption. PAR 1111 and 1121 will directly impact residential customers, who will bear the majority of compliance costs.[5] Therefore, it is essential that communities understand how the proposed amendments will influence their choices and future costs.

Previous updates to Rules 1111 and 1121 required that manufacturers develop equipment to meet stricter emissions standards by setting a feasible NOx reduction target. These updates did not require residents to invest in costly modifications to their homes when their space and water heating equipment required replacement. The present proposed amendments, while presented as an emissions reduction regulation, will require property owners – residential and commercial – and tenants to switch out their gas appliances for electric appliances. If approved, the financial burden of these changes will be placed on residents and consumers in the South Coast AQMD territory.

During the October 3, 2024 South Coast AQMD Public Workshop, an owner of a heating, ventilation, and air conditioning (HVAC) company in the San Bernadino mountains similarly expressed concerns that the public is unaware of the amendments' implications on their future budgets and the costs of major upgrades to their homes. His comments highlighted that staff did not take his region into account when evaluating feasibility and costs. In the analysis, AQMD staff averaged installation costs for climate zones 6, 9, and 10[6]. However, the customers he serves are in climate zone 16 and the majority of these homes do not have preexisting air conditioning (AC). If these amendments are passed and these residents are required to replace their heating system with a heat pump, they will face an additional expense compared to other customers in the District because they will need to install low ambient heat pump equipment which, on average, costs 30 - 50% more than standard heat pump equipment.[7] It appears that these additional incremental costs were not accounted for in staff's cost-effectiveness analysis. Needless to say, PARs 1111 and 1121 will affect millions of residents and businesses in the South Coast AQMD region and it is imperative that there be public outreach campaigns to garner participation from those this will

[4] "Governing Board Meeting Live Webcast," South Coast AQMD, June 7, 2024, *https://www.aqmd.gov/home/news-events/webcast/live-webcast?ms=UeHieemQEZc*.
[5] Rule 1146.2 regulates small commercial boilers and large water heaters as well as tankless water heaters and pool heaters.
[6] South Coast AQMD, "Proposed Amended Rules 1111 and 1121 Working Group Meeting #2," November 28, 2023, Slide 11, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm2-november-2023.pdf?sfvrsn=14*.
[7] *Diane Oestreich, "Kory Griggs Addresses Air Quality Management Board," Mountain News, published on October 9, 2024, https://www.mountain-news.com/news/kory-griggs-addresses-air-quality-management-board/article_73c973dc-867d-11ef-8fc9-4ff63eba5178.html.*

impact the most. SoCalGas requests that South Coast AQMD delay the adoption of these rules to allow adequate time for public outreach. Additionally, SoCalGas requests that South Coast AQMD make all comment letters submitted by stakeholders publicly available on the South Coast AQMD's website within 72 hours of comment submittal.

3. South Coast AMQD staff need to provide the datasets and assumptions used to perform cost-effectiveness calculations to allow stakeholders to better assess the impacts of the proposed amendments

The data sources used, and assumptions made by South Coast AQMD staff in the cost-effectiveness analysis are unclear. Staff provided general citations to public data sources used to estimate costs during the rulemaking process, but citations should point stakeholders to the specific datasets that were relied upon in the cost-effectiveness evaluation.

For example, capital and operating costs were presented in Working Group Meeting #2 on slides 9 – 13. While staff generally references the source of data used to obtain cost information, the presentation lacks citations for specific reports and datasets used in the evaluation. The link provided on slide 13 of the Working Group Meeting #2 presentation, for example, takes users to the landing webpage for Energy Star Certified Heat Pump Water Heaters, which makes it difficult to understand exactly where staff obtained the annual energy use data for certified water heaters. Similarly, in Working Group Meeting #4, staff updated the cost-effectiveness for residential heat pump water heaters to $246,000 per ton without providing any explanation. This value was again updated in the staff report to $327,000 per ton, yet staff never provided an update on this in subsequent Working Group Meetings, and it is unclear how staff determined this value. These are just a few of the many instances where staff failed to provide transparency with the data used to conduct the cost-effectiveness analysis.

Furthermore, in an effort to gain a better understanding of the costs associated with the transition to electric space and residential water heaters for our customers, SoCalGas asked an independent consulting firm, Ramboll, to use the information presented in the PAR 1111 and PAR 1121 Working Group Meetings and apply the South Coast AQMD's cost-effectiveness analysis technique to estimate costs. Using the methodology and data provided in the Working Group Meetings and the staff report, Ramboll's calculated values are significantly different than those presented by staff for all the replacement scenarios. Table 1 below illustrates this difference for single-family water heaters. It is important to reiterate that Ramboll's analysis is using the same assumptions and values presented by staff, and yet the results were unable to be duplicated and independently verified (see Appendix A for complete analysis).

Table 1: Comparison of Cost-Effectiveness Values for Single-Family Water Heater

Category	Cost-Effectiveness ($/Ton)		
	AQMD Analysis	Ramboll Analysis	Percent Change
Single-Family Water Heater with Panel Upgrade	$601,000	$750,345	25%
Single-Family Water Heater	$299,000	$524,016	75%
Overall Weighted Average*	$327,000	$544,385	66%

*Based on South Coast AQMD assumption that 9% of homes require a panel upgrade

The lack of clarity as to how staff arrived at these cost-effectiveness values is very concerning. It appears that staff did not update the average annual electricity usage values as indicated in the staff report to arrive at $601,000[8] for the cost of a water heater replacement with a panel upgrade (Ramboll's analysis using South Coast AQMD's assumptions is 25% higher for water heaters with panel upgrades, 75% higher for water heaters without upgrades, and 66% higher for water heaters when using South Coast's weighted average calculation). Unfortunately, SoCalGas is unable to determine how staff arrived at $299,000 for the cost of a water heater replacement without a panel upgrade. Without visibility into the datasets used, assumptions, and calculations made by staff, stakeholders are unable to get a full picture of how the potential costs associated with compliance with these rules were evaluated. Data transparency is crucial in any rulemaking process but is particularly important for PAR 1111 and PAR 1121, as the potential financial implications of this rulemaking will impact millions of residents and businesses in South Coast AQMD jurisdiction. SoCalGas requests that staff provide details on the assumptions, datasets, and calculations used within the cost-effectiveness analysis to derive the cost-effectiveness values presented. It is critical that staff provide this information to help the public better understand what costs customers may encounter in the not-too-distant future. SoCalGas recommends that staff make their calculation spreadsheet available to the public for review and comment as was done for Proposed Rule 2304.[9]

Given the difficulty of unpacking the cost-effectiveness assumptions and lack of public awareness, stakeholders should be given more time to understand the specific assumptions to ensure the calculations are sound. As such, SoCalGas requests that the Board delay adoption of these proposed rules to allow for an additional public workshop to review the cost-effectiveness calculations that were used to determine the cost-effectiveness values.

[8] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," September 2024, Page 2-20, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18*.

[9] South Coast AQMD, "Proposed Rule 2304," see Potential Port Emission Reduction Strategies excel files from Working Group Meetings, *https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-2304*.

4. Several assumptions within the cost-effectiveness analysis are inconsistent and should be revaluated by staff

The cost-effectiveness analysis contains several assumptions that are inconsistent, which undermines the overall reliability of the findings. To enhance the accuracy and credibility of the evaluation, it is crucial to address these inconsistencies. SoCalGas's analysis of staff's calculations found several areas that should be addressed. Enhancements should focus on ensuring that assumptions are clearly defined, logically sound, and consistently applied throughout the process. We hope that these insights will help to produce more robust and dependable results, ultimately leading to better-informed decisions.

a. *Inconsistent data used to estimate equipment replacement costs*

The South Coast AQMD's analysis uses two different data sets to estimate replacement costs for gas and electrical equipment. Gas replacement estimates are based on the E3 Residential Building Electrification analysis[10], while the electric equipment replacement costs are based on the Technology and Equipment for Clean Heating (TECH) data set[11]. Per the staff report, staff utilized the November 2023 public data set from TECH for Los Angeles, Orange, San Bernardino and Riverside counties and the entire data set from E3 for climate zones 6, 9 and 10[12]. According to staff, TECH Clean California Program data includes only 1,400 Multi-Family (MF) buildings and 18,000 Single-Family (SF) buildings that participated in the state incentive program[13].

It is unclear why staff chose to use two separate sources of data, from where values were pulled, and why staff limited the scope of the data sets. It is important to have data integrity to avoid the appearance of bias in such an analysis. In order to eliminate these data inconsistencies, the same data source can be used for both gas and electric equipment costs. Since the E3 analysis includes estimates for both gas and electric equipment costs, utilizing this data as the basis for the cost-effectiveness calculations would provide consistency.

[10] Amber Mahone et al., "Residential Building Electrification in California," Energy and Environmental Economics, Inc. ("E3"), April 2019, https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf.

[11] Technology and Equipment for Clean Heating (TECH) Clean California. "Heat Pump Data," last modified on September 13, 2024, *https://techcleanca.com/heat-pump-data/download-data/*.

[12] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," September 2024, Page 2-15, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18*.

[13] South Coast AQMD, "Proposed Amended Rules 1111 and 1121Working Group Meeting#3," January 31, 2024, Slide 17, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm3-january-2024.pdf?sfvrsn=12*.

b. *Space heating cost-effectiveness analysis assumes simultaneous replacement of AC units, which are not regulated under Rule 1111*

South Coast AQMD's analysis should not rely upon a baseline of replacing AC units, an appliance which is not regulated by Rule 1111, in order to achieve cost-effectiveness. South Coast AQMD's analysis asserts that it is not cost-effective to replace a furnace with a heat pump in single-family homes without including the costs of replacing an AC system. In fact, in homes that do not currently have AC, the cost-effectiveness for a heat pump replacement is $827,000 per ton without a panel upgrade or $921,000 per ton with a panel upgrade. This exceeds the $349,000 cost-effectiveness threshold.[14] Furnace replacement with a heat pump only appears cost-effective when costs associated with simultaneous replacement of the furnace and AC are included.

Furthermore, to account for the fact that homes without AC are above the cost-effectiveness threshold, the South Coast AQMD's analysis relies on weighted averages. It is unclear how staff is performing these weighted average calculations, but the analysis relies on two percentages; according to staff, 87% of homes in South Coast AQMD already have AC and only 4% of homes will require a panel upgrade.[15] To estimate the percentage of homes with AC and without AC, staff relied on the U.S. Census American Housing Survey (AHS). Staff did not provide details as to how this data was utilized, but it appears that the 87% estimate includes a significant number of room AC units.[16] While the cost-effective analysis should not include AC units at all, it would be more accurate to exclude room units. Per the AHS data, when excluding room air conditioners only 66% of homes in the South Coast have AC (for the Los Angeles-Orange-San Bernardino-Riverside area).[17] Similarly, per the staff report the TECH data was used to determine that only 4% of homes need electrical panel upgrades for space heating, however it is unclear how staff arrived at this percentage and why such a small dataset was utilized.[18]

Overall, this approach assumes a 1:2 appliance replacement and should not be used to conclude that this is cost-effective. Rather than just evaluating the cost to replace a furnace, staff is assuming that customers will replace the furnace and a functioning AC unit at the same time, regardless of cost. It is not realistic to assume that homeowners are going to replace AC units that are in good condition if they only need to buy a new furnace. It is also a divergence from common practice to

[14] South Coast AQMD, "Proposed Amended Rules 1111 and 1121 Working Group Meeting #6," August 15, 2024, Slide 27, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm6-august-2024.pdf?sfvrsn=18*.

[15] South Coast AQMD, "Proposed Amended Rules 1111 and 1121 Working Group Meeting #6," Slide 27.

[16] South Coast AQMD, "Proposed Amended Rules 1111 and 1121 Working Group Meeting #2," November 28, 2023, Slide 7, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm2-november-2023.pdf?sfvrsn=14.*

[17] U.S. Census Bureau, "American Housing Survey (AHS) Table Creator," American Housing Survey, AHS housing unit Characteristics spreadsheet, *https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=00000&s_year=2023&s_tablename=TABLE1&s_bygroup1=1&s_bygroup2=1&s_filtergroup1=1&s_filtergroup2=1*.

[18] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," September 2024, Page 2-17, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18.*

put forth a regulation that is not cost-effective simply because staff believes that residents will benefit from having AC. As indicated in the staff report "although heat pump replacement for furnace without AC has a high cost-effectiveness, the replacement would have an additional benefit of space cooling, which is becoming more of a necessity due to climate change."[19] Consumers should not be forced to bear the cost of an appliance that they may not need or be able to afford. As such, staff should update the cost-effective analysis excluding the costs of AC replacement; doing so will show that these proposed amendments to Rule 1111 are not cost-effective.

c. South Coast AQMD should consider revising electrical panel upgrade costs to more accurately reflect upfront costs to customers

During the rulemaking process, staff acknowledged that the transition to zero-emission units may require electrical panel upgrades, which will be an added cost to customers who are already paying to replace their appliance. Although staff noted that panel upgrades typically cost approximately $3,000 based on available data,[20] the cost-effectiveness analysis ultimately relied upon a panel upgrade cost of $750[21]. This value was derived by dividing the $3,000 estimate in half to account for the longer useful life of the electrical panel (assumed to be 30 years) versus the useful life of the replacement unit (assumed to be 15 years for heat pump water heaters, but staff did not update this value to use the 25-year useful life of heat pump space heaters). Staff also assumed that costs would be shared between both space and water heating appliances even though one appliance replacement could trigger the need to upgrade the whole cost of the panel, resulting in a realized cost of $3,000 to the customer to replace one appliance.

To accurately estimate upfront costs and effectively communicate expected costs to the public, the cost-effectiveness analysis should be updated to include the total cost of an electrical panel upgrade. The financial investment in panel upgrades is made at the time of purchase, not at the end of the equipment life; therefore, electric panel upgrade costs should not be prorated based on the useful life of the appliance. Furthermore, based on available data, the cost of a panel upgrade can be up to $18,000[22] if customers are responsible for utility infrastructure costs such as pole changeouts or conduit replacements, or other costs such as sub-panels, new breakers, trenching, etc. Additionally, space and water heaters have varying life expectancies, thus it is inaccurate to apply a single 15-year panel lifetime cost to both types of equipment. If staff chooses to stick with this approach, however, then appliances with a 25-year expected life should be identified with the prorated panel upgrade cost.

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[19] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," Page 2-18.
[20] NV5, "Service Upgrades for Electrification Retrofits Study Final Report," May 27, 2022, Page 32, *https://pda.energydataweb.com/api/view/2635/Service%20Upgrades%20for%20Electrification%20Retrofits%20Study%20FINAL.pdf.*
[21] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," September 2024, Page 2-17, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18.*
[22] NV5, "Service Upgrades for Electrification Retrofits Study Final Report," Page 32.

Also, as previously noted, staff is performing weighted averages utilizing the assumptions that only "4 percent of homes for space heating and 9 percent of homes for water heating" will require a panel upgrade.[23] Since the transition to zero-emission technology will require California families to ultimately bear this added cost, it is important to ensure that such assumptions used to derive this value are appropriate and provide a realistic cost to customers. For these reasons, we request that South Coast AQMD delay the adoption of these rules to allow for a public workshop to review the assumptions that were used to arrive at these values. In lieu of a public workshop staff could make their calculation spreadsheet available to the public for review and comment.

d. *Energy Prices used in South Coast AQMD's analysis are point sources and representative of prices before the proposed rule implementation date*

In its cost-effectiveness analysis for residential and commercial appliances, South Coast AQMD used projected electricity and natural gas rates for 2024-2050 from the 2023 Integrated Energy Policy Report (IEPR) Energy Demand Forecast.[24] The 2023 IEPR electricity forecast only goes to 2040, but natural gas rates extend to 2050. Since the compliance dates do not begin until 2026 and these types of equipment have long lifetimes (ex. 15 and 25 years), energy prices are expected to change during that period.[25] Hence, SoCalGas proposes that the cost-effectiveness analysis should use an average of projected rates during the equipment's expected 15- or 25-year lifetime to better reflect the actual cost of O&M for the equipment's lifetime. We also believe that the approaches for electric and gas appliances should be consistent; however, we were unable to verify the source and timeframe of the electricity and gas rates used for the cost-effectiveness analysis. Therefore, SoCalGas requests clarification from staff how electricity rates are averaged through 2050 if the data was not available from the forecast. Without this clarification, it is not possible to validate the staff report's analysis.

e. *Inflated coefficient of performance assumptions for heat pumps*

South Coast AQMD staff presented energy consumption data during Working Group Meeting #2 on slides 13 and 14. Table 2 below provides a summary of energy usage assumptions provided, gaps in energy usage assumptions, as well as calculated Coefficients of Performance (COP).

[23] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," September 2024, Page 2-15, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18.*

[24] California Energy Commission, "2023 Integrated Energy Policy Report Energy Demand Forecast California Energy Demand," *https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2023-integrated-energy-policy-report/2023-1*.

[25] U.S. Energy Information Administration, "Annual projections to 2050," retrieved on October 8, 2024, *https://www.eia.gov/analysis/projection-data.php.*

Table 2: Summary of Energy Usage Assumptions Used in South Coast AQMD Analysis

	SF/MF Residential Space Heating		Commercial Space Heating		Residential Water Heating[26]		Coefficient of Performance[27]	
	HP	Gas	HP	Gas	HP	Gas	HPSH	HPWH
Energy Consumption (kWh)[28]	565	3,822	No data provided	No data provided	1,036	5,567	6.76	5.37

Based on the residential energy data South Coast AQMD staff provided, the residential heat pump space and water heating COPs are 6.76 and 5.37, respectively. These levels of efficiencies are not consistent with performance of existing heat pump technologies. Heat pump technologies typically range from 3.5-4.4.[29]

SoCalGas staff attempted to unpack the rationale for the high COP values used by South Coast AQMD staff for both space and water heat pump technologies. The staff report indicates that heat pump technology "can be over three times more efficient than conventional appliances" but does not provide any reference.[30] Additionally, the source of the energy consumption data for water heater usage was unclear as the only reference for data source is the ENERGY STAR product finder link.[31] South Coast AQMD staff should provide the specific appliances or data used to develop these calculations, so stakeholders can understand how the values are derived.

In the South Coast AQMD Space Heating consumption analysis, as presented on slide 12 of Working Group Meeting #2, the current values used in the analysis appear to come from the RASS 2019 executive summary, Tables ES-1 and ES-3.[32] The Southern California Edison (SCE) values in Table ES-1 represent the average consumption of all electric HVAC heat pump installations (single-family, multi-family, and mobile homes) in the SCE service territory, while the SoCalGas values in Table ES-3 represent the average consumption of all gas space heating installations (single-family, multi-family, and mobile homes) in SoCalGas territory. These values, however, do not account for the types of buildings (single-family vs. multi-family vs. mobile homes) in which

[26] Used lowest range energy usage assumption for both heat pumps and conventional gas water heaters.
[27] SoCalGas calculated the coefficient of performance based on energy consumption of gas appliances and heat pump appliances.
[28] Gas energy usage converted from therms to kWh using 29.3 kWh/therm conversion factor including electricity load for furnace fan.
[29] Nate Jutras, "What is Uniform Energy Factor and Why Does it Matter?," ENERGY STAR, accessed October 16, 2024, *https://www.energystar.gov/products/ask-the-experts/what-uniform-energy-factor-and-why-does-it-matter.*
[30] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rules 1111 and 1121," September 2024, Page 2-10, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18.*
[31] ENERGY STAR Certified Heat Pump Water Heaters, *https://www.energystar.gov/productfinder/product/certified-heat-pump-water-heaters/results.*
[32] California Energy Commission, "2019 California Residential Appliance Saturation Study (RASS) Executive Summary*,"* July 2021, Pages 5 and 11, https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-ES.pdf.

the equipment is installed. For example, if there are more HVAC heat pumps in multi-family homes, which have a lower space heating load than single-family buildings, it could show that the heat pump space heater is saving more energy simply by heating smaller building sizes. By comparing the SCE numbers from Table ES-1 to the building specific values in Table ES-2, one can see that the average space heating load in SCE territory is most similar to multi-family energy consumption. Moreover, comparing SoCalGas numbers from Table ES-3 to the building specific values in Table ES-4 shows the space heating load in SoCalGas territory is most similar to mobile home energy consumption. This suggests that there are more heat pump installations in multi-family buildings, which skews the unit energy consumption values lower within SCE territory.

The more appropriate numbers for the analysis would be from Tables ES-2 and ES-4, which control for building size and therefore compare equal building loads. These tables show that multi-family space heating uses about 40% of the single-family energy usage and mobile home space heating uses about 75% of the single-family energy usage. The following table summarizes ES-2 and ES-4 for energy consumption data by technology and residential building types.

Table 3: Summary of ES-2 and ES-4 Energy Consumption Data

	Unit Energy Consumption (UEC)		
	Single-Family	Multi-Family	Mobile Home
Primary Conventional Space Heating (kWh)	1,509	622	1,193
Primary Heat Pump Space Heating (kWh)	1,221	493	980
Primary Heat (therm)	191	67	136
Furnace Fan (kWh)	159	55	116

While these numbers are statewide and include climate zones outside of the South Coast AQMD territory, they provide for a more like-for-like comparison of building usage. The statewide values for different building types in Tables ES-2 and ES-4 would be more appropriate for this analysis.

Further, to get the most accurate consumption values and account for the regionality of energy consumption as well as the different building load usage, the RASS database could be utilized.[33] Although currently unavailable on the CEC website, the RASS 2019 database contains all of the raw data from the RASS study (see footnote 33) to enable a user to search and filter the data usage as needed. The RASS 2019 UEC tables, which calculate energy consumption values of weather sensitive end uses by climate zones and building types, can be utilized to get regional values for different space heating loads depending on the building type.[34] This would allow for a more

[33] California Energy Commission, California Residential Appliance Saturation Study Database, *https://rass.dnv.com/sign/in.*

[34] California Energy Commission, "2019 California Residential Appliance Saturation Study (RASS) Volume 2: Results," July 2021, *https://rass.dnv.com/envodig/api/site/media/CEC-200-2021-005-RSLTS.pdf.*

accurate like-for-like comparison of the different consumption values between building and space heating types within certain regions.

Due to the relatively smaller sample sizes of the UEC values by climate zone, there is more variation in the results of the data. To have statistically significant data, it is best to use the statewide figures from the RASS 2019 database below, similar to the executive summary tables ES-2 and ES-4:

Table 4: RASS 2019 Statewide Energy Consumption Data

Building Type	Primary Heat (therm)	Conv. Heat (kWh)	Heat Pump (kWh)
Single-Family	189	1,509	1,221
Townhome	83	951	593
2-4 Unit Apartment	69	592	559
5+ Unit Apartment	53	582	461
Mobile Home	144	1,193	980

SoCalGas requested that Ramboll use the statewide data per residential building type in their cost-effectiveness analysis.

f. Cost-effectiveness calculations should include costs of alternative compliance pathways

During the October 3, 2024 South Coast AQMD Public Workshop, several stakeholders raised concerns about the alternative compliance pathways laid out within both rules. Stakeholders voiced concern regarding rental appliance feasibility, noting that this would be incredibly complicated and costly to owners. One commenter acknowledged that for his manufacturing company, ultra-low NOx products are only shipped to and sold in areas in California that have low NOx requirements. Another manufacturer commented that the District should not rely on the market to create a rental program and suggested that the District fund a program similar to what was done to support the TECH program.[35] Without such an established program, inventory in the next few years will decline as manufacturers stop producing natural gas units for sale in California. The lack of availability of rental units will impose additional costs on households and could potentially offset emissions reductions if consumers need to utilize higher emitting units because manufacturers stop developing units that meet California's strict emissions standards.

Furthermore, the cost-effectiveness analysis does not include consideration of the additional costs incurred by customers under the alternative compliance options. Staff noted that the alternative compliance options were included as part of the PAR 1111 amendments to address the high upfront cost associated with furnace replacement, since furnace replacement without simultaneous

[35] South Coast AQMD October 3, 2024 Public Workshop, stakeholder comments; recording available by request to AQMD staff.

replacement of an AC systems is not cost-effective[36]. Given 34 percent of homes in the South Coast AQMD region do not have AC, the additional costs of the alternative compliance option will be a reality for many households.[37] To account for these costs, the cost-effectiveness analysis should assume that these homeowners will have to pay double the installation, labor, and permitting costs, in addition to rental costs, since rented natural gas-fired furnaces and water heaters will need to be installed and subsequently uninstalled once a heat pump replacement unit has been procured and any necessary upgrades are completed for the heat pump. It is in the public interest to be made aware of these potential additional upfront costs, as it will impose additional financial burden on anyone who will need to utilize these alternative compliance options.

g. Ramboll's cost-effectiveness analysis

Given these findings, SoCalGas asked Ramboll to apply the South Coast AQMD's cost-effectiveness analysis technique as presented by staff for the proposed zero emission standards for PAR 1111 and 1121 (Appendix A). Ramboll calculated the cost-effectiveness in dollars per ton of NO_X reduced for the replacement of residential natural gas appliances with electric heat pump alternatives using the updated data and assumptions as discussed in the comments above. The results are summarized below in **Table 4.** The analysis indicates that the replacement of a single-family home natural gas water heater, single-family home natural gas furnace (only), and multi-family home natural gas furnace (only) with heat pump equipment are not cost-effective, i.e., cost-effectiveness is greater than the threshold of $349,000. Details of these calculations are presented in Tables B-1, B-2, and B-3 in **Attachment B** for single-family home water heaters, single-family home HVACs, and multi-family home HVACs, respectively.

[36] South Coast AQMD, "Preliminary Draft Staff Report for Proposed Amended Rule 1111 and 1121," September 2024, Page 2-19, https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18.

[37] U.S. Census Bureau, "American Housing Survey (AHS) Table Creator," American Housing Survey, *https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=00000&s_year=2023&s_tablename=TABLE1&s_bygroup1=1&s_bygroup2=1&s_filtergroup1=1&s_filtergroup2=1*.

Table 4: Updated Cost-Effectiveness Comparisons			
	Cost-Effectiveness for Conversion of Residential Natural Gas Equipment to Electric Heat Pump Equipment		
	(2022$/ton NO_X)		
Data Source	**Single-Family Home Water Heater**	**Single-Family Home HVAC**	**Multi-Family Home HVAC**
PAR 1111/1121 Preliminary Draft Staff Report[1]	601,000	921,000	(135,000)
Cost-effectiveness values calculated based on updated data presented in this comment letter[2]	**879,258**	**972,443**	**1,351,118**
Cost-effectiveness threshold ($/ton of NO_X)	349,000		
Notes:			
[1]South Coast AQMD. Preliminary Draft Staff Report for: Proposed Amended Rule 1111 – Reduction of NO_X Emissions from Natural Gas-Fired Furnaces and Proposed Amended Rule 1121 – Reduction of NO_X emissions from Small Natural Gas-Fired Water Heaters. Available at: *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18*. Accessed: October 2024.			
[2]See Attachment B. Analysis includes panel upgrade costs of $3,000			
Abbreviations:			
$ - dollar, HVAC – heating ventilation and air conditions, NO_X – oxides of nitrogen			

Given this, SoCalGas requests that South Coast AQMD staff revisit and refine the assumptions made within the cost-effectiveness analysis. Delay of rule adoption would allow for further investigation and deep-dive discussions between staff and engaged stakeholders to ensure all aspects of this rulemaking have been analyzed and vetted.

4. The Draft Subsequent Environmental Assessment does not sufficiently explain why energy impacts from PAR 1111 and 1121 are less than significant

SoCalGas has had the opportunity to review South Coast AQMD's September 2024 Draft Subsequent Environmental Assessment for PAR 1111 and PAR 1121 (State Clearinghouse No. 2022050287; South Coast AQMMD No. 20240924JA/05122022KN) ("Draft SEA"). SoCalGas offers several comments on the Draft SEA's analysis concerning the proposed project, including comments concerning the Draft SEA's air quality and energy impacts analyses, some of these analyses' underlying data and assumptions, and the Draft SEA's discussion of project alternatives. SoCalGas's comments are detailed in Appendix B. However, SoCalGas would like to highlight the following comment:

The Draft SEA's energy impacts analysis, in its concluding section, states that "[t]he cumulative energy impacts from increased electricity and natural gas demand remain significant and unavoidable." (Draft SEA, p. 4-23.) It then continues: "However, the Final Program Environmental Impact Report (EIR) for the 2022 AQMP also concluded that the use of energy to comply with ambient air quality standards and climate change goals, while contributing to overall electricity and natural gas demand, [] does not result in the wasteful, unnecessary, or inefficient use of energy. Therefore, the cumulative energy impacts are less than significant." (*Id*.)

The Draft SEA leaves unclear how to reconcile these two propositions. The mere passing reference to the 2022 Final (FEIR does not explain how the significant and unavoidable energy demand impacts discussed at length in the preceding pages of the Draft SEA are negated or made less significant by the absence of waste or inefficiency in how this energy is used. In the end, the Draft SEA goes from finding significant and unavoidable impacts to less than significant impacts in the space of just a few sentences, without sufficient explanation.

5. Staff should clarify why they plan to perform a technology check-in after rule implementation

During the October 3, 2024 Public Workshop, South Coast AQMD staff stated that they plan to conduct a technology check-in of the rule amendments by June 2027, ahead of implementation of the rules to consider any issues with the rules as proposed. However, PAR 1121's implementation date is January 1, 2027, for existing buildings. During the comment period, SoCalGas requested clarification as to why the feasibility study would occur after the first implementation date, but South Coast AQMD did not respond to the question. SoCalGas would appreciate if staff could address this inconsistency as it does not benefit customers to have their concerns addressed *after* implementation.

6. The financial impact of the proposed amendments has not been adequately evaluated and will be burdensome to the everyday customer

California is currently one of the most expensive places to live in the country[38] and has experienced one of the highest inflation rates recently.[39] According to the Public Policy Institute of California, nearly a third of Californians are living in or near poverty.[40] Needless to say, affordability is first and foremost on many policymakers' and stakeholders' minds when it comes to living in California.[41]

In the long run, SoCalGas believes that the clean energy transition is a great opportunity to raise the living standards for all Californians in an affordable and equitable fashion. To do so, we believe that we need to understand the immediate and direct impact to consumers in advance of any new policy being enacted. Oftentimes, communities and households who are least able to afford certain costs are most burdened with them and receive little recourse from policies and incentives. According to the LA100 Equity Strategies Report, "low-income families, renters, and people of color—face higher energy and transportation burdens, unsafe temperatures, higher impact from extreme heat events, and other negative impacts of historical legacies that are still present in current policies and practices." Specifically, the report found that "between 1999 and 2022, Los Angeles Department of Water and Power invested $340 million in residential solar installation, $14 million in residential energy efficiency, and $5 million in residential electric vehicle incentive programs, but disadvantaged communities only received 38%, 46%, and 23% of those allocations, respectively."[42]

While we understand that there will be rebates and incentives to help with some costs of compliance, it is concerning that costs can vary significantly. Table 5 below highlights actual costs that consumers will face to comply with PAR 1111 and cost for PAR 1121.[43] Similarly, TECH data, which staff utilized for single-family homes, shows that costs to replace a furnace with a heat pump in communities identified as disadvantaged can range from $3,800 to $56,000.[44] Given that there may be additional upfront costs when replacing with electric instead of gas appliances (e.g., $5,200 vs. $3,000 for water heaters, $18,550 vs. $10,000 for space heating, based on South

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[38] Missouri Economic Research and Information Center, "Cost of Living Data Series", retrieved on Oct. 8, 2024, *https://meric.mo.gov/data/cost-living-data-series.*

[39] Paul Davidson, "The 5 states with the highest inflation and the 5 with the lowest," *USA Today*, April 9, 2024, *https://www.usatoday.com/story/money/2024/04/09/states-highest-lowest-inflation/73184932007/.*

[40] Public Policy Institute of California, "Poverty in California (October 2023 Factsheet)," last modified in 2023, *https://www.ppic.org/publication/poverty-in-california/.*

[41] California Public Utilities Commission (CPUC), "Affordability Rulemaking," last modified in 2023, *https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/affordability.*

[42] National Renewable Energy Laboratory, "LA100: The Los Angeles 100% Renewable Energy Study and Equity Strategies," *https://maps.nrel.gov/la100/equity-strategies/recognizing-inequities#key-findings.*

[43] Costs for PAR 1111 provided by regional HVAC contractor; costs for PAR 1121 from LA BizFed analysis available at: *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/los-angeles-county-business-federation.pdf?sfvrsn=6*.

[44] *September 2024 TECH Working Dataset_Multifamily & TECH Working Dataset_Single-Family Spreadsheets.*

Coast AQMD estimates and both excluding the cost of panel upgrades and other potential costs[45]), we urge South Coast AQMD to be judicious in its cost-effectiveness analysis, to be up-front and clear about how much this will cost the individual consumer, and to provide additional clarification in a cost-effectiveness workshop to help the public understand the assumptions used and the potential impact of these rules on our communities -- households and businesses. Additionally, SoCalGas looks forward to reviewing the Socioeconomic Impact Assessment once it is released later this year.

Table 5: Appliance Replacement Costs

Natural Gas Space Heater	Replacement Cost
Floor Heater	$4,910
Wall Heater	$3,200
Central Furnace	$6,750

Heat Pump Space Heater	Replacement Cost
Floor/Wall Heater Replacement with Panel Upgrade	$32,099
Floor/Wall Heater Replacement without Panel Upgrade	$27,099
Central Heating Without AC	$23,750

Water Heaters	Replacement Cost
Natural Gas Water Heater	$1,700
120V Heat Pump Water Heater	$4,000 - $15,000
240V Heat Pump Water Heater	$30,000 - $80,000

Conclusion

SoCalGas has been an active participant in the South Coast AQMD rulemaking on PAR 1111 and 1121 and appreciates staff's efforts in updating this regulation; however, SoCalGas and other stakeholders continue to have serious concerns.[46] While SoCalGas supports emission reduction efforts, PAR 1111 and 1121 effectively ban gas-fired space and water heaters, disregarding the potential emissions reductions that can be achieved through technological advancements in ultra-low-NOx gas technologies, hydrogen-enriched natural gas systems, and hybrid solutions. These alternatives have the potential to achieve meaningful emissions reductions while maintaining reliable, affordable, and efficient options for residents and consumers. Allowing for ultra-low-NOx alternatives will be far more effective than a zero-NOx mandate that requires residents to spend thousands of dollars modifying their homes to install electric heat pumps.

[45] South Coast AQMD, "Proposed Amended Rules 1111 and 1121 Working Group Meeting #2," November 28, 2023, Slide 11, *https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm2-november-2023.pdf?sfvrsn=14*.

[46] South Coast AQMD October 3, 2024 Public Workshop, stakeholder comments; recording available by request to AQMD staff.

We urge South Coast AQMD to delay adoption of these rules and take the time to wholistically and appropriately evaluate their impacts. Given the earliest compliance deadline for existing buildings is not until January 1, 2027, we feel there is an opportunity for the South Coast AQMD to conduct public outreach to inform property owners and tenants within its jurisdiction of this rulemaking. It is crucial to recognize that homeowners and renters, rather than industry, will be the ones forced to reach deep into their pockets to comply with these rules. Historically, the South Coast AQMD granted extensions to manufacturers under Rule 1121 to meet lower NOx emission limits, acknowledging the challenges they faced with compliance costs. Similarly, we believe it is reasonable to allow more time in this rulemaking process, considering the significant financial impact to homeowners and businesses and the challenges they will likely face with rule implementation. We urge the South Coast AQMD to schedule an additional public workshop to ensure all considerations have been included in the cost-effectiveness values presented to the public. This will also help homeowners and businesses within your jurisdiction to plan their future finances accordingly. SoCalGas, looks forward to collaborating on California's shared goal of advancing air quality objectives.

Respectfully,

/s/ Kevin Barker

Kevin Barker
Senior Manager
Energy and Environmental Policy

Appendix A

RAMBOLL

ENVIRONMENT
& HEALTH

MEMORANDUM

To: Kevin Barker
Southern California Gas Company

From: Varalakshmi Jayaram & Tony Wang
Ramboll Americas Engineering Solutions, Inc.

Subject: **COMMENTS ON SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT'S (SOUTH COAST AQMD'S) COST-EFFECTIVENESS CALCULATIONS FOR PROPOSED AMENDED RULES (PAR) 1111 AND 1121**

Date: October 16, 2024

Ramboll
5 Park Plaza
Suite 500
Irvine, CA 92614
USA

T +1 949 261 5151
F +1 949 261 6202

www.ramboll.com

1. It is unclear how South Coast AQMD arrived at the cost-effectiveness values that they presented in the Preliminary Draft Staff Report for PAR 1111/1121.

Ramboll calculated the cost-effectiveness (CE) in dollars per ton of NO_X (oxides of nitrogen) reduced for the replacement of residential natural gas (NG) appliances with electric heat pump alternatives using the data and assumptions presented by South Coast AQMD in the preliminary draft staff report[1] and Working Group Meetings (WGMs)[2] for PAR 1111/1121. Details of these calculation are presented in Tables A-1, A-2, and A-3 in **Attachment A** for single-family home water heaters, single-family home heating ventilation and air conditioning (HVAC) systems, and multi-family home HVAC systems respectively. As summarized in **Table 1** below, Ramboll's calculated CE values are substantially different from those presented by South Coast AQMD for most of the replacement scenarios.

We understand that staff has made multiple updates to their CE calculations after their initial presentation of assumptions in WGMs #2 and #3. Ramboll has accounted for these updates in our calculations presented in **Attachment A** by incorporating the information provided in the presentation materials for subsequent WGMs and the preliminary draft staff report. However, our results still do not align with those presented in the preliminary draft staff report. We therefore request staff to provide a summary of their current assumptions and methodology for the CE calculations that were used to arrive at these

[1] South Coast AQMD. Preliminary Draft Staff Report for: Proposed Amended Rule 1111 – Reduction of NO_X Emissions from Natural Gas-Fired Furnaces and Proposed Amended Rule 1121 – Reduction of NO_X emissions from Small Natural Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[2] South Coast AQMD Presentation Materials for Working Group Meetings for PAR 1111/1121. Available at: https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1111-and-rule-1121. Accessed: October 2024.

cost-effectiveness values. We are happy to provide a Microsoft Excel version of our detailed calculations that are presented in **Attachment A**, as needed.

Table 1. Comparison of Cost-Effectiveness

Data Source	Cost-Effectiveness for Conversion of Residential Natural Gas Equipment to Electric Heat Pump Equipment (2022$/ton NO_X)				
	Single-Family Home Water Heater	Single-Family Home HVAC		Multi-Family Home HVAC	
		Furnace + AC	Furnace Only	Furnace + AC	Furnace Only
PAR 1111/1121 Preliminary Draft Staff Report[1]	601,000	(183,000)	921,000	(2,633,000)	(135,000)
Cost-Effectiveness Values calculated based on South Coast AQMD Data[2]	750,345	(174,683)	1,483,017	(1,455,633)	(363,058)

Notes:

[1] South Coast AQMD. Preliminary Draft Staff Report for: Proposed Amended Rule 1111 – Reduction of NO_X Emissions from Natural Gas-Fired Furnaces and Proposed Amended Rule 1121 – Reduction of NO_X emissions from Small Natural Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[2] See Attachment A.

Abbreviations:

$ - dollar, AC – air conditioner, HVAC – heating ventilation and air conditions, NO_X – oxides of nitrogen

2. South Coast AQMD's assumptions for electric heat pump efficiencies are substantially higher than those reported for residential heat pumps that are available in the market.

The energy consumption data for heat pumps and the natural gas appliances presented by South Coast AQMD staff in WGM#2[3] indicates that the heat pumps are approximately 5-7 times more efficient than the natural gas appliances they replace. Specifically, the electric heat pump space heater is assumed to be 6.8 times[4] more efficient than a conventional natural gas furnace and the

[3] South Coast AQMD Working Group Meetings for Proposed Amended Rules 1111 - Reduction of NO_X Emissions from Natural-Gas-Fired Furnaces and 1121 - Reduction of NOX Emissions from Residential Type, Natural-Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1111-and-rule-1121. Accessed: October 2024.

[4] South Coast AQMD assumed an annual energy use of 3,822 kWh (127 therm NG for furnace + 101 kWh electricity for furnace fan) from a conventional gas furnace and 565 kWh for a HVAC heat pump to be 565 kWh, in WGM#2, Slide 12, and did not distinguish single family-and multi-family use. This indicates that the heat pump HVAC is 6.8 (3,822÷565) times more efficient than the conventional natural gas furnace.

electric heat pump water heater is assumed to be at least 5.3 times[5] more efficient than a conventional natural gas water heater.

While South Coast AQMD staff claimed the energy consumption data of the natural gas furnace and HVAC heat pumps were obtained from the 2019 California Residential Appliance Saturation Study (2019 RASS)[6], staff used incorrect values from the RASS by mixing the single- and multi-family space heating energy consumptions. **Table 2** below summarizes the space heating Unit Energy Consumption (UEC) for natural gas furnaces (i.e., Primary Heat + Furnace Fan) and heat pump space heaters (i.e., Primary Heat Pump Space Heating) that are listed in the 2019 RASS. We recommend staff uses these UEC values to revise their CE analysis.

Table 2. UEC from the 2019 RASS

Equipment	Single-Family	Multi-Family	Unit
Primary Heat[1]	191	67	therms/year
Furnace Fan[2]	159	55	kWh/year
Primary Heat Pump Space Heating[2]	1,221	493	kWh/year

[1] Data obtained from Table 33 in Volume 2 of the 2019 California RASS. Available at: https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-RSLTS.pdf. Accessed: October 2024. Multi-family UEC data are the average the UECs for townhomes, 2-4 unit apartments, and 5+ unit apartments.

[2] Data obtained from Table 11 in Volume 2 of the 2019 California RASS. Available at: https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-RSLTS.pdf. Accessed: October 2024. Multi-family UEC data are the average the UECs for townhomes, 2-4 unit apartments, and 5+ unit apartments.

Additionally, we would like to point out that the energy efficiency values South Coast AQMD staff used are also significantly higher than the efficiencies of residential heat pumps appliances that are available in the market. For instance, the Coefficient of Performance (COP) of certified Air-Source Heat Pumps (ASHP, or heat pump space heaters) in the ENERGY STAR program's database range from 1.8 to 2.9 (average 2.0).[7] This indicates that residential heat pump space heaters in the market are approximately 2 time more efficient than a conventional NG furnace.

The ENERGY STAR website[8] also indicates that certified heat pump water heaters are 3.5 to 4.4 times more efficient than a traditional NG water heater. Additionally, South Coast AQMD staff

[5] South Coast AQMD assumed an annual energy use of 190 therms NG (5,567 kWh) for a conventional gas water heater and 1,036 kWh for an equivalent heat pump water heater, in the Preliminary Draft Staff Report. This indicates that the heat pump water heater would be at least 5.3 times (5,567÷1,036) more efficient than the conventional gas water heater.

[6] South Coast AQMD assumed an annual energy use of 3,822 kWh (127 therm NG for furnace + 101 kWh electricity for furnace fan) from a conventional gas furnace and 565 kWh for a HVAC heat pump to be 565 kWh, in WGM#2, Slide 12.

[7] ENERGY STAR Certified Air-Source Heat Pumps. Available at: https://data.energystar.gov/Active-Specifications/ENERGY-STAR-Certified-Air-Source-Heat-Pumps/w7cv-9xjt/about_data. Accessed: October 2024.

[8] ENERGY STAR- What is Uniform Energy Factor and Why Does it Matter?. Available at: https://www.energystar.gov/products/ask-the-experts/what-uniform-energy-factor-and-why-does-it-matter. Accessed: October 2024. Note this article reported that the UEF (i.e., Uniform Energy Factor) for a traditional gas water heater is 0.93, while ENERGY STAR certified heat pump water heaters typically have UEF ratings in the range of 3.3 to 4.1. Ramboll calculated the ratio and summarized the efficiency improvement to be 3.5-4.4 times.

have also stated that the heat pump water heater is 4.6 more efficient than a Type 1 NG water heater in the in WGM#3 for PAR 1146.2.[9] While the water heaters subject to Rule 1146.2 are larger than the residential water heaters that would be subject to PAR 1111/1121, the relative efficiency of heat pump water heater to a natural gas water heater should still be similar for both small and large water heaters.

Therefore, we request staff review and update the energy consumption assumptions for the natural gas and residential heat pump appliances that are used in their cost-effectiveness evaluations for PAR 1111/1121.

3. South Coast AQMD should consider changing the panel upgrade cost for each equipment from $750 to $3,000 to reflect an accurate estimation of infrastructure costs.

South Coast AQMD proposes reducing the panel upgrade cost from $3,000 to $1,500, assuming a longer useful panel life compared to the equipment's 15-year lifespan. Staff also assumed that this cost would be shared by both the space heaters and water heaters, resulting in an infrastructure cost of $750 each, as noted in WGM #2, slide 16. However, it is not valid to implement a lower infrastructure cost from an assumed longer panel lifespan because the investment for the panel upgrade must be fully made at the time of purchase, and not at the end of the equipment life. Additionally, space heaters and water heaters have varying lifetimes; therefore, it is invalid to assume all homes will install electric water heaters and space heaters simultaneously to share the panel upgrade cost. Hence, we recommend that staff use a panel upgrade cost to be $3,000 for each equipment replacement project.

4. South Coast AQMD used inconsistent data sources for the capital costs of natural gas appliances and heat pump appliances, leading to uncertainty in the CE analysis.

South Coast AQMD staff utilized capital cost data for NG equipment from the 2019 E3 Residential Building Study (E3 Study) [10], while the capital costs for heat pump equipment were obtained from the TECH Clean California program (TECH)[11]. We are concerned about the discrepancies between these two data sources and the resulting uncertainty in the CE analysis.

For instance, the E3 Study models costs for three types of homes: pre-1978 homes, which typically require electric panel upgrades, 1990s homes, and new construction that complies with California's 2019 Title 24 building code. In contrast, the TECH data only covers electrification projects for existing homes, excluding new construction entirely.

Additionally, the sample size in the TECH dataset varies greatly by home type. Specifically, it includes over 10,000 single-family project records in the South Coast (i.e., water heating and space heating projects in Los Angeles, Riverside, Orange, and San Bernardino counties) but only about 1,000 multi-family projects. This suggests that the TECH data is dominated by single-family projects and may not adequately represent multi-family projects.

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[9] South Coast AQMD Working Group Meeting #3: Proposed Amended Rule 1146.2 – Controls of Oxides of Nitrogen from Large Water Heaters, Small Boilers, and Process Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-wgm3-august-2023.pdf?sfvrsn=14. Accessed: October 2024.

[10] Energy+Environmental Economics (E3). Residential Building Electrification in California. Available at: https://www.ethree.com/e3-quantifies-the-consumer-and-emissions-impacts-of-electrifying-california-homes/. Accessed: October 2024.

[11] TECH Clean California. Heat Pump Data. Available at: https://techcleanca.com/heat-pump-data/. Accessed: October 2024.

Given these discrepancies, we recommend that South Coast AQMD staff revise their CE analysis by using E3 Study data for both natural gas and heat pump equipment costs to ensure consistency and accuracy.

5. The CE analysis should use the average electricity and natural gas prices over the equipment lifetime instead of the current-year electricity and natural gas prices.

The preliminary draft staff report[12] states that the CE analysis relied on the fuel price estimates which are based on a combination of the 2023 Integrated Energy Policy Report (2023 IEPR) and Energy Information Administration national level forecasts. While the staff report does not provide the values of the fuel price estimates that were actually used in the analysis, slide 25 in WGM #4 presentation indicated that these values are 0.0566 $/kWh and 0.2639 $/ kWh for natural gas and electricity, respectively. However, it is not clear how AQMD staff arrived at these values.

The proposed initial implementation year for PAR 1111/1121 starts from 2026, and the expected equipment lifespan for water heater and space heater are 15 years and 25 years, respectively. Additionally, we note that the 2023 IEPR provides electricity price forecasts only till 2040. Hence, we suggest that Staff use the average of the fuel price forecasts from 2026 to 2040 (a 15-year period) in their CE analysis. Ramboll has estimated these fuel price forecasts as described below:

- Ramboll used the price forecasts in the 2023 IEPR[13] to calculate the following 2026 to 2040 average electricity prices for Southern California Edison (SCE) and Los Angeles Department of Water and Power (LADWP): 0.2959 2022$/kWh for SCE and 0.2919 2022$/kWh for LADWP. We then estimated a population weighted average electricity price of 0.2950 2022$/kWh (0.77 x SCE price + 0.23 x LADWP price) for the South Coast Air Basin following the methodology described in the preliminary draft staff report.
- Ramboll received a copy of the California Energy Commission's (CEC's) projected residential rates for Southern California Gas Company (SCG) from SCG. While this data included natural gas base rate projections till 2050, in order to maintain consistency with the approach for estimating the electricity prices, we propose using the 2026 to 2040 average natural gas price of 2.2372 2023$/therm, i.e., 0.07314 2022$/kWh[14].

We recommend that staff review our estimates for fuel prices and use these in the CE analysis.

6. Once all suggested revisions related to CE analysis are incorporated, the CE analysis of PAR 1111 and 1121 to mandate the switch toward electric water heaters and space heaters will no longer be cost-effective for most scenarios.

Ramboll calculated the CE in dollars per ton of NO_X reduced for the replacement of residential NG appliances with electric heat pump alternatives using the updated data and assumptions as discussed in the comments above. These are summarized below in **Table 3**. Our analysis indicates that the replacement of a single-family home natural gas water heater, single-family home natural gas furnace (only), and multi-family home natural gas furnace (only) with heat pump equipment are

[12] South Coast AQMD. Preliminary Draft Staff Report for: Proposed Amended Rule 1111 – Reduction of NO_X Emissions from Natural Gas-Fired Furnaces and Proposed Amended Rule 1121 – Reduction of NO_X emissions from Small Natural Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[13] California Energy Demand Forecast, 2023-2040. Electricity Rate Forecast and Supporting Data. Available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253591. Accessed: October 2024.

[14] 2023$ were converted to 2022$ using a CPI ratio of All Urban Customers in 2022 to All Urban Customers in 2023. CPI data available at: https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF. Accessed: October 2024.

not cost-effective, i.e., CE is greater than the threshold of $349,000. Details of these calculation are presented in Tables B-1, B-2, and B-3 in **Attachment B** for single-family home water heaters, single-family home HVACs, and multi-family home HVACs respectively.

Table 3: Updated Cost-Effectiveness Comparisons

Data Source	Cost-Effectiveness for Conversion of Residential Natural Gas Equipment to Electric Heat Pump Equipment ($2022/ton NO_X)				
	Single-Family Home Water Heater	Single-family Home HVAC		Multi-family Home HVAC	
		Furnace + AC	Furnace Only	Furnace + AC	Furnace Only
PAR 1111/1121 Preliminary Draft Staff Report[1]	601,000	(183,000)	921,000	(2,633,000)	(135,000)
Cost-Effectiveness Values Calculated based on Updated Data presented in this Comment Letter[2]	879,258	(220,761)	972,443	91,831	1,351,118
Cost-effectiveness Threshold ($/ton of NO_X)	349,000				

Notes:

[1] South Coast AQMD. Preliminary Draft Staff Report for: Proposed Amended Rule 1111 – Reduction of NO_X Emissions from Natural Gas-Fired Furnaces and Proposed Amended Rule 1121 – Reduction of NO_X emissions from Small Natural Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[2] See Attachment B.

Abbreviations:

$ - dollar, AC – air conditioner, HVAC – heating ventilation and air conditions, NO_X – oxides of nitrogen

ATTACHMENT A
COST-EFFECTIVENESS CALCULATIONS BASED ON SOUTH COAST AQMD DATA

Table A1. Cost-Effectiveness Calculations for the Replacement of a Residential Single-Family Home Natural Gas Water Heater based on Data presented by South Coast AQMD

	Natural Gas Water Heater	Electric Heat Pump Water Heater	Units
NOx Emissions			
NOx Emission Factor	10.0	0.0	ng/J
Annual Energy Use by Technology Type[1]	5,567	1,036	kWh
Equipment Useful Life	15	15	years
Total Lifetime NOx Emissions[2]	3.3E-03	0.0E+00	tons
Capital Costs			
Capital Costs[3]	3,000	5,200	2022$
Infrastructure	--	750	2022$
Total Capital Costs	3,000	5,950	2022$
Operation and Maintenance (O&M) Costs			
Electricity/Fuel Prices[4]	0.0566	0.2639	2022$/kWh
Annual Electricity/Fuel Costs[5]	315	273	2022$/yr
Total Lifetime O&M Costs[6]	3,503	3,040	2022$
Cost-Effectiveness			
Lifetime NOx Emission Reductions[7]	--	3.3E-03	tons
Incremental Capital Costs[8]	--	2,950	2022$
Incremental Lifetime Operation and Maintenance Costs[8]	--	(464)	2022$
Incremental Lifetime Equipment Costs[8]	--	2,486	2022$
NOx Cost-Effectiveness[9]	**--**	**750,345**	2022$/ton
South Coast AQMD Reported Cost-Effectiveness[10]		**601,000**	2022$/ton
South Coast AQMD NOx Cost-Effectiveness Threshold	349,000	349,000	2022$/ton

Abbreviations:

AQMD - Air Quality Management District
COP - coefficient of performance
hr - hour
kg - kilogram
kW - kilowatt
kWh - kilowatt hour
J - joule
MMBtu - million British thermal units
NOx - oxides of nitrogen
ng - nanogram
yr - year

Constants:

Present Value Factor[11]	11.118
Real Interest Rate	4%

Conversion Factors:

8,760	hr/yr
29.3	kWh/therm
2,000	lbs/ton
2.78E-07	kWh/J
1.0.E+09	ng/g

Notes:

[1] Annual Energy Use obtained from Page 2-20 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[2] Total Lifetime NOx emissions are estimated as the Annual Energy Use multiplied by the Equipment Useful Life, and the NOx Emission Factor.

[3] Capital Costs obtained from Page 2-20 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[4] Electricity/fuel prices ($/kWh) data obtained from South Coast AQMD Working Group Meeting #4: Proposed Amended Rule 1111 - Reduction of NOx Emissions from Natural-Gas-Fired Furnaces and PAR 1121 - Reduction of NOx Emissions from Residential Type, Natural-Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm4-april-2024.pdf?sfvrsn=14. Accessed: October 2024. It appears that updates were made to the methodology used to estimate these prices in the Preliminary Draft Staff Report, however, the exact values that were used for the calculations in the staff report are not presented in the report.

[5] Annual Electricity/Fuel Costs is estimated at the product of the Annual Energy Use and the Electricity/Fuel Prices.

[6] Lifetime O&M Costs are estimated as the Annual Electricity/Fuel Costs multiplied by the Present Value Factor.

[7] Lifetime NOx Emission Reductions are calculated as the difference in Lifetime NOx emissions for the natural gas unit and the electric unit.

[8] Incremental Costs are calculated as the difference in cost compared to the natural gas unit.

[9] NOx Cost-Effectiveness is calculated as the Incremental Lifetime Equipment Costs divided by the Lifetime NOx Emission Reductions

[10] Data obtained from Page 2-20 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[11] The Present Value Factor is part of the Discounted Cash Flow Method that uses expected future cash flows in conjunction with a discount rate to estimate present fair value. Based on South Coast AQMD Working Group Meeting #3 presentation slides. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm3-january-2024.pdf?sfvrsn=12. Accessed: October 2024.

Table A2. Cost-Effectiveness Calculations for the Replacement of a Residential Single-Family Home Natural Gas Furnace based on Data Presented by South Coast AQMD

Parameters for Cost-Effectiveness Analysis	Space Heating and Cooling		Space Heating Only		Units
	Natural Gas Furnace + Air Conditioner	Electric Heat Pump HVAC	Natural Gas Furnace	Electric Heat Pump HVAC	
NOx Emissions					
NOx Emission Factor	14.0	0.0	14.0	0.0	ng/J
Annual Energy Use by Technology Type[1]	3,822	565	3,822	565	kWh
Equipment Useful Life	25	25	25	25	years
Total Lifetime NOx Emissions[2]	5.3E-03	0.0E+00	5.3E-03	0.0E+00	tons
Capital Costs					
Capital Costs[3]	18,800	18,500	10,000	18,500	2022$
Infrastructure	--	750	--	750	2022$
Total Capital Costs	18,800	19,250	10,000	19,250	2022$
Operation and Maintenance (O&M) Costs					
Electricity Prices[4]	0.2639	0.2639	0.2639	0.2639	2022$/kWh
Natural Gas Prices[4]	0.0566		0.0566		2022$/kWh
Annual Electricity/Fuel Costs[5]	237	149	237	149	2022$/yr
Total Lifetime O&M Costs[6]	3,707	2,329	3,707	2,329	2022$
Cost-Effectiveness					
Lifetime NOx Emission Reductions[7]	--	5.3E-03	--	5.3E-03	tons
Incremental Capital Costs[8]	--	450	--	9,250	2022$
Incremental Lifetime Operation and Maintenance Costs[8]	--	(1,377)	--	(1,377)	2022$
Incremental Lifetime Equipment Costs[8]	--	(927)	--	7,873	2022$
NOx Cost-Effectiveness[9]	--	**(174,683)**	--	**1,483,017**	2022$/ton
South Coast AQMD Reported Cost-Effectiveness[10]		**(183,000)**		**921,000**	2022$/ton
South Coast AQMD NOx Cost-Effectiveness Threshold	349,000	349,000	349,000	349,000	2022$/ton

Abbreviations:

AQMD - Air Quality Management District
COP - coefficient of performance
hr - hour
kg - kilogram
kW - kilowatt
kWh - kilowatt hour
J - joule
MMBtu - million British thermal units
NOx - oxides of nitrogen
ng - nanogram
yr - year

Constants:

Present Value Factor[12]	15.622
Real Interest Rate	4%

Conversion Factors:

8,760	hr/yr
29.3	kWh/therm
2,000	lbs/ton
2.78E-07	kWh/J
1.0.E+09	ng/g

Notes:

[1] Annual Energy Use obtained from South Coast AQMD Working Group Meetings #2: Proposed Amended Rule 1111 - Reduction of NOx Emissions from Natural-Gas-Fired Furnaces and PAR 1121 - Reduction of NOx Emissions from Residential Type, Natural-Gas-Fired Water Heaters, Slide 12. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm2-november-2023.pdf. Accessed: October 2024.

[2] Total Lifetime NOx emissions are estimated as the Annual Energy Use multiplied by the Equipment Useful Life, and the NOx Emission Factor.

[3] Capital Costs obtained from Page 2-18 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[4] Electricity/natural gas prices ($/kWh) data obtained from South Coast AQMD Working Group Meeting #4: Proposed Amended Rule 1111 - Reduction of NOx Emissions from Natural-Gas-Fired Furnaces and PAR 1121 - Reduction of NOx Emissions from Residential Type, Natural-Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm4-april-2024.pdf?sfvrsn=14. Accessed: October 2024. It appears that updates were made to the methodology used to estimate these prices in the Preliminary Draft Staff Report, however, the exact values that were used for the calculations in the staff report are not presented in the report.

[5] Annual Electricity/Fuel Costs is estimated at the product of the Annual Energy Use and the Electricity/Fuel Prices.

[6] Lifetime O&M Costs are estimated as the Annual Electricity/Fuel Costs multiplied by the Present Value Factor.

[7] Lifetime NOx Emission Reductions are calculated as the difference in Lifetime NOx emissions for the natural gas unit and the electric unit.

[8] Incremental Costs are calculated as the difference in cost compared to the natural gas unit.

[9] NOx Cost-Effectiveness is calculated as the Incremental Lifetime Equipment Costs divided by the Lifetime NOx Emission Reductions

[10] Data obtained from Page 2-18 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[11] The Present Value Factor is part of the Discounted Cash Flow Method that uses expected future cash flows in conjunction with a discount rate to estimate present fair value. Based on South Coast AQMD Working Group Meeting #3 presentation slides. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm3-january-2024.pdf?sfvrsn=12. Accessed: October 2024.

Table A3. Cost-Effectiveness Calculations for the Replacement of a Multi-Family Home Residential Natural Gas Furnace based on Data Presented by South Coast AQMD

Parameters for Cost-Effectiveness Analysis	Space Heating and Cooling		Space Heating Only		Units
	Natural Gas Furnace + Air Conditioner	Electric Heat Pump HVAC	Natural Gas Furnace	Electric Heat Pump HVAC	
NOx Emissions					
NOx Emission Factor	14.0	0.0	14.0	0.0	ng/J
Annual Energy Use by Technology Type[1]	3,822	565	3,822	565	kWh
Equipment Useful Life	25	25	25	25	years
Total Lifetime NOx Emissions[2]	5.3E-03	0.0E+00	5.3E-03	0.0E+00	kg
Capital Costs					
Capital Costs[3]	12,400	5,300	6,600	5,300	2022$
Infrastructure	--	750	--	750	2022$
Total Capital Costs	12,400	6,050	6,600	6,050	2022$
Operation and Maintenance (O&M) Costs					
Electricity Prices[4]	0.2639	0.2639	0.2639	0.2639	2022$/kWh
Natural Gas Prices[4]	0.0566		0.0566		2022$/kWh
Annual Electricity/Fuel Costs[5]	237	149	237	149	2022$/yr
Total Lifetime O&M Costs[6]	3,707	2,329	3,707	2,329	2022$
Cost-Effectiveness					
Lifetime NOx Emission Reductions[7]	--	5.3E-03	--	5.3E-03	tons
Incremental Capital Costs[8]	--	(6,350)	--	(550)	2022$
Incremental Lifetime Operation and Maintenance Costs[8]	--	(1,377)	--	(1,377)	2022$
Incremental Lifetime Equipment Costs[8]	--	(7,727)	--	(1,927)	2022$
NOx Cost-Effectiveness[9]	--	**(1,455,633)**	--	**(363,058)**	2022$/ton
South Coast AQMD Reported Cost-Effectiveness[10]		**(2,633,000)**		**(135,000)**	2022$/ton
South Coast AQMD NOx Cost-Effectiveness Threshold	349,000	349,000	349,000	349,000	2022$/ton

Abbreviations:

AQMD - Air Quality Management District
COP - coefficient of performance
hr - hour
kg - kilogram
kW - kilowatt
kWh - kilowatt hour
J - joule
MMBtu - million British thermal units
NOx - oxides of nitrogen
ng - nanogram
yr - year

Constants:

Present Value Factor[11]	15.622
Real Interest Rate	4%

Conversion Factors:

8,760	hr/yr
29.3	kWh/therm
2,000	lbs/ton
2.78E-07	kWh/J
1.0.E+09	ng/g

Notes:

[1] Annual Energy Use obtained from South Coast AQMD Working Group Meetings #2: Proposed Amended Rule 1111 - Reduction of NOx Emissions from Natural-Gas-Fired Furnaces and PAR 1121 - Reduction of NOx Emissions from Residential Type, Natural-Gas-Fired Water Heaters, Slide 12. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm2-november-2023.pdf. Accessed: October 2024.

[2] Total Lifetime NOx emissions are estimated as the Annual Energy Use multiplied by the Equipment Useful Life, and the NOx Emission Factor.

[3] Capital Costs obtained from Page 2-19 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[4] Electricity/natural gas prices ($/kWh) data obtained from South Coast AQMD Working Group Meeting #4: Proposed Amended Rule 1111 - Reduction of NOx Emissions from Natural-Gas-Fired Furnaces and PAR 1121 - Reduction of NOx Emissions from Residential Type, Natural-Gas-Fired Water Heaters. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm4-april-2024.pdf?sfvrsn=14. Accessed: October 2024. It appears that updates were made to the methodology used to estimate these prices in the Preliminary Draft Staff Report, however, the exact values that were used for the calculations in the staff report are not presented in the report.

[5] Annual Electricity/Fuel Costs is estimated at the product of the Annual Energy Use and the Electricity/Fuel Prices.

[6] Lifetime O&M Costs are estimated as the Annual Electricity/Fuel Costs multiplied by the Present Value Factor.

[7] Lifetime NOx Emission Reductions are calculated as the difference in Lifetime NOx emissions for the natural gas unit and the electric unit.

[8] Incremental Costs are calculated as the difference in cost compared to the natural gas unit.

[9]NOx Cost-Effectiveness is calculated as the Incremental Lifetime Equipment Costs divided by the Lifetime NOx Emission Reductions

[10] Data obtained from Page 2-19 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[11] The Present Value Factor is part of the Discounted Cash Flow Method that uses expected future cash flows in conjunction with a discount rate to estimate present fair value. Based on South Coast AQMD Working Group Meeting #3 presentation slides. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm3-january-2024.pdf?sfvrsn=12. Accessed: October 2024.

ATTACHMENT B
COST-EFFECTIVENESS CALCULATIONS BASED ON UPDATED DATA PRESENTED IN THIS COMMENT LETTER

Table B1. Cost-Effectiveness Calculations for the Replacement of a Residential Single-Family Home Natural Gas Water Heater

Parameters for Cost-Effectiveness Analysis	Natural Gas Water Heater	Electric Heat Pump Water Heater	Units
NOx Emissions			
NOx Emission Factor	10.0	0.0	ng/J
Annual Energy Use by Technology Type[1]	7,618	1,905	kWh
Equipment Useful Life	15	15	years
Total Lifetime NOx Emissions[2]	4.5E-03	0.0E+00	tons
Capital Costs			
Capital Costs[3]	3,676	4,611	2022$
Infrastructure	--	3,000	2022$
Total Capital Costs	3,676	7,611	2022$
Operation and Maintenance (O&M) Costs			
Electricity/Fuel Prices[4,5]	0.0731	0.2950	2022$/kWh
Annual Electricity/Fuel Costs[6]	557	562	2022$/yr
Total Lifetime O&M Costs[7]	6,195	6,247	$
Cost-Effectiveness			
Lifetime NOx Emission Reductions[8]	--	4.5E-03	tons
Incremental Capital Costs[9]	--	3,935	2022$
Incremental Lifetime Operation and Maintenance Costs[9]	--	52	2022$
Incremental Lifetime Equipment Costs[9]	--	3,987	2022$
NOx Cost-Effectiveness[10]	**--**	**879,258**	2022$/ton
South Coast AQMD Reported Cost-Effectiveness[11]		**601,000**	2022$/ton
South Coast AQMD NOx Cost-Effectiveness Threshold	349,000	349,000	2022$/ton

Abbreviations:

AQMD - Air Quality Management District
COP - coefficient of performance
hr - hour
kg - kilogram
kW - kilowatt
kWh - kilowatt hour
J - joule
MMBtu - million British thermal units
NOx - oxides of nitrogen
ng - nanogram
yr - year

Constants:

Present Value Factor[12]	11.118
Real Interest Rate	4%

Conversion Factors:

8,760	hr/yr
29.3	kWh/therm
2,000	lbs/ton
2.78E-07	kWh/J
1.0.E+09	ng/g

Notes:

[1] Energy consumption of the natural gas water heater was obtained from Table 33 of the 2019 California Residential Appliance Saturation Study (RASS). Available at: https://www.energy.ca.gov/publications/2021/2019-california-residential-appliance-saturation-study-rass. Accessed: October 2024.
For the electric heat pump water heater energy consumption, Ramboll assumed it to be 4 times more efficient than the natural gas water heater based on this article: https://www.energystar.gov/products/ask-the-experts/what-uniform-energy-factor-and-why-does-it-matter. Accessed: October 2024.

[2] Total Lifetime NOx Emissions are estimated as the Annual Energy Use multiplied by the Equipment Useful Life, and the NOx Emission Factor.

[3] Capital Costs were derived based on Capital Cost Data of Zones 6, 9 and 10 from the E3 study, "Residential Building Electrification in in California." Available at: https://www.ethree.com/e3-quantifies-the-consumer-and-emissions-impacts-of-electrifying-california-homes/. Accessed: October 2024.
The costs were also converted from 2018$ to 2022$ based on a CPI ratio of All Urban Customers in 2022 to All Urban Customers in 2018. CPI data available at: https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF. Accessed: October 2024.

[4] As noted in the preliminary draft staff report (Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024), the electricity price is calculated as a population weighted average of 2026 to 2040 projected price averages for SCE and LADWP, i.e., 0.77 x SCE price + 0.23 x LADWP price. The 2026 to 2040 projected average price averages for SCE and LADWP were obtained from the 2023 IEPR. Available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253591. Accessed: October 2024.

[5] Natural gas price was estimated as the average of the 2026 to 2040 residential baseline rates from CEC. Note, these rates were provided in 2023$ and converted to 2022$ using a CPI ratio of All Urban Customers in 2022 to All Urban Customers in 2023. CPI data available at: https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF. Accessed: October 2024.

[6] Annual Electricity/Fuel Costs are estimated as the product of the Annual Energy Use and the Electricity/Fuel Prices.

[7] Total Lifetime O&M Costs are estimated as the Annual Electricity/Fuel Costs multiplied by the Present Value Factor.

[8] Lifetime NOx Emission Reductions are calculated as the difference in Lifetime NOx Emissions for the natural gas unit and the electric unit.

[9] Incremental Costs are calculated as the difference in cost compared to the natural gas unit.

[10] NOx Cost-Effectiveness is calculated as the Incremental Lifetime Equipment Costs divided by the Lifetime NOx Emission Reductions.

[11] Data obtained from Page 2-20 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[12] The Present Value Factor is part of the Discounted Cash Flow Method that uses expected future cash flows in conjunction with a discount rate to estimate present fair value. Based on South Coast AQMD Working Group Meeting #3 presentation slides. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm3-january-2024.pdf?sfvrsn=12. Accessed: October 2024.

Table B2. Cost-Effectiveness Calculations for the Replacement of a Residential Single-Family Home Natural Gas Furnace

Parameters for Cost-Effectiveness Analysis	Space Heating and Cooling		Space Heating Only		Units
	Natural Gas Furnace + Air Conditioner	Electric Heat Pump HVAC	Natural Gas Furnace	Electric Heat Pump HVAC	
NOx Emissions					
NOx Emission Factor	14.0	0.0	14.0	0.0	ng/J
Annual Energy Use by Technology Type[1]	5,755	1,221	5,755	1,221	kWh
Equipment Useful Life	25	25	25	25	years
Total Lifetime NOx Emissions[2]	8.0E-03	0.0E+00	8.0E-03	0.0E+00	tons
Capital Costs					
Capital Costs[3]	19,495	16,230	9,957	16,230	2022$
Infrastructure	--	3000	--	3,000	2022$
Total Capital Costs	19,495	19,230	9,957	19,230	2022$
Operation and Maintenance (O&M) Costs					
Electricity Prices[4]	0.2950	0.2950	0.2950	0.2950	2022$/kWh
Natural Gas Prices[5]	0.0731	--	0.0731	--	2022$/kWh
Annual Electricity/Fuel Costs[6]	456	360	456	360	2022$/yr
Total Lifetime O&M Costs[7]	7,127	5,627	7,127	5,627	2022$
Cost-Effectiveness					
Lifetime NOx Emission Reductions[8]	--	8.0E-03	--	8.0E-03	tons
Incremental Capital Costs[9]	--	(265)	--	9,273	2022$
Incremental Lifetime Operation and Maintenance Costs[9]	--	(1,500)	--	(1,500)	2022$
Incremental Lifetime Equipment Costs[9]	--	(1,765)	--	7,773	2022$
NOx Cost-Effectiveness[10]	--	**(220,761)**	--	**972,443**	2022$/ton
South Coast AQMD Reported Cost-Effectiveness[11]		**(183,000)**		**921,000**	2022$/ton
South Coast AQMD NOx Cost-Effectiveness Threshold	349,000	349,000	349,000	349,000	2022$/ton

Abbreviations:

AQMD - Air Quality Management District
COP - coefficient of performance
hr - hour
kg - kilogram
kW - kilowatt
kWh - kilowatt hour
J - joule
MMBtu - million British thermal units
NOx - oxides of nitrogen
ng - nanogram
yr - year

Constants:

Present Value Factor[12]	15.622
Real Interest Rate	4%

Conversion Factors:

8,760	hr/yr
29.3	kWh/therm
2,000	lbs/ton
2.78E-07	kWh/J
1.0.E+09	ng/g

Notes:

[1] Energy consumptions of the natural gas and heat pump space heaters were obtained from the 2019 California Residential Appliance Saturation Study (RASS), Table 11 and Table 33. Natural gas furnace energy consumption includes 191 therms of natural gas per year and 159 kWh of electricity per year for the furnace fan. Available at: https://www.energy.ca.gov/publications/2021/2019-california-residential-appliance-saturation-study-rass. Accessed: October 2024.

[2] Total Lifetime NOx Emissions are estimated as the Annual Energy Use multiplied by the Equipment Useful Life, and the NOx Emission Factor.

[3] Capital Costs were derived based on Capital Cost Data of Zones 6, 9 and 10 from the E3 study, "Residential Building Electrification in in California." Available at: https://www.ethree.com/e3-quantifies-the-consumer-and-emissions-impacts-of-electrifying-california-homes/. Accessed: October 2024.
The costs were also converted from 2018$ to 2022$ based on a CPI ratio of All Urban Customers in 2022 to All Urban Customers in 2018. CPI data available at: https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF. Accessed: October 2024.

[4] As noted in the preliminary draft staff report (Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024), the electricity price is calculated as a population weighted average of 2026 to 2040 projected price averages for SCE and LADWP, i.e., 0.77 x SCE price + 0.23 x LADWP price. The 2026 to 2040 projected average price averages for SCE and LADWP were obtained from the 2023 IEPR. Available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253591. Accessed: October 2024.

[5] Natural gas price was estimated as the average of the 2026 to 2040 residential baseline rates from CEC. Note, these rates were provided in 2023$ and converted to 2022$ using a CPI ratio of All Urban Customers in 2022 to All Urban Customers in 2023. CPI data available at: https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF. Accessed: October 2024.

[6] Annual Electricity/Fuel Costs are estimated as the product of the Annual Energy Use and the Electricity/Fuel Prices.

[7] Total Lifetime O&M Costs are estimated as the Annual Electricity/Fuel Costs multiplied by the Present Value Factor.

[8] Lifetime NOx Emission Reductions are calculated as the difference in Lifetime NOx Emissions for the natural gas unit and the electric unit.

[9] Incremental Costs are calculated as the difference in cost compared to the natural gas unit.

[10] NOx Cost-Effectiveness is calculated as the Incremental Lifetime Equipment Costs divided by the Lifetime NOx Emission Reductions.

[11] Data obtained from Page 2-18 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[12] The Present Value Factor is part of the Discounted Cash Flow Method that uses expected future cash flows in conjunction with a discount rate to estimate present fair value. Based on South Coast AQMD Working Group Meeting #3 presentation slides. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm3-january-2024.pdf?sfvrsn=12. Accessed: October 2024.

Table B3. Cost-Effectiveness Calculations for the Replacement of a Residential Multi-Family Home Natural Gas Furnace

Parameters for Cost-Effectiveness Analysis	Space Heating and Cooling		Space Heating Only		Units
	Natural Gas Furnace + Air Conditioner	Electric Heat Pump HVAC	Natural Gas Furnace	Electric Heat Pump HVAC	
NOx Emissions					
NOx Emission Factor	14.0	0.0	14.0	0.0	ng/J
Annual Energy Use by Technology Type[1]	2,039	537.67	2,039	537.67	kWh
Equipment Useful Life	25	25	25	25	years
Total Lifetime NOx Emissions[2]	2.8E-03	0.0E+00	2.8E-03	0.0E+00	kg
Capital Costs					
Capital Costs[3]	13,542	11,078	6,857	11,078	2022$
Infrastructure	--	3,000	--	3,000	2022$
Total Capital Costs	13,542	14,078	6,857	14,078	2022$
Operation and Maintenance (O&M) Costs					
Electricity Prices[4]	0.2950	0.2950	0.2950	0.2950	2022$/kWh
Natural Gas Prices[5]	0.0731	--	0.0731	--	2022$/kWh
Annual Electricity/Fuel Costs[6]	162	159	162	159	2022$/yr
Total Lifetime O&M Costs[7]	2,526	2,478	2,526	2,478	2022$
Cost-Effectiveness					
Lifetime NOx Emission Reductions[8]	--	5.3E-03	--	5.3E-03	tons
Incremental Capital Costs[9]	--	536	--	7,221	2022$
Incremental Lifetime Operation and Maintenance Costs[9]	--	(49)	--	(49)	2022$
Incremental Lifetime Equipment Costs[9]	--	487	--	7,172	2022$
NOx Cost-Effectiveness[10]	--	**91,831**	--	**1,351,118**	2022$/ton
South Coast AQMD Reported Cost-Effectiveness[11]		**(2,633,000)**		**(135,000)**	2022$/ton
South Coast AQMD NOx Cost-Effectiveness Threshold	349,000	349,000	349,000	349,000	2022$/ton

Abbreviations:

AQMD - Air Quality Management District
COP - coefficient of performance
hr - hour
kg - kilogram
kW - kilowatt
kWh - kilowatt hour
J - joule
MMBtu - million British thermal units
NOx - oxides of nitrogen
ng - nanogram
yr - year

Constants:

Present Value Factor[12]	15.622
Real Interest Rate	4%

Conversion Factors:

8,760	hr/yr
29.3	kWh/therm
2,000	lbs/ton
2.78E-07	kWh/J
1.0.E+09	ng/g

Notes:

[1] Energy consumptions of the natural gas and heat pump space heaters were obtained from the 2019 California Residential Appliance Saturation Study (RASS), Table 11 and Table 33. Averages of townhomes, 2-4 unit apartment, and 5-unit apartment energy consumptions were used. Natural Gas furnace energy consumption includes 67.7 therms of natural gas per year and 56.7 kWh electricity per year for the furnace fan. Available at: https://www.energy.ca.gov/publications/2021/2019-california-residential-appliance-saturation-study-rass. Accessed: October 2024.

[2] Total Lifetime NOx emissions are estimated as the Annual Energy Use multiplied by the Equipment Useful Life, and the NOx Emission Factor.

[3] Capital Costs were derived based on Capital Cost Data of Zones 6, 9 and 10 from the E3 study, "Residential Building Electrification in in California." Available at: https://www.ethree.com/e3-quantifies-the-consumer-and-emissions-impacts-of-electrifying-california-homes/. Accessed: October 2024.
The costs were also converted from 2018$ to 2022$ based on a CPI ratio of All Urban Customers in 2022 to All Urban Customers in 2018. CPI data available at: https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF. Accessed: October 2024.

[4] As noted in the preliminary draft staff report (Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024), the electricity price is calculated as a population weighted average of 2026 to 2040 projected price averages for SCE and LADWP, i.e., 0.77 x SCE price + 0.23 x LADWP price. The 2026 to 2040 projected average price averages for SCE and LADWP were obtained from the 2023 IEPR. Available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253591. Accessed: October 2024.

[5] Natural gas price was estimated as the average of the 2026 to 2040 residential baseline rates from CEC. Note, these rates were provided in 2023$ and converted to 2022$ using a CPI ratio of All Urban Customers in 2022 to All Urban Customers in 2023. CPI data available at: https://www.dir.ca.gov/oprl/CPI/EntireCCPI.PDF. Accessed: October 2024.

[6] Annual Electricity/Fuel Costs are estimated as the product of the Annual Energy Use and the Electricity/Fuel Prices.

[7] Total Lifetime O&M Costs are estimated as the Annual Electricity/Fuel Costs multiplied by the Present Value Factor.

[8] Lifetime NOx Emission Reductions are calculated as the difference in Lifetime NOx Emissions for the natural gas unit and the electric unit.

[9] Incremental Costs are calculated as the difference in cost compared to the natural gas unit.

[10] NOx Cost-Effectiveness is calculated as the Incremental Lifetime Equipment Costs divided by the Lifetime NOx Emission Reductions.

[11] Data obtained from Page 2-19 of the Preliminary Draft Staff Report. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-preliminary-draft-staff-report.pdf?sfvrsn=18. Accessed: October 2024.

[12] The Present Value Factor is part of the Discounted Cash Flow Method that uses expected future cash flows in conjunction with a discount rate to estimate present fair value. Based on South Coast AQMD Working Group Meeting #3 presentation slides. Available at: https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1111-and-1121/par-1111-and-1121-wgm3-january-2024.pdf?sfvrsn=12. Accessed: January 2024.

Appendix B

Comments on Draft Subsequent Environmental Assessment

1. The Draft SEA's air quality impacts analysis compares potential increases in electricity use under South Coast AQMD's 2022 Air Quality Management Plan with those under the proposed project. In doing so, the Draft SEA assumes that space heaters will operate 4 hours per day on 100 days per year when the temperature is below 70ºF. (Draft SEA, Table 4-3, fn. 3.) However, the Draft SEA does not identify the source of this data, making it difficult for a reader to verify the reasonableness of the assumption. Additionally, Table 4-3 cites to the website of Silicon Valley Power of the City of Santa Clara for its estimates of zero-emission water heaters' and low-NOx space heaters' electricity use. (Draft SEA, Table 4-3, fn. 1.) However, the Draft SEA leaves unclear why it relies on data from Northern California in its analysis of anticipated electricity use for such appliances within South Coast AQMD's Southern California jurisdictional area, and whether electricity use in the two areas might differ. South Coast AQMD could rely on the Residential Appliance Saturation Survey (RASS) for energy consumption by appliance in various utility territories.[1]

2. The Draft SEA's energy impacts analysis, in its concluding section, states that "[t]he cumulative energy impacts from increased electricity and natural gas demand remain significant and unavoidable." (Draft SEA, p. 4-23.) It then continues: "However, the Final Program EIR for the 2022 AQMP also concluded that the use of energy to comply with ambient air quality standards and climate change goals, while contributing to overall electricity and natural gas demand, [] does not result in the wasteful, unnecessary, or inefficient use of energy. Therefore, the cumulative energy impacts are less than significant." (*Id*.)

The Draft SEA leaves unclear how to reconcile these two propositions. The mere passing reference to the 2022 FEIR does not explain how the significant and unavoidable energy demand impacts discussed at length in the preceding pages of the Draft SEA are negated or made less significant by the absence of waste or inefficiency in how this energy is used. In the end, the Draft SEA goes from finding significant and unavoidable impacts to less than significant impacts in the space of just a few sentences, without sufficient explanation.

3. The Draft SEA's energy impacts analysis incorporates the same assumption that that space heaters will operate 4 hours per day on 100 days per year when the temperature is below 70ºF as the Draft SEA's air quality impacts analysis. (Draft SEA, Table 4-6, fn. 3.) And this energy impacts analysis relies on the same source for comparing potential increases in electricity use under South Coast AQMD's 2022 Air Quality Management Plan and under the proposed project as does the Draft SEA's air quality impacts analysis (Silicon Valley Power). (Draft SEA, Table 4-6, fn. 1.) As discussed in Paragraph 1 above, this analysis leaves unclear the source of data for the former proposition and the applicability of electricity use in Northern California for the latter comparison; SoCalGas recommends use of the RASS energy consumption datasets instead.

4. The Draft SEA's discussion of those potential impacts found not to be significant appears to contain an inconsistency. The Draft SEA's analysis of some of these impact areas assumes that installation of new furnaces and water heaters will not require construction activities. (See, e.g.,

[1] California Energy Commission, California Residential Appliance Saturation Study, *https://rass.dnv.com/sign/in*

pp. 4-25 [Aesthetics, Agriculture and Forestry Resources], 4-26 [Geology and Soils].) Yet the Draft SEA's discussion of other impact areas appears to assume at least the possibility of new construction. (See Draft SEA, p. 4-26 [Cultural and Tribal Resources: "In addition, if any new residential buildings are to be constructed, the project would be subject to project-level review, …."].) To the extent the Draft SEA relies on inconsistent assumptions about whether and how much new construction the proposed project might entail, it does not explain this inconsistency.

5. The Draft SEA's discussion of potential Population and Housing impacts (Draft SEA, p. 4-31) does not address whether owners of rental properties might pass the costs of new furnaces or space heaters on to tenants, thus potentially driving up rental rates. CEQA requires lead agencies, in analyzing Population and Housing impacts, to examine whether the proposed project will "displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere." (See CEQA Guidelines, Appendix G, § XIV(b).) The Draft SEA should address whether implementation of the project might result in renters within the South Coast Basin experiencing rent increases and moving to more affordable rental properties elsewhere as a result. Or, if South Coast AQMD views such a housing impact as insignificant, the Draft SEA should explain why.

6. The Draft SEA's project alternatives analysis includes a purportedly "Less Stringent Alternative ("Alternative C"). Under Alternative C, the suggested reduction in stringency comes from allowing the replacement of equipment in existing buildings with low NOx heaters in situations where alternative compliance options would be necessary under the proposed project. (Draft SEA, p. 5-2.) SoCalGas questions why South Coast AQMD's analysis of alternatives to the proposed project does not also incorporate into this "Less Stringent Proposed Project" delayed dates for implementation of the proposed project's required compliance dates. "Alternative B – More Stringent Proposed Project" sets compliance dates 12 months earlier than the proposed project. (See Draft SEA, p. 5-2.) Including a proposed project alternative that would instead defer these dates across the board would allow for a more like-to-like comparison with Alternative B.

Moreover, including an alternative with delayed compliance dates would be particularly helpful given some of the near-term environmental impacts that the Draft SEA identifies. For example, the Draft SEA's analysis of Alternative B explains that this alternative could cause more significant air quality impacts due to its compressed timeframe for implementation, based on the likelihood of more equipment replacement projects occurring on a peak day. (Draft SEA, p. 5-4.) Similarly, in analyzing Alternative B's potential energy impacts, the Draft SEA explains that "Alternative B would result in an earlier increase in electricity demand which is driven by the earlier deployment of zero-emission technologies." (Draft SEA, p. 5-6.) An alternative that incorporates deferred rather than accelerated compliance dates would allow a better comparison between its potential air quality and energy impacts and those of both the proposed project and alternatives like Alternative B.

SoCalGas acknowledges the proposition that a lead agency "need not consider every conceivable alternative to a project" (Cal. Code Regs., tit. 16, § 15126.6), as the Draft SEA states. But analyzing

a project alternative that includes delayed compliance dates would make the Draft SEA a more informative document for the public and for decision makers.