Draft Environmental Impact Report
for the

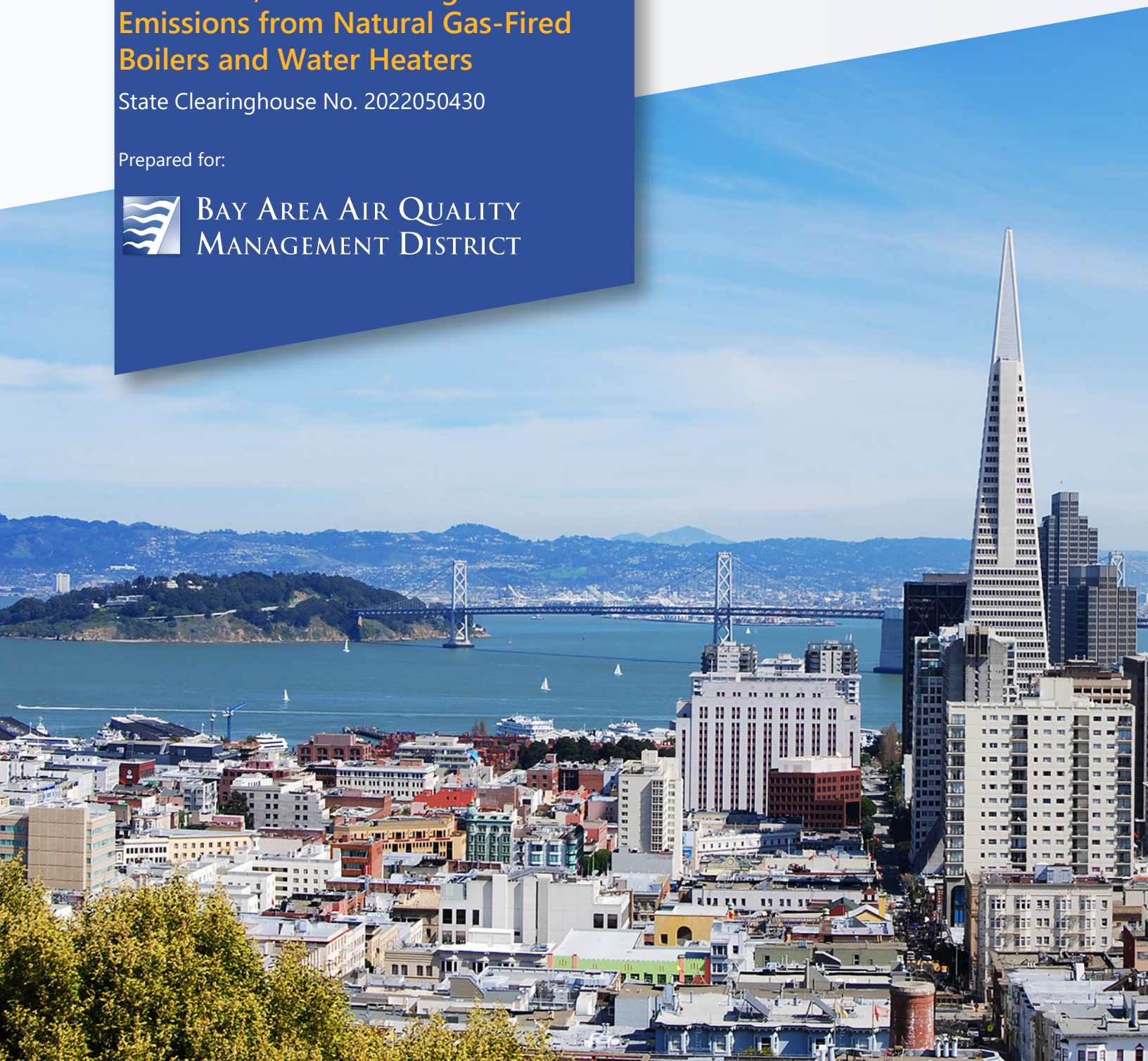
Proposed Amendments to Building Appliance Rules – Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters

State Clearinghouse No. 2022050430

Prepared for:

Bay Area Air Quality Management District

ASCENT ENVIRONMENTAL



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AAQS	air quality standards
AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BART	Bay Area Rapid Transit
BTU	British thermal unit
CAA	federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	corporate average fuel economy
CALGreen	California Green Building Standards
Caltrans	California Department of Transportation
CAP	climate action plan
CARB	California Air Resources Board
CCA	Community Choice Aggregation
CCAA	California Clean Air Act
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
CI	carbon intensity
CNEL	Community Noise Equivalent Level
CNRA	California Natural Resources Agency
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPP	corridor protection program
CPUC	California Public Utilities Commission
dB	decibels
dBA	A-weighted decibels
Delta	Sacramento–San Joaquin Delta

diesel PM	particulate matter exhaust from diesel engines
E3	Energy + Environmental Economics
EIR	environmental impact report
EO	Executive Order
EPA	US Environmental Protection Agency
EV	electric vehicle
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
FTA	Federal Transit Administration
GHG	greenhouse gas
GHGRP	greenhouse gas reduction plan
HAP	hazardous air pollutant
H_2SO_4	sulfuric acid
HFC	hydrofluorocarbons
HNO_3	nitric acid
Hot Spots Act	Air Toxics Hot Spots Information and Assessment Act of 1987
Hz	hertz
I-	Interstate
IS	initial study
lb/day	pounds per day
L_{eq}	Equivalent Continuous Sound Level
L_{max}	Maximum Sound Level
$MMTCO_2e$	million metric tons of carbon dioxide equivalent
mPa	micro-Pascals
MTC/ABAG	Metropolitan Transportation Commission and Association of Bay Area Governments
MW	megawatt
N_2	nitrogen

N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
ng/joule	nanograms per joule
NO_2	nitrogen dioxide
NOP	notice of preparation
NO_X	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NREL	National Renewable Energy Laboratory
O_2	oxygen
OSHA	Occupational Safety and Health Administration
PFC	perfluorocarbons
PG&E	Pacific Gas and Electric Company
PM	particulate matter
PM_{10}	respirable particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less
ppm	parts per million
PRC	Public Resources Code
Project	proposed amendments to Rules 9-4 and 9-6
RCRA	Resource Conservation and Recovery Act
ROG	reactive organic gases
RPS	Renewable Portfolio Standard
Rule 9-4	Regulation 9, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces
Rule 9-6	Regulation 9, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters
RWQCB	regional water quality control board
SB	Senate Bill
SB 350	Clean Energy and Pollution Reduction Act
SCAQMD	South Coast Air Quality Management District
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SIP	state implementation plan
SJVAPCD	San Joaquin Valley Air Pollution Control District

SO_2	sulfur dioxide
SPUR	San Francisco Bay Area Planning and Urban Research Association
SR	State Route
TAC	toxic air contaminant
TCR	tribal cultural resource
VOC	volatile organic compounds

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EXECUTIVE SUMMARY

ES.1 Introduction

This summary is provided in accordance with California Environmental Quality Act Guidelines (State CEQA Guidelines) Section 15123. As stated in Section 15123(a), "an EIR [environmental impact report] shall contain a brief summary of the proposed action and its consequences. The language of the summary should be as clear and simple as reasonably practical." As required by the guidelines, this chapter includes (1) a summary description of the Project, (2) a synopsis of environmental impacts and recommended mitigation measures (Table ES-1), (3) identification of the alternatives evaluated and of the environmentally superior alternative, and (4) a discussion of the areas of controversy associated with the Project.

ES.2 SUMMARY DESCRIPTION OF THE PROJECT

The Bay Area Air Quality Management District (BAAQMD) is proposing amendments to Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces (Rule 9-4) and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (Rule 9-6). Rule 9-4 applies to the natural gas-fired space-heating furnaces commonly found in single-family homes, and Rule 9-6 applies to natural gas-fired water heaters commonly found in residential and commercial applications. Space- and water-heating appliances generate a large portion of nitrogen oxide (NO_x) emissions from sources in the Bay Area. NO_x is formed during natural gas combustion when ambient nitrogen and oxygen combine at high temperatures. If adopted, the proposed rule amendments (or Project) would substantially reduce NO_X emissions from these appliances.

ES.2.1 Project Location

The proposed amendments to Rules 9-4 and 9-6 would apply to building appliances within the BAAQMD's jurisdiction, which encompasses 5,600 square miles. The area of BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. The San Francisco Bay Area is characterized by a large, shallow basin surrounded by coastal mountain ranges tapering into sheltered inland valleys. The combined climatic and topographic factors result in increased potential for the accumulation of air pollutants in the inland valleys and reduced potential for buildup of air pollutants along the coast.

ES.2.2 Background and Need for the Project

The BAAQMD has regulated NO_x emissions from space- and water-heating appliances for several decades. Rule 9-4 for furnaces was first adopted in 1983, with this version of the rule still in place. Rule 9-6 was first adopted in 1992 and was most recently updated with more stringent NO_x emissions standards for certain equipment in 2007. All versions of these rules have included a NO_x emissions standard expressed as nanograms of NO_x per joule of useful heat (ng/joule) delivered by the appliance.

In addition, the South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Air Pollution Control District (SJVAPCD) have adopted regulations that are similar in structure and standards to Rules 9-4 and 9-6. SCAQMD Rule 1111 and SJVAPCD Rule 4905, which are similar to Rule 9-4 in applicability to furnaces, have been updated within the last ten years and require a NO_x emissions standard of 14 ng/joule, the same initial standard identified in the proposed amendments. Rule 9-6 for water heaters and small boilers currently contains NO_X emission standards equivalent to those in SCAQMD Rules 1146.2 and 1121 and SJVAPCD Rules 4308 and 4902 for similar equipment.

The proposed rule amendments to the two rules focus on NO_x emissions from natural gas-fired space- and water-heating appliances in buildings. Space and water heaters are the greatest source of NO_x emissions in the building sector.

Nitrogen oxides are a key criteria pollutant as a precursor to ozone and secondary particulate matter (PM) formation. Secondary PM is formed from the conversion of NO_x to ammonium nitrate through atmospheric chemical reactions with ammonia. Particulate matter, a diverse mixture of suspended particles and liquid droplets, is the air pollutant most harmful to the health of Bay Area residents. The Bay Area is currently classified as non-attainment for particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$) under the annual and 24-hour California Ambient Air Quality Standards (CAAQS) and unclassifiable under National Ambient Air Quality Standards (NAAQS). Exposure to $PM_{2.5}$, on either a short-term or long-term basis, can cause a wide range of respiratory and cardiovascular health effects, including strokes, heart attacks, and premature deaths. Because NO_X compounds in the atmosphere contribute to the formation of secondary PM, any NO_x emission reduction would also result in $PM_{2.5}$ reductions.

In addition, the Bay Area is currently designated as a non-attainment area for ozone, a regional pollutant, under all CAAQS and NAAQS. Emissions of reactive organic gases (ROG) and NO_x throughout the Bay Area contribute to ozone formation in downwind areas. ROG and NO_x react through atmospheric chemical reactions to form ozone. Therefore, reductions in emissions of ROG and NO_x are needed throughout the region to decrease ozone levels. As the ambient temperature rises, ground-level ozone forms at an accelerated rate. Ozone levels are usually highest on hot, windless summer afternoons, especially in inland valleys. Exceedances of State or national ozone standards in the Bay Area occur only on hot, relatively stagnant days. Because weather conditions have a strong impact on ozone formation, ozone levels can vary significantly from day to day or from one summer to the next. Longer and more severe heat waves expected as a result of climate change may cause more ozone formation, resulting in more frequent exceedances of ozone standards.

ES.2.3 Project Objectives

The overall purpose of the proposed amendments is to reduce NO_x emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area. Specifically, the objectives of the proposed amendments to Rules 9-4 and 9-6 are to:

- for Rule 9-4, introduce an "ultra-low" NO_x standard for space-heating appliances with a compliance date in 2024;
- for Rule 9-4, establish a zero-NO_x standard in 2029;
- for Rule 9-6, establish a zero-NO_x standard for water heaters with compliance dates ranging from 2027 to 2031 based on equipment type, use, and size;
- expand the applicability of Rule 9-4 to a larger breadth of space-heating appliances;
- update and clarify the certification and calculation methods contained in the rules;
- ensure equitable implementation of the rules; and
- improve the clarity and enforceability of the rules.

ES.2.4 Characteristics of the Project

The proposed amendments to Rules 9-4 and 9-6 would establish more stringent NO_x emission standards for natural gas-fired space- and water-heating appliances in buildings in the Bay Area.

PROPOSED AMENDMENTS TO RULE 9-4

The proposed amendments for Rule 9-4 include introducing an "ultra-low" NO_X standard for space-heating appliances with a compliance date in 2024 and setting a zero-NO_x standard in 2029. Like the current rule, amended Rule 9-4 would apply only to new devices and only to natural gas-fired devices. The proposed new lower and zero-NO_x standards would apply to appliance retailers/wholesalers, and installers and would affect Bay Area consumers when they replace their existing furnaces.

PROPOSED AMENDMENTS TO RULE 9-6

The proposed amendments for Rule 9-6 include setting a zero-NO_X standard for water heaters with compliance dates ranging from 2027 to 2031 based on equipment type, use, and size. Like the current rule, amended Rule 9-6 would apply only to new devices and only to natural gas-fired devices. The proposed new zero-NO_x standards would apply to appliance retailers/wholesalers, and installers and would affect Bay Area consumers when they replace their existing water heaters.

EMISSION CONTROL METHODS

Emission control methods to meet the proposed 14 ng/joule standard for Rule 9-4 are well established and currently required by SCAQMD Rule 1111 and SJVAPCD Rule 4905. Potential complications identified in other jurisdictions, such as high-altitude and cold weather scenarios, are not applicable in the Bay Area. The BAAQMD anticipates that dual-fuel systems able to demonstrate compliance with this new proposed standard would be eligible for certification.

Current space and water heating appliances that meet the zero-NO_x standard and are available on the market consist mainly of electric heat pump systems. The BAAQMD does not intend to mandate specific technology solutions, but currently available electric solutions were used as the bases to form estimates and projections. Natural gas technologies, with combustion occurring in the absence of nitrogen, along with a variety of other technologies, could also meet the proposed standards. The assumed use of electric appliances for CEQA analysis purposes allows for a conservative estimate for impacts to utility systems and NO_x reductions and potential adverse environmental impacts because a switch to electric appliances would slightly reduce NO_x emissions reductions (some increase in NO_x emissions from power generation); have impacts on utilities and services systems from the additional electricity needed to power these appliances; and have potential noise impacts, as discussed herein. Should natural gas-fired appliances that meet the zero-NO_x standard be developed and used in practice, NO_x emission reductions would be greater than those shown here as the resultant emissions would be zero (i.e., fewer potential emissions associated with electricity generation), there would be lesser impacts due to electricity need, and there would be no other foreseeable potential adverse impacts on any environmental impact areas. Thus, for CEQA analysis purposes, the BAAQMD assumes that currently in-use natural gas-fired appliances would be replaced with electric appliances. The proposed amendments include a zero-NO_x standard four to eight years in the future to encourage technology development, as well as availability and accessibility throughout the Bay Area.

OTHER POTENTIAL PHYSICAL EFFECTS

As described above, the proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed at existing and new residential and commercial buildings. The proposed rule amendments would not result in any land use changes and would not require construction (other than installation of the replacement units at existing buildings). These proposed amendments would also not result in foreseeable changes to equipment manufacturing processes that could require construction of new or expanded equipment manufacturing facilities or notable changes to equipment distribution patterns that could increase vehicle miles traveled. The BAAQMD conducted additional research on electrical grid capacity to serve the Project. The results of this research are included in Appendix C. Although the Project does not include development of other facilities that would directly increase demand for electricity, the Project would result in

long-term replacement of appliances with zero-NO_x appliances that are assumed to be electric. This assumption is made for purposes of conducting a conservative CEQA analysis and is based on currently available technology. This change to electric appliances would contribute to increased electricity demand resulting from other programs, especially State-led decarbonization programs that involve much more reliance on renewable energy. The potential for the Project to contribute to substantial adverse physical effects associated with any electrical supply increases or necessary grid capacity upgrades is analyzed in this EIR in Section 3.3, "Utilities and Service Systems (Energy Resources)." Should natural gas-fired appliances that meet the zero-NO_X standard be developed and used in practice, these potential grid impacts would decrease.

PROJECT TIMELINE

The proposed rule amendments would be in effect beginning in 2024. They would apply to appliance retailers/wholesalers, and installers and would affect Bay Area consumers when they replace their existing furnaces and water heaters. The equipment changeout is projected to be completed in 2046.

ENVIRONMENTAL PERMITS

No environmental permits would be required for Project implementation.

ES.3 ENVIRONMENTAL IMPACTS AND RECOMMENDED MITIGATION MEASURES

ES.3.1 Project-Specific Impacts

This EIR has been prepared pursuant to the CEQA (Public Resources Code [PRC] Section 21000 et seq.) and the State CEQA Guidelines (California Code of Regulations, Title 14, Chapter 3, Section 1500, et seq.) to evaluate the physical environmental effects of the Proposed Amendments to Rules 9-4 and 9-6 Project. The BAAQMD is the lead agency for the Project. The BAAQMD has the principal responsibility for approving and carrying out the Project and for ensuring that the requirements of CEQA have been met. After the final EIR is prepared and the EIR public review process is complete, the BAAQMD Board of Directors is the party responsible for certifying that the EIR adequately evaluates the impacts of the Project.

Table ES-1, presented at the end of this chapter, provides a summary of the environmental impacts for the Proposed Amendments to Rules 9-4 and 9-6 Project. The table provides the level of significance of the impact before mitigation, recommended mitigation measures, and the level of significance of the impact after implementation of the mitigation measures.

As described in Chapter 1, "Introduction," the following were identified as resources that would not experience any significant environmental impacts from the Project.

- Agriculture and Forest Resources
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Wildfire

ES.3.2 Significant-and-Unavoidable Impacts

As documented in this Draft EIR, most of the impacts associated with the Project would be less than significant. The following impacts are considered significant and unavoidable; that is, no feasible mitigation is available to reduce the impacts to a less-than-significant level.

UTILITIES AND SERVICE SYSTEMS (ENERGY RESOURCES)

Impact 3.3-1: Require the Relocation or Construction of New or Expanded Electric Facilities That Would Result in an Adverse Environmental Impact

Assuming that heat pumps are used to replace existing natural gas-fired space and water heating appliances, the Project would, under the "worst case" Low Policy Reference Scenario evaluated by E3 (Appendix C), over the long term, result in increased energy demand beyond the planned electric grid capacity growth represented in this scenario. E3 estimated that the proposed zero-NO_x standards could result in 6.2 terrawatt-hours per year of additional electric load growth by 2050, which would represent 2.2 percent of the total statewide electrical load by 2020 standards. The E3 study estimates that this level of demand could be met by the development of approximately 2,180 megawatt (MW) of incremental utility-scale solar capacity, corresponding to 19,500 acres of direct land use impacts, under the "worst case" Low Policy Reference Scenario. For context, this represents 0.6 to 1.2 percent of the State's total projected land needed solar and land-based wind development for the State to meet its stated climate goals, which is estimated to be between 1.6 and 3.1 million acres for solar and wind projects (not including off-shore wind and other energy sources). Almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. The potential construction and operational impacts associated with these energy facilities could be potentially significant, and may include substantial changes to visual character; obstruction of views; increased light and glare; conversion of Farmland and other impacts to agricultural resources and operations; construction-related air pollution, GHG emissions, and noise; archaeological resources; tribal cultural resources; adverse effects to wildlife species and habitat; adverse effects to other natural resources and waterways; impacts related to geology and paleontological resources; operational noise; conflicts with air traffic; transportation and storage of hazards and hazardous materials; and wildfire and associated environmental effects.. Mitigation measures are likely available to minimize these impacts to a less-than-significant level for many of the environmental issue areas; however, it is likely that some would remain significant and unavoidable. Therefore, under the Low Policy Reference Scenario, the Project would result in a substantial contribution to a significant cumulative impact, and this impact would be potentially significant.

As described in Section 3.3, "Utilities and Service Systems," the location and type of these projects are currently speculative but based on current projections as presented in the E3 study, their associated environmental impacts would generally be located outside the Bay Area, and potentially outside California. The energy projects described would be evaluated in separate, future EIRs by various lead agencies and would ultimately be implemented by these other agencies. For these reasons, the BAAQMD has no jurisdiction over the approval of these projects and cannot identify, monitor, or enforce mitigation. Therefore, the BAAQMD cannot identify feasible mitigation to reduce the Project's contribution to these impacts and the impact remains potentially significant and unavoidable under the Low Policy Reference Scenario.

NOISE

Impact 3.4-1: Potential to Generate Long-Term Operational Noise

The proposed amendments would include installation of stationary sources such as heat pump units, which would be installed inside and outside of existing buildings. The potential operational noise impacts associated with this equipment could be potentially significant depending on the existing ambient noise environment, noise levels associated with the units, and the noise standards of the jurisdiction in which the units would be installed. Mitigation measures are likely available to minimize these impacts to a less-than-significant level; however, it is likely that noise

from some units would remain significant and unavoidable, especially because the BAAQMD does not have jurisdiction to monitor or enforce any of these mitigation measures. Therefore, the Project would result in a substantial long-term operational noise impact, and this impact would be potentially significant.

As described in Section 3.4, "Noise," the installation of appliances that meet the proposed NO_X standards would occur throughout the nine-county Bay Area and operation of these appliances would generate noise. Mitigation measures, such as enclosures or screening, are likely available to minimize operational noise impacts to a less-than-significant level; however, it is likely that some would remain significant and unavoidable. The BAAQMD does not have land use authority to require these mitigation measures for individual equipment installations nor jurisdiction to monitor or enforce any of these measures. Therefore, the Project's contribution to these impacts and the impact remains potentially significant and unavoidable.

ES.4 ALTERNATIVES TO THE PROPOSED PROJECT

The following provides brief descriptions of the alternatives evaluated in this Draft EIR. Table ES-2 presents a comparison of the environmental impacts between the alternatives and the Project.

- Alternative 1: No Project Alternative assumes no actions would be taken by the BAAQMD and the proposed rule amendments would not be adopted. The BAAQMD's existing Rules 9-4 and 9-6, which already establish NO_X emissions standards for natural gas-fired space- and water-heating appliances, would remain in effect without any changes.
- Alternative 2: Earlier Compliance Date would establish a zero-NO_x standard with a compliance date of January 1, 2026, which is approximately three years earlier than the compliance date for the Project (phased in between 2027 and 2031). Except for the earlier compliance date, the proposed amendments to Rules 9-4 and 9-6 would be the same as the Project.
- Alternative 3: Later Compliance Date would establish a zero-NO_x standard with a compliance date of January 1, 2035, which is approximately six years later than the compliance date for the Project (phased in between 2027 and 2031). Except for the later compliance date, the proposed amendments to Rules 9-4 and 9-6 would be the same as the Project.

Table ES-2 Summary of Environmental Effects of the Alternatives Relative to the Proposed Project

Environmental Topic	Proposed Project	Alternative 1: No Project Alternative	Alternative 2: Earlier Compliance Date	Alternative 3: Later Compliance Date
Air Quality	LTS (Beneficial)	Greater	Similar	Similar
Greenhouse Gas Emissions and Climate Change	LTS (Beneficial)	Greater	Similar	Similar
Utilities and Service Systems (Energy Resources)	SU	Less	Greater	Slightly Less
Noise	SU	Less	Similar	Similar
Aesthetics	LTS	Slightly Less	Similar	Similar

Notes: LTS = less than significant; SU = significant and unavoidable.

Source: Data compiled by Ascent Environmental in 2022.

ES.4.1 Environmentally Superior Alternative

As described in Chapter 4, "Alternatives," the State CEQA Guidelines (Section 15126.6[a]) require EIRs to describe a range of reasonable alternatives to the project that would attain most of the project objectives but would "avoid or substantially lessen any of the *significant effects of the project*" (*emphasis* added). CEQA also requires identification of the environmentally superior alternative. In the case of a project that is designed to reduce existing significant

environmental impacts, such as the proposed Project, determination of which alternative is environmentally superior is unique. On one hand, alternatives have been identified that would reduce significant impacts associated with the Project; on the other hand, the Project achieves higher levels of air quality and greenhouse gas (GHG) reduction than the alternatives that lessen the Project's significant impacts—and air quality and climate change are significant impacts under existing conditions. If we follow CEQA to the letter, and view the alternatives only in terms of those that address the Project's significant impacts, then we must grant that the No Project Alternative is the environmentally superior alternative because it avoids significant potential Project impacts associated with noise and also avoids the Project's potential considerable contribution to significant impacts related to electrical infrastructure expansion (including renewable energy expansion). CEQA further specifies that if the environmentally superior alternative is the "no project" alternative, the EIR must identify an environmentally superior alternative among the other alternatives.

Alternative 2 would establish a zero-NO_x standard with a compliance date of January 1, 2026, which is approximately three years earlier than the compliance date for the Project (phased in between 2027 and 2031). Except for the compliance date, Alternative 2 would meet most of the project objectives. Further, Alternative 2 would achieve reductions in NO_x emissions three years earlier than could be achieved under the Project (2043 as compared with 2046), and lead to greater NO_x reductions over the long term due to the earlier implementation date. Alternative 2 would result in similar air quality, GHG, noise, and aesthetic impacts compared to the Project. However, this change in compliance date would ultimately result in greater impacts related to the construction of new or expanded grid capacity. Alternative 2 would also not reduce the Project's significant noise impacts. Alternative 2's greater impacts related to the construction of new or expanded grid capacity are sufficient to eliminate it from further consideration as the environmentally superior alternative.

Alternative 3 would establish a zero-NO_x standard with a compliance date of January 1, 2035, which is approximately six years later than the compliance date for the Project (phased in between 2027 and 2031). Except for the compliance date, Alternative 3 would meet most of the project objectives. Alternative 3, however, would not achieve the same rate of reduction in NO_x emissions until six years after the Project could achieve the same rate of reduction (2052 as compared with 2046) and would achieve fewer NO_x reductions overall due to the later implementation date. Alternative 3 would result in similar air quality, GHG, noise, and aesthetic impacts compared to the Project. However, under Alternative 3, a significant and unavoidable impact of the Project could be slightly reduced (although not eliminated) because the compliance date would be delayed six years, thereby requiring a slightly smaller amount of new solar, new batteries, new transmission capacity, and distribution capacity compared with the Project. Therefore, in accordance with CEQA, this Draft EIR concludes that because Alternative 3 would result in a slight reduction to the Project's substantial contribution to a significant cumulative impact related to the construction of new or expanded grid capacity, Alternative 3 is considered the environmentally superior alternative.

However, it is important to note that if "environmentally superior alternative" were more simply defined as the alternative that is best for the overall environment, including beneficial effects, then the conclusion would likely be different. As described throughout this EIR, the Bay Area is currently designated as a non-attainment area under the annual and 24-hour California Ambient Air Quality Standards (CAAQS) for particulate matter. In addition, the Bay Area is currently designated as a non-attainment area for ozone, a regional pollutant, under CAAQS and the National Ambient Air Quality Standards (NAAQS). This is an existing and significant air quality impact. The Project would address this significant air quality impact by reducing NO_X emissions in the Bay Area, thereby resulting in a less-than-significant (beneficial) impact to regional air quality (see Section 3.1, "Air Quality"). This reduction, as described above, would also occur with implementation of Alternative 3; however, Alternative 3, would not achieve the rate of reduction in NO_x emissions until six years after the Project could begin to achieve NO_x reductions (2052 as compared with 2046), leading to fewer NO_x reductions and therefore less associated health benefits overall. The Project would result in a greater beneficial effect related to GHG and climate change because the reductions would occur sooner than later.

The Project achieves higher levels of NO_x and GHG reduction than Alternative 3 and addresses existing significant air quality impacts in the Air Basin. Weighing the Project's benefits to air quality and GHG against its significant impacts related to noise and utilities and considering that Alternative 3 does not achieve the same level of total NO_x or GHG

reduction as the Project, it would be difficult to justify naming it environmentally superior to the Project. However, to be clear, based on CEQA's specific intent for the identification of alternatives to minimize or avoid a project's significant impacts, as discussed above, Alternative 3 is considered the environmentally superior alternative because it slightly reduces the Project's impact on utilities and service systems.

ES.5 AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

A notice of preparation (NOP) and Initial Study were distributed for the Project on May 19, 2022, to responsible agencies, interested parties, and organizations, as well as private organizations and individuals that may have an interest in the Project. A public scoping meeting was held virtually on June 9, 2022, from 6:00 p.m. to 8:00 p.m. The purpose of the NOP and the scoping meeting was to provide notification that an EIR for was being prepared for the Project and to solicit input on the scope and content of the environmental document. The NOP and responses to the NOP are included in Appendix A. Key environmental concerns and issues that were expressed during the scoping process include the following:

- electrical grid capacity to support increased demands and the potential for blackouts if the grid system is unprepared;
- emissions from new power generation facilities;
- increased electrical demand could stress the grid and/or generate more air pollution if electrical generation is not clean;
- premature zero-NO_x implementation could result in a net increase in GHG emissions associated with increased electricity production;
- potential impacts to cultural resources, including resources that may be considered tribal cultural resources; and
- need to consult with California Native American tribes in accordance with Assembly Bill 52.

All of the substantive environmental issues raised in the NOP comment letters and the scoping meeting have been addressed or otherwise considered during preparation of this Draft EIR.

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Air Quality			
Impact 3.1-1: Long-Term Operational-Related Emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ The proposed amendments would result in a reduction in NO_X emissions generated by natural gas-fired space- and water-heating appliances. This would be achieved through the replacement of these appliances with ultra-low and zero-NO_X natural gas appliances or electric appliances. Operation of ultra-low and zero-NO_X natural gas appliances would inherently result in a reduction in NO_X emissions within the SFBAAB. Moreover, any turnover to electric appliances would eliminate emissions of criteria air pollutants from on-site natural gas combustion and associated emissions from this activity. For these reasons, the proposed amendments would have a less-than-significant (beneficial) impact to regional air quality.	LTS (Beneficial)	No mitigation is required for this impact.	LTS (Beneficial)
Greenhouse Gas Emissions and Climate Change			
Impact 3.2-1: Potential to Generate GHG Emissions The proposed amendments would result in a decrease in GHG emissions over the next 24 years. This decrease exceeds the net zero threshold of significance and would assist the state in meeting its long-term GHG reduction goals extending to 2045. Therefore, the proposed amendments would not have a cumulatively considerable contribution to climate change. This impact would be less than significant.	LTS (Beneficial)	No mitigation is required for this impact.	LTS (Beneficial)
Utilities and Service Systems (Energy Resources)			
Impact 3.3-1: Require the Relocation or Construction of New or Expanded Electric Facilities That Would Result in an Adverse Environmental Impact Assuming that heat pumps are used to replace existing natural gas-fired space and water heating appliances, the Project would, under the "worst case" Low Policy Reference Scenario evaluated by E3 (Appendix C), over the long term, result in increased energy demand beyond the planned electric grid capacity growth represented in this scenario. E3 estimated that the proposed zero-NO_x standards could result in 6.2 terrawatt-hours per year of additional electric load growth by 2050, which would represent 2.2 percent of the total statewide electrical load by 2020 standards. The E3 study estimates that this level of demand could be met by the development of approximately 2,180 MW of incremental utility-scale solar capacity, corresponding to 19,500 acres of direct land use impacts, under the "worst case" Low Policy Reference Scenario. For context, this represents 0.6 to 1.2 percent of the State's total projected land needed for the State to meet its stated climate goals, which is estimated to be between 1.6 and 3.1 million acres for solar and wind projects (not including off-shore wind and other energy sources). Almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. The potential construction and operational impacts associated with these energy facilities could be potentially significant, and may include substantial changes to visual character; obstruction of views; increased light and glare; conversion of Farmland and other impacts to agricultural	PS	No mitigation measures are available.	SU

NI = No impact LTS = Less than significant PS = Potentially significant S = Significant SU = Significant and unavoidable

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
resources and operations; construction-related air pollution, GHG emissions, and noise; archaeological resources; tribal cultural resources; adverse effects to wildlife species and habitat; adverse effects to other natural resources and waterways; impacts related to geology and paleontological resources; operational noise; conflicts with air traffic; transportation and storage of hazards and hazardous materials; and wildfire and associated environmental effects. Mitigation measures are likely available to minimize these impacts to a less-than-significant level for many of the environmental issue areas; however, it is likely that some would remain significant and unavoidable. Therefore, under the Low Policy Reference Scenario, the Project would result in a substantial contribution to a significant cumulative impact, and this impact would be potentially significant.			
Noise			
Impact 3.4-1: Potential to Generate Long-Term Operational Noise The proposed amendments would include installation of stationary sources such as heat pump units, which would be installed inside and outside of existing buildings. The potential operational noise impacts associated with this equipment could be potentially significant depending on the existing ambient noise environment, noise levels associated with the units, and the noise standards of the jurisdiction in which the units would be installed. Mitigation measures are likely available to minimize these impacts to a less-than-significant level; however, it is likely that noise from some units would remain significant and unavoidable, especially because the BAAQMD does not have jurisdiction to monitor or enforce any of these mitigation measures. Therefore, the Project would result in a substantial long-term operational noise impact, and this impact would be potentially significant.	PS	No mitigation measures are available.	SU
Aesthetics			
Impact 3.5-1: Substantial Adverse Effects on a Scenic Vista The proposed Project—specifically proposed Rule 9-4, which imposes NO_x limitations on residential and commercial central furnaces—could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Even the largest of these units would not likely be large enough to substantially adversely affect a scenic vista, especially given that the outdoor units would be mounted on or next to structures that would be much larger and more noticeable than the equipment. For these reasons, the Project would result in a less-than-significant impact related to scenic vistas.	LTS	No mitigation is required for this impact.	LTS
Impact 3.5-2: Substantially Damage Scenic Resources, Including, but not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway Proposed amendments to Rule 9-4, which impose NO_x limitations on residential and commercial central furnaces, could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Implementation of this rule change would not affect trees, rock outcroppings, or other natural scenic resources. Although furnace replacement in existing historic buildings may include exterior heat pumps	LTS	No mitigation is required for this impact.	LTS

NI = No impact LTS = Less than significant PS = Potentially significant S = Significant SU = Significant and unavoidable

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
where no pumps currently exist, any such equipment to be placed on the exterior of historic structures is typically regulated by local municipalities. Even if such regulations did not apply, HVAC and air conditioning units are commonplace on historic structures, and the addition of this equipment to the exterior of a historic structure would not be considered "substantial damage" to the historic building itself or to a scenic resource as viewed from a State Scenic Highway. The Project would therefore result in a less-than-significant impact.			
Impact 3.5-3: Substantially Degrade the Existing Visual Character or Quality of Public Views Sites in Rural Areas, or Conflict with Applicable Zoning or Other Regulations Governing Scenic Quality in Urban Areas In rural areas, replacement of furnaces that would place exterior equipment on existing buildings where no such equipment currently exists would not substantially degrade the visual character of the site because the addition of a small piece of external equipment on an existing or new building would not change the visual character of the site or adversely affect public views. In urbanized areas, exterior equipment is commonplace and the addition of outdoor heat pump units as a result of the Project would not likely conflict with any existing zoning or other regulations governing scenic quality. If such regulations exist, the entity replacing the equipment would be required to comply. For these reasons, the Project would not substantially degrade the existing visual character or quality of public views of the Bay Area or conflict with applicable zoning or other regulations governing scenic quality, and this impact would be less than significant.	LTS	No mitigation is required for this impact.	LTS
Impact 3.5-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Views in the Area Outdoor heat pump units do not include bright lights and are not made of reflective materials (i.e., polished metal or mirrored glass). The proposed rule amendments would not require new lighting fixtures. Therefore, the Project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. No impact would occur.	NI	No mitigation is required for this impact.	NI

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1 INTRODUCTION

This draft environmental impact report (EIR) has been prepared by the Bay Area Air Quality Management District (BAAQMD) to evaluate the environmental impacts resulting from implementing proposed amendments to its building appliance rules. Amendments are proposed to Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces (Rule 9-4) and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (Rule 9-6). The proposed amendments to Rules 9-4 and 9-6 (Project) would reduce nitrogen oxides (NOx) emissions from space and water heating appliances in the Bay Area. This Draft EIR has been prepared under the direction of the BAAQMD in accordance with the requirements of the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Section 21000-21177) and the State CEQA Guidelines (California Code of Regulations [CCR], Title 14, Division 6, Chapter 3, Sections 15000-15387). The BAAQMD is the lead agency for consideration of this EIR and potential Project approval.

1.1 PURPOSE AND INTENDED USES OF THE DRAFT EIR

CEQA requires that public agencies consider the potentially significant adverse environmental effects of projects over which they have discretionary approval authority before taking action on those projects (PRC Section 21000 *et seq*.). CEQA also requires that each public agency avoid or mitigate, wherever feasible, the significant adverse environmental effects of projects it approves or implements. If a project would result in significant and unavoidable environmental impacts (i.e., significant effects that cannot be feasibly mitigated to less-than-significant levels), the project can still be approved, but the lead agency's decision-maker, in this case the BAAQMD Board of Directors, must prepare findings and issue a "statement of overriding considerations" explaining in writing the specific economic, social, or other considerations that they believe, based on substantial evidence, make those significant effects acceptable (PRC Section 21002, CCR Section 15093).

According to CCR Section 15064(f)(1), preparation of an EIR is required whenever a project may result in a significant adverse environmental impact. An EIR is an informational document used to inform public agency decision makers and the general public of the significant environmental effects of a project, identify possible ways to mitigate or avoid the significant effects, and describe a range of reasonable alternatives to the project that could feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. Public agencies are required to consider the information presented in the EIR when determining whether to approve a project.

In accordance with CCR Section 15161, this document is a project EIR that examines the environmental impacts of a specific project. This type of EIR focuses on the changes in the environment that would result from a specific project. In accordance with CCR Section 15161, a project EIR must examine the environmental effects of all phases of the project, including construction and operation.

Because it has the principal authority over approval or denial of the Project, the BAAQMD is the lead agency, as defined by CEQA, for this EIR.

1.2 SCOPE OF ENVIRONMENTAL ANALYSIS

Pursuant to CEQA and the State CEQA Guidelines, a lead agency shall focus an EIR's discussion on significant environmental effects and may limit discussion on other effects to brief explanations about why they are not significant (PRC Section 21002.1, CCR Section 15128). A determination of which impacts would be potentially significant was made for this Project based on a review of the information presented in the Initial Study prepared for the Project (Appendix A) and comments received as part of the public scoping process (Appendix A), as well as additional research and analysis of relevant Project data during preparation of this Draft EIR.

The BAAQMD has determined that the Project has the potential to result in significant environmental impacts on the following resources, which are addressed in detail in this Draft EIR:

- Air Quality
- Greenhouse Gas Emissions and Climate Change,
- Utilities and Service Systems (Energy Resources),
- Noise, and
- Aesthetics.

1.2.1 Effects Found Not to Be Significant

CEQA allows a lead agency to limit the detail of discussion of the environmental effects that are not considered potentially significant (PRC Section 21100, CCR Sections 15126.2[a] and 15128). Effects dismissed in an Initial Study as clearly insignificant and unlikely to occur need not be discussed further in the EIR unless the lead agency subsequently receives information inconsistent with the finding in the Initial Study (CCR Section 15143).

Based on a review of the information presented in the Initial Study prepared for the Project (Appendix A) and comments received as part of the public scoping process (Appendix A), as well as additional research and analysis of relevant Project data during preparation of this Draft EIR, the following were identified as resources that would not experience any significant environmental impacts from the Project. Accordingly, these resources are not addressed further in this Draft EIR but are identified below with a brief explanation as to why significant impacts to each resource are not anticipated, as required by CEQA. Impacts associated with potential expansion of existing and planned energy infrastructure in response to project-related increases in energy demand are addressed in Section 3.3, "Utilities and Service Systems."

- Agriculture and Forest Resources
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Wildfire

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses.

AGRICULTURE AND FOREST RESOURCES

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Existing agricultural and forest land resources within the BAAQMD's jurisdiction would not be affected. The Project would not convert farmland to non-agricultural use, conflict with zoning for agricultural use or a Williamson Act contract, conflict with zoning of forest land, or convert forest land to non-forest use.

For the reasons above, the Project would result in no impacts related to agriculture and forest resources, and this issue is not discussed further.

BIOLOGICAL RESOURCES

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. While outdoor installations are expected, the Project would not involve construction, including the use of heavy-duty construction equipment and vehicles, substantial ground disturbance, or conversion of land. Therefore, the Project would also not result in habitat conversion or vegetation removal. Existing biological resources, including special-status species, habitats, and wildlife corridors, within the BAAQMD's jurisdiction would not be affected. Therefore, the Project would not have a substantial adverse effect on a candidate, sensitive, or special-status species; riparian habitat or other sensitive natural community; or state or federally protected wetlands. Additionally, the Project would not interfere with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

Existing biological resources, including special-status species, habitats, and wildlife corridors, within the BAAQMD's jurisdiction would not be affected. Therefore, the Project would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Similarly, the Project would not conflict with a habitat conservation plan or natural community conservation plan.

For the reasons above, the Project would result in no impacts related to biological resources, and this issue is not discussed further.

CULTURAL RESOURCES

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings and would not require any excavation that may disturb historical or archaeological resources or human remains or structure modification that would cause a substantial adverse change to the significance of historic structures. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities that may disturb historical or archaeological resources or human remains. Therefore, the Project would not adversely affect historical or archaeological resources or disturb human remains, including those interred outside of formal cemeteries.

For the reasons above, the Project would result in no impacts related to cultural resources, and this issue is not discussed further.

ENERGY

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Regardless of the Project, Bay Area

consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. While outdoor installations are expected, implementation of the proposed rule amendments would not require the use of any heavy-duty equipment or other construction-related vehicles and thus, would not result in consumption of energy resources. Regarding operations, the proposed rule amendments would allow for any heating appliance that meets the proposed emissions standards. If natural gas-fired appliances are developed that meet the proposed emissions standards, there will be no change from the current consumption of energy resources, and no environmental impact would occur. If, on the other hand and based on currently available technology, natural gas-fired appliances are replaced with electric solutions, this would also not lead to an adverse environmental impact. According to the California Air Resources Board, electrification supports the wise and efficient use of energy resulting in beneficial long-term operation impacts on energy demand. Replacement of older equipment typically results in increased energy efficiency. In addition, as discussed in the Initial Study (Appendix A), approximately 85 percent of the electricity Pacific Gas and Electric Company supplied in 2020 was greenhouse gas free with more than 35 percent being delivered from Renewable Portfolio Standard -eligible sources, including solar, wind, geothermal, small hydroelectric, and various forms of bioenergy (PG&E 2021). Thus, implementation of the proposed rule amendments would not result in wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation, or conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

For the reasons above, the Project would not result in significant impacts related to energy, and this issue is not discussed further. The potential for the Project to require or result in the relocation or construction of new or expanded electric power facilities is considered, as required by CEQA, in Section 3.3, "Utilities and Service Systems (Energy Resources)."

GEOLOGY AND SOILS

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. While outdoor installations are expected, the Project would not involve construction activities that would result in substantial ground disturbance, excavation, or building construction. Therefore, the Project would not expose people or structures to substantial adverse effects related to rupture of a known earthquake fault, strong seismic ground shaking, strong ground failure or liquefaction, or landslides.

The proposed rule amendments would not result in substantial soil erosion or the loss of topsoil because the appliances would be installed at existing and new residential and commercial buildings and would not require any grading or other ground disturbance.

Geologic hazards are not expected because no construction activities would occur that would result in substantial ground disturbance, excavation, or building construction. The Project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Further, the Project would not be located on expansive soils.

Septic tanks or other similar alternative wastewater disposal systems are typically associated with small residential projects in remote areas. Residential and commercial consumers affected by the proposed rule amendments would

already be connected to appropriate wastewater treatment facilities in the Bay Area and would not rely on septic tanks or similar alternative wastewater disposal systems. Based on these considerations, septic tanks or other alternative wastewater disposal systems are not expected to be affected by the Project.

While outdoor installations are expected, the Project would not involve construction activities that would result in substantial ground disturbance, grading, or excavation. Thus, the Project would not destroy unique paleontological resources or sites or unique geologic features.

For the reasons above, the Project would result in no impacts related to geology and soils, and this issue is not discussed further.

HAZARDS AND HAZARDOUS MATERIALS

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings and would not require the transport, use, or disposal of hazardous materials. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. While outdoor installations are expected, the Project would not involve construction activities that include the transport, use, or disposal of hazardous materials or the accidental release of hazardous materials. Therefore, the proposed amendments would not create a significant hazard to the public or environment related to the transport, use, or disposal of hazardous materials or the accidental release of hazardous materials.

Schools may be located within a quarter mile of residential and commercial buildings affected by the proposed rules amendments. The proposed amendments to Rules 9-4 and 9-6 would not result in the construction or operation of equipment or result in modifications to existing equipment that would generate hazardous emissions, or result in the handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. Compliant furnaces and water heaters are not considered sources of toxic air contaminants. Therefore, no increase in hazardous emissions is expected due to implementation of the proposed amendments to Rule 9-4 and 9-6.

Government Code Section 65962.5 requires the creation of lists of facilities that may be subject to Resource Conservation and Recovery Act (RCRA) permits or site cleanup activities. Because the Project area includes nine counties, it is not known if the affected residential and commercial buildings are located on the hazardous materials sites list pursuant to Government Code Section 65962.5. However, the proposed rule amendments would not interfere with site cleanup activities or create additional site contamination and would not create a significant hazard to the public or environment.

The proposed rule amendments would not result in a safety hazard for people residing or working within two miles of a public airport. No impacts on airports or airport land use plans are anticipated from implementation of the amendments to Rules 9-4 and 9-6 because new appliances would be installed inside of residential and commercial buildings.

While outdoor installations are expected, the Project would not involve construction activities, the use of heavy-duty construction equipment and vehicles, or interfere with existing transportation routes or access. Therefore, the proposed rule amendments would not interfere with an adopted emergency response plan or emergency evacuation plan or require street closures that could affect emergency response or evacuation activities.

The proposed rule amendments would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not generate additional development that would place people or structures closer to

wildland areas. The proposed rule amendments would not increase the existing risk of fire hazards, nor would it increase fire risk by increasing the use of flammable materials. The proposed rule amendments would not expose people or structures to wildfires.

For the reasons above, the Project would result in no impacts related to hazards and hazardous materials, and this issue is not discussed further.

HYDROLOGY AND WATER QUALITY

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The proposed rule amendments would not result in an increase in water runoff or wastewater discharge, would not result in water quality impacts, and would not result in the degradation of surface water or groundwater. The proposed rule amendments are not expected to result in any modifications to National Pollutant Discharge Elimination System (NPDES) permits or result in violation of NPDES permits. No grading or site preparation would be involved and, therefore, no water would be used during these activities. Additionally, the proposed rule amendments would not alter the existing drainage or drainage patterns, result in erosion or siltation, alter the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite. Further, the proposed rule amendments would not result in an increase in wastewater that requires treatment and would not affect any wastewater treatment facility, storm water runoff, or existing drainage patterns. Additionally, the proposed rule amendments would not include the construction of new or relocation of existing housing or other types of facilities and, as such, would not require the placement of housing or other structures within a 100-year flood hazard area. Because no development of new structures or associated construction activities are involved, the proposed rule amendments would not substantially increase risks from flooding; expose people or structures to significant risk of loss, injury or death involving flooding; or increase existing risks, if any, of inundation by seiche, tsunami, or mudflow.

For the reasons above, the Project would result in no impacts related to hydrology and water quality, and this issue is not discussed further.

LAND USE AND PLANNING

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings and would not affect land use or planning. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because no development of structures or associated construction activities would occur, the proposed rule amendments would not physically divide an established community. As noted above, the proposed rule amendments would apply to residential and commercial areas; the Project would not conflict with land use plans, policies, or regulations.

For the reasons above, the Project would result in no impacts related to land use and planning, and this issue is not discussed further.

MINERAL RESOURCES

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would

require construction of new or expanded facilities. Because no grading or subsurface excavation would occur, the proposed amendments would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, or a locally important mineral resource recovery site. Thus, no impacts to mineral resources would occur, and this issue is not discussed further.

POPULATION AND HOUSING

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings. No new residential or commercial buildings would be constructed. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities.

The Project would not change the number of equipment installations only the specific type of appliances being installed. Therefore, the Project is not expected to result in an expansion of the labor pool. It is expected that the existing labor pool in the Bay Area would accommodate installation activities necessary for appliance installation.. As such, implementing the proposed amendments to Rules 9-4 and 9-6 would not induce substantial population growth.

The proposed rule amendments would not displace people or housing or require the construction of replacement housing.

Thus, no impacts to population and housing would occur, and this issue is not discussed further. The potential for growth-inducing effects is considered, as required by CEQA, in Chapter 5, "Other CEQA Sections."

PUBLIC SERVICES

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings that are currently provided with applicable public services; the Project would not increase the demand for these services. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. No additional fire or police protection services are expected to be required due to the proposed rule amendments as they would apply to existing emission sources.

As noted above under, "Population and Housing," implementation of the proposed rule amendments would not induce population growth because the existing labor pool in the Bay Area is expected to accommodate the activities necessary for appliance installation. As such, the proposed rule amendments would not increase the demand for public services nor generate the need for new or physically altered governmental facilities. Thus, no impacts to public services would occur, and this issue is not discussed further.

RECREATION

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. No new residential or commercial buildings would be constructed, and the existing labor pool in the Bay Area is expected to accommodate the activities necessary for appliance installation. Because the proposed amendments to 9-4 and 9-6 would not increase or redistribute population, the proposed amendments would not increase the demand for or use of existing neighborhood and regional parks or other recreational facilities or require the construction of new or the expansion of existing recreational facilities. Thus, no impacts to recreation would occur, and this issue is not discussed further.

TRANSPORTATION

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded equipment manufacturing facilities or notable changes to equipment distribution patterns that could increase vehicle miles traveled.

The proposed rule amendments would regulate the type of equipment that would be installed, not whether it would be installed. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. Similarly, maintenance or repair activities (should they be needed), would occur regardless of the Project. It is expected that the existing labor pool in the Bay Area would accommodate the very minor installation and (should they be needed) maintenance and repair activities.

As discussed above under "Population and Housing," no new residential or commercial buildings would be constructed and the existing labor pool in the Bay Area is expected to accommodate the activities necessary for appliance installation. Thus, no increase in permanent worker or truck traffic would occur. The proposed amendments to Rules 9-4 and 9-6 would not conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. Further, the proposed rule amendments would not conflict with or be inconsistent with CEQA Guidelines Section 15064.3 subdivision(b), as no substantial increase in traffic would occur.

The proposed rule amendments would not increase traffic hazards or create incompatible uses. The Project does not involve construction of any roadways or other transportation design features; therefore, no changes to current roadway designs that would increase traffic hazards would occur. Because the proposed rule amendments would not change the roadway system, would not involve construction, and would not generate substantial truck trips, no impacts to emergency access would occur.

Thus, no impacts to transportation would occur, and this issue is not discussed further.

TRIBAL CULTURAL RESOURCES

Assembly Bill (AB) 52, as provided in PRC Sections 21080.3.1, 21080.3.2, and 21082.3, requires that lead agencies undertaking CEQA review must, upon written request of a California Native American Tribe, begin consultation once the lead agency determines that the application for the project is complete, before the issuance of a notice of preparation (NOP), of an EIR or notice of intent to adopt a negative declaration or mitigated negative declaration. The BAAQMD is not currently aware of any tribal cultural resources (TCRs) that exist in the vicinity of the Project. Further, no California Native American tribes have requested to be informed of projects by BAAQMD; therefore, there is no trigger to begin consultation under AB 52.

As discussed in the Initial Study (Appendix A), the Bay Area has locations that were historically used by Native Americans. Thus, there is the potential for the presence of unrecorded tribal cultural resources to be buried throughout the BAAQMD's jurisdiction. However, the proposed amendments to Rules 9-4 and 9-6 would not involve ground disturbance and would result in the installation of new furnaces and water heaters at existing and new residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities that may disturb tribal cultural resources. As noted above, no California Native American tribes have requested to be informed of projects by BAAQMD; therefore, there is no trigger to begin consultation under AB 52, resulting in no resources identified as TCRs under Public Resources Code Section 21074. Therefore, such resources would not be adversely affected by the proposed rule amendments. Thus, the Project would result in no impacts related to TCRs, and this issue is not discussed further.

WILDFIRE

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings, which are subject to state and local building and fire codes that take wildfire hazard zones and fire protection into consideration. Installation and operation of these appliances would not change existing wildfire risks in the Bay Area. Therefore, the proposed rule amendments would not impair an adopted emergency response plan or emergency evacuation plan, would not expose people to pollutants from a wildfire or the uncontrolled spread of a wildfire, would not require the installation of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk, and would not exposure people or structures to flooding or landslides as a result of post-fire slope or drainage changes. Thus, no impacts related to wildfire would occur, and this issue is not discussed further.

1.3 AGENCY ROLES AND RESPONSIBILITIES

1.3.1 Lead Agency

The BAAQMD is the lead agency responsible for approving and carrying out the Project and for ensuring that the requirements of CEQA have been met. After the EIR public review process is complete, the BAAQMD Board of Directors will determine whether to certify the EIR (see State CEQA Guidelines Sections 15090) and approve the Project.

1.3.2 Trustee and Responsible Agencies

A trustee agency is a State agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California. There are no trustee agencies for this Project.

Responsible agencies are public agencies, other than the lead agency, that have discretionary-approval responsibility for reviewing, carrying out, or approving elements of a project. There are no responsible agencies for this Project.

1.3.3 Other Required Permits and Approvals

No permits or approvals from other agencies are anticipated to be required.

1.4 CEQA PUBLIC REVIEW PROCESS

1.4.1 Notice of Preparation and Initial Study

In accordance with PRC Section 21092 and CCR Section 15082, the BAAQMD issued an NOP and Initial Study on May 19, 2022, to inform agencies and the general public that an EIR was being prepared and to invite comments on the scope and content of the document (Appendix A). The NOP and Initial Study were submitted to the State Clearinghouse, which then distributed the NOP to potential responsible and trustee agencies; posted on the BAAQMD's website (https://www.baaqmd.gov/); posted with the applicable County Clerks; and made available at the BAAQMD's office. In addition, the NOP was distributed directly to public agencies. The NOP was circulated for a 34-day review period, with comments accepted through June 21, 2022.

In accordance with CCR Section 15082(c), a noticed scoping meeting for the EIR was held virtually on June 9, 2022, from 6:00 p.m. to 8:00 p.m.

The purpose of an NOP is to provide sufficient information about the Project and its potential environmental impacts to allow agencies and interested parties the opportunity to provide a meaningful response related to the scope and content of the EIR, including mitigation measures that should be considered and alternatives that should be

addressed (CCR Section 15082[b]). Comments submitted in response to the NOP are used by the lead agency to identify broad topics to be addressed in the EIR. Comments on environmental issues received during the NOP public comment period are considered and addressed in this Draft EIR. Appendix A contains the NOP, Initial Study, and comment letters submitted during the NOP public comment period.

1.4.2 Public Review of this Draft EIR

This Draft EIR is being circulated for public review and comment for a period of 48 days, from December 20, 2022 to February 6, 2023.

During the public comment period, written comments from the public as well as organizations and agencies on the Draft EIR's accuracy and completeness may be submitted to the BAAQMD. Written comments (including via email) must be received by 5:00 p.m. on February 6, 2023. Written comments should be addressed to:

Jennifer Elwell, BAAQMD
375 Beale Street, Suite 600
San Francisco, CA 94105
E-mail: jelwell@baaqmd.gov

Comments provided by email should include the name and physical address of the commenter in the body of the email.

The Draft EIR is available for review during normal business hours at the BAAQMD office (375 Beale Street, Suite 600, San Francisco). The Draft EIR is also available online at: https://www.baaqmd.gov/.

1.4.3 Final EIR

Following public review of the Draft EIR, a Final EIR will be prepared that will include both written and oral comments on the Draft EIR received during the public review period, responses to those comments, and any revisions to the Draft EIR. The Draft EIR and Final EIR will comprise the EIR for the Project.

Before taking action on the Project, the lead agency is required to certify that the EIR has been completed in compliance with CEQA, that the decision-making body reviewed and considered the information in the EIR, and that the EIR reflects the independent judgment of the lead agency.

1.5 ORGANIZATION OF THE DRAFT EIR

This Draft EIR is organized as follows:

The "Executive Summary" introduces the Project; provides a summary of the environmental review process, effects found not to be significant, and key environmental issues; and lists significant impacts and mitigation measures to reduce significant impacts to less-than-significant levels.

Chapter 1, "Introduction," describes the purpose of the EIR, the scope of the environmental analysis, agency roles and responsibilities, the CEQA public review process, organization of this Draft EIR, and standard terminology.

Chapter 2, "Project Description," describes the purpose of and need for the Project, identifies Project objectives, and provides a detailed description of the Project.

Chapter 3, "Environmental Impacts and Mitigation Measures," evaluates the expected environmental impacts generated by the Project, arranged by subject area (e.g., Air Quality, Greenhouse Gas Emissions and Climate Change, Utilities and Service Systems [Energy Resources], Aesthetics, and Noise). Within each subsection of Chapter 3, the regulatory setting, environmental setting, methodology, and thresholds of significance are described. The anticipated changes to the existing conditions after development of the Project are then evaluated for each subject area. For any significant or potentially significant impact that would result from Project implementation, mitigation measures are

presented along with the remaining level of significance. Environmental impacts are numbered sequentially within each section (e.g., Impact 3.1-1, Impact 3.1-2, etc.).

Chapter 4, "Alternatives," evaluates alternatives to the Project, including alternatives considered but eliminated from further consideration. The environmentally superior alternative is identified.

Chapter 5, "Other CEQA Sections," provides a discussion of growth-inducing impacts, significant and unavoidable impacts, and significant and irreversible environmental changes.

Chapter 6, "Report Preparers," identifies the individuals who contributed to preparation of this Draft EIR.

Chapter 7, "References," identifies the references used in preparation of this Draft EIR.

1.6 STANDARD TERMINOLOGY

This Draft EIR includes the following terminology regarding the significance of environmental impacts of the Project:

- No Impact: Implementing the Project would not result in an adverse effect.
- Less-than-Significant Impact: The impact would be adverse but would not exceed the defined standard or threshold of significance. Less-than-significant impacts do not require mitigation.
- Significant Impact: The impact would exceed the defined standard or threshold of significance and would or could cause a substantial adverse change in the environment. Potentially feasible mitigation measures or alternatives are recommended to eliminate the impact, reduce it to a less-than-significant level, or reduce it to the degree feasible.
- Potentially Significant Impact: The impact may be or is likely to be significant. Because information is limited, the conclusion is not definitive. For purposes of the EIR analysis, a potentially significant impact is treated the same as a significant impact and requires feasible mitigation measures or alternatives.
- Mitigation Measure: The measure could feasibly avoid, minimize, or compensate for a significant impact. Mitigation measures must be fully enforceable through permit conditions, agreements, or other legally binding instruments. Compliance with state and federal laws or other regulations, including potential actions to achieve such compliance, may be sufficient mitigation in instances in which compliance would be reasonably expected to avoid, minimize, or compensate for the environmental impact.

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2 PROJECT DESCRIPTION

2.1 INTRODUCTION

The Bay Area Air Quality Management District (BAAQMD) is proposing amendments to Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces (Rule 9-4) and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (Rule 9-6). Rule 9-4 applies to the natural gas-fired space-heating furnaces commonly found in single-family homes, and Rule 9-6 applies to natural gas-fired water heaters commonly found in residential and commercial applications. Space- and water-heating appliances generate a large portion of nitrogen oxide (NO_x) emissions from sources in the Bay Area. If adopted, the proposed amendments would substantially reduce NO_x emissions from these appliances.

This chapter describes the proposed amendments to Rules 9-4 and 9-6 (Project) and provides a brief discussion of the potential environmental impacts associated with implementing these amendments. A more detailed analysis of the Project's potential environmental impacts is provided in Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures."

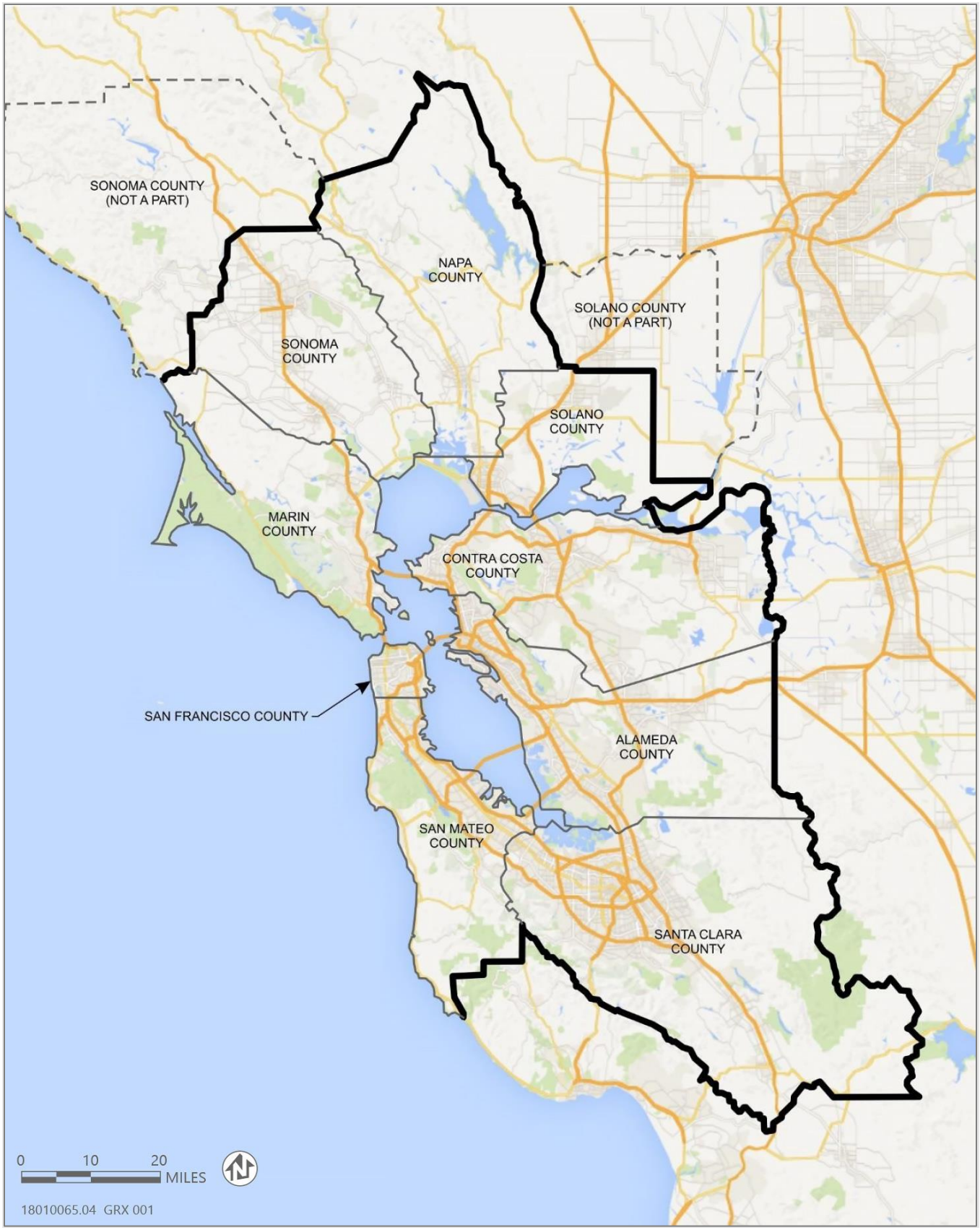
2.2 PROJECT OBJECTIVES

The overall purpose of the proposed amendments is to reduce NO_x emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area. Specifically, the objectives of the proposed amendments to Rules 9-4 and 9-6 are to:

- for Rule 9-4, introduce an "ultra-low" NO_x standard for space-heating appliances with a compliance date in 2024;
- for Rule 9-4, establish a zero-NO_x standard in 2029;
- for Rule 9-6, establish a zero-NO_x standard for water heaters with compliance dates ranging from 2027 to 2031 based on equipment type, use, and size;
- expand the applicability of Rule 9-4 to a larger breadth of space-heating appliances;
- update and clarify the certification and calculation methods contained in the rules;
- ensure equitable implementation of the rules; and
- improve the clarity and enforceability of the rules.

2.3 PROJECT LOCATION

The proposed amendments to Rules 9-4 and 9-6 would apply to building appliances within the BAAQMD's jurisdiction, which encompasses 5,600 square miles. The area of BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties (Figure 2-1). The San Francisco Bay Area is characterized by a large, shallow basin surrounded by coastal mountain ranges tapering into sheltered inland valleys. The combined climatic and topographic factors result in increased potential for the accumulation of air pollutants in the inland valleys and reduced potential for buildup of air pollutants along the coast.



Source: Adapted from BAAQMD 2021.

Figure 2-1 Boundary of BAAQMD's Jurisdiction

2.4 BACKGROUND

2.4.1 Rule 9-4: Nitrogen Oxides from Fan Type Residential Central Furnaces

Rule 9-4 imposes a NO_x emission limit of 40 nanograms of NO_x per joule (40 nanograms per joule [ng/joule]) of useful heat produced by central furnaces with a maximum heat input rating of 175,000 British thermal units per hour (BTU/hour). Additionally, Rule 9-4 requires that furnaces subject to this rule be certified to comply with this limit by their manufacturer. Furnaces in this size range are used in most single-family homes, some multiunit dwellings, and some small commercial spaces in the Bay Area, but Rule 9-4 currently applies only to residential furnaces.

2.4.2 Rule 9-6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters

Rule 9-6 sets NO_x emission standards for small boilers and water heaters, with existing standards varying based on size (less than 2 million BTU/hour) and equipment application.

2.4.3 Industry Description

Proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences, such as apartment buildings; and commercial spaces, such as retail and office buildings. The BAAQMD regulates these sources on a point-of-sale basis, requiring that equipment manufactured after the compliance date and installed within the geographical jurisdiction of the BAAQMD meet the standards contained in the rules. The proposed amendments would apply to commercial and residential applications, as well as noncentral space-heating configurations.

2.4.4 Regulatory History

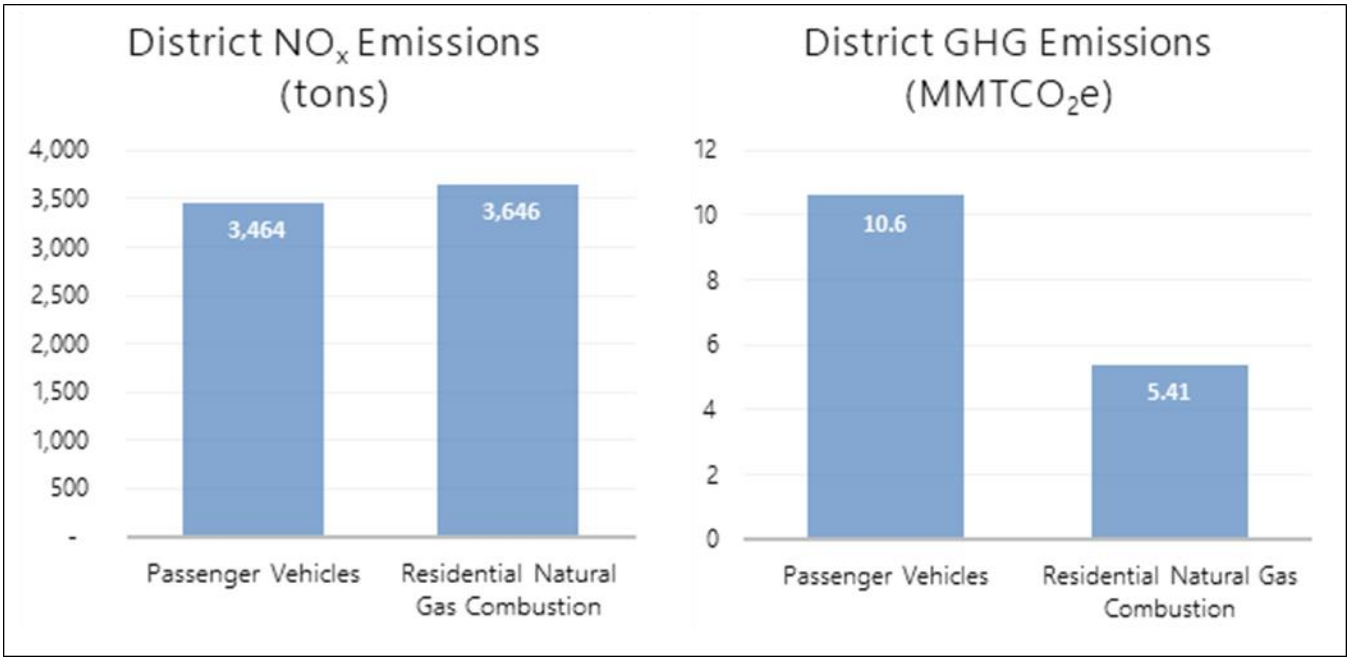
The BAAQMD has regulated NO_x emissions from space- and water-heating appliances for several decades. Rule 9-4 for furnaces was first adopted in 1983, with this version of the rule still in place. Rule 9-6 was first adopted in 1992 and was most recently updated with more stringent NO_x-emissions standards for certain equipment in 2007. All versions of these rules have included a NO_x emissions standard expressed as nanograms of NO_x per joule of useful heat (ng/joule) delivered by the appliance.

In addition, the South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Air Pollution Control District (SJVAPCD) have adopted regulations that are similar in structure and standards to Rules 9-4 and 9-6. SCAQMD Rule 1111 and SJVAPCD Rule 4905, which are similar to Rule 9-4 in applicability to furnaces, have been updated within the last 10 years and require a NO_x-emissions standard of 14 ng/joule, the same initial standard identified in the proposed amendments. Rule 9-6 for water heaters and small boilers currently contains NO_x-emission standards equivalent to those in SCAQMD Rules 1146.2 and 1121 and SJVAPCD Rules 4308 and 4902 for similar equipment.

2.4.5 Emissions Context

Nitrogen oxide emissions from building appliances in the Bay Area are estimated based on aggregated natural gas usage data from the Pacific Gas and Electric Company. These data, combined with data and assumptions regarding the age of buildings and their equipment, are used to calculate criteria and greenhouse gas (GHG) emissions associated with the building sector.

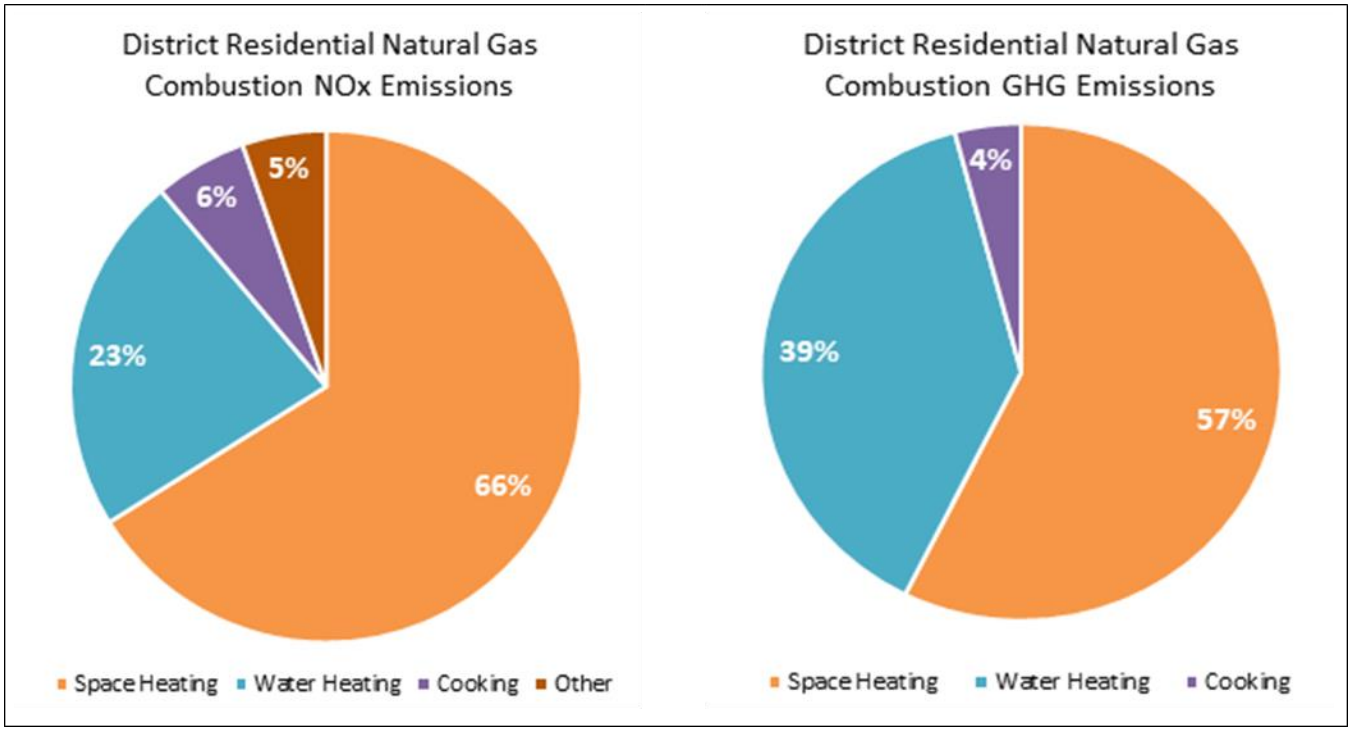
The building sector, identified as a significant Bay Area source of emissions in the BAAQMD's 2017 Clean Air Plan, was highlighted in measures SS30, BL1, and BL2 (BAAQMD 2017). For context, Figure 2-2 compares emissions from natural gas combustion in residential buildings with emissions from passenger vehicles.



Source: Data provided by BAAQMD in 2022.

Figure 2-2 Passenger Vehicle Emissions vs. Residential Natural Gas Combustion (2018)

The proposed rule amendments to the two rules focus on emissions from natural gas-fired space- and water-heating appliances in buildings. Although space and water heaters are not the only natural gas-consuming appliances in buildings, they consume the vast majority of natural gas used in buildings and, therefore, are the greatest source of NO_x emissions in the building sector. Figure 2-3 shows the emissions share by appliance type for residential natural gas combustion. As shown in the figure, space and water heating together represent 89 and 96 percent of NO_x and GHG emissions from residential natural gas combustion, respectively.



Source: Data provided by BAAQMD in 2022.

Figure 2-3 Residential Natural Gas Combustion Emissions by Equipment Type in 2018

2.4.6 Nitrogen Oxide Emissions

The proposed amendments seek to substantially reduce NO_x emissions from space- and water-heating appliances. These appliances emitted 2,410 and 828 tons of NO_x per year, respectively, from residential buildings in the Bay Area in 2018.

Nitrogen oxides are a key criteria pollutant as a precursor to ozone and secondary particulate matter (PM) formation. Secondary PM is formed from the conversion of NO_x to ammonium nitrate through atmospheric chemical reactions with ammonia. Particulate matter, a diverse mixture of suspended particles and liquid droplets, is the air pollutant most harmful to the health of Bay Area residents. The Bay Area is currently classified as non-attainment for particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$) under the annual and 24-hour California Ambient Air Quality Standards (CAAQS) and unclassifiable under National Ambient Air Quality Standards (NAAQS). Exposure to $PM_{2.5}$, on either a short-term or long-term basis, can cause a wide range of respiratory and cardiovascular health effects, including strokes, heart attacks, and premature deaths. Because NO_x compounds in the atmosphere contribute to the formation of secondary PM, any NO_x emission reduction would also result in $PM_{2.5}$ reductions.

In addition, the Bay Area is currently designated as a non-attainment area for ozone, a regional pollutant, under CAAQS and NAAQS. Emissions of reactive organic gases (ROG) and NO_x throughout the Bay Area contribute to ozone formation in downwind areas. Therefore, reductions in emissions of ROG and NO_x are needed throughout the region to decrease ozone levels. As the ambient temperature rises, ground-level ozone forms at an accelerated rate. Ozone levels are usually highest on hot, windless summer afternoons, especially in inland valleys. Exceedances of State or national ozone standards in the Bay Area occur only on hot, relatively stagnant days. Because weather conditions have a strong impact on ozone formation, ozone levels can vary significantly from day to day or from one summer to the next. Longer and more severe heat waves expected as a result of climate change may cause more ozone formation, resulting in more frequent exceedances of ozone standards.

2.5 PROPOSED AMENDMENTS TO RULE 9-4

The proposed amendments for Rule 9-4 include introducing an "ultra-low" NO_x standard for space-heating appliances with a compliance date in 2024 and setting a zero-NO_x standard in 2029. Like the current rule, amended Rule 9-4 would apply only to new devices and only to natural gas-fired devices. The proposed new lower and zero-NO_x standards would apply to appliance retailers/wholesalers, and installers and would affect Bay Area consumers when they replace their existing furnaces and water heaters. The details of these amendments are discussed below.

2.5.1 Rule Title and Applicability

Rule 9-4 is currently titled "Nitrogen Oxides from Fan Type Residential Central Furnaces." To expand the applicability of this rule to a larger breadth of space-heating appliances, the proposed amendments would change the title to "Nitrogen Oxides from Residential and Commercial Furnaces." Existing requirements for residential fan type furnaces would be unchanged. Only new units would be subject to the zero-NO_x emission standard in proposed new Section 9-4-301.3. The BAAQMD differentiates the units through the addition of a definition for "residential fan type central furnace" and specifications for where the standards are more broadly applicable to natural gas-fired space-heating equipment.

2.5.2 Definitions

For clarity and enforceability, the proposed amendments include the addition of definitions for "British thermal unit (BTU)," "heat input," "natural gas," "nitrogen oxides," and "residential fan type central furnace."

2.5.3 Standards

The proposed amendments to Section 9-4-301 would clarify emissions standards, including existing requirements for residential fan type central furnaces in the current version of the rule (Section 9-4-301.1). Section 9-4-301.2 would be added to introduce the "ultra-low NO_x" requirement (14 ng/joule) in 2024 to align with SCAQMD and SJVAPCD emissions standards and achieve near term NO_X reductions and health benefits. This requirement would also be applicable only to residential fan type central furnaces as drafted.

The proposed amendments include the addition of new Section 9-4-301.3 to introduce the zero-NO_x standard, as well as additional applicable equipment. As proposed, the zero-NO_x standard would take effect in 2029 and would apply to all residential and commercial space-heating appliances. This includes wall heating and other direct-vent units. This requirement would not be applicable to furnaces used in mobile homes. The proposed standard is intended to result in substantial regional NO_x (and therefore ozone and secondary PM) emission reductions in the long term. The proposed standard would take effect in 2029 based on a current understanding of the available technology, accessibility, and affordability of zero-NO_x units and planned industry technology development to reduce these barriers.

2.5.4 Administrative Requirements

The proposed amendments include updates and clarifications to certification and calculation methods. The BAAQMD expects dual-fuel units that can demonstrate compliance with the ultra-low NO_x standard, on average, to be able to meet the standards and certification requirements of these rule amendments. In addition, Rule 9-4 requires the completion of a compliance statement for recordkeeping purposes, and the proposed amendments would add a provision to this section to allow for the submission of compliance statements issued by SCAQMD for equivalent emission standards.

The proposed amendments include the addition of an interim report to be brought to the Board of Directors by the Air Pollution Control Officer at least two years before the compliance date for the zero-NO_x standard. BAAQMD staff

intends for this report to provide information to the Board and the public about the accessibility of zero-NO_x appliances to Bay Area residents and to allow the Board of Directors an opportunity to take any necessary action in response to this information. Contents of this report would include information on technology development, market availability of zero-NO_x units, potential costs of compliance, and availability of incentive programs to decrease these costs.

2.5.5 Manual of Procedures

The proposed amendments include the addition of a BAAQMD Manual of Procedures section to provide further clarity around equipment certification and determination of emissions through source tests conducted in accordance with U.S. Environmental Protection Agency reference methods.

2.6 PROPOSED AMENDMENTS TO RULE 9-6

The proposed amendments for Rule 9-6 include setting a zero-NO_X standard for water heaters with compliance dates ranging from 2027 to 2031 based on equipment type, use, and size. Like the current rule, the proposed amendments to Rule 9-6 would apply only to new devices and only to natural gas-fired devices. The proposed new zero-NO_x standards would apply to appliance retailers/wholesalers and installers and would affect Bay Area consumers when they replace their existing furnaces and water heaters. The details of these amendments are discussed below.

2.6.1 Standards

The proposed amendments to Rule 9-6 include the introduction of a zero-NO_x standard for natural gas-fired residential and commercial water heaters and boilers. The proposed compliance dates for these appliances are dependent on equipment size. Units under 75,000 BTU/hour (typically used in single-family residences) would be required to comply by 2027, and larger units of up to 2 million BTU/hour (typically used in multifamily and commercial buildings) would have a 2031 compliance date as proposed.

The BAAQMD anticipates, based on a current understanding of available technologies and market development, that zero-NO_x solutions for single-family residential applications would be available and affordable on a shorter timeframe than larger boilers used in multifamily and commercial applications. This includes the development of lower-voltage heat pump water heaters that would lower cost barriers associated with electric upgrades.

2.6.2 Administrative Requirements

As in Rule 9-4, proposed amendments include the addition of an interim report to be presented to the Board of Directors by the Air Pollution Control Officer at least two years before the compliance dates for the zero-NO_x standards. The BAAQMD intends for this report to provide information to the Board and the public about the accessibility of zero-NO_x appliances to Bay Area residents and to allow the Board of Directors an opportunity to take any necessary action in response to this information. Contents of this report would include information on technology development, market availability of zero-NO_x units, potential costs of compliance, and availability of incentive programs to decrease these costs.

2.7 POTENTIAL PHYSICAL EFFECTS OF RULE AMENDMENTS

The proposed amendments to Rules 9-4 and 9-6 would establish more stringent NO_x emission standards for natural gas-fired space- and water-heating appliances in buildings in the Bay Area. The following sections discuss how the proposed amendments may affect NO_x emissions in the future. This analysis has been prepared by the BAAQMD using existing emissions inventories and reasonable expectations for future appliance replacement rates, emissions

profiles, and available technology. An analysis of the Project's potential environmental impacts is provided in Chapter 3, "Environmental Checklist."

2.7.1 Emission Control Methods

Emission control methods to meet the proposed 14 ng/joule standard for Rule 9-4 are well established and currently required by SCAQMD Rule 1111 and SJVAPCD Rule 4905. Potential complications identified in other jurisdictions, such as high-altitude and cold weather scenarios, are not applicable in the Bay Area. The BAAQMD anticipates that dual-fuel systems able to demonstrate compliance with this new proposed standard would be eligible for certification.

Current space and water heating appliances that meet the zero-NO_x standard and are available on the market consist mainly of electric heat pump systems. The BAAQMD does not intend to mandate specific technology solutions, but currently available electric solutions were used as the basis to form estimates and projections. Natural gas technologies, with combustion occurring in the absence of nitrogen, along with a variety of other technologies, could also meet the proposed standards. The assumed use of electric appliances for CEQA analysis purposes allows for a conservative estimate for impacts to utility systems and NO_x reductions and potential adverse environmental impacts because a switch to electric appliances would slightly reduce NO_x emissions reductions (some increase in NO_x emissions from power generation); have impacts on utilities and services systems from the additional electricity needed to power these appliances; and have potential noise impacts, as discussed herein. Should natural gas-fired appliances that meet the zero-NO_x standard be developed and used in practice, NO_x emission reductions would be greater than those shown here as the resultant emissions would be zero (i.e., fewer emissions associated with electricity generation), there would be lesser impacts due to electricity need, and there would be no other foreseeable potential adverse impacts on any environmental impact areas. Thus, for CEQA analysis purposes, the BAAQMD assumes that currently in-use natural gas-fired appliances would be replaced with electric appliances. The proposed amendments include a zero-NO_x standard four to eight years in the future to encourage technology development, as well as availability and accessibility throughout the Bay Area.

2.7.2 Emission Reductions

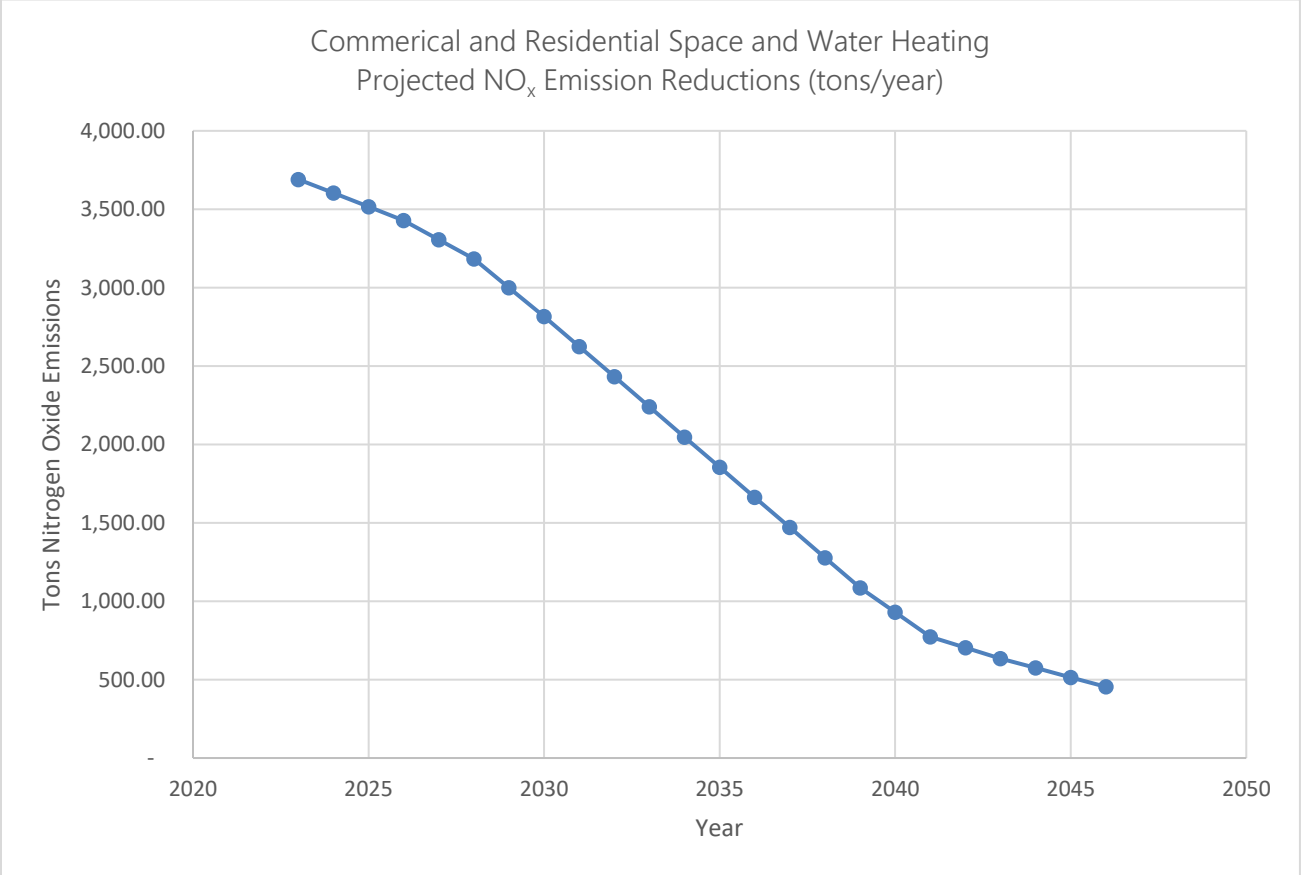
Because the applicable rules function as point-of-sale requirements, emission reductions associated with the proposed rule amendments would occur over time in relation to the lifespan of currently installed equipment. To model these predicted emission reductions, the BAAQMD made the following assumptions:

- While the proposed regulatory amendments would allow for natural gas-fired zero-NO_x appliances, based on currently available technology, staff assumed that, upon burnout, natural gas-fired appliances would be replaced with electric solutions when the proposed zero-NO_x standards are in effect. As noted above, this results in a conservative analysis of NO_x reductions because other technologies that may be developed could avoid the additional NO_x from electricity generation.
- For electric replacements, it is assumed that the electricity provided is from the community choice aggregator local to the customer, or direct from the Pacific Gas and Electric Company. The emissions associated with each of these electricity sources as well as their contribution to projected Bay Area electric load is discussed further in Appendix B. The resulting weighted average is 85 percent carbon and NO_x-free electricity generation. Further information on this calculation is provided in Appendix B.
- Electricity generated from natural gas-fired powerplants is assumed to result in NO_x emissions of 5 parts per million by dry volume at 15-percent oxygen. This emission limit represents best available control technology for simple-cycle gas turbine power plants over 50 megawatts (CARB 2004).
- Although some Bay Area residents are choosing to install zero-NO_x solutions at this time, and this trend is expected to continue and increase over time, modeled emission reductions do not assume any voluntary uptake of zero-NO_x technology before the proposed compliance dates. BAAQMD staff anticipates that voluntary uptake

rates will be minimal when considered in comparison with the overall inventory of equipment and, therefore, will not substantially affect emissions projections shown here.

- Commercial space and water heating is frequently achieved through the use of larger boilers that are covered under the BAAQMD's Regulation 9, Rule 7. For this reason, BAAQMD staff assumed that 50 percent of commercial space- and water-heating baseline emissions would not be affected by the proposed amendments.
- Since the proposed amendments would affect only direct emissions from two types of building appliances and would not affect natural gas distribution, BAAQMD staff did not assume any upstream emission reductions along the natural gas infrastructure. These reductions could have been associated with GHG co-benefits through reduced methane leakage but are not guaranteed because the technologies to be used to meet the proposed standards could rely on the natural gas system for energy, and the proposed amendments would not affect the existing natural gas distribution system.
- Water heaters were assumed to have an average lifespan of 13 years, and space-heating equipment was assumed to have an average lifespan of 18 years (E3 2019:41).

Figure 2-4 shows the projected NO_x emissions over time based on the assumptions described above and the proposed amendments to Rules 9-4 and 9-6. The 2018 BAAQMD emissions inventory provides the baseline for this projection.



Source: Data provided by BAAQMD in 2022.

Figure 2-4 Projected NO_x Emissions under Proposed Amendments

Initial reductions would be achieved by the introduction of the ultra-low NO_x requirements (14 ng/joule) for residential furnaces. For replacements under this standard between 2024 and 2029, BAAQMD staff estimates a 65-percent reduction in NO_x emissions on a per unit basis compared to existing standards. Additional substantial

emission reductions would be achieved starting in 2027 with the zero-NO_x compliance date for small water heaters and additionally in 2029 with the zero-NO_x compliance date for all new space-heating units.

Yearly emission reductions would continue as the zero-NO_x level requirements for large water heaters take effect in 2031 and units, including ultra-low NO_x units, are changed out over the course of the average assumed appliance lifetimes.

Table 2-1 presents values for projected yearly emissions and for projected reductions compared with the baseline emissions inventory for selected years as represented by the graph in Figure 2-4. It should be noted that 2018 is the baseline year for the projected NO_x emissions; however, BAAQMD staff anticipates that reductions would not occur until 2024 because the BAAQMD has assumed that voluntary uptake rates would be minimal.

Table 2-1 Projected NO_x Emissions Upon Implementation of Proposed Amendments

Year	Projected Yearly NO_X Emissions (tons/year)	Projected NO_X Reduction vs. Baseline (tons/year)
2018*	3,690	—
2025	3,516	174
2030	2,816	874
2035	1,855	1,835
2040	930	2,761
2045	515	3,176
2046	454	3,236

Notes: NO_X = nitrogen oxide.

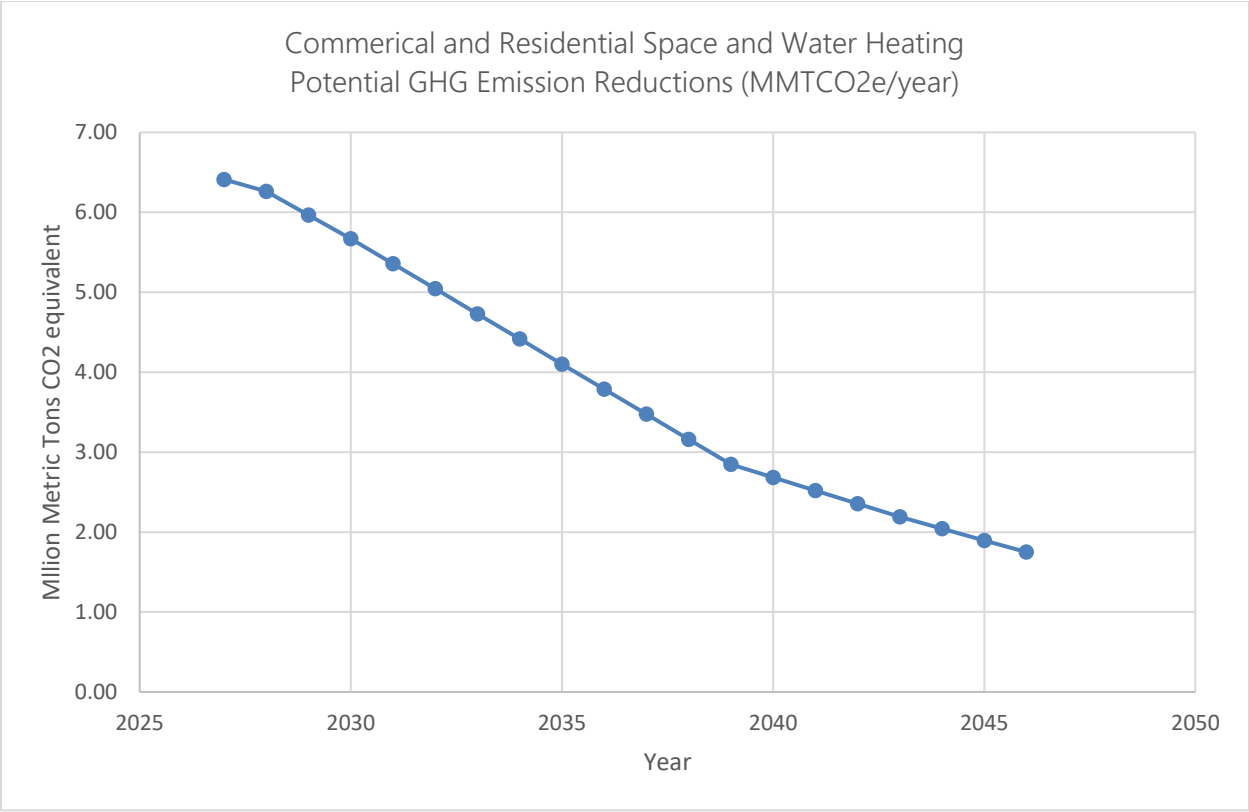
* 2018 is the baseline year for emissions inventory.

Source: Data provided by BAAQMD in 2022.

These NO_x emission reductions would be substantial over time, with an 88-percent reduction of emissions compared to the baseline by the time the equipment changeout is projected to be completed in 2046. This reduction could be realized sooner with voluntary uptake and replacements before breakdown both before and throughout the compliance period. NO_x is a criteria pollutant of concern for the Bay Area and these emissions affect overall regional air quality and ozone formation, as well as secondary PM formation. BAAQMD staff anticipates that the significant NO_x reduction expected from the proposed amendments to the rules would result in meaningful local health benefits through reduced PM formation.

The BAAQMD additionally estimated GHG emission co-benefits that may result from the proposed amendments. Figure 2-5 shows the potential GHG emission reductions over time based on the same set of assumptions listed at the beginning of this section. These assumptions include the proliferation of electric technologies in the absence of other new technology development but do not include potential GHG savings along the natural gas infrastructure that could result from the widespread use of electric appliances. If zero-NO_x natural gas-fired technologies are developed and adopted, the potential GHG savings depicted below would not occur at the scale projected in Figure 2-5 and Table 2-2. For GHGs, 2018 BAAQMD emissions data serve as the baseline.

GHG co-benefits would be achieved in a fashion similar to the emission reductions described for NO_x. Potential GHG co-benefits are based largely on the assumption of in-kind electric replacements and low-carbon content power provided by Pacific Gas and Electric Company and the community choice aggregators in the Bay Area as described above. Further details on and examples of this calculation are provided in Appendix B.



Source: Data provided by BAAQMD in 2022.

Figure 2-5 Potential GHG Emissions Upon Implementation of Proposed Amendments

Table 2-2 provides values for projected yearly emissions and projected reductions compared with the baseline emissions inventory for selected years as represented by the graph in Figure 2-5. It should be noted that 2018 is the baseline year for the projected GHG emissions; however, BAAQMD staff anticipates that reductions would not occur until 2027 because BAAQMD staff has assumed that voluntary uptake rates would be minimal.

Table 2-2 Potential GHG Emissions Upon Implementation of Proposed Amendments

Year	Projected Yearly GHG Emissions ($MMTCO_2e/yr$)	Potential GHG Reduction vs. Baseline ($MMTCO_2e/yr$)
2018*	6.56	—
2030	5.67	0.89
2035	4.10	2.46
2040	2.68	3.88
2046	1.75	4.81

Notes: GHG = greenhouse gas; $MMTCO_2e/yr$ = million metric tons of carbon dioxide equivalent per year.

* 2018 is the baseline year for the GHG emissions inventory.

Source: Data provided by BAAQMD in 2022.

2.7.3 Other Potential Physical Effects

As described above, the proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed at existing and new residential and commercial buildings. The proposed rule amendments would not result in any land use changes and would not require construction (other than installation of the replacement units at existing buildings). These proposed

amendments would also not result in foreseeable changes to equipment manufacturing processes that could require construction of new or expanded equipment manufacturing facilities or notable changes to equipment distribution patterns that could increase vehicle miles traveled. The BAAQMD conducted additional research on electrical grid capacity to serve the Project. The results of this research are included in Appendix C. Although the Project does not include development of other facilities that would directly increase demand for electricity, the Project would result in long-term replacement of appliances with zero-NO_x appliances that are assumed to be electric. This assumption is made for purposes of conducting a conservative CEQA analysis and is based on currently available technology. This change to electric appliances would contribute to increased electricity demand resulting from other programs, especially State-led decarbonization programs that involve much more reliance on renewable energy. The potential for the Project to contribute to substantial adverse physical effects associated with any electrical supply increases or necessary grid capacity upgrades is analyzed in this EIR in Section 3.3, "Utilities and Service Systems (Energy Resources)." Should natural gas-fired appliances that meet the zero-NO_x standard be developed and used in practice, these potential grid impacts would decrease.

A more detailed analysis of the Project's potential environmental impacts is provided in Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures."

3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

APPROACH TO THE ENVIRONMENTAL ANALYSIS

This Draft EIR evaluates and discloses the environmental impacts associated with the Proposed Amendments to Rules 9-4 and 9-6 Project, in accordance with CEQA (Public Resources Code [PRC] Section 21000, et seq.) and the State CEQA Guidelines (California Code of Regulation, Title 14, Chapter 3, Section 1500, et seq.). Sections 3.1 through 3.5 of this Draft EIR present a discussion of regulatory setting, environmental setting, environmental impacts associated with construction and operation of the Project, mitigation measures to reduce the level of impact, and residual level of significance (i.e., after application of mitigation, including impacts that would remain significant and unavoidable after application of all feasible mitigation measures). Issues evaluated in these sections consist of the environmental topics identified for review in the notice of preparation (NOP) prepared for the Project (see Appendix A). Chapter 4, "Alternatives," presents a reasonable range of alternatives and evaluates the environmental effects of those alternatives relative to those of the Project, as required by Section 15126.6 of the State CEQA Guidelines. Chapter 5, "Other CEQA Sections," includes an analysis of the Project's growth inducing impacts, as required by Section 21100(b)(5) of CEQA.

Sections 3.1 through 3.5 of this Draft EIR each include the following components:

- **Regulatory Setting:** This subsection presents information on the laws, regulations, plans, and policies that relate to the issue area being discussed. Regulations originating from the federal, state, and local levels are each discussed as appropriate.
- **Environmental Setting:** This subsection presents the existing environmental conditions on the Project site and in the surrounding area as appropriate, in accordance with State CEQA Guidelines Section 15125. The discussions of the environmental setting focus on information relevant to the issue under evaluation. The extent of the environmental setting area evaluated (the Project study area) differs among resources, depending on the locations where impacts would be expected to occur. For example, air quality impacts are assessed for the air basin (macroscale) as well as the site vicinity (microscale).
- **Environmental Impacts and Mitigation Measures:** This subsection presents thresholds of significance and discusses significant and potentially significant effects of the Proposed Amendments to Rules 9-4 and 9-6 Project on the existing environment, including the environment beyond the Project boundaries, in accordance with State CEQA Guidelines Section 15126.2. The methodology for the impact analysis is described, including technical studies upon which the analyses rely. The thresholds of significance are defined, and thresholds for which the Project would have no impact are disclosed and dismissed from further evaluation. Project impacts and mitigation measures are numbered sequentially in each subsection (Impact 3.1-1, Impact 3.1-2, Impact 3.1-3, etc.). A summary impact statement precedes a more detailed discussion of each environmental impact. The discussion includes the analysis, rationale, and substantial evidence on which conclusions are based. The determination of level of significance of the impact is presented in bold text. A "less-than-significant" impact is one that would not result in a substantial adverse change in the physical environment. A "potentially significant" impact or "significant" impact is one that would result in a substantial adverse change in the physical environment; both are treated the same under CEQA in terms of procedural requirements and the need to identify feasible mitigation. Mitigation measures are identified, as feasible, to avoid, minimize, rectify, reduce, or compensate for significant or potentially significant impacts, in accordance with the State CEQA Guidelines Section 15126.4. Unless otherwise noted, the mitigation measures presented are recommended in the EIR for consideration by the BAAQMD to adopt as conditions of approval.

  Where an existing law, regulation, or permit specifies mandatory and prescriptive actions about how to fulfill the regulatory requirement as part of the Project definition, leaving little discretion in its implementation, and would avoid an impact or maintain it at a less-than-significant level, the environmental protection afforded by the regulation is considered before determining impact significance. Where existing laws or regulations specify a

mandatory permit process for future projects, performance standards without prescriptive actions to accomplish them, or other requirements that allow substantial discretion in how they are accomplished, or have a substantial compensatory component, the level of significance is determined before applying the influence of the regulatory requirements. In this circumstance, the impact would be potentially significant or significant, and the regulatory requirements would be included as a mitigation measure.

This subsection also describes whether mitigation measures would reduce Project impacts to less-than-significant levels. Significant and unavoidable impacts are identified as appropriate in accordance with State CEQA Guidelines Section 15126.2(b). Significant and unavoidable impacts are also summarized in Chapter 5, "Other CEQA Sections."

Each section concludes with a discussion of potential cumulative impacts.

- **References:** The full references associated with the references cited in Sections 3.1 through 3.5 are presented in Chapter 7, "References," organized by section number.

3.1 AIR QUALITY

This section includes a discussion of existing air quality conditions, a summary of applicable regulations, and an analysis of potential air quality impacts caused by project implementation.

Two comments related to air quality were received in response to the notice of preparation (see Appendix A). The Air Conditioning, Heating, & Refrigeration Institute expressed concern about emissions from new power generation facilities. The San Francisco Bay Area Planning and Urban Research Association (SPUR) commented that increased electrical demand could stress the grid and/or generate more air pollution if electrical generation is not clean. To mitigate increased strain on the electrical grid, SPUR recommended that the EIR include an alternative in which the BAAQMD takes an active role in encouraging decentralized solar (and possibly storage). Alternatives are discussed in Chapter 4, "Alternatives." No new power generation facilities are proposed as part of the project. The BAAQMD did take into consideration NO_x emissions from electric power generation in its calculation of NO_x emissions estimates from the Project, as described in this section. NO_x emissions from an increase in electricity production would only occur if currently designed natural gas-fired appliances are replaced with electric heat pump appliances. In this scenario, the decrease in appliance combustion-related NO_x emissions from a switch from gas to electric appliances would far outweigh any increase in emissions from electricity production, as seen in the projected emissions reductions presented below. Indirect impacts, including potential air quality impacts, associated with potential expansion of existing and planned energy infrastructure in response to project-related increases in energy demand are addressed in Section 3.3, "Utilities and Service Systems."

3.1.1 Regulatory Setting

Ambient air quality in the project area is regulated through the efforts of various federal, state, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, planning, policy making, education, and a variety of programs. The agencies responsible for improving air quality in the San Francisco Bay Area Air Basin (SFBAAB) are discussed below. There are currently no federal or state criteria air pollutant standards for space and water heating appliances.

FEDERAL

US Environmental Protection Agency

The US Environmental Protection Agency (EPA) has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970 (42 US Code Chapter 85). The most recent major amendments were made by Congress in 1990.

Criteria Air Pollutants

The CAA required EPA to establish National Ambient Air Quality Standards (NAAQS) for six common air pollutants found all over the United States, referred to as criteria air pollutants. EPA has established primary and secondary NAAQS for the following criteria air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead. The NAAQS are shown in Table 3.1-1. The primary standards protect public health, and the secondary standards protect public welfare. The CAA also required each state to prepare a state implementation plan (SIP) for attaining and maintaining the NAAQS. The federal Clean Air Act Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. California's SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA is responsible for reviewing all SIPs to determine whether they conform to the mandates of the CAA and its amendments and whether implementation will achieve air quality goals. If EPA determines a SIP to be inadequate, it may prepare a federal implementation plan that imposes additional control

measures. If an approvable SIP is not submitted or implemented within the mandated time frame, sanctions may be applied to transportation funding and stationary air pollution sources in the air basin.

Table 3.1-1 National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California (CAAQS)[a, b]	National (NAAQS)[c]	
			Primary[b, d]	Secondary[b, e]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	—	Same as primary standard
	8-hour	0.070 ppm (137 µg/m^3)	0.07 ppm (147 µg/m^3)	Same as primary standard
Carbon monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	Same as primary standard
	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	Same as primary standard
Nitrogen dioxide (NO_2)	Annual arithmetic mean	0.030 ppm (57 µg/m^3)	53 ppb (100 µg/m^3)	Same as primary standard
	1-hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)	—
Sulfur dioxide (SO_2)	24-hour	0.04 ppm (105 µg/m^3)	—	—
	3-hour	—	—	0.5 ppm (1,300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3)	—
Respirable particulate matter (PM_{10})	Annual arithmetic mean	20 µg/m^3	—	Same as primary standard
	24-hour	50 µg/m^3	150 µg/m^3	Same as primary standard
Fine particulate matter ($PM_{2.5}$)	Annual arithmetic mean	12 µg/m^3	12 µg/m^3	15 µg/m^3
	24-hour	—	35 µg/m^3	Same as primary standard
Lead [f]	Calendar quarter	—	1.5 µg/m^3	Same as primary standard
	30-day average	1.5 µg/m^3	—	—
	Rolling 3-month average	—	0.15 µg/m^3	Same as primary standard
Hydrogen sulfide	1-hour	0.03 ppm (42 µg/m^3)	No national standards	No national standards
Sulfates	24-hour	25 µg/m^3	No national standards	No national standards
Vinyl chloride [f]	24-hour	0.01 ppm (26 µg/m^3)	No national standards	No national standards
Visibility-reducing particulate matter	8-hour	Extinction of 0.23 per km	No national standards	No national standards

Notes: µg/m^3 = micrograms per cubic meter; km = kilometers; mg/m^3 = milligrams per cubic meter; ppb = parts per billion; ppm = parts per million.

[a] California standards for ozone, carbon monoxide, SO_2 (1- and 24-hour), NO_2, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25 degrees Celsius (°C) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[c] National standards (other than for ozone and particulate matter and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. The $PM_{2.5}$ 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the US Environmental Protection Agency for further 0clarification and current federal policies.

[d] National primary standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[e] National secondary standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] The California Air Resources Board has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Source: CARB 2016.

Hazardous Air Pollutants and Toxic Air Contaminants

Toxic air contaminants (TACs) or, in federal parlance, hazardous air pollutants (HAPs) are a defined set of airborne pollutants that may pose a present or potential hazard to human health. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness or that may pose a hazard to human health. A substance that is listed as a HAP pursuant to Subsection (b) of Section 112 of the CAA (42 US Code Section 7412[b]) is

considered a TAC. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

A wide range of sources, from industrial plants to motor vehicles, emit TACs. The health effects associated with TACs are quite diverse and generally are assessed locally, rather than regionally. TACs can cause long-term health effects, such as cancer, birth defects, neurological damage, asthma, bronchitis, and genetic damage, or short-term acute effects, such as eye watering, respiratory irritation (a cough), runny nose, throat pain, and headaches.

For evaluation purposes, TACs are separated into carcinogens and noncarcinogens based on the nature of the physiological effects associated with exposure to the pollutant. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. This contrasts with criteria air pollutants for which ambient standards have been established (Table 3.1-1). Cancer risk from TACs is expressed as excess cancer cases per one million exposed individuals, typically over a lifetime of exposure.

EPA and, in California, the California Air Resources Board (CARB) regulate HAPs and TACs, respectively, through statutes (i.e., 42 US Code Section 7412[b]) and regulations that generally require the use of the maximum achievable control technology or best available control technology (BACT) for toxics to limit emissions.

CARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA) (California Health and Safety Code Section 40910).

Criteria Air Pollutants

The CCAA, which was adopted in 1988, required CARB to establish California Ambient Air Quality Standards (CAAQS) (Table 3.1-1). CARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants identified by EPA. In most cases, the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the state endeavor to attain and maintain the CAAQS by the earliest date practical. It specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources. The CCAA also provides air districts with the authority to regulate indirect sources.

Toxic Air Contaminants

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807, Chapter 1047, Statutes of 1983) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (Hot Spots Act) (AB 2588, Chapter 1252, Statutes of 1987). AB 1807 sets forth a formal procedure for CARB to designate substances as TACs. Research, public participation, and scientific peer review are required before CARB can designate a substance as a TAC. To date, CARB has identified more than 21 TACs and adopted EPA's list of HAPs as TACs. Most recently, particulate matter (PM) exhaust from diesel engines (diesel PM) was added to CARB's list of TACs.

After a TAC is identified, CARB then adopts an airborne toxics control measure for sources that emit that particular TAC. If a threshold exists for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If no safe threshold exists, the measure must incorporate BACT for toxics to minimize emissions.

The Hot Spots Act requires that existing facilities that emit toxic substances above a specified level prepare an inventory of toxic emissions, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

CARB has adopted diesel exhaust control measures and more stringent emissions standards for various transportation-related mobile sources of emissions, including transit buses, and off-road diesel equipment (e.g., tractors, generators). Over time, the replacement of older vehicles will result in a vehicle fleet that produces substantially lower levels of TACs than are produced under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1-3-butadiene, diesel PM) have been reduced substantially over the last decade and will be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control

technologies. With implementation of CARB's Risk Reduction Plan and other regulatory programs, it is estimated that emissions of diesel PM will be less than half of those in 2010 by 2035 (CARB 2022). Adopted regulations are also expected to continue to reduce formaldehyde emissions emitted by cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

REGIONAL

Bay Area Air Quality Management District

The BAAQMD maintains and manages air quality conditions in the SFBAAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of the BAAQMD includes the preparation of plans and programs for the attainment of the NAAQS and CAAQS, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. The BAAQMD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the CAA and CCAA.

The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS in their region by the earliest practical date. To achieve the CAAQS, the BAAQMD prepares and updates air quality plans on a regular basis.

For state air quality planning purposes, the SFBAAB is classified as a nonattainment area with respect to the 1-hour ozone standard. On April 19, 2017, the BAAQMD adopted the most recent revision to the Clean Air Plan, titled the *2017 Clean Air Plan: Spare the Air, Cool the Climate* (BAAQMD 2017a). This plan serves to:

- define a vision for transitioning the region to a postcarbon economy needed to achieve 2030 and 2050 greenhouse gas reduction targets;
- decrease emissions of air pollutants most harmful to Bay Area residents, such as particulate matter, ozone, and TACs;
- reduce emissions of methane and other potent climate pollutants; and
- decrease emissions of carbon dioxide by reducing fossil fuel combustion.

Although offensive odors are typically below health thresholds, they can be unpleasant, leading to considerable stress (and associated negative health impacts) among the public and often generating citizen complaints to local governments and the BAAQMD. The BAAQMD's Regulation 7 ("Odorous Substances") regulates odors.

City and County General Plans

The most comprehensive land use planning for the San Francisco Bay Area region is provided by city and county general plans, which local governments are required by State law (California Government Code Section 65300 et seq.) to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or that the jurisdiction has chosen to include. Required topics are land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address include public facilities, parks and recreation, community design, natural resources, healthy communities, energy and sustainability, air quality, and growth management. Except for the San Joaquin Valley area, air quality is an optional general plan topic. Jurisdictions may choose to consider air quality as a stand-alone topic, as part of another mandatory or optional element, or not at all. Local planning policies related to air quality often address exposure to air pollutants, public health, density, compact development, alternative transportation modes, energy conservation, cleaner-fuel vehicles, emissions reduction, and public education, among other topics.

3.1.2 Environmental Setting

The Project is located in the SFBAAB. The SFBAAB includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties; the western portion of Solano County; and the southern portion of Sonoma County. The ambient concentrations of air pollutant emissions are determined by the amount of emissions released

by the sources of air pollutants and the atmosphere's ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and sunlight. Air quality conditions in the area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources, as discussed separately below.

CLIMATE, METEOROLOGY, AND TOPOGRAPHY

The Bay Area region has a Mediterranean climate characterized by wet winters and dry summers. Rainfall totals can vary widely over a short distance, with windward coastal mountain areas receiving over 40 inches of rain, while leeward areas receive about 15 inches. During rainy periods, horizontal and vertical air movement ensures rapid pollutant dispersal.

Normally, air temperatures decrease with increasing elevations. Sometimes this normal pattern is inverted, with warmer air aloft and cool air trapped near the earth's surface. This phenomenon occurs in all seasons. In summer, especially when wind speeds are very low, a strong inversion will trap air emissions, and high levels of ozone smog can occur. In winter, a strong inversion can trap emissions of particulate and carbon monoxide near the surface, resulting in unhealthful air quality. Particulate matter (PM) pollution exposure is anticipated to increase because of climate change, which can lead to worsening asthma symptoms, chronic obstructive pulmonary disease, and respiratory infections associated to premature mortality. Increasing temperatures related to climate change are also anticipated to lead to an increase in wildfires across California. Wildfires are a significant source of smoke and PM exposure. PM can also be carried over long distances by wind and then settle on ground or water. Depending on chemical composition, the effects of PM settling may include; making lakes and streams acidic, changing the nutrient balance in coastal waters and large river basins, depleting the nutrients in soil, damaging sensitive forests and farm crops and affecting the diversity of ecosystems, contributing to acid rain effects (EPA 2022a).

The Bay Area topography is complex, consisting of coastal mountain ranges, inland valleys, and bays, which distort normal wind flow patterns. The Pacific Ocean bounds the area to the west with warmer inland valleys to the south and east. The only major break in California's Coast Ranges occurs at San Francisco Bay. The gap on the western side is called the Golden Gate, and on the eastern side, it is called the Carquinez Strait. These gaps allow air to pass between the Central Valley and the Pacific Ocean. The general region lies in the semipermanent high-pressure zone of the eastern Pacific, resulting in a mild climate tempered by cool sea breezes with light average wind speeds. The usually mild climatological pattern is interrupted occasionally by periods of extremely hot weather, winter storms, and offshore winds.

Regional wind patterns vary from season to season. During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Peninsula. Wind speeds may be strong locally in areas where air is channeled through a narrow opening, such as the Carquinez Strait, Golden Gate, or the San Bruno Gap. In the winter, the region frequently experiences stormy conditions with moderate to strong winds, as well as periods of stagnation with very light winds. Winter stagnation episodes are characterized by nighttime drainage flows in coastal valleys. Drainage refers to the reversal of the usual daytime air flow patterns; air moves from the Central Valley toward the coast.

Wind tends to move from areas of high pressure to areas of low pressure. In warmer months, this means that air currents move onshore from the Pacific Ocean to inland areas. Pacific Ocean air receives emissions from numerous sources (anthropogenic and biogenic) as it comes onshore and will carry these pollutants to areas many miles away. Mountains and valleys often affect onshore winds. This means that a wind pattern that started as northwesterly will often swing 90 degrees or more when it encounters topographic features.

The climatological pollution potential of an area is largely dependent on winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and a strong inversion produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 miles per hour, smog potential is greatly reduced. Because of wind patterns and, to a lesser degree, the geographic location of emission sources, high ozone levels usually occur in inland valleys, such as the Livermore area. High PM levels can occur in areas of intense

motor vehicle use, such as freeways and ports and in most valley areas where residential wood smoke and other pollutants are trapped by inversions and stagnant air.

CRITERIA AIR POLLUTANTS

Concentrations of criteria air pollutants are used to indicate the quality of the ambient air. A brief description of key criteria air pollutants in the SFBAAB is provided below. Emission source types and health effects are summarized in Table 3.1-2. The attainment designation of the SFBAAB is summarized in Table 3.1-3.

Ozone

Ground-level ozone is not emitted directly into the air but is created by chemical reactions between ROG and NO_x. This happens when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight. Ozone at ground level is a harmful air pollutant because of its effects on people and the environment, and it is the main ingredient in smog (EPA 2022a).

Acute health effects of ozone exposure include increased respiratory and pulmonary resistance, cough, pain, shortness of breath, and lung inflammation. Chronic health effects include permeability of respiratory epithelia and possibility of permanent lung impairment (EPA 2022a). Emissions of the ozone precursors ROG and NO_x have decreased over the past two decades because of BAAQMD regulations, more stringent motor vehicle standards and cleaner burning fuels (CARB 2013).

Table 3.1-2 Sources and Health Effects of Criteria Air Pollutants

Pollutant	Sources	Acute[1] Health Effects	Chronic[2] Health Effects
Ozone	Secondary pollutant resulting from reaction of ROG and NO_X in presence of sunlight. ROG emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NO_X results from the combustion of fuels	increased respiration and pulmonary resistance; cough, pain, shortness of breath, lung inflammation	permeability of respiratory epithelia, possibility of permanent lung impairment
Carbon monoxide (CO)	Incomplete combustion of fuels; motor vehicle exhaust	headache, dizziness, fatigue, nausea, vomiting, death	permanent heart and brain damage
Nitrogen dioxide (NO_2)	combustion devices; e.g., boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines	coughing, difficulty breathing, vomiting, headache, eye irritation, chemical pneumonitis or pulmonary edema; breathing abnormalities, cough, cyanosis, chest pain, rapid heartbeat, death	chronic bronchitis, decreased lung function
Sulfur dioxide (SO_2)	coal and oil combustion, steel mills, refineries, and pulp and paper mills	Irritation of upper respiratory tract, increased asthma symptoms	Insufficient evidence linking SO_2 exposure to chronic health impacts
Respirable particulate matter (PM_{10}), Fine particulate matter ($PM_{2.5}$)	fugitive dust, soot, smoke, mobile and stationary sources, construction, fires and natural windblown dust, and formation in the atmosphere by condensation and/or transformation of SO_2 and ROG	breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, premature death	alterations to the immune system, carcinogenesis
Lead	metal processing	reproductive/ developmental effects (fetuses and children)	numerous effects including neurological, endocrine, and cardiovascular effects

Notes: NO_X = oxides of nitrogen; ROG = reactive organic gases.

[1] "Acute" refers to effects of short-term exposures to criteria air pollutants, usually at fairly high concentrations.

[2] "Chronic" refers to effects of long-term exposures to criteria air pollutants, usually at lower, ambient concentrations.

Source: EPA 2016.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NO_X and are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local sources of NO_X emissions (EPA 2022a).

Acute health effects of exposure to NO_X include coughing, difficulty breathing, vomiting, headache, eye irritation, chemical pneumonitis, pulmonary edema, breathing abnormalities, cyanosis, chest pain, rapid heartbeat, and death. Chronic health effects include chronic bronchitis and decreased lung function (EPA 2022a).

Table 3.1-3 Attainment Status Designations for the San Francisco Bay Area Air Basin

Pollutant	Averaging Time	California Standard	California Designation Status	National Standard	National Designation Status
Ozone	1-hour	0.09 ppm	N	—	—
	8-hour	0.070 ppm	N	0.070 ppm	N
Fine particulate matter ($PM_{2.5}$)	24-hour	—	—	35 µg/m^3	N
	Annual	12 µg/m^3	N	12 µg/m^3	U/A
Respirable particulate matter (PM_{10})	24-hour	50 µg/m^3	N	150 µg/m^3	U
	Annual	20 µg/m^3	N	—	—
Carbon monoxide (CO)	1-hour	20 ppm	A	35 ppm	U/A
	8-hour	9 ppm	A	9 ppm	U/A
Sulfur dioxide (SO_2)	1-hour	0.25 ppm	A	75 ppb	A/U
	24-hour	0.04 ppm	A	—	—
Nitrous oxide (NO_2)	Annual	0.030 ppm	A	0.053 ppm	U
	1-hour	0.18 ppm	A	100 ppb	U/A
Lead	3-month rolling average	—	—	0.15 µg/m^3	U/A
	30-day average	1.5 µg/m^3	A	—	—

Notes: µg/m^3 = micrograms per cubic meter; ppb = parts per billion; ppm = parts per million; A = Attainment, N = Non-Attainment, U = Unclassified.

Source: EPA 2022b.

Particulate Matter

PM is emitted directly into the air and includes soot, smoke, and fugitive dust from mobile and stationary sources, construction operations, and fires and natural windblown dust. PM can also be secondarily formed in the atmosphere by the reaction of gaseous precursors (CARB 2013). $PM_{2.5}$ includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. Current estimates of $PM_{2.5}$ show that secondary formation contributes about half of total ambient levels. Major sources of PM_{10} emissions in the SFBAAB include fugitive dust emissions from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and industrial sources, such as landfills and aggregate facilities. Residential wood burning and on-road mobile sources each contribute about 10 percent of total PM_{10} emissions. Direct emissions of PM_{10} are projected to remain relatively constant through 2035. Major contributors of $PM_{2.5}$ in the SFBAAB are fuel combustion sources, including residential wood burning, which contribute nearly a quarter of annual $PM_{2.5}$ emissions; industrial sources; and on-road and off-road mobile sources, such as cars, trucks, construction equipment, and ships. Stationary non-combustion sources, such as petroleum refining, commercial cooking, landfills, and other industrial sources in total contribute more than 20 percent. Direct emissions of $PM_{2.5}$ have steadily declined in the SFBAAB between 2000 and 2010 and are projected to increase slightly through 2035 (CARB 2013).

Acute health effects of exposure to PM_{10} include breathing and respiratory symptoms; aggravation of existing respiratory and cardiovascular diseases, including asthma and chronic obstructive pulmonary disease; and premature death. Chronic health effects include alterations to the immune system and carcinogenesis (EPA 2022a). For $PM_{2.5}$, short-term exposure (up to 24-hour duration) has been associated with premature mortality, increased hospital admissions for heart or lung cases, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days. These adverse health effects have been reported primarily in infants, children, and older adults with preexisting heart or lung diseases. Long-term exposure (months to years) to $PM_{2.5}$ has been linked to premature death, particularly in people who have chronic heart or lung diseases, and reduced lung function growth in children.

TOXIC AIR CONTAMINANTS

According to the 2013 Edition of the *California Almanac of Emissions and Air Quality*, health risks from TACs can largely be attributed to relatively few compounds, the most important being diesel PM (CARB 2013: 5-2 to 5-4). Other TACs that pose high ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene. Diesel PM poses the greatest health risk among the 10 TACs mentioned.

ODORS

Odors generally do not cause direct health impacts. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals can smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition occurs only with an alteration in the intensity.

Odor sources of concern include wastewater treatment plants, sanitary landfills, composting facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting operations, coffee roasters, rendering plants, food packaging plants, and cannabis (BAAQMD 2017b). These sources of odor are interspersed throughout the SFBAAB.

SENSITIVE RECEPTORS

Sensitive receptors are generally considered to include those land uses where exposure to pollutants could result in health-related risks to sensitive individuals, such as children or the elderly. Residential dwellings, schools, hospitals, playgrounds, and similar facilities are of primary concern because of the presence of individuals particularly sensitive to pollutants and/or the potential for increased and prolonged exposure of individuals to pollutants. Sensitive receptors are located throughout the SFBAAB.

3.1.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and waters heaters that would be allowed for sale and installation in the Bay Area.

Operation of ultra-low and zero NO_x appliances would result in decreased NO_X emissions in the SFBAAB. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. Estimates of future reductions are presented quantitatively and presented below under Impact 3.1-1. Because the applicable rules function as point-of-sale requirements, emission reductions associated with the proposed rule amendments would occur over time in relation to the lifespan of currently installed equipment. Staff estimated emissions reductions from the proposed amendments as newer equipment is phased in over time due to equipment replacements. To model these predicted emission reductions, staff made the following assumptions:

- While the proposed regulatory amendments would allow for natural gas-fired zero NO_x appliances, based on currently available technology, staff assumed that, upon burnout, natural gas-fired appliances would be replaced with electric solutions when the proposed zero NO_x standards are in effect. As noted above, this results in a conservative analysis of NO_x reductions because other technologies that may be developed could avoid the additional NO_x from electricity generation.
- For electric replacements, it is assumed that the electricity provided is from the community choice aggregator local to the customer, or direct from the Pacific Gas and Electric Company. The emissions associated with each of these electricity sources as well as their contribution to projected Bay Area electric load is discussed further in Appendix B. The resulting weighted average is 85 percent carbon and NO_x -free electricity generation.
- Electricity generated from natural gas-fired powerplants is assumed to result in NO_x emissions of 5 ppm by dry volume at 15 percent oxygen. This emission limit represents best available control technology for simple-cycle gas turbine power plants over 50 megawatts (CARB 2004).
- While some Bay Area residents are choosing to install zero NO_x solutions at this time, and this is expected to continue and increase over time, modeled emissions reductions do not assume any voluntary uptake of zero NO_x technology prior to the proposed compliance dates because voluntary uptake is not expected to be significant.
- Commercial space and water heating is frequently achieved through the use of larger boilers that are covered under the BAAQMD's Regulation 9, Rule 7. Based on available inventories, staff assumed that 50 percent of commercial space and water heating baseline emissions would not be affected by the proposed amendments to Rule 9-4 and Rule 9-6.
- Because the proposed rule amendments would affect only direct emissions from two types of building appliances and would not affect natural gas distribution, staff did not assume any upstream emission reductions along the natural gas infrastructure. Although reduced use of natural gas may result in less methane leakage, this reduced leakage is not guaranteed because the technologies used to meet the proposed standards may rely on the natural gas system for energy, and the proposed amendments do not affect the existing natural gas distribution system.
- Water heaters were assumed to have an average lifespan of 13 years and space heating equipment were assumed to have an average lifespan of 18 years (E3 2019: 41).

Detailed model assumptions and inputs for these calculations are presented in Appendix B.

THRESHOLDS OF SIGNIFICANCE

The significance criteria used to evaluate impacts on air quality under CEQA are based on Appendix G of the State CEQA Guidelines and thresholds of significance adopted by the BAAQMD. According to State CEQA Guidelines Appendix G, an air quality impact would be significant if implementation of the Project would:

- conflict with or obstruct implementation of the applicable air quality plan,
- violate any air quality standard or contribute substantially to an existing or projected air quality violation,

- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors),
- expose sensitive receptors to substantial pollutant concentrations, or
- create objectionable odors affecting a substantial number of people.

The BAAQMD's air quality thresholds of significance are tied to achieving or maintaining attainment designations with the NAAQS and CAAQS, which are scientifically substantiated, numerical concentrations of criteria air pollutants considered to be protective of human health. Implementing the Project would have a significant impact related to air quality such that human health would be adversely affected if it would (BAAQMD 2017b):

- cause construction-generated criteria air pollutant or precursor emissions to exceed 54 pounds per day (lb/day) of ROG and NO_X, 82 lb/day for PM_{10} exhaust, and 54 lb/day for $PM_{2.5}$ exhaust, or substantially contribute to emissions concentrations (e.g., PM_{10}, $PM_{2.5}$) that exceed the applicable NAAQS or CAAQS;
- result in a net increase in long-term operational criteria air pollutant or precursor emissions that exceed 54 lb/day or 10 tons per year (tons/year) of ROG and NO_X, 82 lb/day or 15 tons/year for PM_{10} exhaust, and 54 lb/day or 10 tons/year for $PM_{2.5}$ exhaust, or substantially contribute to emissions concentrations (e.g., PM_{10}, $PM_{2.5}$) that exceed the applicable NAAQS or CAAQS;
- not implement the BAAQMD's Basic Construction Mitigation Measures for dust emissions (e.g., PM_{10} and $PM_{2.5}$);
- result in long-term operational local mobile-source CO emissions that would violate or contribute substantially to concentrations that exceed the 1-hour CAAQS of 20 parts per million (ppm) or the 8-hour CAAQS of 9 ppm;
- result in an incremental increase in cancer risk (i.e., the risk of contracting cancer) greater than 10 in one million at any off-site receptor and/or a noncarcinogenic hazard index of 1.0 or greater; or
- result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

ISSUES NOT DISCUSSED FURTHER

Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. While outdoor installations are expected, implementation of the proposed amendments would not result in any new construction or development that could result in direct emissions of air pollutants. The proposed amendments involve a change in the type of appliances that would be installed in the future; the Project would not change the number of appliances or require construction-related activities. Therefore, the Project would not result in direct construction-related emissions of air pollutants. However, the Project would result in a long-term increase in electricity demand, which would contribute, along with implementation of statewide decarbonization programs, to the need for expansion of energy infrastructure in California and outside the state. Therefore, the Project's projected incremental energy demand increase would require the construction of new and/or expanded infrastructure (i.e., transmission lines, substations, solar fields, battery storage facilities) to accommodate the increased electricity demand from the conversion of natural gas appliances to electric appliances. It is anticipated that most of the necessary energy projects would be constructed outside the Bay Area and a portion of these projects would occur outside of the state (see E3 study included as Appendix C). These projects would produce construction-related emissions in various air basins depending on the future locations of this infrastructure. The Project's potential contribution to environmental impacts (including impacts to air quality) associated with these energy projects are described in Section 3.3, "Utilities and Service Systems." Thus, construction-related emissions of criteria air pollutants and ozone precursors are not discussed further in this analysis.

The proposed amendments would result in an overall decrease in on-site NO_x emissions associated with furnaces and water heaters throughout the Bay Area. Furnaces and water heaters are not considered significant sources of TACs. Therefore, TAC impacts from the proposed amendments would not occur, and TACs are not discussed further.

The proposed amendments would not generate new vehicle trips beyond what is currently occurring within the Bay Area. The proposed amendments would change the emissions factors for new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These changes would not directly influence the rate or magnitude that furnaces and water heaters would be replaced. Therefore, localized CO impacts from the proposed amendments would not occur, and CO hotspot emissions are not discussed further.

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Newly installed appliances would not contribute odors within residential and commercial buildings beyond existing conditions. Therefore, odor impacts from the proposed amendments would not occur, and odors are not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.1-1: Long-Term Operational-Related Emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$

The proposed amendments would result in a reduction in NO_X emissions generated by natural gas-fired space- and water-heating appliances. This would be achieved through the replacement of these appliances with ultra-low and zero-NO_X natural gas appliances or electric appliances. Operation of ultra-low and zero-NO_X natural gas appliances would inherently result in a reduction in NO_X emissions within the SFBAAB. Moreover, any turnover to electric appliances would eliminate emissions of all criteria air pollutants from on-site natural gas combustion and associated emissions from this activity. For these reasons, the proposed amendments would have a less-than-significant (beneficial) impact to regional air quality.

The overall purpose of the proposed amendments is to reduce NO_x emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area. Table 3.1-4 shows the projected yearly emissions and projected reductions compared with the baseline inventory (2018) for selected years. These NO_x emission reductions would be substantial over time, with an 88 percent reduction of emissions compared to the baseline by the time the equipment changeout is projected to be completed in 2046.

NO_x emissions are a key criteria pollutant as a precursor to ozone and secondary PM formation. Secondary PM is formed from the conversion of NO_x to ammonium nitrate through atmospheric chemical reactions with ammonia. PM, a diverse mixture of suspended particles and liquid droplets, is the air pollutant most harmful to the health of Bay Area residents. The Bay Area is currently classified as non-attainment for $PM_{2.5}$ under the CAAQS. Exposure to $PM_{2.5}$, on either a short-term or long-term basis, can cause a wide range of respiratory and cardiovascular health effects, including strokes, heart attacks, and premature deaths. Because NO_x compounds in the atmosphere contribute to the formation of secondary PM, any NO_x emission reduction would also result in reduction of the formation of secondary $PM_{2.5}$ reductions. In addition, the Bay Area is currently in non-attainment for ozone, a regional pollutant, under NAAQS and CAAQS. Emissions of ROG and NO_x throughout the Bay Area contribute to ozone formation in downwind areas. Therefore, reductions in emissions of ROG and NO_x are needed throughout the region to decrease ozone levels. Thus, implementation of the proposed rule amendments would directly support the goals of the BAAQMD's 2017 Clean Air Plan, Spare the Air, Cool the Climate (Plan) to reduce ozone precursor emissions and improve public health. In addition, because the proposed rule amendments would reduce NO_x emissions (a precursor to ozone and secondary PM formation), as discussed above, implementation would not result in a cumulatively considerable net increase in any air pollutants for which the Bay Area is designated as a non-attainment area or exposure sensitive receptors to substantial pollutant concentrations. This impact would be less than significant (beneficial).

Table 3.1-4 Projected NO_X Emissions Upon Implementation of Proposed Amendments

Year	Projected Yearly NO_X Emissions (tons/year)	Projected NO_X Reduction vs. Baseline (tons/year)
2018*	3,690	—
2025	3,516	174
2030	2,816	874
2035	1,855	1,835
2040	930	2,761
2045	515	3,176
2046	454	3,236

Notes: NO_X = nitrogen oxide.

* 2018 is the baseline year for emissions inventory.

Source: Provided by BAAQMD in 2022.

Mitigation Measures

No mitigation is required for this impact.

CUMULATIVE IMPACTS

As described under Impact 3.1-1, the Project would result in a reduction in NO_X emissions generated by natural gas-fired space- and water-heating appliances. As summarized above under the heading, "Thresholds of Significance," the BAAQMD has developed project-level thresholds of significance for evaluating new development or proposed actions that contribute criteria air pollution to the SFBAAB. Projects that emit ROG, NO_X, PM_{10}, and $PM_{2.5}$ below the BAAQMD's thresholds would not contribute to air basin's nonattainment designation under the NAAQS and CAAQS. Project-level thresholds of significance are developed in consideration of long-term regional air quality planning (i.e., the BAAQMD's Clean Air Plan), and are designed to minimize a project's contribution of air pollution in a regional context.

These thresholds are, therefore, inherently cumulative by design. With respect to the proposed amendments, which would result in a net decrease in NO_X emissions—a precursor pollutant to the secondary formation of ground-level ozone—from strengthening of emissions standards for furnaces and water heaters compared to baseline conditions and would serve to assist the BAAQMD in its long-term regional air quality planning efforts to attain the NAAQS and CAAQS ozone standards. Impact 3.1-1 is therefore a cumulative impact analysis and no further cumulative impact analysis is needed for air quality.

3.2 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

This section presents a summary of regulations applicable to greenhouse gas (GHG) emissions, a summary of climate change science and GHG sources in California, and quantification of the Project's potential impact on GHG emissions in the Bay Area.

One comment related to GHG emissions was received in response to the notice of preparation (see Appendix A). The Rheem Manufacturing Company expressed concern that premature zero-NOx implementation could result in a net increase in GHG emissions associated with increased electricity production. The BAAQMD did take into consideration GHG emissions from electric power generation in its calculation of GHG emissions estimates from the Project, as described in this section. Potential GHG emissions from electric power generation are conservatively based on the Pacific Gas and Electric Company's (PG&E) current mix of power sources and do not cause an increase in GHG emissions. GHG emissions from an increase in electricity production would only occur if currently designed natural gas-fired appliances are replaced with electric heat pump appliances, and under this assumption, the decrease in appliance combustion-related GHG emissions from a switch from gas to electric appliances would far outweigh any increase in emissions from electricity production, as shown in the emissions estimates below. Indirect impacts, including potential GHG impacts, associated with potential expansion of existing and planned energy infrastructure in response to project-related increases in energy demand are addressed in Section 3.3, "Utilities and Service Systems."

3.2.1 Regulatory Setting

FEDERAL

Greenhouse Gas Emission Standards

In *Massachusetts et al. v. Environmental Protection Agency et al.,* 549 US 497 (2007), the Supreme Court of the United States ruled that carbon dioxide (CO_2) is an air pollutant as defined under the federal Clean Air Act (CAA) and that the US Environmental Protection Agency (EPA) has the authority to regulate GHG emissions. In 2010, EPA started to address GHG emissions from stationary sources through its New Source Review permitting program, including operating permits for "major sources" issued under Title V of the CAA. There are currently no federal GHG emissions standards for space and water heating appliances.

STATE

Plans, policies, regulations, and laws established by the state agencies are generally presented in the order they were established. There are currently no state GHG emissions standards for space and water heating appliances.

Statewide GHG Emission Targets and Climate Change Scoping Plan

Reducing GHG emissions in California has been the focus of the state government for approximately two decades. GHG emission targets established by the state legislature include reducing statewide GHG emissions to 1990 levels by 2020 (Assembly Bill [AB] 32 of 2006) and reducing them to 40 percent below 1990 levels by 2030 (Senate Bill [SB] 32 of 2016). Executive Order S-3-05 calls for statewide GHG emissions to be reduced to 80 percent below 1990 levels by 2050. Executive Order B-55-18 calls for California to achieve carbon neutrality by 2045 and achieve and maintain net negative GHG emissions thereafter. These targets are in line with the scientifically established levels needed in the U.S. to limit the rise in global temperature to no more than 2 degrees Celsius, the warming threshold at which major climate disruptions, such as super droughts and rising sea levels, are projected; these targets also pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

The *California's 2017 Climate Change Scoping Plan*, prepared by the California Air Resources Board (CARB), outlines the main strategies California will implement to achieve the legislated GHG emission target for 2030 and "substantially advance toward our 2050 climate goals" (CARB 2017). It identifies the reductions needed by each GHG

emission sector (e.g., transportation, industry, electricity generation, agriculture, commercial and residential, pollutants with high global warming potential, and recycling and waste). CARB and other state agencies also released the *January 2019 Draft California 2030 Natural and Working Lands Climate Change Implementation Plan* consistent with the carbon neutrality goal of Executive Order B-55-18 (CalEPA et al. 2019). On May 10, 2022, CARB released the Draft 2022 Scoping Plan Update, which sets the framework for the state to achieve carbon neutrality as set by Executive Order B-55-18 and an 80 percent reduction in 1990 baseline GHG emissions by 2050. At the time of writing this Draft EIR, CARB has not adopted the final version of the Draft 2022 Scoping Plan Update.

The state has also passed more detailed legislation addressing GHG emissions associated with transportation, electricity generation, and energy consumption, as summarized below.

Legislation Associated with Electricity Generation

The state has passed legislation requiring the increasing use of renewables to produce electricity for consumers. California's Renewables Portfolio Standard Program was established in 2002 (SB 1078) with the initial requirement to generate 20 percent of their electricity from renewable by 2017, 33 percent of their electricity from renewables by 2020 (SB X1-2 of 2011), 52 percent by 2027 (SB 100 of 2018), 60 percent by 2030 (also SB 100 of 2018), and 100 percent by 2045 (also SB 100 of 2018).

LOCAL

Bay Area Air Quality Management District

The BAAQMD is the primary agency responsible for addressing air quality concerns in the San Francisco Bay Area. Its role is discussed further in Section 3.1, "Air Quality." The BAAQMD also recommends methods for analyzing project-related GHG emissions in CEQA analyses and recommends multiple GHG reduction measures for land use development projects. The BAAQMD recently developed and finalized its *Justification Report: CEQA Thresholds for Evaluating the Significance from Land Use Project and Plans* (Justification Report) (BAAQMD 2022). The Justification Report is intended to be used to uniformly evaluate the significance of operation-related emissions from land use development projects; however, the proposed amendments do not fit within the category of a land use development project or a plan.

City and County General Plans

The most comprehensive land use planning for the San Francisco Bay Area region is provided by city and county general plans, which local governments are required by State law (California Government Code Section 65300 et seq.) to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or that the jurisdiction has chosen to include. Required topics are land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address include public facilities, parks and recreation, community design, natural resources, healthy communities, energy and sustainability, air quality, and growth management. Except for the San Joaquin Valley area, air quality is an optional general plan topic. Jurisdictions may choose to consider air quality as a stand-alone topic, as part of another mandatory or optional element, or not at all. Local planning policies related to air quality often address exposure to air pollutants, public health, density, compact development, alternative transportation modes, energy conservation, cleaner-fuel vehicles, emissions reduction, and public education, among other topics.

Local Climate Action Plans

Consistent with CARB recommendations, several Bay Area jurisdictions have completed community emissions inventories (103), and 79 jurisdictions have finalized and adopted community climate action plans (CAPs) or greenhouse gas reduction plans (GHGRPs). The Bay Area's CAPs seek to help local jurisdictions achieve state emissions goals. They identify recommendations for meeting emissions goals, often in terms of different land uses or categories, including transportation, land use, energy, water, waste, and green infrastructure, and require monitoring of emissions over time. While not required above, a majority of jurisdictions in the region participate in the creation of both emissions inventories and CAPs.

3.2.2 Environmental Setting

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the atmosphere from space. A portion of the radiation is absorbed by the earth's surface, and a smaller portion of this radiation is reflected toward space. The absorbed radiation is then emitted from the earth as low-frequency infrared radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth.

Prominent GHGs contributing to the greenhouse effect are CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs in excess of natural ambient concentrations are found to be responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. The Sixth Assessment Report contains IPCC's strongest warnings to date on the causes and impacts of climate change. Importantly, the report notes that, in terms of solutions, "We need transformational change operating on processes and behaviors at all levels: individual, communities, business, institutions, and governments. We must redefine our way of life and consumption" (IPCC 2021).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas most pollutants with localized air quality effects have relatively short atmospheric lifetimes, GHGs have long atmospheric lifetimes (one year to several thousand years). GHGs persist in the atmosphere long enough to be dispersed around the globe. Although the lifetime of any GHG molecule depends on multiple variables and cannot be determined with any certainty, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO_2 emissions, approximately 55 percent are estimated to be sequestered through ocean and land uptake every year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO_2 emissions remain stored in the atmosphere (IPCC 2013).

The quantity of GHGs in the atmosphere responsible for climate change is not precisely known, but it is considered to be enormous. No single project alone would measurably contribute to an incremental change in the global average temperature or to global or local climates or microclimates. From the standpoint of CEQA, GHG impacts relative to global climate change are inherently cumulative.

SAN FRANCISCO BAY AREA EMISSIONS

As discussed previously, GHG emissions are attributable in large part to human activities. The BAAQMD conducted the most recent GHG inventory for the San Francisco Bay Area in 2015 for a baseline year of 2011; emissions totaled 86.6 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) (BAAQMD 2015). Table 3.2-1 summarizes the GHG inventory for the Bay Area by $MMTCO_2e$ and percentage.

Table 3.2-1 Bay Area GHG Emissions by Economic Sector

Sector	$MMTCO_2e$	Percent
Transportation	34.3	39.7%
Industrial/Commercial	31.0	35.7%
Electricity/Co-Generation	12.1	14.0%
Residential Fuel Usage	6.6	7.7%
Off-Road Equipment	1.3	1.5%
Agriculture/Farming	1.3	1.5%
Total	86.6	100%

Note: $MMTCO_2e$ = million metric tons of carbon dioxide equivalent.

Source: BAAQMD 2015.

As shown in Table 3.2-1, transportation, industry/commercial, and electricity/co-generation comprise the greatest sources of GHGs in the Bay Area.

Emissions of CO_2 are byproducts of fossil fuel combustion. Methane, a highly potent GHG, results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) associated with agricultural practices, landfills, and forest fires. Leaks from the natural gas distribution network also contribute to methane emissions. Nitrous oxide is also largely attributable to agricultural practices and soil management. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution (CO_2 dissolving into the water) and are two of the most common processes for removing CO_2 from the atmosphere.

EFFECTS OF CLIMATE CHANGE ON THE ENVIRONMENT

The global average temperature is expected to increase by 3 to 7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2007). According to California's Fourth Climate Change Assessment, depending on future GHG emissions scenarios, average annual maximum daily temperatures in California are projected to increase between 3.6 and 5.8°F by 2050 and by 5.6 to 8.8°F by 2100 (OPR, CEC, and CNRA 2018).

Other environmental resources could be indirectly affected by the accumulation of GHG emissions and resulting rise in global average temperature. In recent years, California has been marked by extreme weather and its effects. Climate model projections for California demonstrate that impacts will vary throughout the state and show a tendency for the northern part of the state to become wetter while the southern portion of California to become drier (Pierce et al. 2018). According to California Natural Resources Agency's (CNRA) report, *Safeguarding California Plan: 2018 Update* (CNRA 2018), California experienced the driest four-year statewide precipitation on record from 2012 through 2015; the warmest years on average in 2014, 2015, and 2016; and the smallest and second smallest Sierra snowpack on record in 2015 and 2014 (CNRA 2018). Climate model projections included in California's Fourth Climate Change Assessment, demonstrate that seasonal summer dryness in California may be prolonged due to earlier spring soil drying and would last longer into the fall and winter rainy season. Increases in temperature are also predicted to result in changes to California's snowpack. Based on climate model projections, the mean snow water equivalent, a common measurement which indicates the amount of water contained within snowpack, in California is anticipated to decline to two-thirds of its historic average by 2050 and between less than half and less than one-third of historic average by 2100, depending on future emissions scenarios (OPR, CEC, and CNRA 2018).

Climate model projections demonstrate that California will experience variation in precipitation patterns as well. The Northern Sierra Nevada range experienced its wettest year on record in 2016 (CNRA 2018). As temperatures increase, the increase in precipitation falling as rain rather than snow also could lead to increased potential for floods because water that would normally be held in the snowpack of the Sierra Nevada and Cascade mountains until spring will flow into the Central Valley concurrently with winter rainstorm events. This scenario will place more pressure on California's levee/flood control system (CNRA 2018). As the climate continues to warm, extreme precipitation events in California will increase and could, subsequently, increase the probability of 'mega-flood" events (Polade et al. 2017).

Climate change is also projected to result in tertiary impacts on energy infrastructure throughout California. Changes in temperature, precipitation patterns, extreme weather events, and sea-level rise have the potential to affect and decrease the efficiency of thermal power plants and substations, decrease the capacity of transmission lines, disrupt electrical demand, and threaten energy infrastructure with the increased risk of flooding (CNRA 2018).

According to California's Fourth Climate Change Assessment, climate change will create impacts on the state's transportation network that will have 'ripple effects' including direct and indirect impacts on inter-dependent infrastructure networks as well as negative impacts on the economy. Without appropriate adaptations strategies for roadway materials (i.e., asphalt and pavement), researchers estimate that the median total cost to California for 2040-2070 will be between $1 billion and $1.25 billion (OPR, CEC, and CNRA 2018). The California Department of Transportation (Caltrans) owns and operates more than 51,000 miles along 265 highways, as well as three of the busiest passenger rail lines in the nation. Sea level rise, storm surge, and coastal erosion are imminent threats to highways, roads, bridge supports, airports, transit systems and rail lines near sea level and seaports. Shifting precipitation patterns, increased temperatures, wildfires, and increased frequency in extreme weather events also

threaten transportation systems across the state. Temperature extremes and increased precipitation can increase the risk of road and railroad track failure, decreased transportation safety, and increased maintenance costs (CNRA 2018). Modeling for flood events in California demonstrates that approximately 370 miles of highways are susceptible to flooding in a 100-year storm event by the year 2100 (OPR, CEC, and CNRA 2018).

Water availability and changing temperatures affect the prevalence of pests, disease, and species, which will directly impact crop development, forest health, and livestock production. Other environmental concerns include decline in water quality, groundwater security, and soil health (CNRA 2018). Vulnerabilities of water resources also include risks to degradation of watersheds, alteration of ecosystems and loss of habitat, (OPR, CEC, and CNRA 2018).

California's Fourth Climate Change Assessment also identifies the impacts climate change will have on public health and social systems. Average temperature increases in California are estimated to have impacts on human mortality, with 6,700 to 11,300 additional annual deaths in 2050, depending on higher or lower emissions scenarios (Ostro et al. 2011). Studies have also shown that impacts from climate change can also have indirect impacts on public health, such as increased vector-borne diseases, and stress and mental trauma due to extreme events, economic disruptions, and residential displacement (Gould and Dervin 2012; McMichael and Lindgren 2011; US Global Change Research Program 2016).

3.2.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and waters heaters that would be allowed for sale and installation in the Bay Area. All new furnaces and water heaters would be required to be zero-NO_x units upon implementation of the proposed amendments. Currently, zero-NO_x units that are available on the market are electric heat pump units. Electric heat pumps not only emit zero NO_x, but also emit zero GHGs. Operation of electric heat pump appliances would result in decreased natural gas combustion resulting in a decrease in GHG emissions associated with natural gas combustion. However, the proposed amendments do allow for manufacturers to develop and market zero-NO_x appliances that are natural gas-fired. If such appliances are developed, consumers would be able to choose between zero- NO_x electric heat pumps and zero-NO_x natural gas-fired units upon implementation of the proposed amendments, and the result would be that some combination of electric heat pumps and zero-NO_x natural gas fired appliances are installed. If this is the case, GHG emissions would still decrease upon implementation of the proposed rule amendments, but not by as much as if current appliances are only replaced by electric heat pumps. The analysis here assumes, based on currently available technology, that only electric heat pumps are installed once the proposed amendments are implemented. The GHG emission reduction projections should be seen as the maximum potential reductions.

Turnover of currently designed appliances would also generate some vehicle trips associated with the sale and distribution of furnaces and water heaters, including worker commute trips to install these appliances; however, this level of trips would not be greater than what is occurring at present. The proposed amendments would result in the disposal of currently designed natural gas–powered furnaces and water heaters; however, GHG emissions from solid waste disposal are generated from the anaerobic decomposition of organic material in landfills, and such appliances are not categorized as organic. Notably, this level of solid waste disposal would not be greater than what is occurring at present. Because there would not be an increase in new vehicle trips or solid waste disposal compared to baseline conditions, there would be no GHG emissions from mobile sources or solid waste disposal. The proposed amendments would also not generate any water or wastewater; thus, no emissions from the water sector would occur.

Estimates of future reductions are presented quantitatively and presented below under Impact 3.2-1. Because the applicable rules function as point-of-sale requirements, emission reductions associated with the proposed rule amendments would occur over time in relation to the lifespan of currently installed equipment. Staff estimated

emissions reductions from the proposed amendments as newer equipment is phased in over time due to equipment replacements. To model these potential emission reductions, staff made the following assumptions:

- While the proposed regulatory amendments would allow for natural gas-fired zero NO_x appliances, based on currently available technology, staff assumed that, upon burnout, natural gas-fired appliances would be replaced with electric solutions when the proposed zero NO_x standards are in effect. This results in presenting maximum potential GHG reductions from the proposed amendments.
- For electric replacements, it is assumed that electricity provided is from the community choice aggregator local to the customer, or direct from (PG&E). The emissions associated with each of these electricity sources as well as their contribution to projected Bay Area electric load is discussed further in Appendix B. The resulting weighted average is 85 percent carbon and NO_x-free electricity generation.
- For natural-gas generated electricity, a correction factor is applied to account for operational differences between natural gas appliance and turbine combustion. Further information on this calculation is provided in Appendix B.
- While some Bay Area residents are choosing to install zero NO_x solutions at this time, and this is expected to continue and increase over time, modeled emissions reductions do not assume any voluntary uptake of zero-NO_x technology prior to the proposed compliance dates because voluntary uptake is not expected to be significant.
- Commercial space and water heating is frequently achieved through the use of larger boilers that are covered under the BAAQMD's Regulation 9, Rule 7. Based on available inventories, staff assumed that 50 percent of commercial space and water heating baseline emissions would not be affected by the proposed amendments to Rule 9-4 and Rule 9-6.
- Because the proposed rule amendments would affect only direct emissions from two types of building appliances and would not affect natural gas distribution, staff did not assume any upstream emission reductions along the natural gas infrastructure. Although reduced use of natural gas may result in less methane leakage, this reduced leakage is not guaranteed because the technologies used to meet the proposed standards may rely on the natural gas grid for energy.
- Water heaters were assumed to have an average lifespan of 13 years and space heating equipment were assumed to have an average lifespan of 18 years (E3 2019: 41).

Detailed model assumptions and inputs for these calculations are presented in Appendix B.

THRESHOLDS OF SIGNIFICANCE

The issue of global climate change is inherently a cumulative issue because the GHG emissions of individual projects cannot be shown to have any material effect on global climate. Thus, the proposed amendments' impact on climate change is addressed only as a cumulative impact.

State CEQA Guidelines Section 15064 and relevant portions of Appendix G recommend that a lead agency consider a project's consistency with relevant, adopted plans and discuss any inconsistencies with applicable regional plans, including plans to reduce GHG emissions. Under Appendix G of the State CEQA Guidelines, implementing a project would result in a cumulatively considerable contribution to climate change if it would:

- generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

As noted in Section 3.2.1, "Regulatory Setting," the BAAQMD published new guidance for evaluating climate change impacts for land use development projects in 2022. In its guidance, the BAAQMD states, "[t]here is no proposed construction-related climate impact threshold at this time. Greenhouse gas emissions from construction represent a very small portion of a project's lifetime GHG emissions. The proposed thresholds for land use projects are designed

to address operational GHG emissions which represent the vast majority of project GHG emissions" (BAAQMD 2022). Based on this guidance, construction-related emissions are not compared to any standard of significance.

The BAAQMD's guidance also provides land use development and lead agencies with mechanisms that can be incorporated as project design features that would suggest that a project is doing their fair share to reduce GHG emissions and assist the state in meeting its long-term GHG reduction goals. These project design features recommended by the BAAQMD are intended to reduce operational GHG emissions from land use development projects, which the Project is not.

The BAAQMD also establishes guidance for CAP or GHGRP CEQA streamlining. The proposed amendments would apply throughout the Bay Area, which currently supports dozens of CAPs and GHGRPs depending on location. Replacement of furnaces and hot water heaters would not individually be considered a project under CEQA. Therefore, CAP streamlining would not be an appropriate standard for the proposed amendments.

Thus, because the proposed amendments are not a land use development project and CAP streamlining would not be appropriate, the BAAQMD's CEQA guidance is not applicable to the Project.

The Project would not generate new vehicle trips beyond what is currently occurring within the Bay Area. The Project could induce electricity demand (based on currently available zero NO_x electric heat pump technology), which would, in turn, produce GHG emissions; however, these emissions would be offset by a decrease in on-site natural gas combustion. Appendix D of the Draft 2022 Scoping Plan states than an "approach to project-level alignment with State climate goals is net zero GHG emissions" (CARB 2022: 12). Projects that demonstrate a net zero increase in GHG emissions, resulting in no contribution to GHG impacts, may therefore be an appropriate overall objective for a project and would demonstrate alignment with the state's long-term goals of reducing emissions by 40 percent below 1990 levels by 2030 (SB 32) and 85 percent below 1990 and carbon neutrality by 2045 (AB 1279).

Using CARB's guidance, the proposed amendments would not have a potentially significant contribution to global climate change if it were to demonstrate a net zero increase in GHG emissions.

ISSUES NOT DISCUSSED FURTHER

Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. While outdoor installations are expected, implementation of the proposed amendments would not result in any new construction or development that could result in direct GHG emissions from the use of heavy-duty equipment or vehicles. The proposed amendments involve a change in the type of appliances that would be installed in the future; the Project would not change the number of appliances or require construction-related activities. Therefore, the Project would not result in direct construction-related GHG emissions. However, based on currently available zero NO_x electric heat pump technology, the Project could result in a long-term increase in electricity demand, which would contribute, along with implementation of statewide decarbonization programs, to the need for expansion of energy infrastructure in California and outside the state. Therefore, the Project's projected incremental demand increase would require the construction of new and/or expanded infrastructure (i.e., transmission lines, substations, solar fields, battery storage facilities) to accommodate the increased electricity demand from the conversion of natural gas appliances to electric appliances. It is anticipated that most of the necessary energy projects would be constructed outside the Bay Area and a portion of these projects would occur outside of the state (see E3 study included as Appendix C). These projects would produce construction-related GHG emissions in various air basins depending on the future locations of this infrastructure. The Project's potential contribution to environmental impacts (including impacts to GHG) associated with these energy projects are described in Section 3.3, "Utilities and Service Systems." Thus, construction-related GHG emissions are not discussed further in this analysis.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.2-1: Potential to Generate GHG Emissions

The proposed amendments would result in a decrease in GHG emissions over the next 24 years. This decrease exceeds the net zero threshold of significance and would assist the state in meeting its long-term GHG reduction goals extending to 2045. Therefore, the proposed amendments would not have a cumulatively considerable contribution to climate change. This impact would be less than significant (beneficial).

The proposed amendments would result in a transition from currently designed natural gas–powered furnaces and water heaters to zero-NO_x electric furnaces and water heaters and/or zero-NO_x natural gas-powered appliances (if they are developed by manufacturers). If zero-NO_x natural gas-powered appliances are developed, consumers would be able to choose between gas and electric zero-NO_x appliances, and it is assumed that the proposed amendments would result in the installation of some combination of the two choices. If this is the case, GHG emissions would still decrease upon implementation of the rule amendments, but not by as much as if current appliances are only replaced by electric heat pumps. The analysis here assumes, based on currently available technology, that only electric heat pumps are installed once the proposed amendments are implemented. The GHG emission reduction projections should be seen as the maximum potential reductions. Replacement of currently designed natural gas-powered appliances with electric appliances upon rule implementation would result in a decrease in on-site natural gas combustion; however, the energy used to power these appliances would be sourced from the electrical grid of the Bay Area and surrounding regions (see Section 3.3, "Utilities and Service Systems," for a discussion of the project's contribution to energy infrastructure impacts). The electrical grid is also a source of GHG emissions.

The level of GHGs generated by electricity consumption is contingent upon a variety of factors. A utility's energy portfolio (i.e., the composition of the sources used to generate electricity). For example, PG&E is the main electricity provider in the Bay Area, among other Community Choice Aggregates operating within the region. In 2019, PG&E provided its customers on its base plan with 27 percent electricity sourced from large hydroelectric power, which is considered a renewable electricity source that doesn't produce GHG emissions (CEC 2020). Due to statewide drought in 2020, this percentage in 2020 fell to 10 percent of PG&E's total base plan (CEC 2021). Due to decreased availability of large hydroelectric power, PG&E relied upon a greater percentage of natural gas consumption in 2020 compared to 2019 resulting in comparatively greater GHG emissions.

Notably, several statewide regulations and mechanisms are in place to require public and private utilities, such as PG&E, to procure an incrementally greater portion of their electricity from eligible renewable energy sources. The RPS requires that utilities be 100 percent renewable by 2045, at a minimum. PG&E has also committed to a goal of achieving carbon neutrality by 2040, 5 years ahead of the state's carbon neutrality goal by 2045. Therefore, while the proposed amendments may result in increased electrical demand, the GHG emissions associated with this demand would become progressively less over time.

Table 3.2-2 provides values for projected yearly emissions and maximum potential reductions compared with the baseline emissions inventory for selected years, assuming that only electric heat pumps are installed upon implementation of the proposed rule amendments. It should be noted that 2018 is the baseline year for the projected GHG emissions; however, BAAQMD staff anticipates that reductions would not occur until 2027 because BAAQMD staff has assumed that voluntary uptake rates would be minimal.

As shown in Table 3.2-2, the proposed amendments could result in a reduction of 4.81 $MMTCO_2e$ by 2046 compared to baseline conditions. This decrease goes beyond meeting the net zero increase threshold of significance and demonstrates that the proposed amendments would not conflict with the 2022 Scoping Plan or the state's long-term GHG reduction goals. Moreover, if some combination of electric heat pumps and zero-NO_x natural gas-fired appliances are installed upon implementation of the proposed amendments, the proposed Rules would still result in a reduction in GHG emissions, though it would be less than 4.81 $MMTCO_2e$/year. This impact would be less than significant (beneficial).

Table 3.2-2 Potential GHG Emissions Upon Implementation of Proposed Amendments

Year	Projected Yearly GHG Emissions ($MMTCO_2e/yr$)	Potential GHG Reduction vs. Baseline ($MMTCO_2e/yr$)
2018*	6.56	—
2030	5.67	0.89
2035	4.10	2.46
2040	2.68	3.88
2046	1.75	4.81

Notes: GHG = greenhouse gas; $MMTCO_2e/yr$ = million metric tons of carbon dioxide equivalent per year.

* 2018 is the baseline year for the GHG emissions inventory.

Source: Data provided by BAAQMD in 2022.

Mitigation Measures

No mitigation is required for this impact.

CUMULATIVE IMPACTS

As described above, the discussion of GHG emissions in Impact 3.2-1 is inherently a cumulative impact analysis. GHG emissions from one project cannot, on their own, result in changes in climatic conditions; therefore, the emissions from one project must be considered in the context of their contribution to cumulative global emissions. Impact 3.2-1 is therefore a cumulative impact analysis and no further cumulative impact analysis is needed for GHG emissions and climate change.

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3.3 UTILITIES AND SERVICE SYSTEMS (ENERGY RESOURCES)

The proposed amendments are not expected to generate substantial demand for water, water treatment, wastewater treatment, natural gas infrastructure, or solid waste disposal. Therefore, this section provides a focused evaluation of the availability of existing electricity systems to serve the proposed amendments and the impact of the proposed amendments on these systems. Because the proposed amendments target nitrogen oxide (NO_x) emissions standards for natural gas–powered furnaces and water heaters, relevant information related to natural gas is provided in the regulatory and environmental settings below.

The analysis is based on the accompanying technical report *Electric Infrastructure Impacts from Proposed Zero NO_X Standards* prepared by Energy + Environmental Economics (E3) in 2022 (Appendix C).

Several comments related to utilities and service systems (energy resources) were received in response to the notice of preparation (see Appendix A). The Associated General Contractors of California expressed concern about there being sufficient electrical grid capacity to support increased demands and the potential for blackouts if the grid system is unprepared. The Air Conditioning, Heating, & Refrigeration Institute expressed concern about emissions from new power generation facilities and ensuring that grid updates and capacity are capable of meeting increased demand prior to enacting rules changes. The San Francisco Bay Area Planning and Urban Research Association commented that increased electrical demand could stress the grid. These issues are addressed in this section.

3.3.1 Regulatory Setting

FEDERAL

No federal plans, policies, regulations, or laws are applicable to energy for the proposed amendments.

STATE

California Environmental Quality Act

Appendix F of the State CEQA Guidelines sets forth goals for energy conservation, including decreasing per capita energy consumption and reliance on fossil fuels and increasing reliance on renewable energy sources. CEQA requires EIRs to describe potential energy impacts of projects, with an emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy (Public Resources Code [PRC] Section 21100[b][3]).

The California Energy Commission (CEC) prepares an integrated policy report every two years that assesses major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (CEC 2022). Energy efficiency is one of the key components of the state's strategy to reduce greenhouse gas emissions (GHGs) and to achieve reduction targets set forth by Assembly Bill (AB) 32, Senate Bill (SB) 32, and Governor Brown's Executive Order (EO) B-30-15. Efficiency achieved through building codes, appliance standards, and ratepayer-funded programs has had a positive impact on GHG emissions in recent years (CEC 2022). The policy report discusses efforts to decarbonize California's energy system and recognizes transitioning to zero- and near-zero emission vehicles will be a fundamental part of meeting the state's climate goals.

The California Public Utilities Commission (CPUC) 2008 Energy Efficiency Strategic Plan established goals of having all new residential construction in California be zero net energy (ZNE) by 2020 and all new commercial construction ZNE by 2030 (CPUC 2008).

Clean Energy and Pollution Reduction Act

On October 7, 2015, the Clean Energy and Pollution Reduction Act (SB 350) was signed into law, establishing new clean energy, clean air, and GHG reduction goals for 2030 and beyond. SB 350 codifies Governor Brown's clean energy goals to increase California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030, and is part of California's overall strategy to address climate change. SB 350 enhances the state's ability to meet its long-term climate goal of reducing GHG emissions to 40 percent of 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

California Building Energy Efficiency Standards (Title 24, Part 6)

The energy consumption of new residential and nonresidential buildings in California is regulated by the California Energy Code. The code was established by CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption and provide energy-efficiency standards for residential and nonresidential buildings. CEC updates the California Energy Code every three years, typically including more stringent design requirements for reduced energy consumption, which results in the generation of fewer GHG emissions.

The 2019 California Energy Code was adopted by CEC on May 9, 2018 and applies to projects constructed after January 1, 2020. CEC estimates that the combination of required energy-efficiency features and mandatory solar panels in the 2019 California Energy Code will result in new residential buildings that use 53 percent less energy than those designed to meet the 2016 California Energy Code. CEC also estimates that the 2019 California Energy Code will result in new commercial buildings that use 30 percent less energy than those designed to meet the 2016 standards, primarily through the transition to high-efficacy lighting (CEC 2018).

The 2022 California Energy Code was adopted by CEC on August 11, 2021 and will go into effect on January 1, 2023. The 2022 California Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, and strengthens ventilation standards.

California Green Building Standards (Title 24, Part 11)

The California Green Building Standards, also known as CALGreen, is a reach code (i.e., optional standards that exceed the requirements of mandator codes) developed by CEC that provides green building standards for statewide residential and nonresidential construction. The current version is the 2019 CALGreen Code, which took effect on January 1, 2020. As compared to the 2016 CALGreen Code, the 2019 CALGreen Code strengthened sections pertaining to EV and bicycle parking, water efficiency and conservation, and material conservation and resource efficiency, among other sections of the CALGreen Code. The CALGreen Code sets design requirements equivalent to or more stringent than those of the California Energy Code for energy efficiency, water efficiency, waste diversion, and indoor air quality. These codes are adopted by local agencies that enforce building codes and used as guidelines by state agencies for meeting the requirements of EO B-18-12.

Legislation Associated with Electricity Generation

The state has passed multiple pieces of legislation requiring the increasing use of renewable energy to produce electricity for consumers. California's Renewable Portfolio Standard (RPS) Program was established in 2002 (SB 1078) with the initial requirement to generate 20 percent of their electricity from renewable by 2017, 33 percent of their electricity from renewables by 2020 (SB X1-2 of 2011), 52 percent by 2027 (SB 100 of 2018), 60 percent by 2030 (also SB 100 of 2018), and 100 percent by 2045 (also SB 100 of 2018).

Green Building Initiative

In 2012, Governor Brown's EO B-18-12 (State of California Governor Office 2012) and its related Green Building Action Plan state the following energy and water efficiency improvement goals for facilities owned, funded, and leased by the State:

- All new state buildings beginning design after 2025 shall be constructed as ZNE facilities with an interim target for 50 percent of new facilities beginning design after 2020 to be ZNE. State agencies shall also take measures toward achieving ZNE for 50 percent of the square footage of existing state-owned building area by 2025.

- The state shall identify at least three buildings by January 1, 2013, to pursue ZNE as pilot projects.
- New and major renovated state buildings shall be designed and constructed to exceed the applicable version of CCR Title 24, Part 6, by 15 percent or more, and include building commissioning, for buildings authorized to begin design after July 1, 2012.
- Any proposed new or major renovation of state buildings larger than 10,000 square feet shall use clean, onsite power generation such as solar photovoltaic, solar thermal, and wind power generation, and clean backup power supplies, if economically feasible.
- New and major renovated state buildings larger than 10,000 square feet shall obtain Leadership in Energy and Environmental Design (LEED) "Silver" certification or higher.
- State agencies shall reduce water use at the facilities they operate by 10 percent by 2015 and by 20 percent by 2020, as measured against a 2010 baseline.
- All new and renovated state buildings and landscapes shall utilize alternative sources of water wherever cost-effective. Sources may include, but are not limited to: recycled water, graywater, rainwater capture, stormwater retention, and other water conservation measures.
- Landscape plants shall be selected based on their suitability to local climate and site conditions, and reduced water needs and maintenance requirements.
- State agencies shall identify and pursue opportunities to provide electric vehicle charging stations, and accommodate future charging infrastructure demand, at employee parking facilities in new and existing buildings.

LOCAL

Local Climate Action Plans

Consistent with recommendations of the California Air Resources Board (CARB), several Bay Area jurisdictions have completed community emissions inventories (103), and 79 jurisdictions have finalized and adopted community climate action plans (CAPs) or greenhouse gas reduction plans. The Bay Area's CAPs seek to help local jurisdictions achieve state emissions goals. They identify recommendations for meeting emissions goals, often in terms of different land uses or categories, including transportation, land use, energy, water, waste, and green infrastructure, and require monitoring of emissions over time. While not required above, a majority of jurisdictions in the region participate in the creation of both emissions inventories and CAPs.

Community Choice Aggregation Programs

Several Community Choice Aggregation (CCA) programs operate in the Bay Area. A CCA allows local governments to partner with local utilities to procure power on behalf of its residents, businesses, and municipal accounts. CCAs use the transmission and distribution services of a utility while supporting a municipality's choice to obtain energy from typically greener sources. CCAs in the Plan area include East Bay Community Energy, Peninsula Clean Energy, MCE, CleanPowerSF, San Jose Clean Energy, Silicon Valley Clean Energy, and Sonoma Clean Power, all of which have partnered with the Pacific Gas and Electric Company (PG&E).

3.3.2 Environmental Setting

ENERGY

Electricity

Electricity within the Bay Area is serviced by PG&E in partnership with several CCAs, including East Bay Community Energy, Peninsula Clean Energy, MCE, CleanPowerSF, San Jose Clean Energy, Silicon Valley Clean Energy, and

Sonoma Clean Power. Table 3.3-1 summarizes the electricity consumption of the nine counties governed by the BAAQMD in 2020, which comprise the project area for the proposed amendments.

Table 3.3-1 Electricity Consumption by County in 2020

County	Electricity Demand (GWh)
Alameda	10,247
Contra Costa	8,622
Marin	1,330
Napa	1,032
San Francisco	5,025
San Mateo	4,167
Santa Clara	16,435
Solano	3,320
Sonoma	2,867
Total	53,045

Notes: GWh = gigawatt hour.

Source: Data compiled by Ascent Environmental in 2022.

In 2020, PG&E supplied its customers on its base plan with 31 percent renewable energy (i.e., biomass, geothermal, eligible hydroelectric, solar, and wind), 43 percent nuclear, 16 percent natural gas, and 10 percent large hydroelectric power (PG&E 2021). PG&E also offers its customers with an option to engage in a 50 or 100 percent Solar Choice option, where customers may pay an additional fee to ensure that their electricity is procured from renewable energy resources.

Natural Gas

Natural gas is supplied to residents of the Bay Area by PG&E. Natural gas is distributed throughout the Bay Area through a network of underground pipes. Table 3.3-2 summarizes the natural gas combustion for each of the nine counties covered by the BAAQMD in 2020.

Table 3.3-2 Natural Gas Consumption by County in 2020

County	Millions of Therms[1]
Alameda	366
Contra Costa	1,061
Marin	67
Napa	36
San Francisco	208
San Mateo	200
Santa Clara	418
Solano	217
Sonoma	104
Total	2,677

Notes: [1] The therm is a unit of heat energy equal to 100,00 British thermal units.

Source: Data compiled by Ascent Environmental in 2022.

3.3.3 Environmental Impacts and Mitigation Measures

ANALYSIS METHODOLOGY

Current emission control methods for the proposed zero-NO_X emissions standard available on the market consist mainly of electric heat pump systems. The BAAQMD does not intend to mandate specific technology solutions, but currently available electric solutions were used to form estimates and projections. Natural gas technologies, with combustion occurring in the absence of nitrogen, along with a variety of other technologies, could also meet the proposed standards. The assumed use of electric appliances for CEQA analysis purposes allows for a conservative estimate for impacts to the electric grid. Should natural gas-fired appliances that meet the zero-NO_X standard be developed and used in practice, the potential impacts on the electric grid would be lessened. Thus, to understand maximum potential impact on utilities and service systems, for CEQA analysis purposes, the BAAQMD assumes that all currently in-use natural gas-fired appliances would be replaced with electric appliances if the proposed rules are implemented.

As described above, the electric grid analysis is based on the accompanying technical report *Electric Infrastructure Impacts from Proposed Zero NO_X Standards* prepared by E3 and included as Appendix C. Potential electric grid impacts were evaluated relative to two reference scenarios: a Low Policy Reference, which assumes no major state policy changes in support of building electrification, and a High Policy Reference, which assumes major state policy support for building electrification by the 2030s.

Maximum potential space heating and water heating load impacts are calculated based on gas usage data provided to the BAAQMD by PG&E. These data include annual gas usage in the BAAQMD's territory for four end uses: residential space heating, residential water heating, commercial space heating, and commercial water heating. For each end use, the maximum potential load impact assumes that 100 percent of gas demand for that end use shifts to heat pumps and is adjusted for the device performance characteristics of gas devices and heat pumps. Annual load impacts are then calculated for each end use as a percentage of the maximum potential load impact, based on the incremental heat pump adoption relative to a reference scenario in that year.

Current levels of air conditioning adoption and estimates of future adoption are based on data from the CEC's 2019 Residential Appliance Saturation Survey. Average per-building air conditioning loads were calculated from the National Renewable Energy Laboratory (NREL) ResStock and ComStock databases.

THRESHOLDS OF SIGNIFICANCE

According to State CEQA Guidelines Appendix G, a utilities and service systems impact would be significant if implementation of the Project would:

- require or result in the relocation or construction of new or expanded electric power facilities, the construction or relocation of which could cause significant environmental effects.

ISSUES NOT DISCUSSED FURTHER

As described above, the proposed amendments to Rules 9-4 and 9-6 does not include the construction of new facilities or an increased demand for utility services. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing residential and commercial buildings that are already provided with utility services. There would be no change to existing water use or wastewater treatment. Therefore, the proposed rule amendments would not adversely affect the sufficiency of water supplies or wastewater treatment capacity. No impact would occur, and the issue of impact on water use and wastewater systems will not be analyzed further.

The proposed rule amendments would regulate the type of equipment that would be installed, not whether it would be installed. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. When new appliances are installed, the old appliances would be removed and properly disposed of either at an appropriate recycling facility (that accepts scrap metal) or landfill in accordance with federal, state, and local laws. This would be a continuation of existing conditions. It is not anticipated that the amount of solid waste generated as a result of the proposed rule amendments would exceed the capacity of Bay Area landfills, which have an estimated average of 46 percent remaining capacity (MTC and ABAG 2021: 3.14-18), because proper disposal of old appliances would continue to occur regardless of whether the Project is implemented. Therefore, no impact would occur, and the issue of impact on solid waste will not be analyzed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.3-1: Require the Relocation or Construction of New or Expanded Electric Facilities That Would Result in an Adverse Environmental Impact

Assuming that heat pumps are used to replace existing natural gas-fired space and water heating appliances, the Project would, under the "worst case" Low Policy Reference Scenario evaluated by E3 (Appendix C), over the long term, result in increased energy demand beyond the planned electric grid capacity growth represented in this scenario. E3 estimated that the proposed zero-NO_x standards could result in 6.2 terrawatt-hours per year of additional electric load growth by 2050, which would represent 2.2 percent of the total statewide electrical load by 2020 standards. The E3 study estimates that this level of demand could be met by the development of approximately 2,180 MW of incremental utility-scale solar capacity, corresponding to 19,500 acres of direct land use impacts, under the "worst case" Low Policy Reference Scenario. For context, this represents 0.6 to 1.2 percent of the State's total projected land needed for the State to meet its stated climate goals, which is estimated to be between 1.6 and 3.1 million acres for solar and wind projects (not including off-shore wind and other energy sources). Almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. The potential construction and operational impacts associated with these energy facilities could be potentially significant, and may include substantial changes to visual character; obstruction of views; increased light and glare; conversion of Farmland and other impacts to agricultural resources and operations; construction-related air pollution, GHG emissions, and noise; archaeological resources; tribal cultural resources; adverse effects to wildlife species and habitat; adverse effects to other natural resources and waterways; impacts related to geology and paleontological resources; operational noise; conflicts with air traffic; transportation and storage of hazards and hazardous materials; and wildfire and associated environmental effects. Mitigation measures are likely available to minimize these impacts to a less-than-significant level for many of the environmental issue areas; however, it is likely that some would remain significant and unavoidable. Therefore, under the Low Policy Reference Scenario, the Project would result in a substantial contribution to a significant cumulative impact, and this impact would be potentially significant.

The Project does not include any development or other use that would result in a direct increase in demand for electricity such that relocation or construction of new or expanded electric infrastructure would be required as part of the Project. However, the zero-NO_x standard would be in effect beginning in 2027, and over time, result in replacement of appliances powered by natural gas or propane with appliances that meet zero-NO_x standards, which, at least in the foreseeable future, would primarily use electricity. This would result in a long-term increase in electricity demand as more electric appliances are installed under the proposed rules change. Full installation is anticipated for year 2046. Over this long term, a variety of other (primarily) state-led programs, such as CARB's 2022 Scoping Plan and future updates, would also be implemented and will substantially increase electricity demand. As described above under "Analysis Methodology," the analysis that follows is based on the accompanying technical report *Electric Infrastructure Impacts from Proposed Zero NO_X Standards* prepared by E3 and included as Appendix C. The E3 report examines the project's contribution to projected increases in electricity demand through year 2050.

The Project would amend Rules 9-4 and 9-6, which govern NOx emissions from residential and commercial space and water heating systems. The proposed amendments would introduce zero-NO_x standards for devices covered

under these rules. Today, the only technologies that meet zero-NO_x standards for these end uses are electric space and water heating devices. In the future, gas-fired technologies that meet the proposed standards could be developed. To determine potential conservative impacts on electric infrastructure, the E3 study assumed that gas space heating and water heating devices would be replaced by electric heat pump devices upon burnout.

The E3 study evaluates potential electric grid impacts based on two reference scenarios: a Low Policy Reference, which represents a business-as-usual future in which California does not meet its 2030 or 2045 GHG emissions targets, and a High Policy Reference, which assumes major state policy changes to decarbonize all sectors of the state's economy aligned with achieving the state's GHG emissions targets.

Under the Low Policy Reference scenario, heat pump adoption would occur consistent with the 2022 Draft Scoping Plan Business-as-Usual Reference Scenario. As such, this scenario assumes existing and currently planned levels of incentives for heat pumps and no major policy changes supporting building electrification would occur. As a result, this scenario assumes relatively low heat pump adoption through 2045. Under the Low Policy Reference scenario, the proposed amendments would generate 2,180 megawatt (MW), 680 MW, 460 MW, and 420 MW of new electrical demand for new solar, new batteries, new transmission capacity, and distribution capacity, respectively, by 2050.

Under the High Policy Reference, heat pump adoption would be consistent with the 2022 Draft Scoping Plan Proposed Scenario and state-level policies would drive a fast pace of heat pump adoption. Under the High Policy Reference Scenario, the proposed amendments would generate 70 MW, <10 MW, <10 MW, and <10 MW of new electrical demand for new solar, new batteries, new transmission capacity, and distribution capacity, respectively, by 2050. Table 3.3-3 summarizes the potential 2050 electric grid impacts of the proposed amendments.

Table 3.3-3 Summary of Potential 2050 Electric Grid Impacts of the Proposed Amendments

Grid Impact Category	Impact Relative to Low Policy Reference	Impact Relative to High Policy Reference
Utility-scale solar to serve electric loads	2,180 MW new solar by 2050	70 MW new solar by 2050 + accelerated build in 2030s & 2040s
4-hour battery storage for generation capacity	680 MW new batteries by 2050	< 10 MW new batteries by 2050 + accelerated build in 2030s & 2040s
Transmission capacity	460 MW impact by 2050	< 1 MW impact by 2050 + accelerated build in 2030s & 2040s
Distribution capacity	420 MW impact by 2050	< 10 MW impact by 2050 + accelerated build in 2030s & 2040s

Notes: MW = megawatt.

Source: Modeling prepared by E3 in 2022 (see Appendix C).

Given the high priority of the state to decarbonize, the High Policy Reference scenario may be more likely to occur than the Low Policy Reference scenario; however, because the Low Policy Reference scenario assumes the Project would result in a higher level of electricity demand, it serves as a more conservative scenario for evaluating potential impacts to the environment under CEQA. For this reason, the Low Policy Reference scenario will be the focus of the analysis that follows.

Also, as described in the E3 study, resource planning studies have considered the mix of new electric generation resources that will be developed in California. CPUC's Integrated Resource Plan (IRP) developed a Preferred System Plan that describes the optimal resource build through 2032. This plan includes the development of the following energy resources: 19 GW of utility-scale solar, 5 GW of land-based wind (including 1.5 GW out of state), 2 GW of offshore wind, 1 GW of geothermal, and 0.1 GW of biomass. In addition, battery storage, pumped hydro storage, and demand response are developed to provide generation capacity.

While the IRP is focused on resource needs over the next decade, the 2021 "SB100 Joint Agency Report" considers resource needs through 2045. This report documents a joint study by the CEC, CPUC, and CARB, investigating electric generation resource needs to meet the SB 100 requirement that 100 percent of electric retail sales be from zero-carbon resources by 2045. Results of this study indicate that energy needs will be met through a mix of utility-scale

solar, customer solar, land-based wind, and offshore wind, with utility-scale solar representing the majority of resource additions.

Together, these studies indicate that utility-scale solar will be the predominant generation resource built to serve new loads in California, although some amount of land-based wind, offshore wind, geothermal, biomass, and/or other resources may also be developed. The location and type of any particular development is not within BAAQMD's jurisdiction and is unknown and speculative at this time.

Utility-Scale Solar

As shown in Table 3.3-3, under the Low Policy Reference, the proposed amendments would necessitate 2,180 MW of new solar by 2050. Based on a NREL study, the direct land use impact of utility scale solar is estimated to be 9 acres per MW. Using this ratio of acreage to MW, the incremental utility scale solar needs summarized in Table 3.3-3 would correspond to a direct land use impact of 19,500 acres under the Low Policy Reference in 2050.

This projected acreage is unlikely to be sited within the Bay Area due to the characteristics of the region's climate. Rather, utility scale solar development would be focused in areas of high solar sources including the Central Valley, Inland Empire, and Mojave Desert. The location and type of any particular development is not within BAAQMD's jurisdiction and is unknown and speculative at this time. Potential impacts of these utility-scale solar projects would be evaluated in separate, future EIRs by various lead agencies. Likely impacts to the environment could include substantial changes to visual character; obstruction of views; increased light and glare; conversion of Farmland and other impacts to agricultural resources and operations; construction-related air pollution, GHG emissions, and noise; archaeological resources; tribal cultural resources; adverse effects to wildlife species and habitat; and adverse effects to other natural resources and waterways. Mitigation measures would likely be available to reduce many of these impacts. Some impacts may not be able to be mitigated to a less-than-significant level and may remain significant and unavoidable. The BAAQMD does not have jurisdiction to develop energy resources or monitor or enforce any of these mitigation measures.

Other Energy Sources

The land requirements of renewable generation resources are well understood, and environmental restrictions on renewable project siting are an active topic of discussion among policymakers and stakeholders. In 2019, The Nature Conservancy published a report called "The Power of Place," which considered the land impacts of renewable generation needed to achieve California's climate goals and evaluated scenarios with different environmental exclusions for renewable development. Across the scenarios evaluated, the study found 480,000 to 2.6 million acres of land would be developed by 2050 for wind generation (Nature Conservancy n.d.: 6). This does not include the area necessary for offshore wind development. Geothermal, biomass, and other energy generation sources would also be developed, although these constitute a small fraction of the overall energy generation projected to be developed to meet the state's future energy needs, as the state implements existing and planned decarbonization programs. Impacts associated with these other energy resources include substantial changes to visual character; obstruction of views; increased light and glare; conversion of Farmland and other impacts to agricultural resources and operations; conversion of Forestland and other impacts to forest resources; construction-related air pollution, GHG emissions, and noise; archaeological resources; tribal cultural resources; adverse effects to wildlife species and habitat (including bird and bat strikes and impacts to marine habitat associated with wind facilities); adverse effects to other natural resources and waterways; impacts related to geology and paleontological resources; operational noise; conflicts with air traffic; transportation and storage of hazards and hazardous materials; and wildfire and associated environmental effects. Mitigation measures would likely be available to reduce many of these impacts. Some impacts may not be able to be mitigated to a less-than-significant level and may remain significant and unavoidable. The BAAQMD does not have jurisdiction to develop energy resources or monitor or enforce any of these mitigation measures.

Transmission and Distribution Capacity/4-Hour Battery Storage

Based on the values summarized in Table 3.3-3, relative to the Low Policy Reference, potential heat pump adoption under the proposed standards would require infrastructure to support 680 MW, 460 MW, and 420 MW of 4-hour battery storage capacity, incremental transmission capacity need, and distribution capacity need, respectively, by 2050.

Under the Low Policy Reference, it is projected that the proposed amendments could require the construction of 6 new electrical banks, 45 new electric feeders, 10 new electric line sections, 31 bank upgrades, and 35 line section upgrades. The location of any particular construction project is unknown and speculative at this time.

Distribution infrastructure projects range from upgrades or replacements of existing equipment, which occur in existing rights of way, to greenfield construction of new line sections, distribution feeders, or substations, which may have a more significant environmental impact. Potential impacts of these transmission and distribution infrastructure projects would be evaluated in separate, future EIRs by various lead agencies. Environmental impacts likely to occur as a result of installation of transmission, distribution, and storage would include substantial changes to visual character; obstruction of views; increased light and glare; conversion of Farmland and other impacts to agricultural resources and operations; conversion of Forestland and other impacts to forest resources; construction-related air pollution, GHG emissions, and noise; archaeological resources; tribal cultural resources; adverse effects to wildlife species and habitat; adverse effects to other natural resources and waterways; operational noise; conflicts with air traffic; transportation and storage of hazards and hazardous materials; and wildfire and associated environmental effects. Mitigation measures would likely be available to reduce many of these impacts. Some impacts may not be able to be mitigated to a less-than-significant level and may remain significant and unavoidable. The BAAQMD does not have jurisdiction to develop energy resources or monitor or enforce any of these mitigation measures.

Conclusion

The state of California has adopted stringent statewide GHG reduction targets, including reducing emissions by 40 percent below 1990 levels by 2030 as mandated by SB 32 and reducing emissions by 85 percent below 1990 levels and achieving carbon neutrality by 2045 as directed by AB 1279. To reach these ambitious targets, the decarbonization of several sectors, including the mobile source and existing and future building sectors, is necessary.

The electrical sector's capacity in California will need to be expanded to accommodate increased electrical demand as energy production shifts from the burning of fossil fuels such as natural gas, gasoline, and diesel. As the state's mobile source sector continues to electrify through programs such as the Advanced Clean Cars II Program, Advanced Clean Fleets Regulation, and Advanced Clean Trucks Regulation, CARB, CPUC, and CEC are currently investing in retrofitting and expanding California's electrical grid to meet the demands of electric vehicles.

Moreover, the California Energy Code is trending towards total decarbonization and reflects new building requirements with every update to the code. The 2022 California Energy Code, which will go into effect on January 1, 2023, requires new residential and nonresidential development to be prewired to support electric appliances in lieu of natural gas–powered appliances. Home and business owners will have access to outlets in locations where water heaters, stoves, and furnaces are placed to facilitate the transition to electric appliances at the owner's discretion.

California's electrical sector is also progressively becoming more renewable as utilities continue to meet their renewable standard requirements under the RPS. To meet these benchmark goals, investments are being made statewide in small hydroelectric energy, geothermal technologies, on- and off-shore wind, solar photovoltaic systems, solar water and oil fields, and biomass facilities.

The High Policy Reference accounts for these other regulatory pressures that would require an expansion of the electricity sector's capacity and represents the most realistic scenario to be realized in the state. Under the High Policy Reference Scenario, the proposed amendments' contribution of electrical demand would be negligible in the greater context of total electrical demand in the Bay Area and would individually not require the construction of new electrical infrastructure or facilities. However, although the High Policy Reference Scenario is more likely to occur, the analysis above and the conclusions of this evaluation are based on the Low Policy Reference Scenario because the pace of policy implementation under the High Policy Reference Scenario cannot be guaranteed, and assuming implementation under the Low Policy Reference Scenario provides a conservative analysis of the Project's contribution to environmental impacts.

Therefore, under the "worst case" Low Policy Reference Scenario evaluated by E3 (Appendix C), the Project would, over the long term, result in increased energy demand beyond the planned electric grid capacity growth represented in this scenario. E3 estimated that the proposed zero NOx standards could result in 6.2 terrawatt-hours per year of

additional electric load growth by 2050, which would represent 2.2 percent of the total statewide electrical load by 2020 standards. The E3 study estimates that the Project could require approximately 19,500 acres of utility-scale solar under the "worst-case" Low Policy Reference Scenario. This represents 0.6 to 1.2 percent of the state's total projected land needed for the state to meet its stated climate goals, which is estimated to be between 1.6 and 3.1 million acres for solar and wind projects (not including off-shore wind and other energy sources). As indicated above, almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. Development of these potential new energy resources is not part of the current Project under review, but rather a likely indirect impact of implementation of the proposed amendments. Selection, location, development, review, and approval of any new energy resources is outside of BAAQMD's jurisdiction and would be completed by other agencies. It is not possible to determine any particular energy resource that would be developed to meet growing demand; that determination is outside of BAAQMD's jurisdiction and is unknown and speculative at this time. The potential impacts associated with these energy facilities are described above. As discussed, mitigation measures are likely available to minimize potentially significant impacts to a less-than-significant level for many of the environmental issue areas; however, it is likely that some would remain significant and unavoidable. Therefore, under the Low Policy Reference Scenario, the Project would result in a substantial contribution to a significant cumulative impact, and this impact would be potentially significant.

Mitigation Measures

As described above, the location and type of these projects are currently speculative but based on current projections as presented in the E3 study, their associated environmental impacts would generally be located outside the Bay Area, and potentially outside California. The energy projects described would be evaluated in separate, future EIRs by various lead agencies and would ultimately be implemented by these other agencies. For these reasons, the BAAQMD has no jurisdiction over the approval of these projects and cannot identify, monitor, or enforce mitigation. Therefore, the BAAQMD cannot identify feasible mitigation to reduce the Project's contribution to these impacts and the impact remains potentially significant and unavoidable under the Low Policy Reference Scenario.

CUMULATIVE IMPACTS

As described under Impact 3.3-1, the Project would result in a long-term increase in energy demand. The zero NOx standard would be in effect beginning in 2027, and comparison of this long-term energy demand increase with existing energy supplies would not be realistic, especially in the context of the massive statewide projected energy demand increases associated with existing and planned decarbonization programs described above, which will require drastic changes to the existing energy infrastructure in the Bay Area and across the state. Impact 3.3-1 evaluates the Project's contribution to the projected statewide increase in energy demand and the associated proportion of the likely resulting environmental impacts. Impact 3.3-1 is therefore a cumulative impact analysis and no further cumulative impact analysis is needed for utilities.

3.4 NOISE

This section includes a summary of applicable regulations related to noise and vibration, a description of ambient-noise conditions, and an analysis of potential noise impacts associated with the proposed amendments.

The proposed amendments, which would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area, are not anticipated to generate substantial construction noise or vibration. Further, the proposed amendments would not expose people residing or working in the Project area to excessive noise levels associated with airports and would not locate residents or commercial buildings or other sensitive noise receivers closer to airport operations. Therefore, this section provides a focused evaluation of the Project's potential to generate a substantial permanent increase in ambient noise levels.

The notice of preparation (NOP) for this Project did not identify noise as a potentially significant impact. No comments related to noise were received in response to the NOP (see Appendix A). However, the BAAQMD has determined the need to address potential noise impacts in this EIR.

3.4.1 Regulatory Setting

COMMON NOISE DESCRIPTORS

Prior to providing the regulatory and environmental setting, some fundamental definitions of commonly used noise terms are provided in this section. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors used throughout this section.

Equivalent Continuous Sound Level (L_{eq}): L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound level that occurs during the same period (Caltrans 2013: 2-48). For instance, the 1-hour equivalent sound level, also referred to as the hourly L_{eq}, is the energy average of sound levels occurring during a 1-hour period and is the basis for noise abatement criteria used by the California Department of Transportation (Caltrans) and the Federal Transit Administration (FTA) (Caltrans 2013: 2-47; FTA 2018).

Maximum Sound Level (L_{max}): L_{max} is the highest instantaneous sound level measured during a specified period (Caltrans 2013: 2-48; FTA 2018).

Community Noise Equivalent Level (CNEL): CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-decibels (dB) penalty applied to sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m. and a 5-dB penalty applied to the sound levels occurring during evening hours between 7 p.m. and 10 p.m. (Caltrans 2013: 2-48).

FEDERAL

US Environmental Protection Agency Office of Noise Abatement and Control

The US Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate Federal noise control activities. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at more local levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, documents and research completed by the EPA Office of Noise Abatement and Control continue to provide value in the analysis of noise effects.

STATE

California General Plan Guidelines

The State of California General Plan Guidelines 2017, published by the California Governor's Office of Planning and Research (2017), provides guidance for the compatibility of projects within areas of specific noise exposure. Acceptable and unacceptable community noise exposure limits for various land use categories have been determined to help guide new land use decisions in California communities. In many local jurisdictions, these guidelines are used to derive local noise standards and guidance. Citing EPA materials and the State Sound Transmissions Control Standards, the State's general plan guidelines recommend interior and exterior CNEL of 45 and 60 decibels (dB) for residential units, respectively (OPR 2017:378).

State guidance reflects the fact that noise-sensitive land uses are compatible with exterior transportation-related noise exposure not exceeding 65 A-weighted dB (dBA) CNEL, which is the typical noise standard for suburban areas. In areas with more urban development exterior noise exposure is considered incompatible if noise exposure exceeds 70 dBA CNEL.

REGIONAL

City and County General Plans

Cities and counties within California must adopt a noise element as part of their general plans to identify, assess, and address noise problems within their communities. According to California Government Code 65302, the noise element of a general plan is to be used as "a guide for establishing a pattern of land uses in the land use element that minimizes the exposure of community residents to excessive noise." The noise element should assess current and projected future noise levels associated with local noise sources, including, but not limited to, traffic, trains, aircraft, and industrial operations. California general plan guidance establishes land use compatibility guidelines for various land uses. However, local jurisdictions may adopt their own noise exposure goals and policies, which may or may not be the same as or similar to those recommended by the State. Additionally, based on Title 24 standards and State general plan guidelines, interior noise exposure should not exceed 45 dB CNEL within noise-sensitive spaces, whether in suburban or urban environments. Standard modern building techniques and requirements, such as use of dual-paned windows, typically reduce exterior to interior noise transmission by 25 dB. The standards within the noise element of locally adopted general plans are for planning policy purposes and are generally not regulatory. Most jurisdictions regulate noise through their municipal code.

Local Noise Ordinances and Standards

The local noise code is generally applied to address noise complaints associated with non-transportation (e.g., public address systems, mechanical equipment). Noise exposure criteria presented within municipal codes should match performance criteria presented in the noise element of the general plan for the given jurisdiction.

Cities and counties often provide noise level performance standards for stationary noise sources (e.g., mechanical equipment) in the municipal code. These standards are used to address intermittent noise exposure and are often in terms of the hourly average noise level (L_{eq}) or maximum noise level (L_{max}). Noise standards are generally provided for interior and exterior noise exposure, with lower standards for interior noise. Most jurisdictions have different stationary noise standards depending on the time of day (e.g., daytime and nighttime) to account for changes in noise sensitivity during different times of day. Similarly, land uses or zoning districts often have different noise standards to account for the noise sensitivity of various receivers. Residential land uses are more sensitive to noise exposure than commercial and industrial land uses. For example, Section 13.40.050 of the City of Berkeley Municipal Code provides exterior noise standards for residential land uses of 55 dBA L_{eq} from 7:00 a.m. to 10:00 p.m. and 45 dBA L_{eq} from 10:00 p.m. to 7:00 a.m. The City of Berkeley has a higher noise standard for commercial uses of 65 dBA L_{eq} from 7:00 a.m. to 10:00 p.m. and 60 dBA L_{eq} from 10:00 p.m. to 7:00 a.m. Section 13.40.050 of the City of Berkeley Municipal Code contains separate noise standards for interior noise exposure of 40 dBA L_{eq} from 7:00 a.m. to 10:00 p.m. and 40 dBA L_{eq} from 10:00 p.m. to 7:00 a.m. for all zoning districts. Other jurisdictions, such as Marin County, do

not have numerical noise standards for non-transportation noise sources in their municipal code and instead cite nuisance noise. For example, Section 6.70.030, Enumerated Noises, of the Marin County Code prohibits unnecessary and excessive noise levels from horns, signaling devices, radios, loudspeakers, amplifiers, and yelling between the hours of 11:00 p.m. and 7:00 a.m.

Noise ordinances throughout the Bay Area reflect the differences in the intensity of land uses in each jurisdiction. Typical noise standards for rural and suburban areas are often lower than urban areas to account for the existing noise environment. For example, the City of Oakland (a more urban area), has higher noise allowances of up to 75 dBA L_{eq} during the daytime for residential uses (Section 17.120.050 of the City of Oakland Municipal Code), while the City of Rohnert Park (a more suburban area) has lower residential daytime residential noise standards of 60 dBA L_{max} (City of Rohnert Park Municipal Code Section 17.12.030).

3.4.2 Environmental Setting

ACOUSTIC FUNDAMENTALS

Prior to discussing the noise setting for the Project, background information about sound, noise, and vibration, and is needed to provide context and a better understanding of the technical terms referenced throughout this section.

Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a human ear. Noise is defined as loud, unexpected, annoying, or unwanted sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, or thousands of hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this large range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB).

Addition of Decibels

Because decibels are logarithmic units, SPLs cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness at the same time, the resulting sound level at a given distance would be 3 dB higher than if only one of the sound sources was producing sound under the same conditions. For example, if one idling truck generates an SPL of 70 dB, two trucks idling simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level approximately 5 dB louder than one source.

A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within this range better than sounds of the same amplitude with frequencies outside of this range. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of A-weighted decibels) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgment correlates well with the A-scale sound levels of those sounds. Thus, noise levels are typically reported in terms of A-weighted decibels. All sound levels discussed in this section are expressed in A-weighted decibels. Table 3.4-1 describes typical A-weighted noise levels for various noise sources.

Table 3.4-1 Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet	— 100 —	
Gas lawn mower at 3 feet	— 90 —	
Diesel truck at 50 feet at 50 miles per hour	— 80 —	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, daytime, Gas lawn mower at 100 feet	— 70 —	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	— 60 —	
Quiet urban daytime	— 50 —	Large business office, Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime	— 30 —	Library, Bedroom at night
Quiet rural nighttime	— 20 —	
	— 10 —	Broadcast/recording studio
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Notes: dBA = A-weighted decibels.

Source: Caltrans 2013: Table 2-5.

Human Response to Changes in Noise Levels

The doubling of sound energy results in a 3-dB increase in the sound level. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different from what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear can discern 1-dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000–8,000 Hz) range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 Hz and perceives both higher and lower frequency sounds of the same magnitude with less intensity (Caltrans 2013: 2-18). In typical noisy environments, changes in noise of 1–2 dB are generally not perceptible. However, it is widely accepted that people can begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness (Caltrans 2013). Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which a noise level decreases with distance depends on the following factors:

Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Roads and highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources, thus propagating at a slower rate in comparison to a point source. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

Ground Absorption

The propagation path of noise from a source to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling provides additional attenuation associated with geometric spreading. Traditionally, this additional attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), additional ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the attenuate rate associated with cylindrical spreading, the additional ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance. This would hold true for point sources, resulting in an overall drop-off rate of up to 7.5 dB per doubling of distance.

Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels, as wind can carry sound. Sound levels can be increased over large distances (e.g., more than 500 feet) from the source because of atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also affect sound attenuation.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction (Caltrans 2013: 2-41; FTA 2018: 42). Barriers higher than the line of sight provide increased noise reduction (FTA 2018: 16). Vegetation between the source and receiver is rarely effective in reducing noise because it does not create a solid barrier unless there are multiple rows of vegetation (FTA 2018: 15).

EXISTING NOISE ENVIRONMENT

Existing Noise-Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels, and because of the potential for nighttime noise to result in sleep disruption. Additional land uses such as schools, transient lodging, historic sites, cemeteries, and places of worship are also generally considered sensitive to increases in noise levels. Local general plans often specify noise sensitive land uses in their jurisdiction.

Existing Noise Sources

The existing noise environment in the Bay Area is composed of two primary categories of noise sources: transportation and non-transportation. The ambient noise environment in the urban areas of the Bay Area is primarily influenced by traffic noise. Traffic noise exposure is primarily a function of the volume of vehicles per day, the speed of those vehicles, the type of ground (i.e., hard or soft), the number of those vehicles represented by medium and heavy trucks, the distribution of those vehicles during daytime and nighttime hours, and the proximity of noise-sensitive receivers to the roadway. Baseline traffic noise within the Bay Area has been characterized by traffic noise modeling. The baseline for the noise analysis is a simulation of 2015 traffic levels and land use. Based on modeling conducted for all roadway types within Bay Area, average noise levels range from 52.6 dBA CNEL (next to collector and small roads) to as high as 74.9 dBA CNEL (next to freeways) (MTC and ABAG 2021: 3.12-9).

The Bay Area is also affected by noise from freight and passenger rail operations. While these operations generate significant noise levels in the immediate vicinity of the railways, train operations are intermittent and area railways are widely dispersed. Commuter rail, such as San Francisco Municipal Railway and Valley Transportation Authority, operate with more frequency than standard gauge rail operations but at lower speeds, resulting in lower noise levels. Bay Area Rapid Transit operations, on the other hand, can attain higher speeds and have the potential for greater noise levels along extended stretches. Based on available data, noise levels from rail operations within the Bay Area can range from 62 dBA CNEL to 81 dBA CNEL (MTC and ABAG 2021: 3.12-9).

The Bay Area has many airports, including public use, private use, and military facilities. Major airports include San Francisco International, Oakland International, and Norman Y. Mineta San Jose International. In addition to the daily aircraft operations originating and terminating at these facilities, aircraft not using these airports frequently fly over the Bay Area. All of these operations contribute to the overall ambient noise environment. In general, like rail noise, the proximity of the receiver to the airport and aircraft flight path determines the noise exposure. Other contributing factors include the type of aircraft operated, altitude of the aircraft, and atmospheric conditions. Atmospheric conditions may contribute to the direction of aircraft operations (flow) and affect aircraft noise propagation.

A wide variety of industrial and other non-transportation noise sources are located within the Bay Area. These include manufacturing plants, landfills, treatment plants (e.g., water), power generation facilities, refineries, food packaging plants, lumber mills, and aggregate mining facilities, just to name a few. Noise generated by these sources varies widely, but in many cases may be a significant if not dominant contributor to the noise environment (MTC and ABAG 2021: 3.12-11).

3.4.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

This analysis evaluates the potential operational noise impacts associated with appliances that emit zero NO_X and would be allowed for sale and installation within the Bay Area if the proposed amendments are adopted. Because noise thresholds are not standardized throughout the Bay Area this analysis presents a qualitative assessment of noise from appliances, such as new furnaces and water heaters, for residential and commercial installation.

All new furnaces and water heaters would be required to be zero-NOx units upon implementation of the proposed amendments. Currently, zero-NOx units that are available on the market are electric heat pump units. However, the proposed amendments do allow for manufacturers to develop and market zero-NOx appliances that are natural gas-fired. If such appliances are developed, consumers would be able to choose between zero-NOx electric heat pumps and zero-NOx natural gas-fired units upon implementation of the proposed amendments, and the result would be that some combination of electric heat pumps and zero-NOx natural gas fired appliances are installed. Both natural gas-fired and electric heat pump units would generate noise, though it is unknown if one would generate more noise than the other or if they would generate a similar amount of noise. The analysis here assumes, based on currently available technology, that only electric heat pumps are installed if the proposed amendments are implemented.

THRESHOLDS OF SIGNIFICANCE

According to State CEQA Guidelines Appendix G, a noise impact would be significant if implementation of the Project would:

- generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards;
- generate excessive groundborne vibration or groundborne noise levels; or
- for a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

ISSUES NOT DISCUSSED FURTHER

Construction Noise

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of appliances, such as furnaces and water heaters, that would be allowed for sale and installation within the Bay Area. The proposed rule amendments would not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The proposed rule amendments would regulate the type of equipment that would be installed, not whether it would be installed. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. These appliances meeting the NOx standards would primarily be installed inside of residential and commercial buildings, but may also be installed outside. Installation activities, which may generate a small amount of noise and would be temporary, would occur with or without the Project. Installation of these appliances on building exteriors, such as at ground level, or on exterior walls and roofs, would require minimal construction (e.g., less than a week) and would not involve large or loud construction equipment. Because any exterior construction noise involved with appliance installation would be minimal, the proposed amendments would not generate a substantial temporary increase in ambient noise levels in excess of local noise standards. Therefore, noise impacts associated with construction activities would not occur, and this issue will not be discussed further.

Vibration

The proposed rule amendments would not generate or expose people to excessive groundborne vibration or groundborne noise. No large construction equipment that would generate substantial noise or vibration (e.g., backhoes, graders, jackhammers, etc.) would be needed to install new appliances, no new appliances that would generate vibration would be installed, and no increase in traffic would be generated. Therefore, no vibration impacts would occur, and this issue will not be discussed further.

Airport Noise

Airports may be located within two miles of residential and commercial buildings affected by the proposed rule amendments. However, the proposed rule amendments, which would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area, would not expose people residing or working in the Project area to excessive noise levels associated with airports. Further, the proposed amendments would not locate residents or commercial buildings or other sensitive noise sources closer to airport operations. Therefore, the Project would not expose people residing or working in the Project area to excessive noise levels. No impacts related to airport noise would occur, and this issue will not be discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.4-1: Potential to Generate Long-Term Operational Noise

The proposed amendments would include installation of stationary sources such as heat pump units, which would be installed inside and outside of existing buildings. The potential operational noise impacts associated with this equipment could be potentially significant depending on the existing ambient noise environment, noise levels associated with the units, and the noise standards of the jurisdiction in which the units would be installed. Mitigation measures are likely available to minimize these impacts to a less-than-significant level; however, it is likely that noise from some units would remain significant and unavoidable, especially because the BAAQMD does not have jurisdiction to monitor or enforce any of these mitigation measures. Therefore, the Project would result in a substantial long-term operational noise impact, and this impact would be potentially significant.

The proposed amendments would result in a transition from currently designed natural gas–powered furnaces and water heaters to zero-NO_x electric furnaces and water heaters and/or zero-NO_x natural gas-powered appliances (if they are developed by manufacturers). If zero-NO_x natural gas-powered appliances are developed, consumers would be able to choose between gas and electric zero-NO_x appliances, and it is assumed that the proposed amendments would result in the installation of some combination of the two choices. Both natural gas-fired and electric heat pump units would generate noise, though it is unknown if one would generate more noise than the other or if they would generate a similar amount of noise, and it is unknown if zero-NO_x natural gas-fired appliances would include equipment installed outdoors. Currently available zero-NO_x electric heat pumps used for space heating include equipment that is installed both inside and outside of the building the appliance is heating. The exterior equipment would add a new source of noise to the outside environment, while the interior equipment would replace currently existing equipment of similar noise levels. Currently available zero-NO_x electric heat pumps used for water heating are installed at the same location (typically indoors in an enclosed utility closet) as standard natural gas-fired tank water heaters, but may produce more noise than currently installed appliances. The analysis here assumes, based on currently available technology, that only electric heat pumps are installed if the proposed amendments are implemented.

Noise from new appliances that meet the proposed NO_x standards would vary depending on the size, model of equipment installed, and if the equipment would serve residential or commercial uses. The loudest published level for commercial heat pumps that would be installed for the proposed rule amendments is 83 dBA (Daikin 2021). Noise levels from commercial equipment are used in this analysis to represent a conservative assessment of stationary source equipment because commercial equipment would generally be larger and therefore louder than appliances for residential development. This analysis is conservatively based on the loudest published noise levels for commercial heat pumps of 83 dBA and does not take into consideration measures, such as locating heat pumps in enclosures or behind barriers, that would reduce noise levels.

Noise levels from the equipment at the nearest receiver would vary depending on several factors including distance to receivers, location of installation (e.g., utility closet, on the ground, wall, or roof), and if the equipment would be installed inside or outside of the building. Equipment installed inside of buildings would not be audible outside of the building and, thus, would not affect surrounding receivers but may affect residents of the building. Noise levels from equipment installed on the exterior of buildings may result in noise in exceedance of community noise levels.

Stationary noise is typically regulated through local municipal codes, which provide performance-based noise standards, specific to the noise source. Some agencies have a permit process for installation of equipment, such as heat pump units. Therefore, noise generated by appliances that meet the proposed NO_x standards outside of buildings would be subject to the maximum allowable exterior and interior noise standards contained in the applicable jurisdictions municipal code.

However, because noise standards vary across the Bay Area, this analysis determines if there would be a substantial increase in noise based on if the jurisdiction is considered a rural, suburban, or urban area. For example, urban development is frequently located in areas subject to higher noise, and local standards often provide that higher

noise levels are conditionally acceptable for residential uses in such areas. The City of San Francisco, for example, lists noise levels as high as 70 dBA CNEL as conditionally acceptable for residential uses.

As discussed above under "Existing Noise Environment," the Bay Area has a variety of noise environments and sensitive receivers. Rural or less densely populated areas would experience higher outdoor noise levels from proposed stationary equipment than urbanized areas because the stationary sources would be more audible over lower existing ambient noise. Based on the range of existing noise standards in the Bay Area, a substantial exterior noise impact would occur if Project-specific noise levels result in an exceedance of 70 dBA CNEL in urban and mixed-use areas and 65 dBA CNEL in a suburban or rural area. A substantial interior increase in noise from the Project would occur if noise levels from new appliances would exceed the California Building Code and California General Plan Guidelines of 45 dBA CNEL.

Implementation of the Project could result in an increase in location-specific and/or community noise levels from operation of the new appliances. Noise from new appliances would vary depending on ambient noise levels and amount of existing development. Noise from stationary equipment installed to meet the zero-NO_x standard would be intermittent in nature and would fluctuate throughout the day. These appliances do not typically run all day, but operate in short bursts. However, this analysis conservatively assumes that noise from operation of individual appliances could be as loud as 83 dBA outdoors operating up to 24 hours a day.

Although specific noise locations for new appliances as part of the Project are not known at this time, considering the high density of land development throughout the Bay Area in already urbanized areas, including suburban and rural development, where existing sensitive receivers exist, the Project could result in a significant impact on certain noise receptors on its own, and/or an increase in community noise levels that is significant. Multiple appliances in operation could together result in a significant impact on certain individual residents and/or an exceedance of community noise exposure of existing sensitive receivers to noise levels above 65 dBA CNEL or 70 dBA CNEL (exterior) and 45 dBA CNEL (interior). The appliances may be installed in areas that already exceed acceptable noise levels, and any additional noise impact in these areas could introduce a cumulatively considerable addition to an existing significant impact.

Compliance with performance-based noise standards may require installation of noise reduction measures. However, such permit processes and requirements are not required in all jurisdictions throughout the Bay Area. Stationary equipment noise is typically regulated through local municipal codes, which provide specific performance-based noise standards in L_{eq} and L_{max}, specific to the noise source, and give the local jurisdiction the ability to enforce noise sources that violate the code (see "Regional Setting," above). These criteria are generally tied directly to the standards presented in the city/county municipal code (i.e., noise ordinance).

Any noise producing equipment must comply with local noise ordnances and applicable federal Occupational Safety and Health Administration (OSHA) and California OSHA noise requirements. Compliance with these noise requirements would apply to residential and commercial buildings and would be expected to limit noise to acceptable levels. Noise from the new appliances could be further reduced through requirements to add shielding, screening, or coverings on proposed equipment where noise would exceed applicable standards. However, it is likely that noise from operation of some of these appliances would still exceed applicable standards in some locations. Therefore, the Project could result in a substantial long-term operational noise impact, and this impact would be potentially significant.

Mitigation Measures

As described above, the installation of appliances that meet the proposed NO_x standards would occur throughout the nine-county Bay Area and operation of these appliances would generate noise. Mitigation measures, such as enclosures or screening, are likely available to minimize operational noise impacts to a less-than-significant level; however, it is likely that some would remain significant and unavoidable. The BAAQMD does not have land use authority to require these mitigation measures for individual equipment installations nor jurisdiction to monitor or enforce any of these measures. Therefore, the Project's contribution to these impacts and the impact remains potentially significant and unavoidable.

CUMULATIVE IMPACTS

As described under Impact 3.4-1, the Project could result in a long-term increase in operational noise. If approved, the zero-NO_x standards would be in effect beginning in 2027, and a quantitative comparison of this long-term increase in operational noise with the existing noise environment would not be realistic, especially in the context of the nine-county Bay Area, which includes a variety of different noise environments and noise regulations. Impact 3.4-1 evaluates the Project's direct noise impacts and the Project's contribution to the existing and projected long-term increase in operational noise throughout the Bay Area. Impact 3.4-1 is therefore both a project-based impact analysis and a cumulative impact analysis and no further cumulative impact analysis is needed for noise.

3.5 AESTHETICS

This section describes the existing visual conditions, meaning the physical features that make up the visible landscape, in the Bay Area and evaluates the potential changes to those conditions that would occur from Project implementation. The effects of the Project on the visual environment are generally defined in terms of the Project's physical characteristics and potential visibility, the extent to which the Project's presence would change the perceived visual character and quality of the environment, and the expected level of sensitivity that the viewing public may have where the Project would alter existing views.

The notice of preparation (NOP) for this Project did not identify aesthetics as a potentially significant impact. No comment letters regarding aesthetics were received in response to the NOP (see Appendix A). However, the BAAQMD has determined the need to evaluate potential aesthetic impacts in this EIR.

3.5.1 Regulatory Setting

FEDERAL

No federal plans, policies, regulations, or laws related to aesthetics are applicable to the Project.

STATE

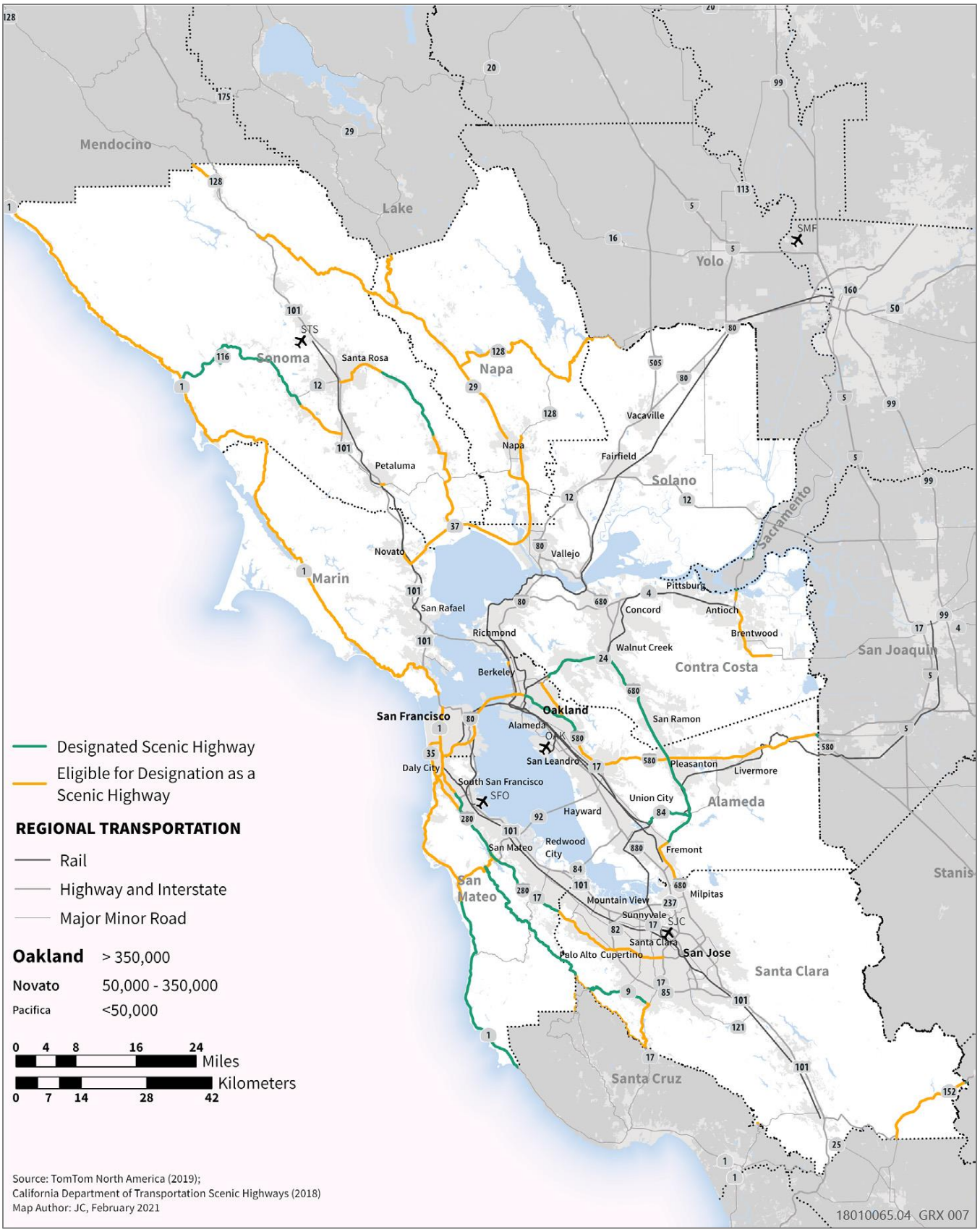
California Scenic Highway Program

Recognizing the value of scenic areas and views from roads in such areas, the State Legislature established the California Scenic Highway Program in 1963. and is managed by the California Department of Transportation (Caltrans) This legislation preserves and protects scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to highways. The goal of the Scenic Highway Program is to preserve and enhance the natural beauty of California. Under this program, portions of a number of State highways have been designated as eligible for inclusion as scenic routes. To nominate a scenic highway the local jurisdictions through which the roadway passes must conduct a visual assessment, submit a Scenic Highway Proposal, and prepare and adopt a corridor protection program (CPP). After Caltrans and the State Scenic Highway Coordinators review the nomination and recommend designation of the roadway, the State may officially designate roadways as scenic routes. Interstate highways, State highways, and county roads may be designated as scenic under the program (Caltrans n.d.).

As noted, a CPP must be adopted by the local governments with land use jurisdiction over the area through which the roadway passes as the first step in moving a road from "eligible" to "designated" status. Each designated corridor is monitored by the State, and designation may be revoked if a local government fails to enforce the provisions of the corridor protection program. Although there are no restrictions on scenic highway projects, local agencies and Caltrans must work together to coordinate transportation and development projects and ensure the protection of the corridor's scenic value to the greatest extent possible, including undergrounding all visible electric distribution and communication utilities within 1,000 feet of a scenic highway. In some cases, local governments have their own land use and site planning regulations in place to protect scenic values along a designated corridor. At a minimum, each corridor protection program must include:

- regulation of land use and density of development,
- detailed land and site planning,
- control of outdoor advertising devices,
- control of earthmoving and landscaping, and
- regulation of the design and appearance of structures and equipment.

The Bay Area includes numerous designated or eligible State scenic highways. Officially designated State scenic highways are illustrated in Figure 3.5-1. All officially designated and eligible State scenic highways in the Bay Area are listed in Table 3.5-1.



Source: MTC and ABAG 2021: Figure 3.2-2.

Figure 3.5-1 Scenic Highways

Table 3.5-1 California State Scenic Highway System Officially Designated and Eligible Routes in the Bay Area

Designation	Route	County	Location
OD	1	San Mateo	Santa Cruz County line to southern city limit of Half Moon Bay
OD	9	Santa Clara	Santa Cruz County line/Saratoga Gap to Blaney Plaza in Saratoga
OD	9	Santa Clara	Blaney Plaza in Saratoga to Los Gatos city limit
OD	12	Sonoma	Danielli Avenue east of Santa Rosa to London Way north of Agua Caliente
OD	24	Contra Costa	East portal of Caldecott Tunnel to I-680 north of Walnut Creek
OD	35	San Mateo	Santa Cruz County line to Santa Clara County line
OD	35	San Mateo	Santa Clara County line to SR 92 in Half Moon Bay
OD	84	Alameda	SR 238 (Mission Boulevard) to I-680 near Sunol
OD	116	Sonoma	SR 1 to southern city limit of Sebastopol
OD	280	San Mateo	Santa Clara County line to northern city limit of San Bruno
OD	580	Alameda	San Joaquin County line to SR 205
OD	580	Alameda	San Leandro city limit to SR 24 in Oakland
OD	680	Alameda	Mission Boulevard in Fremont to Bernal Avenue near Pleasanton
OD	680	Alameda	Bernal Avenue near Pleasanton to Contra Costa County line
OD	680	Contra Costa	Alameda County line to SR 24
E	1	Marin/ Sonoma/Mendocino	SR 101 near Marin City to SR 101 near Leggett
E	1	San Francisco	SR 35 in San Francisco to SR 101 near Golden Gate Bridge in San Francisco
E	1	San Luis Obispo/San Mateo/ San Francisco	SR 101 near San Luis Obispo to SR 35 near Daly City
E	4	Contra Costa	SR 160 near Antioch to SR 84 near Brentwood
E	9	Santa Clara	SR 35 to SR 17 near Los Gatos
E	12	Sonoma	SR 101 near Santa Rosa to SR 121 near Sonoma
E	13	Alameda	SR 24 to I-580
E	17	Santa Cruz/Santa Clara	SR 1 near Santa Cruz to SR 9 near Los Gatos
E	24	Contra Costa	Alameda/Contra Costa County line to I-680 in Walnut Creek
E	29	Napa/Lake	Trancas Street in Napa to SR 20 near Upper Lake
E	29	Solano/Napa	SR 37 near Vallejo to SR 221 near Napa
E	35	Santa Clara/Santa Cruz/ San Mateo/San Francisco	SR 17 to SR 92/I-280/SR 1 in San Francisco
E	37	Marin	SR 251 near Nicasio to SR 101 near Novato
E	37	Marin/ Sonoma/Solano	SR 101 near Ignacio to SR 29 near Vallejo
E	80	San Francisco/Alameda	I-280 near First Street in San Francisco to SR 61 in Oakland
E	84	Alameda	SR 238 to I-680 near Sunol
E	92	San Mateo	SR 1 north of Half Moon Bay to I-280 north of Crystal Springs Lake
E	101	Marin	North of San Francisco across the Golden Gate Bridge to SR 1 in Marin City
E	101	Marin	SR 37 near Ignacio to SR 37 near Novato
E	116	Sonoma	SR 1 near Jenner to SR 101 near Cotati
E	121	Napa	SR 221 near Napa State Hospital to near Trancas Street in Napa
E	121	Sonoma	SR 37 near Sears Point to SR 12 near Sonoma
E	152	Santa Clara/Merced	SR 156 near San Felipe to I-5
E	156	Monterey/San Benito/Santa Clara	SR 1 near Castroville to SR 152 northeast of Hollister

Designation	Route	County	Location
E	160	Contra Costa/Sacramento	SR 4 near Antioch to Sacramento
E	221	Napa	SR 29 at Suscol Road to SR 121 in Napa
E	239	Alameda/Contra Costa	I-580 west of Tracy to SR 4 near Brentwood
E	251	Marin	SR 37 near Nicasio to SR 1 near Point Reyes
E	280	Santa Clara/San Mateo/ San Francisco	SR 17 to I-80 near First Street in San Francisco
E	580	San Joaquin/Alameda	I-5 southwest of Vernalis to I-80
E	680	Alameda/Contra Costa	Santa Clara County line to SR 24 in Walnut Creek

Notes: E = eligible; OD = officially designated; I- = Interstate; SR = State Route.

Source: Caltrans 2019.

Open Space Easement Act of 1974

Cities and counties can use open space easements as a mechanism to preserve scenic resources if they have adopted open space plans, as provided by the Open Space Easement Act of 1974 (Government Code, Sections 51070, 51097). According to this act, a city or county may acquire or approve an open space easement through a variety of means, including use of public money.

California Code of Regulations Title 24 Part 6

The California Energy Code (24 CCR 6) creates standards in an effort to reduce energy consumption. The type of luminaries and the allowable wattage of certain outdoor lighting applications are regulated.

REGIONAL AND LOCAL

City and County General Plans

City and county general plans may include policies for protecting scenic resources, such as hillsides, natural areas, landmarks, roads, and historic districts. Such policies may restrict new development in areas that maintain scenic vistas or areas that contain important character-defining structures. Additionally, design guidelines established at the local level may establish specific standards for addressing development where local character and/or important visual resources may be affected.

Counties and municipalities also may have scenic route components within their individual general plans. Policies usually encourage the designation of scenic routes as scenic corridors, either by local action or through the State program. Counties and municipalities may also establish regulatory programs or recommend corridor studies to determine the appropriate regulatory program to preserve scenic quality.

Issues pertaining to visual resources are typically addressed in the land use elements of general plans, but policies can also be found in the conservation and open space elements. The General Plan Guidelines, prepared by the California Governor's Office of Planning and Research, recommend that the land use element address an inventory of scenic viewsheds and points of interest, definition of community scenic values, programs for protecting and promoting community aesthetics, and identification of scenic highways and byways (OPR 2017).

3.5.2 Environmental Setting

The Bay Area is characterized by the diversity of urban development and the combination of rural and agricultural landscapes, as well as the natural beauty and wildlife provided by the surrounding mountain ranges and rich wildlife habitats. It stretches along the central northern Pacific coast of California, with several branches of the Coast Ranges dividing it into valleys, plains, and water bodies. The largest of these valleys contains San Francisco Bay, whereas at the eastern edge of the region is the great Central Valley, a flat plain lying between the Coast Ranges and the Sierra Nevada. The hills of the Coast Ranges provide expansive views of the valleys and plains below, revealing a variety of

development types, including urban areas along the bay plains and inland valleys, agricultural lands, and protected open space, and natural areas.

The landscapes of the San Francisco Bay Area are varied, unique, and recognized by many in the region and beyond. The basin formed by the Coast Ranges, East Bay hills, and the Bay itself are prominent physical features of the region. To the west, the Pacific Ocean and the Coast Ranges dominate the visual setting, stretching from Mount Tamalpais in the north to the Santa Cruz Mountains in the south. To the east, the Diablo Range, punctuated by Mount Diablo, provides a view of a different character. In the north, the vineyards of Napa and Sonoma Counties are unique and draw visitors from around the world. Many built features in the Bay Area—the Golden Gate and Bay Bridge and the San Francisco skyline in particular—are also of international renown. Bay Area residents and tourists alike value the variety and quality of the visual experiences that are found throughout the Bay Area, including urban and rural public spaces, regional parks, and transportation corridors in the region, including heavily traveled freeways, transit lines, and ferries, and narrow country roads through secluded forests and agricultural areas. Figure 3.5-2 depicts the locations of major scenic resources found in the Bay Area. Major land use and/or transportation projects may affect the visual experiences of travelers and the distinctive visual environment of the region.

HILLS AND VALLEYS

The Bay Area contains several distinct mountain ranges and hills. Along the peninsula between the Pacific Ocean and San Francisco Bay lie the coastal hills of San Mateo and Santa Clara Counties and, north of the Golden Gate, the hills of Marin County. The East Bay hills rise steeply from the urbanized plain along the eastern edge of the Bay, forming a several mile–wide band that also defines the western edge of the Diablo and Livermore Valleys of Contra Costa and Alameda Counties. The rolling hills of the Diablo Range separate these valleys from the lowlands of the Central Valley. These hills converge at the south end of the Bay Area in Santa Clara County. To the north, several ranges frame the Napa and Sonoma valleys.

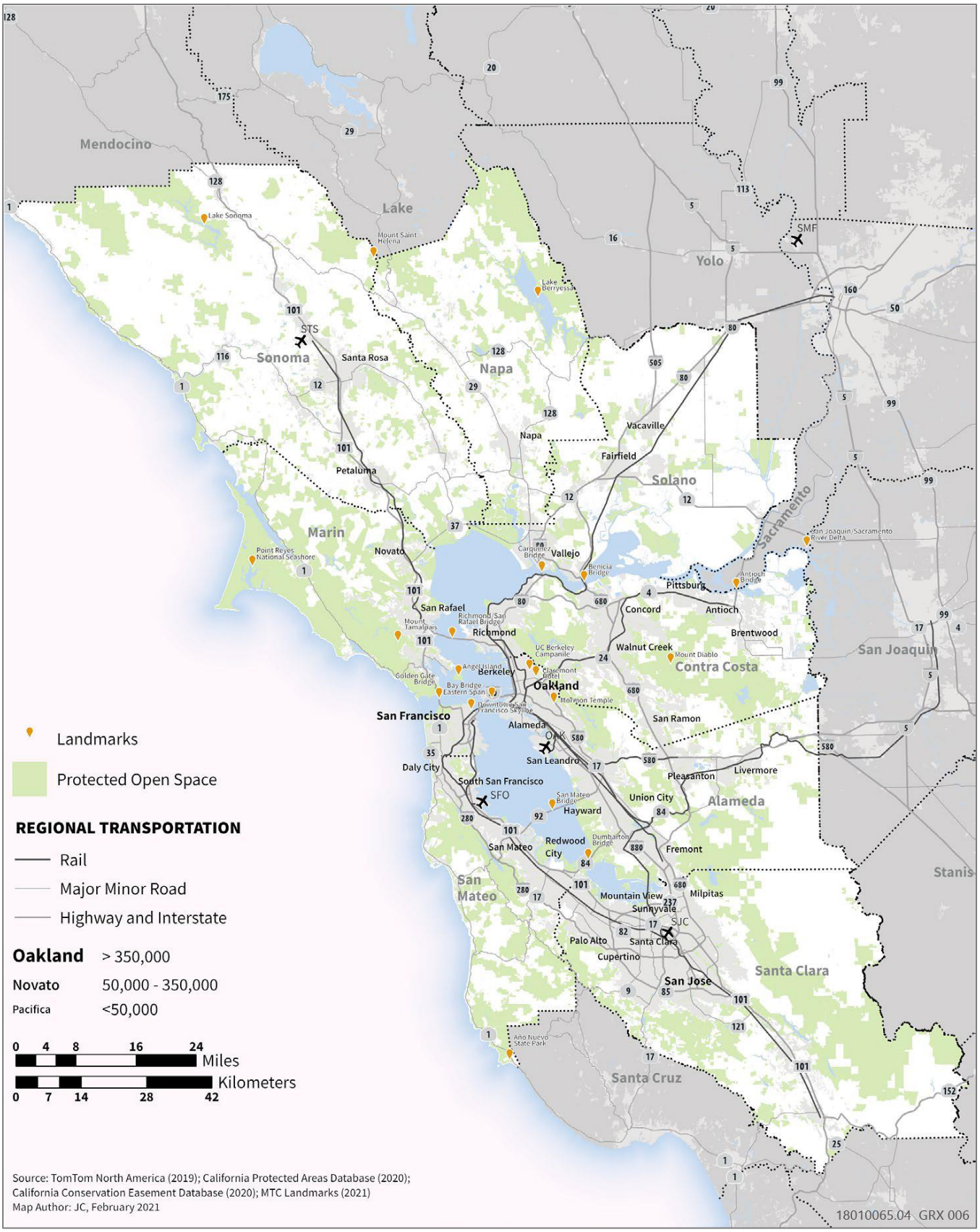
Between these ranges and hills are numerous valleys, both broad and narrow. San Francisco Bay, for example, is bordered along the east and west by a narrow, heavily urbanized plain. This plain widens in the south into the Santa Clara Valley, which, until World War II, was primarily agricultural. The East Bay and coastal hills, which are visible throughout these lowlands, orient viewers and give a sense of scale to the surrounding urban areas. Likewise, to the north, the hills forming the Sonoma and Napa valleys enclose these agricultural areas with urban pockets.

LANDMARKS AND GATEWAYS

Certain features of the Bay Area stand out as symbols and points of orientation (see Figure 3.5-2). These landmarks include the Golden Gate and Bay Bridges, Alcatraz and Angel Islands, San Francisco skyline, several large buildings in the East Bay hills (the Campanile on the University of California, Berkeley, campus; the Claremont Hotel; and the Mormon Temple in Oakland, for example), and Mount Saint Helena at the northern end of the Napa Valley. These landmarks help visitors and residents locate themselves within the region and, in the case of the Golden Gate Bridge, symbolize the Bay Area for the rest of the world.

WATERWAYS

The Bay Area is home to a number of bodies of water and waterways that flow through or are located in the region. Estuaries, creeks, and built waterways are found throughout the region, as well as the dominant body of water, the San Francisco Bay, which reaches out to the northern and southernmost counties of the Bay Area. Most rivers and streams originating in each of the nine counties of the Bay Area flow into the San Francisco Bay, which provides access to the Pacific Ocean. There are also many smaller built reservoirs in the Bay Area that provide notable landscape features, as well as a few larger reservoirs, notably Lake Berryessa in Napa County and Lake Sonoma in Sonoma County.



Source: MTC and ABAG 2021: Figure 3.2-1.

Figure 3.5-2 Major Bay Area Scenic Resources

VIEWS FROM TRAVEL CORRIDORS

Many roadways and rail lines that intersect the landscapes of the Bay Area provide expansive, regional views of surrounding areas, often because of their wide rights-of-way, location along high points, the elevation of the facilities, or a combination of these factors. Examples include Interstate (I-) 280 along the peninsula, State Route (SR) 92 as it crosses the Coastal Ranges, I-80 near Rodeo, I-580 over the Altamont Pass and above Oakland, and the SR 24 corridor. Similarly, the rest area on I-80 above Vallejo, the west end of the Caldecott Tunnel, southbound US 101 in Marin County, and portions of US 101 in San Francisco offer dramatic views of notable Bay Area landscapes. The bridges crossing San Francisco Bay and the Carquinez Strait offer similar experiences. Both the Bay and Golden Gate Bridges provide world-famous views of San Francisco, whereas the Richmond-San Rafael Bridge provides sweeping views of the North Bay, including Mount Tamalpais and Angel Island. The Antioch Bridge allows views over the Sacramento–San Joaquin Delta.

Similarly, rail facilities (including Bay Area Rapid Transit [BART]) can provide travelers with broad views of the region or portions of it. The elevated BART lines through the East Bay, for example, provide views of the East Bay hills and the neighborhoods of Oakland, Berkeley, and El Cerrito. The Amtrak rail lines along San Pablo Bay and the San Joaquin River also provide broad views of the water with the hills beyond.

Roads and rail lines also provide more intimate views of forested hills or narrow valleys. SR 35 (along the crest of the San Mateo Peninsula) and SR 84 (through the narrows of Niles Canyon) are examples of such views. Similarly, SR 1 and Sir Francis Drake Boulevard run through the forests and grasslands of Marin County to the beaches, parks, and open space areas along the coast, up to and through Sonoma County. SR 29 and the Silverado Trail through the Napa Valley and SR 12 through the Sonoma Valley provide dramatic views of enclosing hills, adjoining vineyards, and wineries.

Finally, although carrying only a small proportion of the region's travelers, the Bay ferries provide unique viewing experiences of the Bay Area.

3.5.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

Assessment of impacts to aesthetics and visual resources is based on an objective evaluation of the Project's potential effects on the visual environment. This includes consistency with local ordinances and policies adopted for visual integrity of the community, impacts on viewsheds and scenic areas identified as important or valuable to the community, and changes in visual character of the area as compared to existing conditions.

THRESHOLDS OF SIGNIFICANCE

According to State CEQA Guidelines Appendix G, an aesthetic impact would be significant if implementation of the Project would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings (public views are those that are experienced from publicly accessible vantage points); in urbanized areas, conflict with applicable zoning and other regulations governing scenic quality; or
- create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

ISSUES NOT DISCUSSED FURTHER

All issues related to aesthetics listed under the significance criteria above are addressed in this section.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.5-1: Substantial Adverse Effects on a Scenic Vista

The proposed Project—specifically proposed Rule 9-4, which imposes NOx limitations on residential and commercial central furnaces—could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Even the largest of these units would not likely be large enough to substantially adversely affect a scenic vista, especially given that the outdoor units would be mounted on or next to structures that would be much larger and more noticeable than the equipment. For these reasons, the Project would result in a less-than-significant impact related to scenic vistas.

Effects on scenic vistas associated with the proposed Project would relate to changes to views of important landscape features, such as the Golden Gate Bridge, or landforms, such as mountains. The potential to affect scenic vistas is related to the specific vantage point of a viewer and the types of development that currently exist. Important public views are typically protected based on locally adopted land use policies and/or regulations.

The proposed rule amendments would not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Therefore, no new or expanded buildings that could have substantial adverse effects on a scenic vista would be constructed as a result of the proposed rule amendments.

The proposed Project—specifically proposed Rule 9-4, which imposes NO_x limitations on residential and commercial central furnaces—could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Manufacturers may develop zero-NO_x natural gas-fired furnaces in the future, but there is currently no evidence to indicate that these appliances would be installed outdoors such that they could have potential visual impacts. Thus, the potential aesthetic impacts of installation of zero-NO_x space heating appliances focuses on installation of electric heat pump units.

The proposed Rule 9-6 amendments would require installation of zero-NO_x water heaters. Currently available zero NO_x electric heat pump water heaters appear visually similar to existing natural gas-fired water heaters and are installed within the same footprint of the existing appliances (typically in interior utility closets). Manufacturers may develop zero-NO_x natural gas-fired water heaters in the future, but there is currently no evidence to indicate that these appliances would be installed outdoors such that they could have potential visual impacts. Installation of zero-NO_x water heaters would not be expected to have any new visual impacts and this section focuses on potential impacts of amendments to Rule 9-4.

Electric heat pump units that replace furnaces are typically installed at ground level or on the exterior wall of a residential building. For larger, multifamily buildings or commercial applications, or in dense environments where there is no exterior space available at ground level, they may be installed on the roofs of buildings. Figures 3.5-3a through 3.5-3c shows a variety of heat pump units in different locations. The replacement of this equipment may involve a permitting process through a local agency, which could include visibility considerations, but there may be cases for which no permit would be required. In those cases, there would be no mechanism for a local agency to impose code or policy requirements related to visual resource protection.

Many of the furnace replacements would involve structures that currently have existing heating ventilation and air conditioning (HVAC) equipment or other exterior mechanical equipment, such that the addition or replacement of an outdoor unit would not result in any noticeable change. However, as indicated above, replacement of furnaces that are currently housed entirely within an existing structure (not uncommon in the Bay Area) with a heat pump unit would place some mechanical equipment on the exterior of the building—typically on the side or roofs of buildings, but in some cases may include smaller window units outside of individual, multi-family residential units.

Figure 3.5-3a Representative Photographs of Heat Pump Units at Ground Level Next to a Building

Figure 3.5-3b Representative Photographs of Heat Pump Units on the Side of Multi-Family Buildings

Figure 3.5-3c Representative Photographs of Heat Pump Units on Building Rooftops

In terms of scenic vistas, to substantially affect these resources, the exterior equipment would need to be large enough to obstruct views of the vistas or otherwise substantially alter the vista. Typical large outdoor units are under four feet in height and vary in width, depending on the style of unit, but most are under four feet in width. Most outdoor units, especially for single-family or small-to-medium-sized residential structures, would be smaller. Large buildings may have multiple outdoor units or clusters of units, typically mounted on rooftops. Ground-mounted units typically occur on the sides of structures where they are usually not conspicuously visible. Roof-mounted units are generally not visible from ground-level public viewing areas, but may be visible if the public viewing area is at or above the height of the structure's roof. In these cases, the existing structure itself would obstruct a given scenic vista far more than any additional piece(s) of equipment. For these reasons, a substantial adverse effect to a scenic vista is not considered to be a reasonably foreseeable outcome of the implementation of the proposed Project, and the impact would be less than significant.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.5-2: Substantially Damage Scenic Resources, Including, but not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway

Proposed amendments to Rule 9-4, which impose NO_x limitations on residential and commercial central furnaces, could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Implementation of this rule change would not affect trees, rock outcroppings, or other natural scenic resources. Although furnace replacement in existing historic buildings may include exterior heat pumps where no pumps currently exist, any such equipment to be placed on the exterior of historic structures is typically regulated by local municipalities. Even if such regulations did not apply, HVAC and air conditioning units are commonplace on historic structures, and the addition of this equipment to the exterior of a historic structure would not be considered "substantial damage" to the historic building itself or to a scenic resource as viewed from a State Scenic Highway. The Project would therefore result in a less-than-significant impact.

The proposed rule amendments would not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Therefore, no new or expanded buildings that could substantially damage scenic resources would be constructed as a result of the proposed rule amendments.

Proposed amendments to Rule 9-4, which impose NO_x limitations on residential and commercial central furnaces, could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Although it is possible that these units might be visible from one of the Bay Area's State Scenic Highways (see Figure 3.5-1), they would be associated with an existing or new structure and would not result in damage to trees, rock outcroppings, or other natural scenic resources. It is possible that units would be added to historic buildings visible from a State Scenic Highway; however, local agencies typically have strict requirements for alteration to the exterior of historic structures, including installation of equipment. Any installation of outdoor heat pump units on historic buildings would typically be subject to these requirements. Even if this equipment was added to a historic building where such requirements did not apply, it would not alter the visual character of the resource such that "substantial damage" would occur to the historic building itself or to a scenic resource as viewed from a State Scenic Highway. Historic buildings with HVAC and air conditioning units are extremely commonplace and still look like historic buildings. Further, it is likely that the new heat pump units would replace equipment already located on the exterior of historic buildings and/or would be co-located with other exterior utility equipment and, as such, would not materially alter the historic character of such buildings. Therefore, the addition of outdoor heat pump units to the exterior of a building, although potentially visible, would not result in substantial damage to a historic building itself or to a scenic resource seen from a State Scenic Highway, and the Project would result in a less-than-significant impact.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.5-3: Substantially Degrade the Existing Visual Character or Quality of Public Views Sites in Rural Areas, or Conflict with Applicable Zoning or Other Regulations Governing Scenic Quality in Urban Areas

In rural areas, replacement of furnaces that would place exterior equipment on existing buildings where no such equipment currently exists would not substantially degrade the visual character of the site because, by definition, an existing building would already exist in these circumstances, and addition of a small piece of external equipment on an existing building would not change the visual character of the site or adversely affect public views. In urbanized areas, exterior equipment is commonplace and the addition of outdoor heat pump units as a result of the Project would not likely conflict with any existing zoning or other regulations governing scenic quality. If such regulations exist, the entity replacing the equipment would be required to comply. For these reasons, the Project would not substantially degrade the existing visual character or quality of public views of the Bay Area or conflict with applicable zoning or other regulations governing scenic quality, and this impact would be less than significant.

Land within the Bay Area consists of a wide range of visual character types. Terrain ranges from flat valley floors, to sloping hillsides, to mountains. The Bay Area includes the Pacific Coast, the San Francisco Bay and Delta, as well as numerous lakes, reservoirs, rivers, and tributaries. The level of urban development within these areas highly influences the existing visual character. For example, an urbanized coastal community, such as Pacifica, has a much different character than the rural Sonoma coast. The urbanized valley land of San Jose has an entirely different visual character than the rural valley land of Gilroy.

The Environmental Checklist included as Appendix G of the State CEQA Guidelines identifies a two-part question that is used as the threshold of significance of this impact analysis: (1) in non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings (public views are those that are experienced from publicly accessible vantage points); (2) in urbanized areas, would the project conflict with applicable zoning and other regulations governing scenic quality. Because the proposed Project applies to the nine-county Bar Area region, both of these questions apply.

The proposed rule amendments would not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Therefore, no new or expanded buildings that could substantially degrade the existing visual character or quality of public views Sites in rural areas, or conflict with applicable zoning or other regulations governing scenic quality in urban areas would be constructed as a result of the proposed rule amendments.

Similar to Impacts 3.5-1 and 3.5-2, above, this impact discussion focuses on proposed Rule 9-4, which imposes NO_x limitations on residential and commercial central furnaces, and could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). These units are typically installed at ground level or on the exterior wall of a residential or commercial building but may also be installed on the building's roof (see Figures 3.5-3a through 3.5-3c).

In non-urbanized areas, there are fewer structures than in urbanized areas; however, there are structures. This is important because the only cases where the rule could change the exterior of a structure involve existing structures. Therefore, in non-urbanized areas, the only change to the visual character would involve changes to an existing structure. Because the existing structure is already part of the visual character of the affected site, the addition of an outdoor heat pump unit to that structure would not substantially alter the visual character of the site.

In urbanized areas, exterior equipment such as HVAC units and air conditioners (and heat pumps) are extremely commonplace. It is highly unlikely that the addition of an outdoor heat pump unit would conflict with any zoning or other regulations governing visual quality. In cases where such codes and policies exist, the entity replacing the unit would be required to comply with any applicable restrictions or other regulations. Therefore, the proposed rule

amendments would not conflict with applicable zoning or other regulations governing scenic quality in urban areas. Implementation of the Project would result in a less-than-significant impact.

Mitigation Measures

No mitigation is required for this impact.

Impact 3.5-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Views in the Area

Outdoor heat pump units do not include bright lights and are not made of reflective materials (i.e., polished metal or mirrored glass). The proposed rule amendments would not require new lighting fixtures. Therefore, the Project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. No impact would occur.

The proposed amendments could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). These units are typically installed at ground level or on the exterior wall of a residential or commercial building but may also be installed on the building's roof. Outdoor heat pump units do not include bright lights and are not made of reflective materials (i.e., polished metal or mirrored glass). The proposed rule amendments would not require new lighting fixtures. Therefore, the Project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. No impact would occur.

Mitigation Measures

No mitigation is required for this impact.

CUMULATIVE IMPACTS

As described under Impacts 3.4-1 through 3.4-4, the Project would not result in substantial adverse effects related to aesthetics. Therefore, the Project would not result in a considerable contribution to a significant cumulative impact related to aesthetics. This cumulative impact would be less than significant.

4 ALTERNATIVES

4.1 INTRODUCTION

The California Code of Regulations (CCR) Section 15126.6(a) (State CEQA Guidelines) requires EIRs to describe "… a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a range of potentially feasible alternatives that will avoid or substantially lessen the significant adverse impacts of a project and foster informed decision making and public participation. An EIR is not required to consider alternatives that are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason." This section of the State CEQA Guidelines also provides guidance regarding what the alternatives analysis should consider. Subsection (b) further states the purpose of the alternatives analysis is as follows:

> Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code [PRC] Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

The State CEQA Guidelines require that the EIR include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the project as proposed (CCR Section 15126.6[d]).

The State CEQA Guidelines further require that the "no project" alternative be considered (CCR Section 15126.6[e]). The purpose of describing and analyzing a no project alternative is to allow decision makers to compare the impacts of approving a proposed project with the impacts of not approving the proposed project. If the no project alternative is the environmentally superior alternative, CEQA requires that the EIR "…shall also identify an environmentally superior alternative among the other alternatives." (CCR Section 15126[e][2]).

In defining "feasibility" (e.g., "… feasibly attain most of the basic objectives of the project …"), CCR Section 15126.6(f) (1) states, in part:

> Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent). No one of these factors establishes a fixed limit on the scope of reasonable alternatives.

In determining what alternatives should be considered in the EIR, it is important to consider the objectives of the project, the project's significant effects, and unique project considerations. These factors are crucial to the development of alternatives that meet the criteria specified in Section 15126.6(a). Although, as noted above, EIRs must contain a discussion of "potentially feasible" alternatives, the ultimate determination as to whether an alternative is feasible or infeasible is made by the lead agency's decision-making body, here the BAAQMD Board of Directors. (See PRC Sections 21081.5, 21081[a] [3].)

4.2 CONSIDERATIONS FOR SELECTION OF ALTERNATIVES

4.2.1 Attainment of Project Objectives

As described above, one factor that must be considered in selection of alternatives is the ability of a specific alternative to attain most of the basic objectives of the project (CCR Section 15126.6[a]). Chapter 2, "Project Description," articulated the Project's purpose and objectives, which are repeated below.

The overall purpose of the proposed amendments is to reduce nitrogen oxide (NO_X) emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area. Specifically, the objectives of the proposed amendments to Rules 9-4 and 9-6 are to:

- for Rule 9-4, introduce an "ultra-low" NO_X standard for space-heating appliances with a compliance date in 2024;
- for Rule 9-4, establish a zero-NO_X standard in 2029;
- for Rule 9-6, establish a zero-NO_X standard for water heaters with compliance dates ranging from 2027 to 2031 based on equipment type, use, and size;
- expand the applicability of Rule 9-4 to a larger breadth of space-heating appliances;
- update and clarify the certification and calculation methods contained in the rules;
- ensure equitable implementation of the rules; and
- improve the clarity and enforceability of the rules.

4.2.2 Environmental Impacts of the Project

Sections 3.1 through 3.5 of this Draft EIR address the environmental impacts of implementation of the proposed amendments to Rules 9-4 and 9-6. Potentially feasible alternatives were developed with consideration of avoiding or lessening the significant, and potentially significant, adverse impacts of the project, as identified in Chapter 3 of this Draft EIR and summarized below. If an environmental issue area analyzed in this Draft EIR is not addressed below, it is because no significant impacts were identified for that issue area. In summary, the Project would result in the following significant impacts:

UTILITIES AND SERVICE SYSTEMS (ENERGY RESOURCES)

- Impact 3.3-1: Require the Relocation or Construction of New or Expanded Electric Facilities That Would Result in an Adverse Environmental Impact (significant and unavoidable)

NOISE

- Impact 3.4-1: Potential to Generate Long-Term Operational Noise (significant and unavoidable)

4.3 ALTERNATIVES CONSIDERED BUT NOT EVALUATED FURTHER

As described above, State CEQA Guidelines Section 15126.6(c) provides that the range of potential alternatives for the project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. Alternatives that fail to meet the fundamental project purpose need not be addressed in detail in an EIR. (*In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1165-1167.)

In determining what alternatives should be considered in the EIR, it is important to acknowledge the objectives of the project, the project's significant effects, and unique project considerations. These factors are crucial to the

development of alternatives that meet the criteria specified in Section 15126.6(a). Although, as noted above, EIRs must contain a discussion of "potentially feasible" alternatives, the ultimate determination as to whether an alternative is feasible or infeasible is made by lead agency decision-maker(s). (See PRC Section 21081(a)(3).) At the time of action on the project, the decision-maker(s) may consider evidence beyond that found in this EIR in addressing such determinations. The decision-maker(s), for example, may conclude that a particular alternative is infeasible (i.e., undesirable) from a policy standpoint, and may reject an alternative on that basis provided that the decision-maker(s) adopts a finding, supported by substantial evidence, to that effect, and provided that such a finding reflects a reasonable balancing of the relevant economic, environmental, social, and other considerations supported by substantial evidence. (*City of Del Mar v. City of San Diego* (1982) 133 Cal.App.3d 401, 417; *California Native Plant Society v. City of Santa Cruz* (2009) 177 Cal.App.4th 957, 998.)

The EIR should also identify any alternatives that were considered by the lead agency but were rejected during the planning or scoping process and briefly explain the reasons underlying the lead agency's determination.

The following alternatives were considered by the BAAQMD but are not evaluated further in this Draft EIR.

4.3.1 Non-Zero Requirements

A potential alternative to the proposed rule amendments would be to implement a non-zero NO_X emissions limit for the applicable appliances that is substantially lower than the current limit (and lower than the interim ultra-low NO_x emissions limit that is part of the Project for space heating appliances). This approach is being considered as an alternative compliance method by the South Coast Air Quality Management District (SCAQMD) in their 2022 Air Quality Management Plan (SCAQMD 2022) and discussion of potential amendments to rules that cover similar appliances installed in the South Coast air basin. A non-zero NO_X emissions limit would potentially result in fewer conversions of gas-powered appliances to electric-powered appliances, and, therefore, the impacts to the electric grid and potential impacts associated with power generation and distribution and operational noise associated with the Project could be less. However, the extent of this difference is not known because many consumers may still choose to meet a non-zero requirement with an electric appliance. Additionally, the proposed rule amendments do not require electric appliances to be used; in the future, a zero NO_X natural gas appliance could be developed and would be compliant with the proposed requirements. The costs and impacts of developing lower NO_X, but non-zero, requirements are not currently known and cannot be accurately estimated within the scope of this analysis. Finally, the goals of the BAAQMD, aligned with those of the California Air Resources Board (CARB), to reduce emissions of NO_X and fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$) "using all mechanisms available" (CARB 2022) to improve ambient air quality and protect public health would not be met by the implementation of a non-zero standard when there is technology available to achieve the proposed standard For these reasons, this alternative is not evaluated further in this Draft EIR.

Similarly, another potential alternative would be to only implement the ultra-low NOx emissions limit for space heating appliances and forgo the zero NOx emissions limits proposed for space and water heating appliances. This approach would align the BAAQMD standards with those currently in place in the SCAQMD as well as the San Joaquin Valley Air Pollution Control District (SJVAPCD), and likely greatly reduce the potential impacts to the electric grid of the proposed Project and the potential operational noise impacts. However, this alternative would also not achieve all feasible NOx reductions or use "all mechanisms available," in line with CARB's and BAAQMD's goals. Further, in October 2022, the Environmental Protection Agency required the SJVAPCD to evaluate the feasibility of a zero-NOx appliance requirement in order to fulfill their requirements under the State Implementation Plan for attaining the $PM_{2.5}$ National Ambient Air Quality Standards. For this reason, this alternative is not evaluated further in this Draft EIR.

4.3.2 Additional Planning Measures

In response to the notice of preparation (see Appendix A), the San Francisco Bay Area Planning and Urban Research Association (SPUR) recommended that the EIR include an alternative in which the BAAQMD takes an active role in

encouraging decentralized solar (and possibly storage). Should the proposed rule amendments be adopted, the BAAQMD is planning on convening an implementation working group that would allow stakeholder input into measures that the BAAQMD and other agencies can take to assist in implementation of the proposed rule amendments, including those mentioned by SPUR. However, planning measures such as these are not strictly under the purview of the BAAQMD, nor are they sources that are typically regulated through a BAAQMD rulemaking process. For these reasons, this alternative is not evaluated further in this Draft EIR.

4.3.3 No Change to Rule 9-4

Proposed revisions to Rule 9-4 requires zero NOx space heating systems. As discussed in this Draft EIR, these proposed changes could result in significant noise impacts associated with installation of exterior equipment (i.e., heat pumps) where existing gas-burning space heating systems to do not include exterior equipment. Alternatives were considered to reduce these impacts. Because any enhancement to the NOx reduction associated with Rule 9-4 would likely lead to some level of electrification of space heating systems, eliminating the changes to Rule 9-4 would be the only alternative that would effectively minimize potential noise impacts. However, eliminating any changes to this Rule would not meet most of the project's primary objectives. For this reason, this alternative is not evaluated further in this Draft EIR.

4.4 ALTERNATIVES SELECTED FOR DETAILED ANALYSIS

The following alternatives are evaluated in this Draft EIR.

- Alternative 1: No Project Alternative assumes no actions would be taken by the BAAQMD and the proposed rule amendments would not be adopted. The BAAQMD's existing Rules 9-4 and 9-6, which already establish NO_X emissions standards for natural gas-fired space- and water-heating appliances, would remain in effect without any changes.
- Alternative 2: Earlier Compliance Date would establish a zero-NO_X standard with a compliance date of January 1, 2026, which is approximately three years earlier than the compliance date for the Project (phased in between 2027 and 2031). Except for the earlier compliance date, the proposed amendments to Rules 9-4 and 9-6 would be the same as the Project.
- Alternative 3: Later Compliance Date would establish a zero-NO_X standard with a compliance date of January 1, 2035, which is approximately six years later than the compliance date for the Project (phased in between 2027 and 2031). Except for the later compliance date, the proposed amendments to Rules 9-4 and 9-6 would be the same as the Project.

Further details on these alternatives, and an evaluation of environmental effects relative to the Project, are provided below.

4.4.1 Alternative 1: No Project Alternative

Under Alternative 1, the No Project Alternative, no actions would be taken by the BAAQMD and the proposed rule amendments would not be adopted. The BAAQMD's existing Rules 9-4 and 9-6, which already establish NO_x emissions standards for natural gas-fired space- and water-heating appliances, would remain in effect without any changes. For a description of these current rules, see Section 2.4, "Background," in Chapter 2, "Project Description." Compared to existing conditions, the No Project Alternative would not reduce NO_x emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area beyond what is required under the existing rules. Further, the No Project Alternative would not meet the project objectives. For example, the No Project Alternative would not establish a zero-NO_x standard; expand the applicability of Rule 9-4 to a larger breadth of space-heating appliances; update and clarify the certification and calculation methods contained in the rules; or improve the clarity and enforceability of the rules. However, as required by CEQA, the No Project Alternative is evaluated in this Draft EIR.

Although it is acknowledged that with the No Project Alternative, there would be no discretionary action by the BAAQMD and, thus, no impact, for purposes of comparison with the other action alternatives, conclusions for each technical area are characterized as "impacts" that are greater, similar, or less, to describe conditions that are worse than, similar to, or better than those of the Project.

AIR QUALITY

Without implementation of the proposed rule amendments, the beneficial impacts resulting from the proposed rule amendments would not occur. This would include no reduction of NO_X emissions beyond what is required under the existing rules. There would be no further reductions in criteria air pollutants that would provide public health benefits, achieve federal and State ambient air quality standards (AAQS), and meet the goals of the State Implementation Plan (SIP). Additionally, the No-Project Alternative would not further decrease greenhouse gas (GHG) emissions in support of CARB's climate targets.

NO_x emissions are a key criteria pollutant as a precursor to ozone and secondary PM formation. Secondary PM is formed from the conversion of NO_x to ammonium nitrate through atmospheric chemical reactions with ammonia. PM, a diverse mixture of suspended particles and liquid droplets, is the air pollutant most harmful to the health of Bay Area residents. The Bay Area is currently classified as non-attainment for $PM_{2.5}$ under the State AAQS. Exposure to $PM_{2.5}$, on either a short-term or long-term basis, can cause a wide range of respiratory and cardiovascular health effects, including strokes, heart attacks, and premature deaths. Because NO_x compounds in the atmosphere contribute to the formation of secondary PM, any NO_x emission reduction would also result in reduction of the formation of secondary $PM_{2.5}$ reductions. In addition, the Bay Area is currently in non-attainment for ozone, a regional pollutant, under Federal and State AAQS. Emissions of ROG and NO_x throughout the Bay Area contribute to ozone formation in downwind areas. Therefore, reductions in emissions of NO_x are needed throughout the region to decrease ozone levels and particulate matter levels. Reductions of NO_x expected from the proposed rule amendments can be seen in Table 3.1-4 in Section 3.1, "Air Quality." Because the No Project Alternative would not result in reduction of the existing significant impacts related to air quality, the No Project Alternative would have greater air quality impacts compared with the Project. (*Greater*)

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

Without implementation of the proposed rule amendments, the potential beneficial impacts resulting from the proposed rule amendments would not occur. This would include no likely reduction of GHG emissions. The No-Project Alternative would not support the achievement of GHG reduction goals that have been set by CARB. Because the No Project Alternative would not result in reduction of existing environmental impacts related to GHG emissions and climate change, the No Project Alternative would have greater GHG impacts compared with the Project. (*Greater*)

UTILITIES AND SERVICE SYSTEMS (ENERGY RESOURCES)

Under the No Project Alternative, there would be no changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. The No Project Alternative would not influence the existing or projected demands for electricity in the Bay Area and, thus, would not contribute to the need for construction of additional electricity production or additional electrical grid capacity, which would likely result in significant impacts to the environment. Therefore, no impacts related to the construction of new or expanded facilities for electricity production or distribution would occur under the No Project Alternative, and the No Project Alternative would avoid a project-related considerable contribution to a significant cumulative impact. (*Less*)

NOISE

Under the No Project Alternative, there would be no changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. Therefore, the No Project Alternative would not result

in installation of new heat pump units and would not generate long-term operational noise. No impacts related to long-term operational noise would occur under the No Project Alternative, and the No Project Alternative would avoid a project-related considerable contribution to a significant cumulative impact. (*Less*)

AESTHETICS

Under the No Project Alternative, there would be no changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. Therefore, the No Project Alternative would not result in installation of new heat pump units and would not adversely affect scenic vistas, damage scenic resources, degrade the existing visual character or quality public views, conflict with applicable zoning and other regulations governing scenic quality, or create a new source of substantial light or glare. No impacts related to aesthetics would occur under the No Project Alternative. (*Slightly Less*)

4.4.2 Alternative 2: Earlier Compliance Date

As described in Chapter 2, "Project Description," the Project would establish a zero-NO_x standard with a compliance date in 2029 for Rule 9-4 and compliance dates ranging from 2027 to 2031 based on equipment type, use, and size for Rule 9-6.

There are currently appliances available on the market that meet the zero-NO_x requirements included in the proposed rule amendments. As such, Alternative 2 would require compliance with the zero-NOx standard at an earlier date compared with the Project. This alternative would establish a zero-NO_x standard with a compliance date of January 1, 2026 for all appliances covered by the proposed zero-NO_x requirements in Rules 9-4 and 9-6. That is approximately three years earlier than the compliance date for the Project (2029). Table 4-1 shows the anticipated electric grid capacity and required upgrades for Alternative 2 assuming a compliance date of January 1, 2026.

Table 4-1 Anticipated Electric Grid Capacity and Required Upgrades for Alternative 2: Earlier Compliance Date Compared with the Project

Grid Impact Category	Impact Relative to Low Policy Reference	Impact Relative to High Policy Reference
Utility-scale solar to serve electric loads	2,240 MW new solar by 2050	120 MW new solar by 2050 + accelerated build in 2030s & 2040s
4-hour battery storage for generation capacity	700 MW new batteries by 2050	< 10 MW new batteries by 2050 + accelerated build in 2030s & 2040s
Transmission Capacity	460 MW impact by 2050	< 10 MW impact by 2050 + accelerated build in 2030s & 2040s
Distribution Capacity	440 MW impact by 2050	< 10 MW impact by 2050 + accelerated build in 2030s & 2040s

Notes: MW = megawatt.

Source: Data provided by BAAQMD in 2022.

As described in Section 3.3, "Utilities and Service Systems," the E3 study (see Appendix C) evaluates potential electric grid impacts based on two reference scenarios: a Low Policy Reference, which represents a business-as-usual future in which California does not meet its 2030 or 2045 GHG emissions targets, and a High Policy Reference, which assumes major state policy changes to decarbonize all sectors of the state's economy aligned with achieving the state's GHG emissions targets.

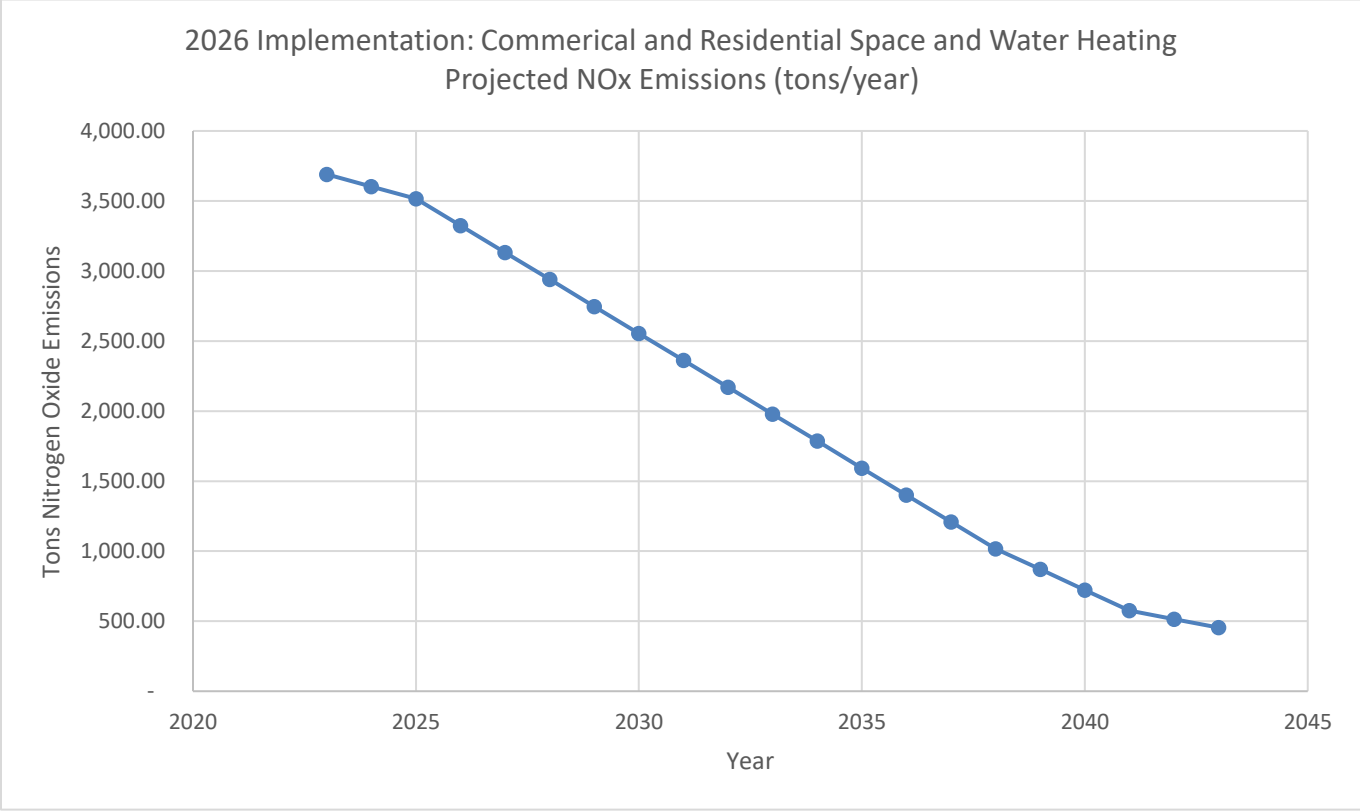
Under the Low Policy Reference scenario, heat pump adoption would occur consistent with the 2022 Draft Scoping Plan Business-as-Usual Reference Scenario. As such, this scenario assumes existing and currently planned levels of incentives for heat pumps and no major policy changes supporting building electrification would occur. As a result, this scenario assumes relatively low heat pump adoption through 2045. Under the Low Policy Reference, Alternative 2 would result in the demand for 2,240 megawatt (MW) of new solar, 700 MW of new batteries, 460 MW of new

transmission capacity, and 440 MW of new distribution capacity by 2050. Compared to the Project, Alternative 2 would require a slightly larger amount of new solar, new batteries, and distribution capacity, and the same amount of new transmission capacity (see Table 3.3-3 in Section 3.3, "Utilities and Service Systems").

Under the High Policy Reference, heat pump adoption would be consistent with the 2022 Draft Scoping Plan Proposed Scenario and state-level policies would drive a fast pace of heat pump adoption. Under the High Policy Reference, Alternative 2 would result in the demand for 120 MW of new solar, less than 10 MW of new batteries, less than 10 MW of new transmission capacity, and less than 10 MW of new distribution capacity by 2050. Compared to the Project, Alternative 2 would require a larger amount of new solar and transmission capacity and the same amount of new batteries and distribution capacity (see Table 3.3-3 in Section 3.3, "Utilities and Service Systems").

Given the high priority of the state to decarbonize, the High Policy Reference scenario may be more likely to occur than the Low Policy Reference scenario; however, consistent with the approach of the analysis in Section 3.3, "Utilities and Service Systems," because the Low Policy Reference scenario assumes Alternative 2 would result in a higher level of electricity demand, it serves as a more conservative scenario for evaluating potential impacts to the environment under CEQA. For this reason, the Low Policy Reference scenario will be the focus of the analysis that follows.

Figure 4-1 shows the projected NO_X emissions over time based on the assumptions described above for Alternative 2. The 2018 BAAQMD emissions inventory provides the baseline for this projection.



Source: Provided by BAAQMD in 2022.

Figure 4-1 Projected NO_X Emissions under Alternative 2: Earlier Compliance Date

Table 4-2 presents values for projected yearly emissions and for projected reductions compared with the baseline emissions inventory for selected years as represented by the graph in Figure 4-1 for Alternative 2. It should be noted that 2018 is the baseline year for the projected NO_x emissions; however, BAAQMD staff anticipates that reductions would not occur until the ultra-low NO_x standard is in place in 2024 because the BAAQMD has assumed that voluntary uptake rates would be minimal.

Table 4-2 Projected NO_X Emissions from Alternative 2: Earlier Compliance Date

Year	Projected Yearly NO_X Emissions (tons/year)	Projected NO_X Reduction vs. Baseline (tons/year)
2018*	3,690	—
2025	3,516	174
2030	2,555	1,135
2035	1,594	2,097
2040	722	2,968
2043	454	3,236

* 2018 is the baseline year for emissions inventory.

Source: Data provided by BAAQMD in 2022.

Alternative 2 would achieve an 88-percent reduction of NO_x emissions compared to the baseline by the time the equipment changeout is projected to be completed in 2043; comparatively, the Project would not achieve the same 88-percent reduction until 2046, three years later than could be achieved under Alternative 2 (see Table 2-1 in Chapter 2, "Project Description"). While electric heat pump technology is available to meet the earlier compliance dates in Alternative 2, this technology is currently more expensive to install and can be in short supply. The later compliance dates in the proposed Project provide time for additional technology development (including potential natural gas-fired zero NO_x technology) and expected decreases in cost and increases in supply of electric heat pump technology.

Implementation of Alternative 2 would achieve most of the project objectives except those related to specific compliance dates that allow for equitable implementation of the amendments. Additionally, this alternative would reduce more total NO_x and GHG emissions because the reductions would occur earlier (compared to the Project). The earlier implementation of Alternative 2 results in an estimated 4,299 tons more of overall avoided NO_x emissions than the proposed Project and up to 11.02 MT CO_2e more GHG emissions reductions than the proposed Project for the years 2024 to 2052.

Table 4-3 shows the total NO_x and GHG emissions reductions for the proposed Project and Alternative 2 during this period.

Table 4-3 Cumulative Emissions Reductions from Proposed Project and Alternative 2, 2024-2052

Scenario	Total NOx Emissions Reductions, 2024-2052 (tons)	Total GHG Emissions Reductions, 2024-2052 (MT CO_2e)
Proposed Project	60,161	83.42
Alternative 2	64,461	94.43

Notes: GHG = greenhouse gases; MT CO2e = MTCO_2e = metric tons of carbon dioxide equivalent; NOx = nitrogen oxide.

Source: Data provided by BAAQMD in 2022.

AIR QUALITY

Similar to the Project, Alternative 2 would result in a reduction in NO_x emissions generated by natural gas-fired space- and water-heating appliances. This would be achieved through the replacement of these appliances with ultra low-NO_X furnaces in 2024 and then zero NO_x natural gas appliances or electric appliances beginning in 2026. Operation of zero-NO_x natural gas appliances would inherently result in a reduction in NO_x emissions within the San Francisco Bay Area Air Basin (SFBAAB). Moreover, the potential turnover to electric appliances would eliminate emissions of criteria air pollutants from on-site natural gas combustion and associated emissions from this activity. Alternative 2 would result in the same rate of reduction of the existing significant impacts related to air quality, but the reduction would occur earlier. The earlier reduction would result in greater total NO_x reductions and associated health benefits. Overall, Alternative 2 would result in similar impacts related to air quality compared to the Project. (*Similar*)

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

Similar to the Project, Alternative 2 would result in a decrease in GHG emissions over the next 20 years. This decrease exceeds the net zero threshold of significance and would assist the state in meeting its long-term GHG reduction goals extending to 2045. Therefore, similar to the Project, Alternative 2 would not have a cumulatively considerable contribution to climate change. Alternative 2 would result in the same rate of potential reduction of existing environmental impacts related to GHG emissions and climate change, but the reduction would occur earlier. The earlier reduction would provide for greater total potential reductions in GHG emissions. Overall, Alternative 2 would result in similar impacts related to GHG emissions and climate change compared to the Project. (*Similar*)

UTILITIES AND SERVICE SYSTEMS (ENERGY RESOURCES)

Similar to the Project, Alternative 2 would, over the long term, result in increased energy demand that would contribute to massive statewide energy demands as the state implements programs to decarbonize the state. As shown in Table 4-1, under the Low Policy Reference, Alternative 2 would result in the demand for 2,240 MW of new solar, 700 MW of new batteries, 460 MW of new transmission capacity, and 440 MW of new distribution capacity by 2050. Compared to the Project, Alternative 2 would require a larger amount of new solar, new batteries, and distribution capacity, and the same amount of new transmission capacity (see Table 3.3-3 in Section 3.3, "Utilities and Service Systems").

Almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. The potential construction and operational impacts associated with these energy facilities could be potentially significant. Mitigation measures are likely available to minimize these impacts to a less-than-significant level for many of the environmental issue areas; however, it is likely that some would remain significant and unavoidable. Therefore, under the Low Policy Reference Scenario, Alternative 2 would result in greater impacts compared to the Project due to the larger amount of new solar, new batteries, and distribution capacity required for Alternative 2. (*Greater*)

NOISE

Similar to the Project, Alternative 2 could result in an increase in long-term operational noise related to the installation and operation of equipment such as heat pump units. The potential operational noise impacts associated with these units could be potentially significant depending on the existing ambient noise environment, noise levels associated with the units, and the noise standards of the jurisdiction in which the units would be installed. Mitigation measures are likely available to minimize these impacts to a less-than-significant level; however, it is likely that noise from some units would remain significant and unavoidable. Therefore, Alternative 2 would result in similar impacts related to long-term operational noise compared to the Project. (*Similar*)

AESTHETICS

Similar to the Project, Alternative 2 could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Depending on the size and location of the building, these units can be installed at ground level, on the exterior wall of a building, or on a building's roof. Alternative 2 would result in similar, and less-than-significant, impacts related to effects on scenic vistas, damage to scenic resources, degradation of the existing visual character or quality public views, and conflicts with applicable zoning and other regulations governing scenic quality. Similar to the Project, Alternative 2 would not create a new source of substantial light or glare. Overall, Alternative 2 would result in similar impacts related to aesthetics compared to the Project. (*Similar*)

4.4.3 Alternative 3: Later Compliance Date

Alternative 3 would require compliance with the zero-NO_x standard at a later date compared with the Project. A later compliance date could have potential benefits related to consumer costs, technology development timelines, and electric infrastructure expansion and updates. Later compliance dates would allow for the market of zero-NO_x appliances to mature further, likely resulting in decreased consumer costs for appliance replacement. Based on current projections for State renewable energy development, a later compliance date would also result in removing the need for an accelerated build of electric resources to supply the project. This alternative would establish a zero-NO_x standard with a compliance date of January 1, 2035 for all appliances covered by the proposed zero-NO_x requirements in Rules 9-4 and 9-6. That is approximately six years later than the compliance date for the Project (phased in between 2027 and 2031).

Table 4-4 shows the anticipated electric grid capacity and required upgrades for Alternative 3 assuming a compliance date of January 1, 2035.

Table 4-4 Anticipated Electric Grid Capacity and Required Upgrades for Alternative 3: Later Compliance Date

Grid Impact Category	Impact Relative to Low Policy Reference	Impact Relative to High Policy Reference
Utility-scale solar to serve electric loads	2,010 MW new solar by 2050	-60 MW new solar by 2050 (less need compared with the Project)
4-hour battery storage for generation capacity	650 MW new batteries by 2050	~0 new batteries by 2050 (less need compared with the Project)
Transmission Capacity	420 MW impact by 2050	~0 MW impact by 2050 (less need compared with the Project)
Distribution Capacity	390 MW impact by 2050	~0 MW impact by 2050 (less need compared with the Project)

Notes: MW = megawatt.

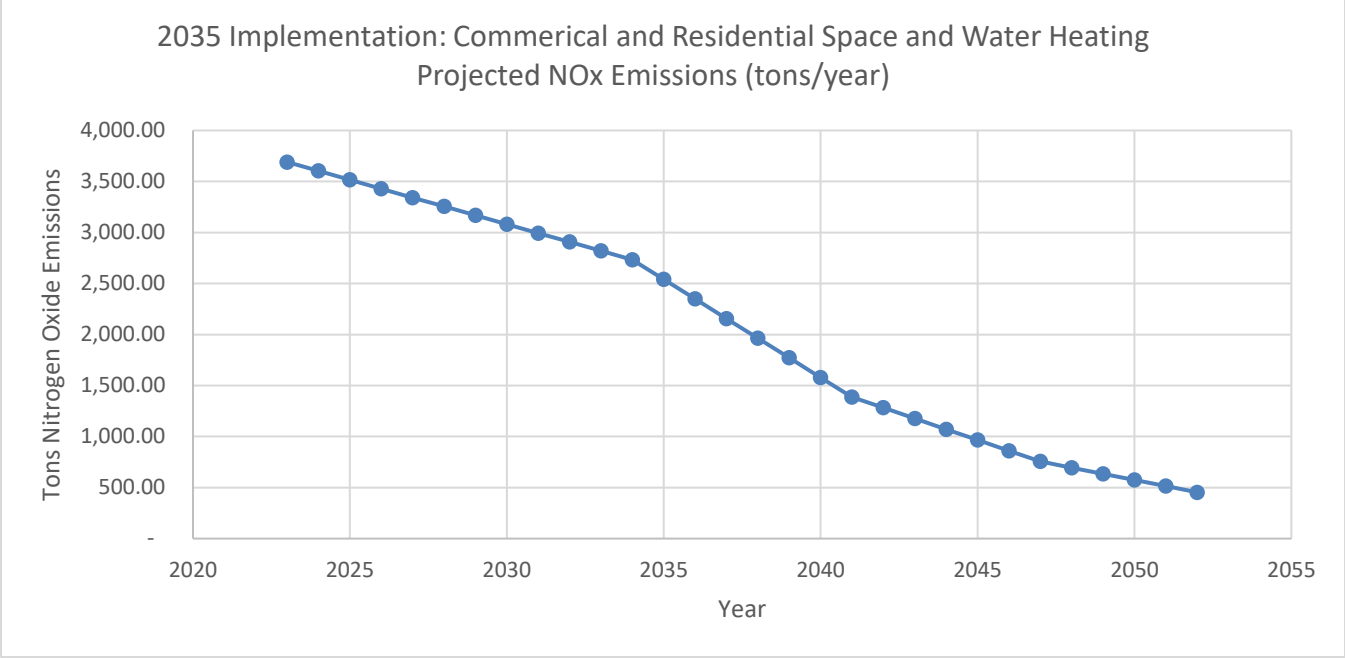
Source: Data provided by BAAQMD in 2022.

Under the Low Policy Reference scenario, heat pump adoption would occur consistent with the 2022 Draft Scoping Plan Business-as-Usual Reference Scenario. As such, this scenario assumes existing and currently planned levels of incentives for heat pumps and no major policy changes supporting building electrification would occur. As a result, this scenario assumes relatively low heat pump adoption through 2045. Under the Low Policy Reference, Alternative 3 would result in the demand for 2,010 MW of new solar, 650 MW of new batteries, 420 MW of new transmission capacity, and 390 MW of new distribution capacity by 2050. Compared to the Project, Alternative 3 would require a slightly smaller amount of new solar, new batteries, new transmission capacity, and distribution capacity (see Table 3.3-3 in Section 3.3, "Utilities and Service Systems").

Under the High Policy Reference, heat pump adoption would be consistent with the 2022 Draft Scoping Plan Proposed Scenario and state-level policies would drive a fast pace of heat pump adoption. Under the High Policy Reference, Alternative 3 would result in the demand for about 60 MW of new solar and no new batteries, new transmission capacity, or new distribution capacity by 2050. Compared to the Project, Alternative 3 would require a smaller amount of new solar, new batteries, new transmission capacity, and new distribution capacity (see Table 3.3-3 in Section 3.3, "Utilities and Service Systems").

Given the high priority of the state to decarbonize, the High Policy Reference scenario may be more likely to occur than the Low Policy Reference scenario; however, consistent with the approach of the analysis in Section 3.3, "Utilities and Service Systems," because the Low Policy Reference scenario assumes Alternative 3 would result in a higher level of electricity demand, it serves as a more conservative scenario for evaluating potential impacts to the environment under CEQA. For this reason, the Low Policy Reference scenario will be the focus of the analysis that follows.

Figure 4-2 shows the projected NO_X emissions over time based on the assumptions described above for Alternative 3. The 2018 BAAQMD emissions inventory provides the baseline for this projection.



Source: Provided by BAAQMD in 2022.

Figure 4-2 Projected NO_X Emissions under Alternative 3: Later Compliance Date

Table 4-5 presents values for projected yearly emissions and for projected reductions compared with the baseline emissions inventory for selected years as represented by the graph in Figure 4-2 for Alternative 3. It should be noted that 2018 is the baseline year for the projected NO_X emissions; however, BAAQMD staff anticipates that reductions would not occur until the proposed ultra-low NO_x standard for furnaces is in effect in 2024 because the BAAQMD has assumed that voluntary uptake rates would be minimal.

Table 4-5 Projected NO_X Emissions from Alternative 3: Later Compliance Date

Year	Projected Yearly NO_X Emissions (tons/year)	Projected NO_X Reduction vs. Baseline (tons/year)
2018*	3,690	—
2025	3,516	174
2030	3.081	609
2035	2,541	1,150
2040	1,580	2,111
2045	966	2,724
2050	574	3,116
2052	454	3,236

* 2018 is the baseline year for emissions inventory.

Source: Data provided by BAAQMD in 2022.

Alternative 3 would achieve an 88 percent reduction of NO_x emissions compared to the baseline by the time the equipment changeout is projected to be completed in 2052; comparatively, the Project would achieve the same 88-percent reduction in 2046, six years earlier than could be achieved under Alternative 3 (see Table 2-1 in Chapter 2, "Project Description").

Alternative 3 is a feasible alternative to the Project. However, delayed implementation of the proposed rule amendments would result in delayed health benefits resulting from air quality improvements in the region and an overall increase in total NO_x emissions in the Bay Area versus the Project. The later implementation of Alternative 3

results in an estimated 10,722 tons of overall additional NO_x emissions, and up to 32.28 MT CO2e additional GHG emissions that would not be emitted in the implementation schedule of the proposed Project.

Table 4-6 shows the total NO_x and GHG emissions reductions for the proposed Project and Alternative 2 during this period.

Table 4-6 Cumulative Emissions Reductions from Proposed Project and Alternative 3, 2024-2052

Scenario	Total NOx Emissions Reductions, 2024-2052 (tons)	Total GHG Emissions Reductions, 2024-2052 (MT CO2e)
Proposed Project	60,161	83.42
Alternative 3	49,439	51.14

Notes: GHG = greenhouse gases; MT CO2e = $MTCO_2e$ = metric tons of carbon dioxide equivalent; NOx = nitrogen oxide.

Source: Data provided by BAAQMD in 2022.

Based on current projections for state renewable energy development, a later compliance date would also result in removing the need for an accelerated build of electric resources to supply the Project. While the Project would result in accelerated build of energy resources, it is important to note that the overall demand from appliances installed as a result of the proposed rule amendments is not expected to meaningfully change once fully implemented, regardless of the compliance date.

Implementation of Alternative 3 would achieve most of the project objectives except those related to specific compliance dates. Additionally, this alternative would reduce NO_x emissions but the reductions would begin to occur later and thus be lower overall (compared to the Project).

AIR QUALITY

Similar to the Project, Alternative 3 would result in a reduction in NO_x emissions generated by natural gas-fired space- and water-heating appliances. This would be achieved through the replacement of these appliances with ultra-low and zero-NO_x natural gas appliances or electric appliances. Operation of zero-NO_x natural gas appliances would inherently result in a reduction in NO_x emissions within the SFBAAB. Moreover, the potential turnover to electric appliances would eliminate emissions of criteria air pollutants from on-site natural gas combustion and associated emissions from this activity. Alternative 3 would result in the same rate of reduction of the existing significant impacts related to air quality, but the reduction would occur later. Delaying these emissions reductions would result in greater total NO_x emissions and provide less health benefits than the Project. Overall, Alternative 3 would result in similar impacts related to air quality compared to the Project. (*Similar*)

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

Similar to the Project, Alternative 3 would result in a decrease in GHG emissions over the next 29 years. This decrease exceeds the net zero threshold of significance and would assist the state in meeting its long-term GHG reduction goals extending to 2045. Therefore, similar to the Project, Alternative 3 would not have a cumulatively considerable contribution to climate change. Alternative 3 would result in the same rate of reduction of existing environmental impacts related to GHG emissions and climate change, but the reduction would occur later. Delaying the reduction would result in less overall GHG benefit than the Project because the total CO_2 emissions would be higher. Overall, Alternative 3 would result in similar impacts related to GHG emissions and climate change compared to the Project. (*Similar*)

UTILITIES AND SERVICE SYSTEMS (ENERGY RESOURCES)

Similar to the Project, Alternative 3 would, over the long term, result in increased energy demand that would contribute to massive statewide energy demands as the state implements programs to decarbonize the state. As shown in Table 4-4, under the Low Policy Reference, Alternative 3 would result in the demand for 2,010 MW of new

solar, 650 MW of new batteries, 420 MW of new transmission capacity, and 390 MW of new distribution capacity by 2050. Compared to the Project, Alternative 3 would require a slightly smaller amount of new solar, new batteries, new transmission capacity, and distribution capacity (see Table 3.3-3 in Section 3.3, "Utilities and Service Systems").

Almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. The potential construction and operational impacts associated with these energy facilities could be potentially significant. Mitigation measures are likely available to minimize these impacts to a less-than-significant level for many of the environmental issue areas; however, it is likely that some would remain significant and unavoidable. Therefore, under the Low Policy Reference Scenario, Alternative 3 would result in slightly less impact compared to the Project due to the smaller amount of new solar, new batteries, new transmission capacity, and distribution capacity required for Alternative 3; Alternative 3 would not avoid or substantially reduce a significant impact associated with the Project. (*Slightly Less*)

NOISE

Similar to the Project, Alternative 3 could result in an increase in long-term operational noise related to the installation and operation of heat pump units. The potential operational noise impacts associated with these units could be potentially significant depending on the existing ambient noise environment, noise levels associated with the units, and the noise standards of the jurisdiction in which the units would be installed. Mitigation measures are likely available to minimize these impacts to a less-than-significant level; however, it is likely that noise from some units would remain significant and unavoidable. Therefore, Alternative 3 would result in similar impacts related to long-term operational noise compared to the Project. (*Similar*)

AESTHETICS

Similar to the Project, Alternative 3 could result in replacement of existing furnaces located entirely within a building's interior with a heat pump unit that includes exterior equipment (similar in size and appearance to an air conditioner). Depending on the size and location of the building, these units can be installed at ground level, on the exterior wall of a building, or on a building's roof. Alternative 3 would result in similar, and less-than-significant, impacts related to effects on scenic vistas, damage to scenic resources, degradation of the existing visual character or quality public views, and conflicts with applicable zoning and other regulations governing scenic quality. Similar to the Project, Alternative 3 would not create a new source of substantial light or glare. Overall, Alternative 3 would result in similar impacts related to aesthetics compared to the Project. (*Similar*)

4.5 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Table 4-7 provides a summary comparison of the alternatives and the proposed Project.

Table 4-7 Summary of Environmental Effects of the Alternatives Relative to the Proposed Project

Environmental Topic	Proposed Project	Alternative 1: No Project Alternative	Alternative 2: Earlier Compliance Date	Alternative 3: Later Compliance Date
Air Quality	LTS (Beneficial)	Greater	Similar	Similar
Greenhouse Gas Emissions and Climate Change	LTS (Beneficial)	Greater	Similar	Similar
Utilities and Service Systems (Energy Resources)	SU	Less	Greater	Slightly Less
Noise	SU	Less	Similar	Similar
Aesthetics	LTS	Slightly Less	Similar	Similar

Notes: LTS = less than significant; SU = significant and unavoidable.

Source: Data compiled by Ascent Environmental in 2022.

As described above, the State CEQA Guidelines (Section 15126.6[a]) require EIRs to describe a range of reasonable alternatives to the project that would attain most of the project objectives but would "avoid or substantially lessen any of the *significant effects of the project*" (*emphasis* added). CEQA also requires identification of the environmentally superior alternative. In the case of a project that is designed to reduce existing significant environmental impacts, such as the proposed Project, determination of which alternative is environmentally superior is unique. On one hand, alternatives have been identified that would reduce significant impacts associated with the Project; on the other hand, the Project achieves higher levels of air quality and GHG reduction than the alternatives that lessen the Project's significant impacts—and air quality and climate change are significant impacts under existing conditions. If we follow CEQA to the letter and view the alternatives only in terms of those that address the Project's significant impacts, then we must grant that the No Project Alternative is the environmentally superior alternative because it avoids significant potential Project impacts associated with noise and also avoids the Project's potential considerable contribution to significant impacts related to electrical infrastructure expansion (including renewable energy expansion). CEQA further specifies that if the environmentally superior alternative is the "no project" alternative, the EIR must identify an environmentally superior alternative among the other alternatives.

Alternative 2 would establish a zero-NO_X standard with a compliance date of January 1, 2026, which is approximately three years earlier than the compliance date for the Project (phased in between 2027 and 2031). Except for the compliance date, Alternative 2 would meet most of the project objectives. Further, Alternative 2 would achieve reductions in NO_X emissions three years earlier than could be achieved under the Project (2043 as compared with 2046) and lead to greater NO_x reductions over the long term due to the earlier implementation date. Alternative 2 would result in similar air quality, GHG, noise, and aesthetic impacts compared to the Project. However, this change in compliance date would ultimately result in greater impacts related to the construction of new or expanded grid capacity. Alternative 2 would also not reduce the Project's significant noise impacts. Alternative 2's greater impacts related to the construction of new or expanded grid capacity are sufficient to eliminate it from further consideration as the environmentally superior alternative.

Alternative 3 would establish a zero-NO_X standard with a compliance date of January 1, 2035, which is approximately six years later than the compliance date for the Project (phased in between 2027 and 2031). Except for the compliance date, Alternative 3 would meet most of the project objectives. Alternative 3, however, would not achieve the same rate of reduction in NO_X emissions until six years after the Project could achieve the same rate of reduction (2052 as compared with 2046) and would achieve fewer NO_x reductions overall due to the later implementation date. Alternative 3 would result in similar air quality, GHG, noise, and aesthetic impacts compared to the Project. However, under Alternative 3, a significant and unavoidable impact of the Project could be slightly reduced (although not eliminated) because the compliance date would be delayed six years, thereby requiring a slightly smaller amount of new solar, new batteries, new transmission capacity, and distribution capacity compared with the Project. Therefore, in accordance with CEQA, this Draft EIR concludes that because Alternative 3 would result in a slight reduction to the Project's substantial contribution to a significant cumulative impact related to the construction of new or expanded grid capacity, Alternative 3 is considered the environmentally superior alternative.

However, it is important to note that if "environmentally superior alternative" were more simply defined as the alternative that is best for the overall environment, including beneficial effects, then the conclusion would likely be different. As described throughout this EIR, the Bay Area is currently designated as a non-attainment area under the annual and 24-hour California Ambient Air Quality Standards (CAAQS) for particulate matter. In addition, the Bay Area is currently designated as a non-attainment area for ozone, a regional pollutant, under CAAQS and the National Ambient Air Quality Standards (NAAQS). This is an existing and significant air quality impact. The Project would address this significant air quality impact by reducing NO_X emissions in the Bay Area, thereby resulting in a less-than-significant (beneficial) impact to regional air quality (see Section 3.1, "Air Quality"). This reduction, as described above, would also occur with implementation of Alternative 3; however, Alternative 3, would not achieve the same rate of reduction in NO_X emissions until six years after the Project could achieve the same reduction (2052 as compared with 2046) and would achieve fewer reductions overall. The Project would also likely result in a greater beneficial effect related to GHG and climate change because the reductions would occur sooner than later and be greater overall.

The Project achieves higher levels of NOx and GHG reduction than Alternative 3 and addresses existing significant air quality impacts in the Air Basin. Weighing the Project's benefits to air quality and GHG against its significant impacts related to noise and utilities and considering that Alternative 3 does not achieve the same level of total NOx or GHG reduction as the Project, it would be difficult to justify naming it environmentally superior to the Project. However, to be clear, based on CEQA's specific intent for the identification of alternatives to minimize or avoid a project's significant impacts, as discussed above, Alternative 3 is considered the environmentally superior alternative because it slightly reduces the Project's impact on utilities and service systems.

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5 OTHER CEQA SECTIONS

5.1 GROWTH INDUCEMENT

CEQA Section 21100(b)(5) specifies that the growth-inducing impacts of a project must be addressed in an EIR. Section 15126.2(d) of the State CEQA Guidelines provides the following guidance for assessing growth-inducing impacts of a project:

> Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also, discuss the characteristics of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

A project can induce growth directly, indirectly, or both. Direct growth inducement would result if a project involved construction of new housing. Indirect growth inducement would result, for instance, if implementing a project resulted in any of the following:

- substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises);
- substantial short-term employment opportunities (e.g., construction employment) that indirectly stimulates the need for additional housing and services to support the new temporary employment demand; and/or
- removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service (e.g., construction of a major sewer line with excess capacity through an undeveloped area).

Growth inducement itself is not an environmental effect but may foreseeably lead to environmental effects. If substantial growth inducement occurs, it can result in secondary environmental effects, such as increased demand for housing, demand for other community and public services and infrastructure capacity, increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, conversion of agricultural and open-space land to urban uses, and other effects.

5.1.1 Growth-Inducing Impacts of the Project

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new residential and commercial buildings. No new residential or commercial buildings would be constructed. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities.

It is expected that the existing labor pool in the Bay Area would accommodate the installation activities. . As such, implementing the proposed amendments to Rules 9-4 and 9-6 would not induce substantial population growth. Therefore, no impact would occur.

5.2 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS

The State CEQA Guidelines Section 15126.2(b) requires EIRs to include a discussion of the significant environmental effects that cannot be avoided if the proposed project is implemented. As documented throughout Chapter 3 of this Draft EIR, most of the impacts associated with the Project would be less than significant. The following impacts are considered significant and unavoidable; that is, no feasible mitigation is available to reduce the impacts to a less-than-significant level.

5.2.1 Utilities and Service Systems (Energy Resources)

Impact 3.3-1: Require the Relocation or Construction of New or Expanded Electric Facilities That Would Result in an Adverse Environmental Impact

Assuming that heat pumps are used to replace existing natural gas-fired space and water heating appliances, the Project would, under the "worst case" Low Policy Reference Scenario evaluated by E3 (Appendix C), over the long term, result in increased energy demand beyond the planned electric grid capacity growth represented in this scenario. E3 estimated that the proposed zero-NO_x standards could result in 6.2 terrawatt-hours per year of additional electric load growth by 2050, which would represent 2.2 percent of the total statewide electrical load by 2020 standards. The E3 study estimates that this level of demand could be met by the development of approximately 2,180 megawatt (MW) of incremental utility-scale solar capacity, corresponding to 19,500 acres of direct land use impacts, under the "worst case" Low Policy Reference Scenario. For context, this represents 0.6 to 1.2 percent of the State's total projected land needed for the State to meet its stated climate goals, which is estimated to be between 1.6 and 3.1 million acres for solar and wind projects (not including off-shore wind and other energy sources). Almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. The potential construction and operational impacts associated with these energy facilities could be potentially significant, and may include substantial changes to visual character; obstruction of views; increased light and glare; conversion of Farmland and other impacts to agricultural resources and operations; construction-related air pollution, GHG emissions, and noise; archaeological resources; tribal cultural resources; adverse effects to wildlife species and habitat; adverse effects to other natural resources and waterways; impacts related to geology and paleontological resources; operational noise; conflicts with air traffic; transportation and storage of hazards and hazardous materials; and wildfire and associated environmental effects. Mitigation measures are likely available to minimize these impacts to a less-than-significant level for many of the environmental issue areas; however, it is likely that some would remain significant and unavoidable. Therefore, under the Low Policy Reference Scenario (described in Section 3.3 and the E3 study), the Project would result in a substantial contribution to a significant cumulative impact, and this impact would be potentially significant.

As described in Section 3.3, "Utilities and Service Systems," the location and type of these projects are currently speculative but based on current projections as presented in the E3 study, their associated environmental impacts would generally be located outside the Bay Area, and potentially outside California. The energy projects described would be evaluated in separate, future EIRs by various lead agencies and would ultimately be implemented by these other agencies. For these reasons, the BAAQMD has no jurisdiction over the approval of these projects and cannot identify, monitor, or enforce mitigation. Therefore, the BAAQMD cannot identify feasible mitigation to reduce the Project's contribution to these impacts and the impact remains potentially significant and unavoidable under the Low Policy Reference Scenario.

5.2.2 Noise

Impact 3.4-1: Potential to Generate Long-Term Operational Noise

The proposed amendments would include installation of stationary sources such as heat pump units, which would be installed inside and outside of existing buildings. The potential operational noise impacts associated with this equipment could be potentially significant depending on the existing ambient noise environment, noise levels

associated with the units, and the noise standards of the jurisdiction in which the units would be installed. Mitigation measures are likely available to minimize these impacts to a less-than-significant level; however, it is likely that noise from some units would remain significant and unavoidable, especially because the BAAQMD does not have jurisdiction to monitor or enforce any of these mitigation measures. Therefore, the Project would result in a substantial long-term operational noise impact, and this impact would be potentially significant.

As described in Section 3.4, "Noise," the installation of appliances that meet the proposed NO_X standards would occur throughout the nine-county Bay Area and operation of these appliances would generate noise. Mitigation measures, such as enclosures or screening, are likely available to minimize operational noise impacts to a less-than-significant level; however, it is likely that some would remain significant and unavoidable. The BAAQMD does not have land use authority to require these mitigation measures for individual equipment installations nor jurisdiction to monitor or enforce any of these measures. Therefore, the Project's contribution to these impacts and the impact remains potentially significant and unavoidable.

5.3 SIGNIFICANT AND IRREVERSIBLE ENVIRONMENTAL CHANGES

The State CEQA Guidelines requires a discussion of any significant irreversible environmental changes that would be caused by the project. Specifically, the State CEQA Guidelines section 15126.2(c) states:

> Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible, since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generation to similar uses. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed at existing and new buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The overall goal of the Project is to reduce NO_X emissions. Therefore, the Project would not result in the irreversible and irretrievable commitment of energy and material resources.

As discussed in Section 3.3, "Utilities and Service Systems," the Project would, over the long term, result in increased energy demand that would contribute to massive statewide energy demands as the state implements programs to decarbonize the state. Almost all of this energy production is anticipated to occur outside of the Bay Area, and a portion of it will likely be developed outside California. These projects could result in the irreversible and irretrievable commitment of energy and material resources, including the following:

- construction materials, including such resources as soil, mineral resources, rocks, wood, concrete, glass, roof shingles, and steel;
- land area committed to new/expanded project facilities;
- water supply for project operation; and
- energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction and operation.

The potential impacts of these projects (including the use of nonrenewable resources) would be evaluated in separate, future EIRs by various lead agencies. The BAAQMD has no jurisdiction over the approval of these projects and cannot identify, monitor, or enforce mitigation.

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5 Other CEQA Sections

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Appendix A

Notice of Preparation, Initial Study, and Scoping Comments

Notice of Preparation

BAY AREA AIR QUALITY MANAGEMENT DISTRICT NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PUBLIC SCOPING MEETING FOR THE PROPOSED AMENDMENTS TO RULES 9-4 AND 9-6 PROJECT

To:	Responsible Agencies, Trustee Agencies, and Interested Persons
Lead Agency and Project Applicant:	Bay Area Air Quality Management District 375 Beale Street, Suite 600 San Francisco, CA 94105
Subject:	Notice of Preparation of a Draft Environmental Impact Report for the Proposed Amendments to Rules 9-4 and 9-6 Project
Project Title:	Amendments to Rule 9-4 and Rule 9-6

In accordance with the provisions of the California Environmental Quality Act (CEQA), the Bay Area Air Quality Management District (BAAQMD) will prepare an Environmental Impact Report (EIR) to study the potential impacts of proposed Amendments to Rules 9-4 and 9-6 (Project). The purpose of this Notice of Preparation (NOP) and attached Initial Study is to provide an opportunity for the public, interested parties and public agencies to comment on the scope and proposed content of the EIR.

This NOP (and attached Initial Study) initiates the CEQA scoping process. The BAAQMD will be the lead agency for preparation of the EIR. Documents related to this Project will be available for review on the BAAQMD's website at: https://www.baaqmd.gov/ruledev.

PUBLIC SCOPING MEETING

The BAAQMD will conduct a public scoping meeting to inform interested parties about the Project, and to provide agencies and the public with an opportunity to provide comments on the scope and content of the EIR. The public scoping meeting will be held virtually on June 9, 2022, from 6:00 p.m. to 8:00 p.m. To access the Zoom meeting, you can join via web browser or by phone as described below:

To join via web browser: https://us02web.zoom.us/j/86192822047
To join via phone: +1 669 900 6833
Meeting ID: 861 9282 2047

PROVIDING COMMENTS ON THIS NOTICE OF PREPARATION AND INITIAL STUDY

Written and/or email comments on the NOP and Initial Study should be provided at the earliest possible date, but must be received by 5:00 p.m. on June 21, 2022. Please send all comments on the NOP and Initial Study to:

Jennifer Elwell, BAAQMD
375 Beale Street, Suite 600
San Francisco, CA 94105
E-mail: jelwell@baaqmd.gov

Comments provided by email should include the name and mailing address of the commenter in the body of the email.

Focus of Input

The BAAQMD relies on responsible and trustee agencies to provide information relevant to the analysis of resources falling within their jurisdiction. The BAAQMD encourages input for the proposed EIR, with a focus on the following topics:

Scope of Environmental Analysis. Guidance on the scope of analysis for this EIR, including identification of specific issues that will require closer study due to the location, scale, and character of the Project;

Mitigation Measures. Ideas for feasible mitigation, including mitigation that could potentially be imposed by the BAAQMD and that would avoid, eliminate, or reduce potentially significant or significant impacts;

Alternatives. Suggestions for alternatives to the Project that could potentially reduce or avoid potentially significant or significant impacts; and

Interested Parties. Identification of public agencies, public and private groups, and individuals that the BAAQMD should notice regarding this Project and the accompanying EIR.

PROJECT OVERVIEW

BAAQMD is proposing amendments to Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces (Rule 9-4) and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (Rule 9-6). Rule 9-4 applies to the natural gas-fired space-heating furnaces commonly found in single-family homes, and Rule 9-6 applies to natural gas-fired water heaters commonly found in residential and commercial applications. Space- and water-heating appliances generate a large portion of nitrogen oxide (NO_X) emissions from sources in the Bay Area. NO_X is formed during natural gas combustion when ambient nitrogen and oxygen combine at high temperatures. The proposed amendments would substantially reduce NO_X emissions from these appliances.

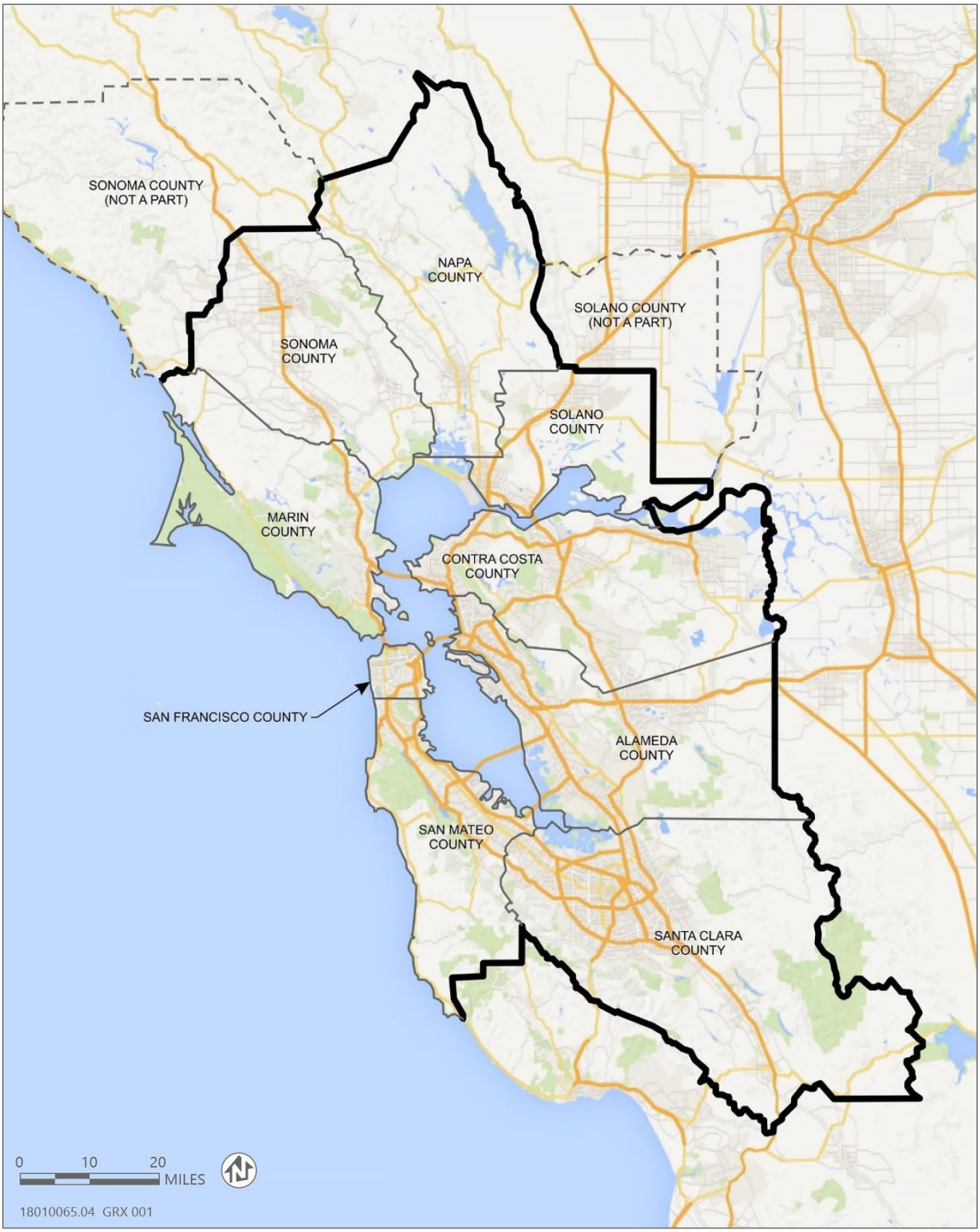
PROJECT LOCATION

The proposed amendments to Rules 9-4 and 9-6 would apply to building appliances within the BAAQMD's jurisdiction, which encompasses 5,600 square miles. The area of the BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties (Figure 1). The San Francisco Bay Area is characterized by a large, shallow basin surrounded by coastal mountain ranges tapering into sheltered inland valleys. The combined climatic and topographic factors result in increased potential for the accumulation of air pollutants in the inland valleys and reduced potential for buildup of air pollutants along the coast.

PROJECT BACKGROUND

The BAAQMD has regulated NO_X emissions from space- and water-heating appliances for several decades. Rule 9-4 for furnaces was first adopted in 1983, with this version of the rule still in place. Rule 9-6 was first adopted in 1992 and was most recently updated with more stringent NO_X emissions standards for certain equipment in 2007. All versions of these rules have included a NO_X emissions standard expressed as nanograms of NO_X per joule of useful heat (ng/joule) delivered by the appliance.

In addition, the South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Air Pollution Control District (SJVAPCD) have adopted regulations that are similar in structure and standards to Rules 9-4 and 9-6. SCAQMD Rule 1111 and SJVAPCD Rule 4905, which are similar to Rule 9-4 in applicability to furnaces, have been updated within the last 10 years and require a NO_X emissions standard of 14 ng/joule, the same initial standard identified in the proposed amendments. Rule 9-6 for water heaters and small boilers currently contains NO_X emission standards equivalent to those in SCAQMD Rules 1146.2 and 1121 and SJVAPCD Rules 4308 and 4902 for similar equipment.



Source: Adapted from the BAAQMD.

Figure 1 Boundary of BAAQMD's Jurisdiction

The proposed rule amendments to the two rules focus on emissions from natural gas-fired space- and water-heating appliances in buildings. Space and water heaters are the greatest source of NO_X emissions in the building sector and unlike some other appliances, space and water heaters vent directly outdoors into the ambient air, affecting the local and regional air quality of the Bay Area, which is the focus of the BAAQMD.

Nitrogen oxides are a key criteria pollutant as a precursor to ozone and secondary particulate matter (PM) formation. Secondary PM is formed from the conversion of NO_X to ammonium nitrate through atmospheric chemical reactions with ammonia. Particulate matter, a diverse mixture of suspended particles and liquid droplets, is the air pollutant most harmful to the health of Bay Area residents. The Bay Area is currently classified as non-attainment for particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$) under California Ambient Air Quality Standards (CAAQS) and unclassifiable under National Ambient Air Quality Standards (NAAQS). Exposure to $PM_{2.5}$, on either a short-term or long-term basis, can cause a wide range of respiratory and cardiovascular health effects, including strokes, heart attacks, and premature deaths. Because NO_X compounds in the atmosphere contribute to the formation of secondary PM, any NO_X emission reduction would also result in $PM_{2.5}$ reductions.

In addition, the Bay Area is currently in non-attainment for ozone, a regional pollutant, under CAAQS and NAAQS. Emissions of reactive organic gases (ROG) and NO_X throughout the Bay Area contribute to ozone formation in downwind areas. Therefore, reductions in emissions of ROG and NO_X are needed throughout the region to decrease ozone levels. As the ambient temperature rises, ground-level ozone forms at an accelerated rate. Ozone levels are usually highest on hot, windless summer afternoons, especially in inland valleys. Exceedances of State or national ozone standards in the Bay Area occur only on hot, relatively stagnant days. Because weather conditions have a strong impact on ozone formation, ozone levels can vary significantly from day to day or from one summer to the next. Longer and more severe heat waves expected as a result of climate change may cause more ozone formation, resulting in more frequent exceedances of ozone standards.

PROJECT OBJECTIVES

The overall purpose of the proposed amendments is to reduce NO_X emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area. Specifically, the objectives of the proposed amendments to Rules 9-4 and 9-6 are to:

- for Rule 9-4, introduce an "ultra-low" NO_X standard with a compliance date of 2023;
- for Rule 9-4, establish a zero-NO_X standard in 2029;
- for Rule 9-6, establish a zero-NO_X standard with compliance dates ranging from 2027 to 2031 based on equipment type, use, and size;
- expand the applicability of Rule 9-4 to a larger breadth of space-heating appliances;
- update and clarify the certification and calculation methods contained in the rules; and
- improve the clarity and enforceability of the rules.

PROJECT DESCRIPTION

The proposed amendments to Rules 9-4 and 9-6 would establish more stringent NO_X emission standards for natural gas-fired space- and water-heating appliances in buildings in the Bay Area.

Proposed Amendments to Rule 9-4

The proposed amendments for Rule 9-4 include introducing an "ultra-low" NO_X standard with a compliance date of 2023 and setting a zero-NO_X standard in 2029. Like the current rule, amended Rule 9-4 would apply only to new devices and only to natural gas-fired devices. The proposed new lower and zero-NO_X standards would apply to appliance manufacturers, retailers/wholesalers, and installers and would affect Bay Area consumers when they replace their existing furnaces.

Proposed Amendments to Rule 9-6

The proposed amendments for Rule 9-6 include setting a zero-NO_X standard with compliance dates ranging from 2027 to 2031 based on equipment type, use, and size. Like the current rule, amended Rule 9-6 would apply only to new devices and only to natural gas-fired devices. The proposed new zero-NO_X standards would apply to appliance manufacturers, retailers/wholesalers, and installers and would affect Bay Area consumers when they replace their existing water heaters.

Emission Control Methods

Emission control methods to meet the proposed 14 ng/joule standard for Rule 9-4 are well established and currently required by SCAQMD Rule 1111 and SJVAPCD Rule 4905. Potential complications identified in other jurisdictions, such as high-altitude and cold weather scenarios, are not applicable in the Bay Area. The BAAQMD anticipates that dual-fuel systems able to demonstrate compliance with this new proposed standard would be eligible for certification.

Current emission control methods for the zero-NO_X emissions standard available on the market consist mainly of electric and electric heat pump systems. The BAAQMD does not intend to mandate specific technology solutions, but currently available electric solutions were used to form estimates and projections. Natural gas technologies, with combustion occurring in the absence of nitrogen, along with a variety of other technologies, could also meet the proposed standards. The assumed use of electric appliances for CEQA analysis purposes allows for a conservative estimate for NO_X reductions because the assumption requires analyzing the potential for additional NO_X emissions from natural gas-fired power plants used to generate electricity. Should natural gas-fired appliances that meet the zero-NO_X standard be developed and used in practice, NO_X emission reductions would be greater than those shown here as the resultant emissions would be zero (i.e., no potential emissions associated with electricity generation), and there would be no foreseeable potential adverse impacts on any environmental impact areas. Thus, for CEQA analysis purposes, the BAAQMD assumes that currently in-use natural gas-fired appliances would be replaced with electric appliances. The proposed amendments include a zero-NO_X standard six to ten years in the future to encourage technology development, as well as availability and accessibility throughout the Bay Area.

Other Potential Physical Effects

As described above, the proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of residential and commercial buildings and would not be visible to the public. The proposed rule amendments would not result in any land use changes and would not require construction. These proposed amendments would also not result in foreseeable changes to equipment manufacturing processes that could require construction of new or expanded equipment manufacturing facilities or notable changes to equipment distribution patterns that could increase vehicle miles traveled. BAAQMD is currently conducting additional research on electrical grid capacity to serve the project. The results of this research will be included in the EIR and, if it is determined that increased generation of electricity and/or construction of additional grid capacity may be required as a result of the proposed rule amendments, the project's potential to result in indirect physical effects associated with any electrical supply increases or necessary grid capacity upgrades will be analyzed in the EIR.

Project Timeline

The proposed rule amendments would be in effect beginning in 2023. They would apply to appliance manufacturers, retailers/wholesalers, and installers and would affect Bay Area consumers when they replace their existing furnaces and water heaters. The equipment changeout is projected to be completed in 2046.

Environmental Permits

No environmental permits would be required for Project implementation.

POTENTIAL ENVIRONMENTAL EFFECTS

As required by CEQA, the EIR will describe existing conditions and evaluate the potential environmental effects of the proposed project and a reasonable range of alternatives, including the no-project alternative. It will address direct, indirect, and cumulative effects. The EIR will also discuss potential growth-inducing impacts and summarize significant and unavoidable environmental effects. The EIR will identify feasible mitigation measures, if available, to reduce potentially significant impacts. Based on the attached Initial Study prepared for this Project, the BAAQMD anticipates that the Project could potentially result in significant environmental impacts in the following resource areas, which will be further evaluated in the EIR:

Air Quality. The overall purpose of the proposed amendments is to reduce NOx emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area. However, implementation of the proposed rule amendments is not expected to, but could result in a net increase in criteria air pollutant emissions if production of additional electricity that may be required to meet potential Project demand generates significant NOx emissions in excess of the reduction in NOx emissions expected from implementation of the zero NOx appliances emissions standards. These potential emissions could exceed significance criteria established by the BAAQMD to identify significant contributions to regional air pollution and thereby could conflict with the BAAQMD's regulations and applicable air quality plans. Further study is needed. The Bay Area is in non-attainment for pollutants such as ozone and particulate matter. Thus, the Project, along with increases in criteria pollutant emissions from other development in the region, could contribute to non-attainment status pursuant to federal or state ambient air quality standards. Because the Project may exceed the BAAQMD's established significance criteria for criteria pollutants (as noted above), the Project's contribution may be cumulatively considerable. Additionally, production of additional electricity could expose nearby sensitive receptors to increased concentrations of pollutants. These issues will be evaluated in the EIR.

Greenhouse Gas Emissions. The overall purpose of the proposed amendments is to reduce NOx emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area, but implementation may also reduce greenhouse gas (GHG) emissions in the future should existing natural gas-fired appliances be replaced with electric appliances. However, implementation of the proposed rule amendments could generate GHG emissions if production of additional electricity is required to meet Project demand. GHG emissions associated with increased production of electricity could have a significant effect on the environment and could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. These issues require further technical study and will be evaluated in the EIR.

Utilities and Service Systems (Energy Resources). The proposed amendments would not generate substantial demand for water, water treatment, wastewater treatment, or natural gas supplies and infrastructure. Further, the proposed amendments would not alter drainage and stormwater conveyance, or water and wastewater conveyance and treatment. The proposed amendments may require increased amounts of electricity, which could result in the need for additional production of electricity and/or additional electrical grid capacity if Project demands exceed existing and planned supply. The construction of this new or expanded electrical infrastructure could cause significant environmental effects. This issue (energy resources) will be evaluated in the EIR.

Secondary and cumulative effects on other environmental resource areas associated with the potential need for construction of new electricity generation and transmission infrastructure will also be evaluated in the EIR.

Initial Study

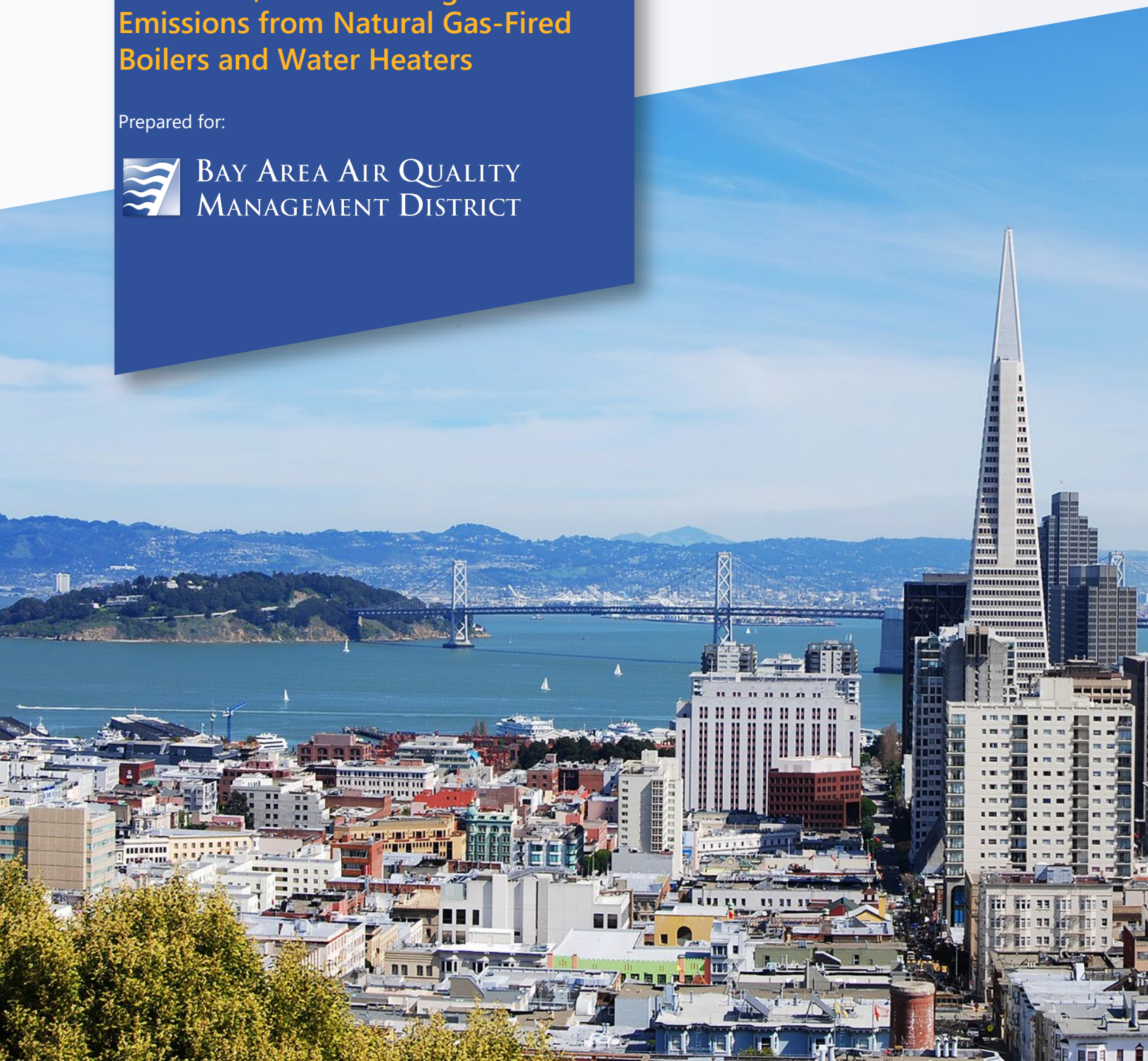
Initial Study
for the

Proposed Amendments to Building Appliance Rules – Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters

Prepared for:

Bay Area Air Quality Management District

ASCENT ENVIRONMENTAL



Initial Study for the

Proposed Amendments to Building Appliance Rules – Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters

Prepared for:

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Contact:

Jennifer Elwell
414.749.4900

Prepared by:

Ascent Environmental
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Contact:

Mike Parker, AICP
916.444.7301

May 2022

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ACRONYMS AND ABBREVIATIONS

AAQS	air quality standards
AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
BP	Before Present
BTU	British thermal unit
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Projection
CEQA	California Environmental Quality Act
CH_4	methane
CHP	California Highway Patrol
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRHR	California Register of Historic Resources
CWA	Clean Water Act
dBA	decibels
Delta	Sacramento–San Joaquin Delta
ECA	Essential Connectivity Areas
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
GHG	greenhouse gas
H_2SO_4	sulfuric acid
HFC	hydrofluorocarbons
HNO_3	nitric acid
IS	Initial Study
LRA	Local Responsibility Area

N_2	nitrogen
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NFIP	National Flood Insurance Program
ng/joule	nanograms per joule
NO_2	nitrogen dioxide
NO_X	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_2	oxygen
PFC	perfluorocarbons
PG&E	Pacific Gas and Electric Company
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
project	proposed amendments to Rules 9-4 and 9-6
RCRA	Resource Conservation and Recovery Act
ROG	reactive organic gases
RPS	Renewable Portfolio Standard
Rule 9-4	Regulation 9, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces
Rule 9-6	Regulation 9, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SF_6	sulfur hexafluoride
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_2	sulfur dioxide
SRA	State Responsibility Area
TAC	toxic air contaminants
TMDL	Total Maximum Daily Load
VMT	vehicle miles traveled
VOC	volatile organic compounds
VTA	Valley Transportation Authority

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1 INTRODUCTION

1.1 INTRODUCTION AND REGULATORY GUIDANCE

This Initial Study (IS) has been prepared by the Bay Area Air Quality Management District (BAAQMD) to provide an initial evaluation of the potential environmental effects resulting from implementing proposed amendments to its building appliance rules. Amendments are proposed to Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces (Rule 9-4) and Regulation 9: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (Rule 9-6). The proposed amendments to Rules 9-4 and 9-6 (Project) would reduce nitrogen oxides (NOx) emissions from space and water heating appliances in the Bay Area.

This document has been prepared in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 et seq.) and the State CEQA Guidelines (California Code of Regulations Section 15000 et seq.). An Initial Study is prepared by a lead agency to determine if a project may have a significant effect on the environment (State CEQA Guidelines Section 15063[a]), and thus to determine the appropriate environmental document. In this circumstance, the BAAQMD has determined, based on the IS, that potential significant physical environmental impacts require further evaluation and preparation of an environmental impact report (EIR).

1.2 NOTICE OF PREPARATION

In accordance with provisions of CEQA, the BAAQMD is distributing a notice of preparation (NOP) of an EIR to solicit comments on the scope of the EIR for this Project. As required by CEQA, the NOP will be provided to the State Clearinghouse/Governor's Office of Planning and Research, responsible and trustee agencies, and the public for at least a 30-day review and comment period.

1.3 PURPOSE OF THIS INITIAL STUDY

Under CEQA, an IS can be prepared by a lead agency to determine if a project may have a significant effect on the environment (State CEQA Guidelines Section 15063[a]), and thus to determine the appropriate environmental document. In this circumstance, the BAAQMD has determined, based on the IS, that potential significant physical environmental impacts require further evaluation and an EIR will be prepared.

1.4 STANDARD TERMINOLOGY

This IS includes the following terminology regarding the significance of environmental impacts of the Project:

- No Impact: Implementing the Project would not result in an adverse effect.
- Less-than-Significant Impact: The impact would be adverse but would not exceed the defined standard or threshold of significance. Less-than-significant impacts do not require mitigation.
- Significant Impact: The impact would exceed the defined standard or threshold of significance and would or could cause a substantial adverse change in the environment. Potentially feasible mitigation measures or alternatives are recommended to eliminate the impact, reduce it to a less-than-significant level, or reduce it to the degree feasible.
- Potentially Significant Impact: The impact may be or is likely to be significant. Because information is limited, the conclusion is not definitive. For purposes of the EIR analysis, a potentially significant impact is treated the same as a significant impact and requires feasible mitigation measures or alternatives.

- Mitigation Measure: The measure could feasibly avoid, minimize, or compensate for a significant impact. Mitigation measures must be fully enforceable through permit conditions, agreements, or other legally binding instruments. Compliance with state and federal laws or other regulations, including potential actions to achieve such compliance, may be sufficient mitigation in instances in which compliance would be reasonably expected to avoid, minimize, or compensate for the environmental impact.

1.5 DOCUMENT ORGANIZATION

This IS is organized as follows:

Chapter 1, "Introduction," provides an introduction to the environmental review process. It describes the purpose and organization of this document.

Chapter 2, "Environmental Checklist," presents an analysis of a range of environmental issues identified in the CEQA Environmental Checklist and determines if Project actions would result in no impact, a less-than-significant impact, a less-than-significant impact with mitigation incorporated, or a potentially significant impact. If any impacts are determined to be potentially significant, further study of the potential impacts will be conducted and disclosed as part of the EIR.

Chapter 3, "References," lists the references used in preparation of this IS.

Chapter 4, "Report Preparers," identifies the report preparers.

2 ENVIRONMENTAL CHECKLIST

PROJECT INFORMATION

1.	Project Title:	Proposed Amendments to Building Appliance Rules – Regulation 9: Inorganic Gaseous Pollutants, Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces and Regulation: Inorganic Gaseous Pollutants, Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters
2.	Lead Agency Name and Address:	Bay Area Air Quality Management District 375 Beale Street, Suite 600 San Francisco, California 94105
3.	Contact Person and Phone Number:	Jennifer Elwell (415) 749-8732
4.	Project Location:	The proposed amendments would apply to the area within the jurisdiction of Bay Area Air Quality Management District (BAAQMD), which includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties, and portions of southwestern Solano and southern Sonoma Counties
5.	Project Sponsor's Name and Address:	Same as lead agency
6.	General Plan Designation:	The proposed amendments would apply to the area within the jurisdiction of BAAQMD and may include all general plan designations within the Bay Area
7.	Zoning:	The proposed amendments would apply to the area within the jurisdiction of BAAQMD and may include all types of zoning within the Bay Area

8. Description of Project: (Describe the whole action involved, including but not limited to later phases of the Project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)

   See Notice of Preparation (attached)

9. Surrounding Land Uses and Setting: (Briefly describe the project's surroundings) — See Notice of Preparation (attached)

10. Other public agencies whose approval is required: (e.g., permits, financing approval, or participation agreement) — None

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?
    Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project

proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See Public Resources Code section 21083.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that Public Resources Code section 21082.3(c) contains provisions specific to confidentiality.

No California Native American tribes have requested to be informed of projects by BAAQMD; therefore, there is no trigger to begin consultation under AB 52, resulting in no resources identified as tribal cultural resources under Public Resources Code Section 21074.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages. Where checked below, the topic with a potentially significant impact will be addressed in an environmental impact report.

☐ Aesthetics	☐ Agriculture and Forest Resources	☒ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Energy
☐ Geology / Soils	☒ Greenhouse Gas Emissions	☐ Hazards / Hazardous Materials
☐ Hydrology / Water Quality	☐ Land Use / Planning	☐ Mineral Resources
☐ Noise	☐ Population / Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☒ Utilities / Service Systems	☐ Wildfire	☒ Mandatory Findings of Significance
	☐ None	☐ None with Mitigation Incorporated

DETERMINATION (To be completed by the Lead Agency)

On the basis of this initial evaluation:

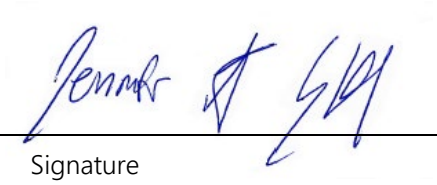
☐ I find that the proposed project could not have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

☐ I find that although the proposed project COULD have a significant effect on the environment, there WILL NOT be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

☒ I find that the proposed project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

☐ I find that the proposed project **MAY** have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.



Signature

5/16/2022

Date

Jennifer Elwell

Printed Name

Senior Air Quality Engineer

Title

Bay Area Air Quality Management District

Agency

EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.
4. "Negative Declaration: Less Than Significant with Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).
5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:
   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.
6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
7. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.
9. The explanation of each issue should identify:
   a) the significance criteria or threshold, if any, used to evaluate each question; and
   b) the mitigation measure identified, if any, to reduce the impact to less than significance.

2.1 AESTHETICS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. Aesthetics.				
Except as provided in Public Resources Code section 21099 (where aesthetic impacts shall not be considered significant for qualifying residential, mixed-use residential, and employment centers), would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

2.1.1 Environmental Setting

The Bay Area Air Quality Management District's (BAAQMD) jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses. Important views of natural features include the San Francisco Bay and ocean, Mount Tamalpais, Mount Diablo, and other peaks and inland valleys of the Coast Range. Cityscape views offered by buildings and distinctive Bay Area bridges, especially the Golden Gate and Bay Bridges and the San Francisco skyline, are also important built visual resources to the region. Views along travel corridors, including roads and rail lines, are in abundance in the Bay Area and include views of the San Francisco Bay, city scape, mountains and hills, redwood groves, and broader views of the ocean and lowlands, such as along ridgelines. Because of the variety of visual resources, scenic highways and corridors are located throughout the Bay Area and include 15 routes that have been designated as scenic highways and 31 routes eligible for designation as scenic highways (MTC and ABAG 2021: 3.2-8 and 3.2-9).

2.1.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of residential and commercial buildings and would not be visible to the public.

a) Have a substantial adverse effect on a scenic vista?

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not be visible to the public. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Therefore, the Project would not adversely affect a scenic vista, damage scenic resources, or degrade the existing visual character or quality of public views within the Bay Area. No impact would occur, and this issue will not be analyzed further in the EIR.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not be visible to the public. The proposed rule amendments would not require new lighting fixtures. Therefore, the Project would not generate substantial light or glare impacts on day or nighttime views. No impact would occur, and this issue will not be analyzed further in the EIR.

2.2 AGRICULTURE AND FOREST RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
II. Agriculture and Forest Resources.				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.				
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

2.2.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses. The Bay Area has a substantial amount of land in agricultural uses, some of which is under Williamson Act contract.

The California Department of Conservation Farmland Mapping and Monitoring Program (FMMP) classifies agricultural land in eight categories based on soil quality and irrigation status. In 2018, over half of the region's approximately 4.4 million acres were zoned for agricultural uses or classified as agricultural land, as defined by the FMMP (MTC and ABAG 2021: 3.3-2). Of these approximately 2.3 million acres of agricultural land, over 70 percent (about 1.7 million acres) are used for grazing. Products grown in the Bay Area include field crops, fruit and nut crops, seed crops,

vegetable crops, and nursery products. Field crops, which include corn, wheat, and oats, as well as pasture lands, represent approximately 62 percent of the Bay Area's agricultural land (MTC and ABAG 2021: 3.3-2).

The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of preserving agriculture and restricting unnecessary conversion to urban uses. Under the contract, landowners receive reduced property tax assessments based on the property's value for farming and open space uses as opposed to full market value. Agricultural land under Williamson Act contract includes both prime and nonprime lands. Prime agricultural land includes land with certain specific soil characteristics, land that has returned a predetermined annual gross value for three of the past five years, livestock-supporting land with specific carrying capacities, or land planted with fruit or nut trees, vines, bushes, or crops that have a non-bearing period of less than five years (Government Code Sections 51200–51207). Nonprime lands include pasture and grazing lands and other non-irrigated agricultural lands with lesser soil quality. In 2018, approximately 1.2 million acres of land were under Williamson Act contract in the Bay Area (MTC and ABAG 2021: 3.3-4). Of the total acres, 17 percent were designated as prime farmland and 83 percent were nonprime. Lands under Williamson Act contract are primarily used for pasture and grazing and not for cultivation of crops.

The Bay Area includes a variety of forest types spread throughout the nine-county region. Forests are generally located at higher elevations of the Coast Ranges in areas with sufficient moisture. Forestland is a valuable environmental and aesthetic resource and a defining feature in many parts of the landscape in the Bay Area. Forest habitats include a wide range of woodland and forest species. In the Bay Area, only Napa (59,100 acres), Sonoma (319,700 acres), San Mateo (45,600 acres), and Santa Clara (28,500) Counties have substantial acreages of unreserved timberland forest (MTC and ABAG 2021: 3.3-6).

2.2.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas.

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b) Conflict with existing zoning for agricultural use or a Williamson Act contract?

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

d) Result in the loss of forest land or conversion of forest land to non-forest use?

e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Existing agricultural and forest land resources within the BAAQMD's jurisdiction would not be affected. The Project would not convert farmland to non-agricultural use, conflict with zoning for agricultural use or a Williamson Act contract, conflict with zoning of forest land, or convert forest land to non-forest use. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

2.3 AIR QUALITY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
III. Air Quality.				
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied on to make the following determinations.				
Are significance criteria established by the applicable air district available to rely on for significance determinations?	☒ Yes		☐ No	
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☒	☐	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☐	☒

2.3.1 Environmental Setting

The San Francisco Bay Area is characterized by a large, shallow basin surrounded by mountain ranges tapering into sheltered inland valleys. The basin is bounded by the Pacific Ocean to the west and includes complex terrain consisting of mountains, valleys, and bays. Combined climatic and topographic factors result in increased potential for the accumulation of air pollutants in the inland valleys and reduced potential for buildup of air pollutants along the coast.

Air quality conditions in the San Francisco Bay Area have improved since the BAAQMD was created in 1955. The long-term trend of ambient concentrations of air pollutants and the number of days on which the region exceeds ambient air quality standards (AAQS) have generally declined, although some year-to-year variability (primarily due to meteorology) causes some short-term increases in the number of exceedance days. The increase of severity and frequency of wildfire smoke episodes since 2017 has led to an increase in levels of annual particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) and particulate matter less than 10 microns in diameter (PM_{10}) and indicates the need for continued reductions. The San Francisco Bay Area is in attainment of the State AAQS for carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). However, the Bay Area is designated as a non-attainment area for the State PM_{10} (24-hour and annual) and $PM_{2.5}$ (annual) standards. The BAAQMD is designated unclassifiable/ attainment for the Federal CO, NO_2, SO_2, lead, PM_{10} and 2013 annual $PM_{2.5}$ standards. A designation of unclassifiable/attainment means that the U.S. Environmental Protection Agency (EPA) has sufficient evidence to find the area either is attaining or likely attaining the Federal AAQS (BAAQMD 2017a).

Based on the 2020 air quality data from the BAAQMD monitoring stations, no monitoring stations measured an exceedance of any of State or federal AAQS for CO or NO_2 (CARB 2020). There was one exceedance of the Federal 1-hour SO_2 standard in 2020 at the Crockett station, and one exceedance of the federal PM_{10} standard in 2020 at the Concord station. The State 24-hour PM_{10} standard was exceeded at one or more Bay Area stations on eleven days in 2020.

The Bay Area is designated as a non-attainment area for the federal and State eight-hour ozone standard and the federal 2006 24-hour $PM_{2.5}$ standard. The State and federal eight-hour ozone standards were exceeded at one site or more in the BAAQMD on ten and nine days in 2020, respectively: most frequently in the Eastern District, the Santa Clara Valley, and the South Central Bay zones. The federal 24-hour $PM_{2.5}$ standard was exceeded at one or more Bay Area stations on 25 days in 2020 throughout the BAAQMD.

CRITERIA AIR POLLUTANT HEALTH EFFECTS

Ozone: Ozone is not emitted directly from pollution sources. Instead, ozone is formed in the atmosphere through complex chemical reactions between hydrocarbons, or reactive organic gases (ROG), also commonly referred to as volatile organic compounds (VOC), and nitrogen oxides (NOx), in the presence of sunlight. ROG and NOx are referred to as ozone precursors. Ozone is harmful to public health at high concentrations near ground level. Ozone can damage the tissues of the lungs and respiratory tract. High concentrations of ozone irritate the nose, throat, and respiratory system and constrict the airways. Ozone also can aggravate other respiratory conditions such as asthma, bronchitis, and emphysema, causing increased hospital admissions. Repeated exposure to high ozone levels can make people more susceptible to respiratory infection and lung inflammation and permanently damage lung tissue. Ozone can also have negative cardiovascular impacts, including chronic hardening of the arteries and acute triggering of heart attacks. Children are most at risk as they tend to be active and outdoors in the summer when ozone levels are highest. Seniors and people with respiratory illnesses are also especially sensitive to ozone's effects. Even healthy adults can be affected by working or exercising outdoors during high ozone levels. The propensity of ozone for reacting with organic materials causes it to be damaging to living cells, and ambient ozone concentrations in the Bay Area are occasionally sufficient to cause health effects. Ozone enters the human body primarily through the respiratory tract and causes respiratory irritation and discomfort, makes breathing more difficult during exercise, reducing the respiratory system's ability to remove inhaled particles and fight infection while long-term exposure damages lung tissue. People with respiratory diseases, children, the elderly, and people who exercise heavily are more susceptible to the effects of ozone. Plants are sensitive to ozone at concentrations well below the health-based standards and ozone is responsible for significant crop damage. Ozone is also responsible for damage to forests and other ecosystems.

Reactive Organic Gases (ROGs): It should be noted that there are no state or national ambient air quality standards for ROGs because they are not classified as criteria pollutants. ROGs are regulated, however, because ROG emissions contribute to the formation of ozone. They are also transformed into organic aerosols in the atmosphere, contributing to higher $PM_{2.5}$ and lower visibility levels. Although health-based standards have not been established for ROGs, health effects can occur from exposures to high concentrations of ROGs because of interference with oxygen uptake. In general, ambient ROG concentrations in the atmosphere are suspected to cause coughing, sneezing, headaches, weakness, laryngitis, and bronchitis, even at low concentrations. Some hydrocarbon components classified as ROG emissions are thought or known to be hazardous. Benzene, for example, one hydrocarbon component of ROG emissions, is known to be a human carcinogen. ROG emissions result primarily from incomplete fuel combustion and the evaporation of paints, solvents, and fuels. Mobile sources are the largest contributors to ROG emissions. Stationary sources include processes that use solvents (such as manufacturing, degreasing, and coating operations) and petroleum refining, and marketing. Area-wide ROG sources include consumer products, pesticides, aerosol and architectural coatings, asphalt paving and roofing, and other evaporative emissions.

Carbon Monoxide (CO): CO is a colorless, odorless, relatively inert gas. It is a trace constituent in the unpolluted troposphere and is produced by both natural processes and human activities. In remote areas far from human habitation, carbon monoxide occurs in the atmosphere at an average background concentration of 0.04 ppm, primarily because of natural processes such as forest fires and the oxidation of methane. Global atmospheric mixing of CO from urban and industrial sources creates higher background concentrations (up to 0.20 ppm) near urban areas. The major source of CO in urban areas is incomplete combustion of carbon-containing fuels, mainly gasoline used in mobile sources. Consequently, CO concentrations are generally highest in the vicinity of major concentrations of vehicular traffic. CO is a primary pollutant, meaning that it is directly emitted into the air, not formed in the

atmosphere by chemical reaction of precursors, as is the case with ozone and other secondary pollutants. Ambient concentrations of CO in the District exhibit large spatial and temporal variations, due to variations in the rate at which CO is emitted, and in the meteorological conditions that govern transport and dilution. Unlike ozone, CO tends to reach high concentrations in the fall and winter months. The highest concentrations frequently occur on weekdays at times consistent with rush hour traffic and late night during the coolest, most stable atmospheric portion of the day. When CO is inhaled in sufficient concentrations, it can displace oxygen and bind with the hemoglobin in the blood, reducing the capacity of the blood to carry oxygen. Individuals most at risk from the effects of CO include heart patients, fetuses (unborn babies), smokers, and people who exercise heavily. Normal healthy individuals are affected at higher concentrations, which may cause impairment of manual dexterity, vision, learning ability, and performance of work. The results of studies concerning the combined effects of CO and other pollutants in animals have shown a synergistic effect after exposure to CO and ozone.

Particulate Matter (PM_{10} & $PM_{2.5}$): Particulate matter, or PM, consists of microscopically small solid particles or liquid droplets suspended in the air. PM can be emitted directly into the air, or it can be formed from secondary reactions involving gaseous pollutants that combine in the atmosphere. Particulate pollution is primarily a problem in winter, accumulating when cold, stagnant weather comes into the Bay Area. PM is usually broken down further into two size distributions, PM_{10} and $PM_{2.5}$. Of great concern to public health are the particles small enough to be inhaled into the deepest parts of the lungs. Respirable particles (particulate matter less than about 10 micrometers in diameter) can accumulate in the respiratory system and aggravate health problems such as asthma, bronchitis, and other lung diseases. Children, the elderly, exercising adults, and those suffering from asthma are especially vulnerable to adverse health effects of PM_{10} and $PM_{2.5}$. A consistent correlation between elevated ambient particulate matter (PM_{10} and $PM_{2.5}$) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. Studies have reported an association between long-term exposure to air pollution dominated by fine particles ($PM_{2.5}$) and increased mortality, reduction in lifespan, and an increased mortality from lung cancer. Daily fluctuations in fine particulate matter concentration levels have also been related to hospital admissions for acute respiratory conditions, to school and kindergarten absences, to a decrease in respiratory function in normal children and to increased medication use in children and adults with asthma. Studies have also shown lung function growth in children is reduced with long-term exposure to particulate matter. The elderly, people with pre-existing respiratory and/or cardiovascular disease and children appear to be more susceptible to the effects of PM_{10} and $PM_{2.5}$.

Nitrogen Dioxide (NO_2): NO_2 is a reddish-brown gas with a bleach-like odor. Nitric oxide (NO) is a colorless gas, formed from the nitrogen (N_2) and oxygen (O_2) in air under conditions of high temperature and pressure which are generally present during combustion of fuels; NO reacts rapidly with the oxygen in air to form NO_2. NO_2 is responsible for the brownish tinge of polluted air. The two gases, NO and NO_2, are referred to collectively as nitrogen oxides or NOx. In the presence of sunlight, NO_2 reacts to form nitric oxide and an oxygen atom. The oxygen atom can react further to form ozone, via a complex series of chemical reactions involving hydrocarbons. Nitrogen dioxide may also react to form nitric acid (HNO_3) which reacts further to form nitrates, which are a component of $PM_{2.5}$. NO_2 is a respiratory irritant and reduces resistance to respiratory infection. Children and people with respiratory disease are most susceptible to its effects.

Sulfur Dioxide (SO_2): SO_2 is a colorless gas with a sharp odor. It reacts in the air to form sulfuric acid (H_2SO_4), which contributes to acid precipitation, and sulfates, which are a component of PM_{10}. Most of the SO_2 emitted into the atmosphere is produced by the burning of sulfur containing fuels. At sufficiently high concentrations, SO_2 affects breathing and the lungs' defenses, and can aggravate respiratory and cardiovascular diseases. Asthmatics and people with chronic lung disease or cardiovascular disease are most sensitive to its effects. SO_2 also causes plant damage, damage to materials, and acidification of lakes and streams.

NON-CRITERIA POLLUTANTS HEALTH EFFECTS

Although the BAAQMD's primary mandate is attaining and maintaining the federal and State AAQS for criteria pollutants within the BAAQMD's jurisdiction, the BAAQMD also has a general responsibility to control, and where possible, reduce public exposure to airborne toxic compounds. Toxic air contaminants (TACs) are a defined set of

airborne pollutants that may pose a present or potential hazard to human health. TACs can be emitted directly and can also be formed in the atmosphere through reactions among different pollutants. The health effects associated with TACs are quite diverse and generally are assessed locally, rather than regionally. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage; or short-term acute affects such as eye watering, respiratory irritation, running nose, throat pain, and headaches. TACs are separated into carcinogens and non-carcinogens based on the nature of the pollutant. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. Non-carcinogenic substances differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is expected to occur. These levels are determined on a pollutant-by-pollutant basis. The air toxics program was established as a separate and complementary program designed to evaluate and reduce adverse health effects resulting from exposure to TACs. The major elements of the BAAQMD's air toxics program are outlined below.

- Preconstruction review of new and modified sources for potential health impacts, and the requirement for new/modified sources with TAC emissions that exceed a specified threshold to use BACT.
- The Air Toxics Hot Spots Program, designed to identify industrial and commercial facilities that may result in locally elevated ambient concentrations of TACs, to report significant emissions to the affected public, and to reduce unacceptable health risks.
- Findings from the District's Community Health Protection Program have been implemented to identify areas where air pollution contributes most to health impacts and where populations are most vulnerable to air pollution; to reduce the health impacts in these areas; and to engage the community and other agencies to develop additional actions to reduce local health impacts.
- Control measures designed to reduce emissions from source categories of TACs, including rules originating from the state Toxic Air Contaminant Act and the federal Clean Air Act.
- The TAC emissions inventory, a database that contains information concerning routine and predictable emissions of TACs from permitted stationary sources.
- Ambient monitoring of TAC concentrations at a number of sites throughout the Bay Area.
- The District's Regulation 11, Rule 18: Reduction from Air Toxic Emissions at Existing Facilities, which was adopted November 15, 2017. This rule requires the District to conduct screening analyses for facilities that report TAC emissions within the District and calculate health prioritization scores based on the amount of TAC emissions, the toxicity of the TAC pollutants, and the proximity of the facilities to local communities. The District will conduct health risk assessments for facilities that have priority scores above a certain level. Based on the health risk assessment, facilities found to have a potential health risk above the risk action level would be required to reduce their risk below the action level or install Best Available Retrofit Control Technology for Toxics on all significant sources of toxic emissions.

TAC HEALTH EFFECTS

TACs can cause or contribute to a wide range of health effects. Acute (short-term) health effects may include eye and throat irritation. Chronic (long-term) exposure to TACs may cause more severe effects such as neurological damage, hormone disruption, developmental defects, and cancer. CARB has identified roughly 200 TACs, including diesel particulate matter (diesel PM) and environmental tobacco smoke.

Unlike criteria pollutants which are subject to ambient air quality standards, TACs are primarily regulated at the individual emissions source level based on risk assessment. Human outdoor exposure risk associated with an individual air toxic species is calculated as its ground-level concentration multiplied by an established unit risk factor for that air toxic species. Total risk due to TACs is the sum of the individual risks associated with each air toxic species.

Occupational health studies have shown diesel PM to be a lung carcinogen as well as a respiratory irritant. Benzene, present in gasoline vapors and a byproduct of combustion, has been classified as a human carcinogen and is

associated with leukemia. 1,3-butadiene, produced from motor vehicle exhaust and other combustion sources, has also been associated with leukemia. Reducing 1,3-butadiene also has a co-benefit in reducing the TAC acrolein.

Acetaldehyde and formaldehyde are emitted from fuel combustion and other sources. They are also formed photo-chemically in the atmosphere from other compounds. Both compounds have been found to cause nasal cancers in animal studies and are also associated with skin and respiratory irritation. Human studies for carcinogenic effects of acetaldehyde are sparse but, in combination with animal studies, sufficient to support classification as a probable human carcinogen. Formaldehyde has been associated with nasal sinus cancer and nasopharyngeal cancer, and possibly with leukemia.

The primary health risk of concern due to exposure to TACs is the risk of contracting cancer. The carcinogenic potential of TACs is a particular public health concern because many scientists currently believe that there are not "safe" levels of exposure to carcinogens without some risk to causing cancer. The proportion of cancer deaths attributable to air pollution has not been estimated using epidemiological methods. Based on ambient air quality monitoring, and using OEHHA cancer risk factors,1 the estimated lifetime cancer risk for Bay Area residents, over a 70-year lifespan from all TACs combined, declined from 4,100 cases per million in 1990 to 690 cases per million people in 2014. This represents an 80 percent decrease between 1990 and 2014 (BAAQMD 2017b).

The cancer risk related to diesel PM, which accounts for most of the cancer risk from TACs, has declined substantially over the past 15-20 years because of CARB regulations and the BAAQMD programs to reduce emissions from diesel engines. However, diesel PM still accounts for roughly 60 percent of the total cancer risk related to TACs.

AIR TOXICS EMISSION INVENTORY

The BAAQMD maintains a database that contains information concerning emissions of TACs from permitted stationary sources in the Bay Area. This inventory, and a similar inventory for mobile and area sources compiled by CARB, is used to plan strategies to reduce public exposure to TACs. The detailed emissions inventory is reported in the BAAQMD's Toxic Air Contaminant Control Program, 2018 Annual Report (BAAQMD 2018). The 2018 emissions inventory continues to show decreasing emissions of many TACs in the Bay Area.

2.3.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of residential and commercial buildings.

a) Conflict with or obstruct implementation of the applicable air quality plan?

Potentially significant impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The applicable air quality plan is the BAAQMD's 2017 Clean Air Plan, Spare the Air, Cool the Climate ("Plan") (BAAQMD 2017b). The Plan outlines a strategy for achieving the Bay Area's clean air goals by reducing emissions of ozone precursors, particulate matter, TACs, and other pollutants in the region.

The overall purpose of the proposed amendments is to reduce NOx emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area. NOx emissions are a key criteria pollutant as a precursor to ozone and secondary PM formation. Secondary PM is formed from the conversion of NOx to ammonium nitrate through atmospheric chemical reactions with ammonia. PM, a diverse mixture of suspended particles and liquid droplets, is the air pollutant most harmful to the health of Bay Area residents. The Bay Area is currently classified as non-attainment for $PM_{2.5}$ under the State AAQS. Exposure to $PM_{2.5}$, on either a short-term or long-term basis, can cause a wide range of respiratory and cardiovascular health effects, including strokes, heart attacks, and premature

deaths. Because NOx compounds in the atmosphere contribute to the formation of secondary PM, any NOx emission reduction would also result in reduction of the formation of secondary $PM_{2.5}$. In addition, the Bay Area is currently in non-attainment for ozone, a regional pollutant, under federal and State AAQS. Emissions of ROG and NOx throughout the Bay Area contribute to ozone formation in downwind areas. Therefore, reductions in emissions of ROG and NOx are needed throughout the region to decrease ozone levels.

Implementation of the proposed rule amendments is intended to directly support the goals of the Plan to reduce ozone and $PM_{2.5}$ precursor emissions and improve public health. The proposed rule amendments do not prescribe what type of energy an appliance must use; rather, they impose an emission limitation that could be met by appliances powered by differing sources of energy. If natural gas-fired appliances that meet a zero NOx standard become available and widely used to replace existing appliances, there would be a reduction in criteria pollutant emissions from the Project because the zero NOx natural gas-fired appliances would emit less criteria pollutant air pollution than the current appliances. On the other hand, if consumers choose to replace natural gas-fired appliances with electric appliances, which are widely available today and meet the zero NOx standard, increases in electricity usage would result from the Project. Whether this increased electricity demand can be met by existing produced supply will be evaluated in the EIR. Implementation of the proposed rule amendments could indirectly result in an increase in criteria air pollutant emissions from any increased production of electricity required to meet the Project demand, depending on the source of the electricity. These potential emissions could exceed significance criteria established by the BAAQMD to identify significant contributions to regional air pollution and thereby could conflict with the BAAQMD's regulations and applicable air quality plans. However, these emissions would be compared to accompanying reductions in criteria pollutant emissions from implementation of the zero NOx appliances standard to determine the net impact and change in the environment. This would be a potentially significant impact that will be analyzed further in the EIR.

Secondary and cumulative effects associated with the potential need for the construction of new electricity generation and transmission infrastructure will also be evaluated in the EIR.

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Potentially significant impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. If generation of additional electricity is required as a result of the proposed rule amendments, there could be an increase in criteria air pollutant emissions, depending on the source of the electricity. However, these potential emissions would be compared to accompanying reductions in criteria pollutant emissions from implementation of the zero NOx appliances standard to determine the net impact and change in the environment. As discussed above, the Bay Area is in non-attainment for pollutants such as ozone and particulate matter. Thus, the Project, along with increases in criteria pollutant emissions from other development in the region, could contribute to non-attainment status pursuant to federal or state ambient air quality standards. Because the Project may exceed the BAAQMD's established significance criteria for criteria pollutants (as noted above), the Project's contribution may be cumulatively considerable. This would be a potentially significant impact that will be analyzed further in the EIR.

Secondary and cumulative effects associated with the potential need for the construction of new electricity generation and transmission infrastructure will also be evaluated in the EIR.

c) Expose sensitive receptors to substantial pollutant concentrations?

Potentially significant impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded

facilities. If generation of additional electricity is required as a result of the proposed rule amendments, depending on the source of the electricity, this could expose nearby sensitive receptors to increased concentrations of pollutant concentrations. The potential for the Project to indirectly increase emissions that could affect sensitive receptors would be a potentially significant impact that will be analyzed further in the EIR.

Secondary and cumulative effects associated with the potential need for the construction of new electricity generation and transmission infrastructure will also be evaluated in the EIR.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Even if production of additional electricity is required as a result of the proposed rule amendments, odorous emissions would not be generated. Therefore, the Project would not result in odorous emissions. No impact would occur.

2.4 BIOLOGICAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. Biological Resources.				
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☐	☒
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

2.4.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses. A wide variety of biological resources are located within the Bay Area.

Special-status species are defined as species that are legally protected or that are otherwise considered sensitive by federal, State, or local resource agencies. Several species known to occur in the Bay Area are considered special-status species because of their recognized rarity or vulnerability to habitat loss or population decline. The U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration Fisheries Service designate critical

habitat for certain species that they have listed as threatened or endangered. Critical habitat has been designated for 30 species in the Bay Area (MTC and ABAG 2021: 3.5-3).

Sensitive natural communities are those native plant communities that are defined by CDFW as having limited distribution Statewide or within a county or region and that are often vulnerable to environmental effects of projects. Sensitive communities in the Bay Area include coastal salt marsh; brackish and freshwater wetlands, including marshes, seasonal wetlands, and vernal pools; riparian forests and woodlands; and several types of coastal scrub, chaparral, and perennial grasslands (MTC and ABAG 2021: 3.5-3).

The Bay Area supports numerous distinct natural communities composed of a diversity of vegetative types that provide habitat for a wide variety of plant and wildlife species. Broad habitat categories in the region include grasslands, coastal scrub and chaparral, woodlands and forests, riparian systems and freshwater aquatic habitat, and wetlands. Extensive aquatic resources are provided by the San Francisco Bay Delta estuary, as well as numerous other rivers and streams. Urban and otherwise highly disturbed habitats, such as agricultural fields, also provide natural functions and values as wildlife habitat (MTC and ABAG 2021: 3.5-9).

The Bay Area includes 13 Essential Connectivity Areas (ECAs), which are a network of wildlands that are considered important to the continued support of California's diverse natural communities (MTC and ABAG 2021: 3.5-22). These ECAs occur within all nine Bay Area counties and are typically centered along the region's mountain ranges. These areas are composed primarily of wildlands but may also include some agricultural and developed areas (mostly rural residential) and many are bisected by major roadways.

2.4.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas.

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because there would be no construction, the Project would also not result in habitat conversion or vegetation removal. Existing biological resources, including special-status species, habitats, and wildlife corridors, within the BAAQMD's jurisdiction would not be affected. Therefore, the Project would not have a substantial adverse

effect on a candidate, sensitive, or special-status species; riparian habitat or other sensitive natural community; or state or federally protected wetlands. Additionally, the Project would not interfere with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites. No impact would occur, and this issue will not be analyzed further in the EIR.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because there would be no construction, the Project would also not result in habitat conversion or vegetation removal. Existing biological resources, including special-status species, habitats, and wildlife corridors, within the BAAQMD's jurisdiction would not be affected. Therefore, the Project would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Similarly, the Project would not conflict with a habitat conservation plan or natural community conservation plan. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

2.5 CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. Cultural Resources.				
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☐	☐	☒
c) Substantially disturb human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

2.5.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses. Cultural resources are defined as buildings, sites, structures, or objects which might have historical architectural, archaeological, cultural, or scientific importance. Cultural resources generally are the material remains of human activity identified with either the prehistoric inhabitants of the area (any time before the arrival of the Spanish in the latter half of the 18th century) or with the historic inhabitants. The historic period begins with the arrival of the Spanish.

Cultural resources in the Bay Area reflect centuries of human settlement in the region and document the changing character of economic, social, and spiritual activities. They include prehistoric resources, historic-period resources, and sensitive locations where resources are likely to be identified in the future based on our existing knowledge of historic and prehistoric settlement patterns. Archaeological resources are locations where human activity has measurably altered the earth or left deposits of prehistoric or historic-era physical remains (e.g., stone tools, bottles, former roads, house foundations). Historical (or built-environment) resources include standing buildings (e.g., houses, barns, outbuildings, cabins) and intact structures (e.g., dams, bridges, roads, districts), or landscapes (MTC and ABAG 2021: 3.7-1).

The Carquinez Strait represents the entry point for the Sacramento and San Joaquin Rivers into the San Francisco Bay. This locality lies within the San Francisco Bay and the west end of the Central Valley archaeological regions, both of which contain a rich array of prehistoric and historical cultural resources. The areas surrounding the Carquinez Strait and Suisun Bay have been occupied for millennia given their abundant combination of littoral and oak woodland resources.

Historic resources are standing structures of historic or aesthetic significance. Architectural sites dating from the Spanish Period (1529-1822) through the late 1960s are generally considered for protection if they are determined to be historically or architecturally significant. These may include missions, historic ranch lands, and structures from the Gold Rush and the region's early industrial era. More recent architectural sites may also be considered for protection if they could gain historic significance in the future (MTC and ABAG 2021: 3.7-1).

Of the 8,118 sites recorded in the Bay Area as of 2013, 1,006 cultural resources were listed in the California Register of Historic Resources (CRHR), meaning that they are significant at the local, State or national level. Of those, 744 are also listed in the National Register of Historic Places (NRHP). From this list, 249 resources are listed as California Historic

Landmarks. The greatest concentration of historic resources listed on both the NRHP and the CRHR in the Bay Area occurs in San Francisco, with 181 resources. Alameda County has the second highest number of NRHP- and CRHR-listed resources, with 147 resources (MTC and ABAG 2021: 3.7-12 and 3.7-13).

2.5.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. Grading would not be required.

a) Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

c) Substantially disturb human remains, including those interred outside of formal cemeteries?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any excavation that may disturb historical or archaeological resources or human remains or structure modification that may affect historic structures. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities that may disturb historical or archaeological resources or human remains. Therefore, the Project would not adversely affect historical or archaeological resources or disturb human remains, including those interred outside of formal cemeteries. No impact would occur, and this issue will not be analyzed further in the EIR.

2.6 ENERGY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. Energy.				
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☐	☒
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

2.6.1 Environmental Setting

Pacific Gas and Electric Company (PG&E) supplies electricity to over five million customers in central and northern California. The counties within the BAAQMD's jurisdiction (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma) used over approximately 53,050 gigawatt/hours (millions of kilowatt/hours) in 2020 (California Energy Commission 2020a). Residential and non-residential electricity use accounts for approximately 33 and 67 percent, respectively. In 2020, the counties within the BAAQMD used approximately 2,682 million therms of natural gas (California Energy Commission 2020b). Residential and non-residential natural gas use accounts for approximately 40 and 60 percent, respectively.

In 2020, approximately 85 percent of the electricity PG&E supplied was GHG free (PG&E 2021). More than 35 percent of PG&E's delivered electricity came from Renewable Portfolio Standard (RPS)-eligible sources, including solar, wind, geothermal, small hydroelectric, and various forms of bioenergy. PG&E is also progressing to meet the State's 60 percent by 2030 renewable energy mandate.

2.6.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of residential and commercial buildings.

a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because no construction would be required, implementation of the proposed rule amendments would not require of the use of any heavy-duty equipment or other construction-related vehicles and thus, would not result in consumption of energy resources.

Regarding operations, the draft rule amendments would allow for any energy source that meets the draft emissions standards. If natural gas-fired appliances are developed that meet the proposed emissions standards, there will be no change from the current consumption of energy resources, and no environmental impact would occur. If, on the other hand and based on currently available technology, natural gas-fired appliances are replaced with electric solutions, this would also not lead to an adverse environmental impact. According to CARB, electrification supports the wise and efficient use of energy resulting in beneficial long-term operation impacts on energy demand. Replacement of older equipment typically results in increased energy efficiency. In addition, as discussed above, approximately 85 percent of the electricity PG&E supplied in 2020 was GHG free with more than 35 percent being delivered from RPS-eligible sources, including solar, wind, geothermal, small hydroelectric, and various forms of bioenergy (PG&E 2021). Thus, implementation of the proposed rule amendments would not result in wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation, or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. No impact would occur, and this issue will not be analyzed further in the EIR.

2.7 GEOLOGY AND SOILS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. Geology and Soils.				
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

2.7.1 Environmental Setting

REGIONAL GEOLOGY

California has 11 natural geologic regions, known as geomorphic provinces, which are defined by the presence of similar physical characteristics, such as relief, landforms, and geology. The majority of the Bay Area is located within what is known as the Coast Range geomorphic province, with eastern portions of Solano, Contra Costa, and Alameda Counties extending into the neighboring Great Valley geomorphic province, located east of the Coast Range.

The Coast Range extends about 400 miles along the Pacific Coast, from Oregon south into Southern California. The Coast Range province is characterized by a series of northwest trending ridges and valleys that roughly parallel the San Andreas fault zone and can be further divided into the northern and southern ranges, which are separated by San Francisco Bay. The San Francisco Bay is a broad, shallow regional structural depression created from an east-west expansion between the San Andreas and the Hayward fault systems (MTC and ABAG 2021: 3.8-1).

Much of the Coast Range province is composed of marine sedimentary and volcanic rocks located east of the San Andreas Fault. The region west of the San Andreas Fault is underlain by a mass of basement rock that is composed of mainly marine sandstone and various metamorphic rocks. Marginal lands surrounding San Francisco Bay consist generally of alluvial plains of low relief that slope gently towards the bay from bordering uplands and foothills. The alluvial plains that make up the bay margin are composed of alluvial sediments (up to two million years old) consisting of unconsolidated stream and basin deposits. These alluvial plains terminate bayward at the tidal marshlands that immediately surround the bay. Marshlands are composed of intertidal deposits, including widely found, fine-grained plastic clays commonly referred to as bay mud, which, in some areas, underlies artificial fills (MTC and ABAG 2021: 3.8-2).

Portions of Solano, Contra Costa, and Alameda Counties are in the Great Valley geomorphic province, which is characterized by a large, nearly level inland alluvial plain 400 miles in length and averaging 50 miles in width. The topography of the Great Valley is primarily flat, but it slopes gently along its eastern margin (Sierra Nevada foothills) and western margin (Coast Ranges) (MTC and ABAG 2021: 3.8-2).

SOILS

A wide variety of soils and soil types can be found throughout the nine-county Bay Area region. Soils in the Bay Area fall within four major classifications established by the U.S. Natural Resources Conservation Service. Depending on localized conditions, these general classifications are grouped into more specific soil types by location, climate, and slope. The Santa Clara Valley and the alluvial plains surrounding San Francisco Bay are classified as deep alluvial plain and floodplain soils. These soils occupy the valleys in areas with higher rainfall and are considered productive when drained and fertilized. Soils closer to the bay margin are generally dark-colored clays that have a high water table or are subject to flooding. Soils at the extreme edge of San Francisco Bay have a moderate to high content of soluble salts; these soils are referred to as alkali soils. Soils in northern San Mateo County, the eastern portion of San Francisco, and Marin County are classified as residual soils and are characterized by moderate depth to underlying bedrock. However, much of the Bay Area has been developed, and in urbanized areas, native soils are commonly no longer present or have been reworked and combined with imported fill materials over a long history of earthwork activities associated with development (MTC and ABAG 2021: 3.8-2).

SEISMICITY AND SEISMIC HAZARDS

The San Francisco Bay Area is a seismically active region with numerous active and potentially active faults capable of producing significant seismic events. An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years) unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. The Hayward, Calaveras, and San Andreas Faults are the three faults considered to have the highest probabilities of causing a significant seismic event in the Bay Area. These three faults are classified as strike-slip faults that have experienced movement within the last 155 years. Other faults include the Rodgers Creek-Healdsburg, Concord-Green Valley, Marsh Creek-Greenville, and the West Napa Faults. A major seismic event on any of these active faults could cause significant ground shaking and potential surface fault rupture (MTC and ABAG 2021: 3.8-3).

Ground movement intensity during an earthquake can vary depending on the overall magnitude, distance to the fault, direction of earthquake energy, and type of geological material. Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as artificial fill. Earthquake

ground shaking may have secondary effects on certain foundation materials, including liquefaction, seismically induced settlement, and lateral spreading.

PALEONTOLOGICAL RESOURCES

Important vertebrate and invertebrate fossils and unique geologic units have been documented throughout California. The fossil yielding potential of a particular area is highly dependent on the geologic age and origin of the underlying rocks. Pleistocene or older (older than 11,000 years) continental sedimentary deposits are considered to have a high paleontological potential while Holocene-age deposits (less than 10,000-year-old) are generally considered to have a low paleontological potential because they are geologically immature and are unlikely to contain fossilized remains of organisms. Metamorphic and igneous rocks have a low paleontological potential, either because they formed beneath the surface of the earth (such as granite), or because they have been altered under heat and high pressures, chaotically mixed, or severely fractured. Records of paleontological finds maintained by the University of California Museum of Paleontology state that there are approximately 5,809 sites at which fossil remains have been found in the Bay Area, with the greatest concentration of 2,570 occurring in Contra Costa County; San Mateo County has the second highest number of paleontological sites at 924 (MTC and ABAG 2021: 3.8-12 and 3.8-13).

2.7.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. Grading would not be required.

a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)

ii) Strong seismic ground shaking?

iii) Seismic-related ground failure, including liquefaction?

iv) Landslides?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Geologic hazards are not expected because no construction activities would occur. Therefore, the Project would not expose people or structures to substantial adverse effects related to rupture of a known earthquake fault, strong seismic ground shaking, strong ground failure or liquefaction, or landslides. No impact would occur, and this issue will not be analyzed further in the EIR.

b) Result in substantial soil erosion or the loss of topsoil?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any grading or other ground

disturbance. Thus, the proposed rule amendments would not result in substantial soil erosion or the loss of topsoil. No impact would occur, and this issue will not be analyzed further in the EIR.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Geologic hazards are not expected because no construction activities would occur. Therefore, the Project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. No impact would occur, and this issue will not be analyzed further in the EIR.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial direct or indirect risks to life or property?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Geologic hazards are not expected because no construction activities would occur. Therefore, the Project would not be located on expansive soils. No impact would occur, and this issue will not be analyzed further in the EIR.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No impact. Septic tanks or other similar alternative wastewater disposal systems are typically associated with small residential projects in remote areas. Residential and commercial consumers affected by the proposed rule amendments would already be connected to appropriate wastewater treatment facilities in the Bay Area and would not rely on septic tanks or similar alternative wastewater disposal systems. Based on these considerations, septic tanks or other alternative wastewater disposal systems are not expected to be affected by the Project. No impact would occur, and this issue will not be analyzed further in the EIR.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because no construction or grading would occur, the Project would not destroy unique paleontological resources or sites or unique geologic features. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

2.8 GREENHOUSE GAS EMISSIONS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. Greenhouse Gas Emissions.				
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

2.8.1 Environmental Setting

Global climate change refers to changes in average climatic conditions on the earth as a whole, including temperature, wind patterns, precipitation and storms. Global climate change is caused primarily by an increase in levels of greenhouse gases (GHGs) in the atmosphere. The major GHGs are the so-called "Kyoto Six" gases – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs) – as well as black carbon. These GHGs absorb longwave radiant energy (heat) reflected by the earth, which warms the atmosphere in a phenomenon known as the "greenhouse effect." The potential effects of global climate change include rising surface temperatures, loss in snowpack, sea level rise, ocean acidification, more extreme heat days per year, and more drought years.

Increases in the combustion of fossil fuels (e.g., gasoline, diesel, coal, etc.) since the beginning of the industrial revolution have resulted in a significant increase in atmospheric levels of GHGs. CO_2 levels have increased from long-term historical levels of around 280 ppm before the mid-18th century to over 400 ppm today. This increase in GHGs has already caused noticeable changes in the climate. The average global temperature has risen by approximately 1.4°F (0.8°C) over the past one hundred years, and 16 of the 17 hottest years in recorded history have occurred since 2001, according to the National Oceanic and Atmospheric Administration.

Total global GHG emissions contributing to climate change are in the tens of billions of metric tons of carbon dioxide equivalent (CO_2e) emissions per year. Technically, black carbon is not a gas but is made up of solid particulates or aerosols. It is included in the discussion of GHG emissions because it is an important contributor to global climate change.

Historically, regional GHG emissions rose substantially as the Bay Area industrialized (BAAQMD 2022). But emissions have peaked recently, and they are expected to decline in the coming years. Emissions are expected to decline in the future as the region continues to shift away from burning fossil fuels and towards renewable energy resources such as wind and solar power. Emissions will need to decline even more than currently projected, however, to reach the aggressive targets adopted by California and by the BAAQMD.

2.8.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of residential and commercial buildings.

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Potentially significant impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The overall purpose of the proposed amendments is to reduce NOx emissions from natural gas-fired space- and water-heating appliances in buildings in the Bay Area, but implementation may also reduce GHG emissions in the future.

As discussed in Section 2.3, "Air Quality," the Plan provides a regional strategy to protect public health by continuing progress toward attaining all Federal and State AAQS and eliminating health risk disparities from exposure to air pollution among Bay Area communities (BAAQMD 2017b). Regarding climate change, the Plan also defines a vision for transitioning the region to a post-carbon economy needed to achieve ambitious GHG reduction targets for 2030 and 2050 and provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve those GHG reduction targets and align with State goals, supporting the California's 2017 Climate Scoping Plan and the 2022 Scoping Plan update currently in process. The Plan includes a wide range of control measures designed to decrease emissions of the air pollutants that are most harmful to Bay Area residents, such as particulate matter, ozone, and TACs; to reduce emissions of CH_4 and other "super-GHGs" that are potent climate pollutants in the near-term; and to decrease emissions of CO_2 by reducing fossil fuel combustion.

The proposed amendments to Rules 9-4 and 9-6 may reduce GHG emissions and support the achievement of reduction goals if natural gas-fired appliances are replaced by electric appliances. As discussed above, applicable plans, policies and regulations are aimed at limiting global climate change to well under 2°C, and at reducing regional and state-wide emissions to 80 percent below 1990 levels by 2050 to achieve that goal. The amendments would not directly conflict with Bay Area's progress towards achieving that emission reduction target. In fact, the Project would implement portions of the Plan and is intended to create a consistent regulatory framework for these operations.

However, implementation of the proposed rule amendments could result in indirect generation of GHG emissions if construction of additional grid capacity is required. GHG emissions associated with construction and operation of new or expanded electrical infrastructure could have a significant effect on the environment and could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. This would be a potentially significant impact that will be analyzed further in the EIR.

2.9 HAZARDS AND HAZARDOUS MATERIALS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. Hazards and Hazardous Materials.				
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☐	☒

2.9.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, and potions of western Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, and agricultural uses.

Facilities and operations within the BAAQMD handle and process substantial quantities of flammable materials and acutely toxic substances. Accidents involving these substances can result in worker or public exposure to fire, heat, blast from an explosion, or airborne exposure to hazardous substances.

Hazards are related to the production, use, storage, and transport of hazardous materials. Industrial production and processing facilities are potential sites for hazardous materials. Some facilities produce hazardous materials as their

end product, while others use such materials as an input to their production processes. Examples of hazardous materials used by consumers include fuels, paints, paint thinner, nail polish, and solvents. Hazardous materials may be stored at facilities producing such materials and at facilities where hazardous materials are part of the production processes. Currently, hazardous materials are transported throughout the Bay Area in great quantities via all modes of transportation including rail, highway, water, air, and pipeline.

2.9.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. No construction would be required.

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require the transport, use, or disposal of hazardous materials. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Impacts related to the transport, use, or disposal of hazardous materials or the accidental release of hazardous materials are not expected because no construction activities would occur. Therefore, the proposed amendments to Rules 9-4 and 9-6 would not create a significant hazard to the public or environment related to the transport, use, or disposal of hazardous materials or the accidental release of hazardous materials. No impact would occur, and this issue will not be analyzed further in the EIR.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No impact. Schools may be located within a quarter mile of residential and commercial buildings affected by the proposed rules amendments. The proposed amendments to Rules 9-4 and 9-6 would not result in the construction or operation of equipment or result in modifications to existing equipment, that would generate hazardous emissions, or result in the handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. The proposed rule amendments are expected to result in a reduction in TAC emissions and a reduction in the related health risk associated with exposure to TAC emissions, providing emissions and health benefits. Therefore, no increase in hazardous emissions is expected due to implementation of the proposed amendments to Rule 9-4 and 9-6. No impact would occur, and this issue will not be analyzed further in the EIR.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No impact. Government Code Section 65962.5 requires the creation of lists of facilities that may be subject to Resource Conservation and Recovery Act (RCRA) permits or site cleanup activities. Because the Project area includes nine counties, it is not known if the affected residential and commercial buildings are located on the hazardous materials sites list pursuant to Government Code Section 65962.5. However, the proposed rule amendments would not interfere with site cleanup activities or create additional site contamination and would not create a significant hazard to the public or environment. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

No impact. The proposed rule amendments would not result in a safety hazard for people residing or working within two miles of a public airport. No impacts on airports or airport land use plans are anticipated from implementation of the amendments to Rules 9-4 and 9-6 because new appliances would be installed inside of residential and commercial buildings. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because no construction would occur, the proposed rule amendments would not interfere with an adopted emergency response plan or emergency evacuation plan or require street closures that could affect emergency response or evacuation activities. Therefore, implementation of the proposed rule amendments would not impair implementation of or interfere with an adopted emergency response plan or emergency evacuation plan. No impact would occur, and this issue will not be analyzed further in the EIR.

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not generate additional development that would place people or structures closer to wildland areas. The proposed rule amendments would not increase the existing risk of fire hazards, nor would it increase fire risk by increasing the use of flammable materials. The proposed amendments to Rules 9-4 and 9-6 would not expose people or structures to wildfires. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

2.10 HYDROLOGY AND WATER QUALITY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. Hydrology and Water Quality.				
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☐	☐	☒
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) Result in substantial on- or offsite erosion or siltation;	☐	☐	☐	☒
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☐	☒
iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	☒
iv) Impede or redirect flood flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

2.10.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles.

REGIONAL HYDROLOGY

San Francisco Bay encompasses approximately 1,600 square miles and is surrounded by the nine Bay Area counties, of which seven border the bay. The San Francisco Bay is partially enclosed and is relatively shallow. Much of the perimeter of the bay is shallow tidal mud flats, tidal marshes, diked or leveed agricultural areas, and salt ponds. The

north lobe of San Francisco Bay is brackish and is known as San Pablo Bay. It is surrounded by Marin, Sonoma, Napa, and Solano Counties. Suisun Marsh is between San Pablo Bay and the Sacramento–San Joaquin Delta (Delta) and is the largest contiguous brackish marsh on the west coast of North America, providing more than 10 percent of California's remaining natural wetlands (MTC and ABAG 2021: 3.10-2).

The San Francisco Bay estuary system is one of the largest in the country and drains approximately 40 percent of California. Water from the Sacramento and San Joaquin Rivers of the Central Valley flow into what is known as the Delta region, then into the subbays, Suisun Bay and San Pablo Bay, and finally into the central area of the bay and out the Golden Gate strait. The Delta is a large triangle of interconnected sloughs and agricultural "islands" that form a key link in California's water delivery system. Some of the freshwater flows through the Delta and into the bay, but much is diverted from the bay for agricultural, residential, and industrial purposes, as well as delivery to distant cities of southern California as part of state and federal water projects (MTC and ABAG 2021: 3.10-2).

The two major drainages, the Sacramento and San Joaquin Rivers, receive more than 90 percent of runoff during the winter and spring months from rainstorms and snow melt. Other surface waters flow either directly to the bay or Pacific Ocean. The drainage basin that contributes surface water flows directly to the bay covers a total area of 3,464 square miles. The largest watersheds include the Alameda Creek (695 square miles), the Napa River (417 square miles), and the Coyote Creek (353 square miles) watersheds. The San Francisco Bay estuary includes deep-water channels, tidelands, and marshlands that provide a variety of habitats for plants and animals (MTC and ABAG 2021: 3.10-2 and 3.10-3).

The interaction between Delta outflow and Pacific Ocean tides determines how far salt water intrudes into the Delta. The salinity of the water varies widely as the landward flows of saline water and the seaward flows of fresh water converge near the Benicia Bridge. The salinity levels in the central area of the bay can vary from near oceanic levels to one-quarter as much, depending on the volume of freshwater runoff, which depends on precipitation, reservoir releases, and upstream diversions (MTC and ABAG 2021: 3.10-3).

SURFACE WATERS

Surface waters in the Bay Area include freshwater rivers and streams, coastal waters, and estuarine waters. Estuarine waters include the San Francisco Bay Delta from the Golden Gate Bridge to the Sacramento and San Joaquin Rivers, and the lower reaches of various streams that flow directly into the bay, such as the Napa and Petaluma Rivers in the North Bay and the Coyote and San Francisquito Creeks in the South Bay.

GROUNDWATER

The Bay Area region is divided into a total of 28 groundwater basins. Groundwater in the region is used for numerous purposes, including municipal and industrial water supply. However, groundwater use accounts for only about five percent of the total water consumption (MTC and ABAG 2021: 3.10-4 and 3.10-5).

SURFACE WATER QUALITY

The quality of surface water resources in the Bay Area varies considerably and is locally affected by point-source (i.e., emitted from a single point) and nonpoint-source (i.e., diffuse) discharges. The San Francisco Bay Regional Water Quality Control Board (RWQCB), the main agency charged with protecting and enhancing surface water and groundwater quality in the Bay Area, has classified the San Francisco Bay and many of its tributaries as impaired for various water quality constituents, as required by the Clean Water Act (CWA). The San Francisco Bay RWQCB implements the Total Maximum Daily Load (TMDL) Program for impaired water bodies, which involves determining a safe level of loading for each problem pollutant, determining the pollutant sources, allocating loads to all of the sources, and implementing the load allocations (MTC and ABAG 2021: 3.10-6).

FLOOD HAZARDS

The San Francisco Bay contains many flat, low-lying marginal areas and highly developed valleys with surrounding steep terrain that are conducive to flooding, especially during intense storms. Major floods occur regularly in the Bay Area, and local structural flood damage reduction measures, such as reservoirs, levees, and channel improvements, have been implemented. The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), which provides subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains.

TSUNAMIS AND SEICHES

A tsunami is a series of waves generated in a body of water by a rapid disturbance (e.g., submarine seismic, volcanic, or landslide event) that vertically displaces water. Tsunamis affecting the Bay Area can result from offshore earthquakes within the Bay Area or from distant events. A total of 51 tsunamis have been recorded or observed within the San Francisco Bay since 1850 (MTC and ABAG 2021: 3.10-11). Seiches are oscillations of enclosed and semienclosed bodies of water, such as bays, lakes, or reservoirs, caused by strong ground motion from seismic events, wind stress, volcanic eruptions, large landslides, and local basin reflection of tsunamis.

2.10.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. No construction would be required.

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) Result in substantial on- or offsite erosion or siltation;

ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

iv) Impede or redirect flood flows?

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The proposed rule amendments would not result in an increase in water runoff or wastewater discharge, would not result in water quality impacts, and would not result in the degradation of surface water or groundwater. The proposed rule amendments are not expected to result in any modifications to NPDES permits or result in violation of NPDES permits. No grading or site preparation would be involved and, therefore, no water would be used during these activities. Additionally, the proposed rule amendments would not alter the existing drainage or drainage patterns, result in erosion or siltation, alter the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite. Further, the proposed rule amendments would not result in an increase in wastewater that requires treatment and would not affect any wastewater treatment facility, storm water runoff, or existing drainage patterns. Additionally, proposed amendments to Rules 9-4 and 9-6 would not include the construction of new or relocation of existing housing or other types of facilities and, as such, would not require the placement of housing or other structures within a 100-year flood hazard area. Because no construction activities are involved, the proposed rule amendments would not a substantially increase risks from flooding; expose people or structures to significant risk of loss, injury or death involving flooding; or increase existing risks, if any, of inundation by seiche, tsunami, or mudflow. Therefore, no hydrologic or water quality impacts would occur, and this issue will not be analyzed further in the EIR.

2.11 LAND USE AND PLANNING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XI. Land Use and Planning.				
Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

2.11.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses. The land uses surrounding the bay margins tend to be more intensely developed, particularly from San Francisco south along the Peninsula to Santa Clara County, and Contra Costa County south through Alameda County to Santa Clara County. These areas also include extensive networks of open space. The counties north of the bay (Marin, Sonoma, and Napa) are more sparsely developed with a combination of suburban development, smaller cities and towns, and agriculture defining the landscape. Other areas of the Bay Area, such as the East Bay and Solano County, tend to be more suburban in character, with heavy industry related to oil refineries dotting the landscape as well as agriculture (MTC and ABAG 2021: 3.11-1).

According to the most recent data (available from 2016 and 2018), approximately 18 percent of the region's 4.5 million acres are considered to be urban or built-up land according to the California Department of Conservation Farmland Mapping and Monitoring Program. The remaining "undeveloped" area includes open space and agricultural lands, as well as water bodies (excluding the San Francisco Bay) and parks. Approximately 29 percent of the region is identified as protected open space. The Bay Area includes 101 cities with San Jose, San Francisco, and Oakland representing the largest urban centers (MTC and ABAG 2021: 3.11-2).

2.11.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas.

a) Physically divide an established community?

b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not affect land use or planning. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require

construction of new or expanded facilities. Because no construction would occur, the proposed rule amendments would not physically divide an established community. As noted above, the proposed rule amendments would apply to residential and commercial areas; the Project would not conflict with land use plans, policies, or regulations. No land use or planning impacts would occur, and this issue will not be analyzed further in the EIR.

2.12 MINERAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. Mineral Resources.				
Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

2.12.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses.

Most of the mineral resources in the Bay Area are located in the populated plains or valleys (rather than in the mountainous areas), which limits the potential for extraction. Nevertheless, substantial mineral resource extraction has occurred. More than 25 mineral commodities have been recovered in substantial quantities. The major mineral resources recovered in the Bay Area are (1) construction materials, such as limestone and oyster shells (used in manufacture of cement), sand and gravel, and crushed stone; (2) energy sources, such as gas, oil, and geothermal power; and (3) salines. Historically, most mineral products have been used locally, fulfilling a need for low-cost construction materials and a supply of energy (MTC and ABAG 2021: 3.8-13).

2.12.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. No grading or subsurface excavation would be required.

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require any grading or other ground disturbance. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because no grading or subsurface excavation would occur, the proposed amendments would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, or a locally important mineral resource recovery site. Thus, no impacts to mineral resources would occur, and this issue will not be analyzed further in the EIR.

2.13 NOISE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII.Noise.				
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?	☐	☐	☐	☒
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

2.13.1 Environmental Setting

The existing noise environment in the Bay Area is composed of two primary categories of noise sources: transportation and non-transportation. The ambient noise environment in the urban areas of the Bay Area is primarily influenced by traffic noise. Traffic noise exposure is primarily a function of the volume of vehicles per day, the speed of those vehicles, the type of ground (i.e., hard or soft), the number of those vehicles represented by medium and heavy trucks, the distribution of those vehicles during daytime and nighttime hours, and the proximity of noise-sensitive receptors to the roadway. Baseline traffic noise (based on the traffic study) within the Bay Area has been characterized by traffic noise modeling. The baseline for the noise analysis is a simulation of 2015 traffic levels and land use. Based on modeling conducted for all roadway types within Bay Area, average noise levels range from 52.6 decibels (dBA) Community Noise Equivalent Level (CNEL) (next to collector and small roads) to as high as 74.9 dBA CNEL (next to freeways) (MTC and ABAG 2021: 3.12-9).

The Bay Area is also affected by noise from freight and passenger rail operations. While these operations generate significant noise levels in the immediate vicinity of the railways, train operations are intermittent and area railways are widely dispersed. Commuter rail, such as San Francisco Municipal Railway and Valley Transportation Authority, operate with more frequency than standard gauge rail operations but at lower speeds, resulting in lower noise levels. Bay Area Rapid Transit operations, on the other hand, can attain higher speeds and have the potential for greater noise levels along extended stretches. Based on available data, noise levels from rail operations within the Bay Area can range from 62 dBA CNEL to 81 dBA CNEL (MTC and ABAG 2021: 3.12-9). Train operations may also be a source of ground vibration near the tracks.

The Bay Area has many airports, including public use, private use, and military facilities. Major airports include San Francisco International, Oakland International, and Norman Y. Mineta San Jose International. In addition to the daily aircraft operations originating and terminating at these facilities, aircraft not using these airports frequently fly over the Bay Area. All of these operations contribute to the overall ambient noise environment. In general, like rail noise, the proximity of the receiver to the airport and aircraft flight path determines the noise exposure. Other contributing

factors include the type of aircraft operated, altitude of the aircraft, and atmospheric conditions. Atmospheric conditions may contribute to the direction of aircraft operations (flow) and affect aircraft noise propagation.

A wide variety of industrial and other non-transportation noise sources are located within the Bay Area. These include manufacturing plants, landfills, treatment plants (e.g., water), power generation facilities, refineries, food packaging plants, lumber mills, and aggregate mining facilities, just to name a few. Noise generated by these sources varies widely, but in many cases may be a significant if not dominant contributor to the noise environment (MTC and ABAG 2021: 3.12-11).

2.13.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas.

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?

b) Generation of excessive groundborne vibration or groundborne noise levels?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings and would not require construction. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The proposed rule amendments would regulate the type of equipment that would be installed, not whether it would be installed. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which may generate a small amount of noise, would be temporary, and would primarily occur inside of existing residential and commercial buildings) would occur with or without the Project. Because no construction would be involved and installation would occur inside existing buildings, the proposed amendments would not generate a substantial temporary increase in ambient noise levels in excess of local noise standards. Therefore, noise impacts associated with construction activities would not occur, and this issue will not be analyzed further in the EIR.

The new appliances are not major sources of noise and would result in little to no noise impacts. Any noise producing equipment must comply with local noise ordnances and applicable OSHA and Cal/OSHA noise requirements. Compliance with these noise requirements would apply to residential and commercial buildings and would be expected to limit noise to acceptable levels. Therefore, noise impacts associated with operational activities would not occur, and this issue will not be analyzed further in the EIR.

The proposed rule amendments would not generate or expose people to excessive groundborne vibration or groundborne noise. No large construction equipment that would generate substantial noise or vibration (e.g., backhoes, graders, jackhammers, etc.) would be needed, no new appliances that would generate vibration would be installed, and no increase in traffic would be generated. Therefore, no vibration impacts would occur, and this issue will not be analyzed further in the EIR.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No impact. Airports may be located within two miles of residential and commercial buildings affected by the proposed rules amendments. However, the proposed rule amendments, which would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area, would not expose people residing or working in the Project area to excessive noise levels associated with airports, as this type of equipment is not typically noise generating equipment. Further, the proposed amendments would not locate residents or commercial buildings or other sensitive noise sources closer to airport operations. Therefore, the Project would not expose people residing or working in the Project area to excessive noise levels. No impact would occur, and this issue will not be analyzed further in the EIR.

2.14 POPULATION AND HOUSING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. Population and Housing.				
Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

2.14.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses.

Population in the Bay Area in 2015 was about 7.6 million people, which is about 20 percent of California's population. The population of the Bay Area is expected to grow to about 10.4 million people by 2050. Approximately 2.8 million people in the Bay Area were employed in 2015, and that number is expected to grow to 4 million jobs by 2050. Overall, the region's population is expected to grow by 37 percent from 2015 to 2050 conditions, while the number of employed residents is forecasted to increase by 42 percent over the same period, meaning there would be more workers per capita in 2050 than in 2015 (MTC and ABAG 2021: 2-26).

2.14.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. No new residential or commercial buildings would be constructed, and no new jobs or businesses would be created.

a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. No new residential or commercial buildings would be constructed. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities.

It is expected that the existing labor pool in the Bay Area would accommodate the minor installation activities. In addition, no new jobs or businesses would be created as a result of the proposed amendments. As such, implementing the proposed amendments to Rules 9-4 and 9-6 would not induce substantial population growth. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

The proposed rule amendments would not displace people or housing or require the construction of replacement housing. No impact would occur, and this issue will not be analyzed further in the EIR.

2.15 PUBLIC SERVICES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. Public Services.				
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

2.15.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. Public services are provided by a wide variety of local agencies.

Fire protection services are managed at the local level, typically by municipalities, counties, fire protection districts, or volunteer fire companies. California Government Code Section 38611 states that any city organized under general law must establish a fire department unless it is included within the boundaries of an established fire protection district. State and federal lands are generally served by State and federal fire agencies (e.g., the California Department of Forestry and Fire Protection, National Park Service). In some cases, businesses and native tribes manage their own fire departments. Each fire protection agency is responsible for serving its own prescribed area, but mutual aid agreements are in wide use across the region such that agencies can rely on assistance from neighboring agencies in the case of overwhelming demand. In an effort to prevent fire-related emergencies altogether, most fire departments and agencies sponsor prevention programs (e.g., public education, vegetation clearance) and enforce fire code regulations in built structures (MTC and ABAG 2021: 3.13-2).

Police services are provided on the State, county, and local levels. Police services provide law enforcement in crime prevention, traffic and congestion control, safety management, emergency response, and homeland security. The California Highway Patrol (CHP) is responsible for police protection along the interstate highway system that traverse the Bay Area and provides services for traffic management, emergency response, and protection of the highway system. Each county in the Bay Area has its own sheriff's department responsible for police protection in unincorporated areas of each county. Additionally, each incorporated city and town has a police department responsible for police protection within its own jurisdiction. Unincorporated areas and individual cities and towns also may contract with county sheriff departments for police services instead of providing their own. Cities and towns may also contract with the county sheriff department to provide law enforcement services (MTC and ABAG 2021: 3.13-1).

Although the California public school system is under the policy direction of the Legislature, the California Department of Education relies on local control for the management of school districts. School district governing boards and district administrators allocate resources among the schools of the district and set education priorities for their schools. Each jurisdiction in the nine-county region of the Bay Area provides residents with local public education facilities and services, including elementary, middle, secondary, and postsecondary schools, as well as special and adult education. As of the 2018-2019 school year, there were 1,764 public and charter schools in the Bay Area with 1,051,744 enrolled students and 53,174 teachers (MTC and ABAG 2021: 3.13-1).

Public facilities (e.g., libraries, social services, parks) within the BAAQMD are managed by different county, city, and special-use districts.

2.15.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas.

a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

Fire protection?

Police protection?

Schools?

Parks?

Other public facilities?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings that are currently provided with applicable public services; the Project would not increase the demand for these services. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. The proposed amendments are expected to result in additional control measures for sources of NOx emissions, particularly for applications in residential and commercial buildings. The modified rules would not require new facilities but may require sources to implement air pollution control measures. No additional fire or police protection services are expected to be required due to the proposed rule amendments as they would apply to existing emission sources.

As noted in Section 2.14, "Population and Housing," implementation of the proposed rule amendments would not induce population growth because no construction activities would occur, and no new jobs (temporary or permanent) would be created. As such, the proposed rule amendments would not increase the demand for public services nor generate the need for new or physically altered governmental facilities. No impact would occur, and this issue will not be analyzed further in the EIR.

2.16 RECREATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. Recreation.				
Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

2.16.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, and potions of western Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include commercial, industrial, residential, and agricultural uses.

The Bay Area contains over one million acres of parks and open space areas. According to the Bay Area Protected Areas Database compiled by the Bay Area Open Space Council, about 140,000 acres of open space were permanently conserved between 2010 and 2018 (the most recent year for which a full dataset is available) (MTC and ABAG 2021: 3.13-4).

Parks and open space are generally categorized according to their size and amenities. Smaller parks, such as pocket parks, neighborhood parks, community parks, urban forests, and community gardens, serve local communities, typically are located in urbanized areas, and often include a wide range of improvements from playing fields and picnic areas to playgrounds and fitness trails. These parks are most often managed by local park districts or municipalities, which typically set minimum standards for park acreage based on their population. Larger open space areas, such as regional parks, greenbelts, trails and pathways, natural and wildlife preserves, some private farmlands, some public rangelands, State parks, and federal parks, serve a broader geographic range, typically are located outside of major urbanized areas, and generally include fewer improvements. Management of these parks is divided among a range of organizations and agencies, including cities, counties, regional park districts, State and federal government, private individuals, and nonprofit land trusts (MTC and ABAG 2021: 3.13-5).

The California Coastal Commission and the Bay Conservation and Development Commission (BCDC) regulate land use near the coastline and along the bay, respectively, to protect and enhance the coastline and to promote public access within the coastal zone of California. On land, the coastal zone varies in width from several hundred feet in highly urbanized areas to up to 5 miles in certain rural areas, and offshore, the coastal zone extends along a 3-mile-wide band of ocean. The coastal zone established by the California Coastal Act does not include San Francisco Bay, where development is regulated by BCDC.

2.16.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. No new residential or commercial buildings would be constructed, and no new jobs or businesses would be created.

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. No new residential or commercial buildings would be constructed, and no new jobs or businesses would be created. Because the proposed amendments to 9-4 and 9-6 would not increase or redistribute population, the proposed amendments would not increase the demand for or use of existing neighborhood and regional parks or other recreational facilities or require the construction of new or the expansion of existing recreational facilities. No impact would occur, and this issue will not be analyzed further in the EIR.

2.17 TRANSPORTATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. Transportation.				
Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	☐	☐	☐	☒
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☐	☒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☐	☒

2.17.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles. The Bay Area features a robust transportation network, allowing for multimodal access across the region. The transportation system includes interstate and State highways, local arterial roadways, local streets and roads, public transit systems, bicycle and pedestrian facilities, seaports, and airports.

The Bay Area currently contains over 650 miles of limited-access highways, which include both interstates and State highways. These facilities provide access to major employment centers and to destinations outside of the Bay Area. In addition to providing mobility for automobiles, these facilities also support express bus services and freight movement. In addition, the Bay Area has over 20,000 miles of arterials and local streets, providing access to communities, and accommodating on-street parking and loading activities. Together, these roadway facilities carry 165 million vehicle miles each weekday. The road network also serves nearly 660,000 vehicles that travel into or out of the region from adjacent areas (MTC and ABAG 2021: 3.15-1 and 3.15-2). Additionally, Amtrak provides long-distance passenger rail services connecting the Bay Area to the Central Valley, Southern California, the Pacific Northwest, and the Midwest; and California High-Speed Rail service is planned to begin service from San Francisco to the Los Angeles basin, eventually extending to Sacramento and San Diego.

The Bay Area public transit system includes a combination of heavy rail (e.g., BART), light rail (e.g., Muni Metro and Santa Clara Valley Transportation Authority [VTA] Light Rail), commuter rail (e.g., Caltrain and ACE), diesel and electric buses, cable cars, and ferries. This public transit system accommodates a total of over 1.7 million passengers a day, with about 45 percent of daily passengers (744,000) on Muni, about 26 percent of daily passengers (427,000) on BART, 11 percent (180,000) on AC Transit, and 7 percent (121,000) on VTA (MTC and ABAG 2021: 3.15-2).

The Bay Area has an extensive system of pedestrian facilities including multi-use paths, sidewalks, crosswalks, walkways, stairs. In addition to pedestrian facilities, the Bay Area has a bikeway network, of which 1,450 miles of the 2,140-mile network have been completed as of December 2018 (MTC and ABAG 2021: 3.15-8).

The Bay Area is served by five seaports, which provide the opportunity for intermodal transfers to trucks and railcars. The Port of Oakland, the largest of the five, is the third largest U.S. seaport on the West Coast (after the Ports of Los Angeles and Long Beach). Other seaports include the Port of San Francisco, the Port of Richmond, the Port of Benicia,

and the Port of Redwood City. These seaports are supported by freight railroad services operated by Union Pacific and Burlington Northern Santa Fe. The Bay Area is also served by three international airports: San Francisco International Airport, Oakland International Airport, and Norman Y. Mineta San José International Airport.

According to U.S. Census Bureau data, Bay Area residents use a variety of transportation modes to get to their workplaces. While nearly two in three Bay Area residents drive alone to get to work on a typical day, twelve percent of residents rely on public transit and six percent either walk or bike to work. Over the past nearly three decades, the share of workers driving alone to work has been fairly constant at the regional level, remaining at around 68 percent between 1990 and 2010, with a decrease of four percentage points to 64 percent in 2018. Carpooling has decreased in popularity in the Bay Area over the past decade compared to other commute options, declining from thirteen percent in 1990 to ten percent in 2018. Transit mode share has increased by two percentage points, from ten percent to twelve percent, while bicycling to work and working from home have doubled from one percent to two percent and from three percent to six percent, respectively (MTC and ABAG 2021: 3.15-10).

2.17.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. No construction would be required.

a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?

b) Conflict or be inconsistent with CEQA Guidelines section 15064.3(b), which pertains to vehicle miles travelled?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded equipment manufacturing facilities or notable changes to equipment distribution patterns that could increase vehicle miles traveled (VMT).

As described in Section 2.13, "Noise," the proposed rule amendments would regulate the type of equipment that would be installed, not whether it would be installed. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. Installation activities (which would include minimal truck trips for delivery/installation, spread out across the nine counties of the Bay Area, and occurring over several decades as consumers replace their existing furnaces and water heaters) would occur with or without the Project. Similarly, maintenance or repair activities (should they be needed), would occur regardless of the Project. It is expected that the existing labor pool in the Bay Area would accommodate the very minor installation and (should they be needed) maintenance and repair activities.

As discussed in Section 2.14, "Population and Housing," no new jobs or businesses would be created. Thus, no increase in permanent worker or truck traffic would occur. The proposed amendments to Rules 9-4 and 9-6 would not conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. Further, the proposed rule amendments would not conflict with or be inconsistent with CEQA Guidelines Section 15064.3 subdivision(b), as no substantial increase in traffic would occur. Therefore, no impacts would occur, and this issue will not be analyzed further in the EIR.

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

d) Result in inadequate emergency access?

No impact. The proposed rule amendments would not increase traffic hazards or create incompatible uses. The Project does not involve construction of any roadways or other transportation design features; therefore, no changes to current roadway designs that would increase traffic hazards would occur. Because the proposed rule amendments would not change the roadway system, would not involve construction, and would not generate substantial truck trips, no impacts to emergency access would occur. No impacts would occur, and this issue will not be analyzed further in the EIR.

2.18 TRIBAL CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. Tribal Cultural Resources.				
Has a California Native American Tribe requested consultation in accordance with Public Resources Code section 21080.3.1(b)?	☐ Yes			☒ No
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?	☐	☐	☐	☒
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	☐	☐	☐	☒

2.18.1 Environmental Setting

The BAAQMD's jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma Counties. This area covers about 5,600 square miles, and land uses within the area include a range of commercial, industrial, residential, agricultural, and open space uses.

Prehistoric cultural resources are composed of Native American structures or sites of historical or archaeological interest. These may include districts, objects, landscape elements, sites, or features that reflect human occupations of the region, such as villages and burial grounds. The moderate climate, combined with the abundant natural resources found throughout the nine-county region, has supported human habitation for several thousand years Before Present (BP). Some theories suggest that the prehistoric bay and river margins were inhabited as early as 10,000 years ago. Rising sea levels, the formation of the San Francisco Bay, and the resulting filling of inland valleys have covered these early sites, which were most likely located along the then existing bay shore and waterways. Existing evidence indicates the presence of many village sites from at least 5,000 years BP in the region. The arrival of Native Americans into the Bay Area is associated with documented cultural resources from circa 5,500 BP (MTC and ABAG 2021: 3.7-1 and 3.7-2).

Six different groups of Native American population, identified by their language, lived within the Bay Area: Ohlone (Alameda, Contra Costa, San Francisco, San Mateo, Santa Clara, and Solano Counties), Bay Miwok (Contra Costa County), Patwin (Napa and Solano Counties), Coast Miwok (Marin and Sonoma Counties), Pomo (Sonoma County), and Wappo (Napa County). These native populations periodically increased between 5,000 BP and the arrival of the Spanish in the late 18th century. Native villages and campsites were inhabited on a temporary basis and are found in several ecological niches due to the seasonal nature of their subsistence base. Remains of these early populations

indicate that main villages, seldom more than 1,000 residents, were usually established along water courses and drainages. By the late 1760s, about 300,000 Native Americans lived in California (MTC and ABAG 2021: 3.7-2).

TRIBAL CULTURAL RESOURCES AND NATIVE AMERICAN COORDINATION

The State CEQA Guidelines were amended in July 2015 to include evaluation of impacts on tribal cultural resources, which include sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe. Assembly Bill (AB) 52 specifies that a project that may cause a substantial adverse change to a tribal cultural resource may result in a significant effect on the environment. AB 52 requires tribes interested in development projects within a traditionally and culturally affiliated geographic area to notify a lead agency of such interest and to request notification of future projects subject to CEQA prior to determining if a negative declaration, mitigated negative declaration, or environmental impact report is required for a project. The lead agency is then required to notify the tribe within 14 days of deeming a development application subject to CEQA complete to notify the requesting tribe as an invitation to consult on the project. AB 52 identifies examples of mitigation measures that will avoid or minimize impacts to tribal cultural resources and applies to projects that have a notice of preparation or a notice of intent to adopt a negative declaration/mitigated negative declaration circulated on or after July 1, 2015.

No California Native American tribes have requested to be informed of projects by BAAQMD; therefore, there is no trigger to begin consultation under AB 52, resulting in no resources identified as tribal cultural resources under Public Resources Code Section 21074.

2.18.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas. Grading would not be required.

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a) **Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?**

b) **A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?**

No impact. As discussed in Section 2.5, "Cultural Resources," the Bay Area has locations that were historically used by Native Americans. Thus, there is the potential for the presence of unrecorded tribal cultural resources to be buried throughout the BAAQMD's jurisdiction. However, the proposed amendments to Rules 9-4 and 9-6 would not involve ground disturbance, and would result in the installation of new furnaces and water heaters inside of existing residential and commercial buildings. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities that may disturb tribal cultural resources. As noted above, no California Native American tribes have requested to be informed of projects by BAAQMD; therefore, there is no trigger to begin consultation under AB 52, resulting in no resources identified as tribal cultural resources under Public Resources Code Section 21074. Therefore, such resources would not be adversely affected by the proposed rule amendments. No impact would occur, and this issue will not be analyzed further in the EIR.

2.19 UTILITIES AND SERVICE SYSTEMS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. Utilities and Service Systems.				
Would the project:				
a) Require or result in the relocation or construction of construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunication facilities, the construction or relocation of which could cause significant environmental effects?	☒	☐	☐	☐
b) Have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒
e) Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

2.19.1 Environmental Setting

Given the large area covered by the BAAQMD, public utilities are provided by a wide variety of local agencies. Wastewater treatment in the Bay Area is provided by more than 50 agencies throughout the Bay Area. Most public wastewater treatment plants and industrial facilities have wastewater and storm water treatment facilities and discharge treated wastewater under the requirements of National Pollutant Discharge Elimination System (NPDES) permits. Water is supplied by several water purveyors in the Bay Area, including the following major contributors: Alameda County Water District, Bay Area Water Supply & Conservation Agency, Contra Costa Water District, East Bay Municipal Utility District, Marin Municipal Water District, City of Napa Water Department, San Francisco Public Utilities Commission, Santa Clara Valley Water District, Solano County Water Agency, Sonoma Water, and Zone 7 Water Agency (MTC and ABAG 2021: 3.14-2 through 3.14-7). Solid waste is handled through a variety of municipalities, through recycling activities, and at disposal sites (including 14 privately operated landfills). The 14 landfills have a total remaining capacity of 259,634,000 cubic yards, a total daily throughput of 40,254 tons per day, and an estimated average of 46 percent remaining capacity (MTC and ABAG 2021: 3.14-18).

Electric, liquid fuel, and natural gas energy sources make up most of the Bay Area energy systems, which are becoming increasingly diversified as newer, more renewable energy sources are developed and expanded. Pacific Gas and Electric Company (PG&E) is the major operator of electricity infrastructure in the nine-county Bay Area, providing electricity and natural gas services.

Telecommunications services are offered by 39 providers across the Bay Area (MTC and ABAG 2021: 3.14-23).

2.19.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas.

a) Require or result in the relocation or construction of construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunication facilities, the construction or relocation of which could cause significant environmental effects?

Potentially significant impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of existing residential and commercial buildings that are already provided with utility services. There would be no change to existing water use, wastewater treatment, stormwater drainage, natural gas use, or telecommunication use. Therefore, the proposed rule amendments would not result in the relocation or construction of new or expanded facilities related to these utilities. No impact would occur and this issue will not be analyzed further in the EIR.

The new appliances may require increased amounts of electricity to operate, which could result in the need for additional electricity production and/or additional electrical grid capacity if Project demands exceed existing and planned supply (the potential for which will be evaluated in the EIR). The construction of this potential new or expanded electrical infrastructure could cause significant environmental effects. The Project's contribution could be a potentially significant indirect impact that will be analyzed further in the EIR.

Secondary and cumulative environmental effects on other resource areas associated with the potential need for the construction of new electricity generation and transmission infrastructure will also be evaluated in the EIR.

b) Have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

c) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?

No impact. The proposed amendments to Rules 9-4 and 9-6 would not involve the construction of new facilities or an increased demand for utility services. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of existing residential and commercial buildings that are already provided with utility services. There would be no change to existing water use or wastewater treatment. Therefore, the proposed rule amendments would have sufficient water supplies and would have adequate wastewater treatment capacity. No impact would occur, and this issue will not be analyzed further in the EIR.

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

e) Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings, which are required to comply with applicable federal, state, and local regulations related to solid waste. As described in Section 2.13, "Noise," the proposed rule amendments would regulate the type of equipment that would be installed, not whether it would be installed. Regardless of the Project, Bay Area consumers would continue to purchase and install new furnaces and water heaters over the coming decades. When new appliances are installed, the old appliances would be removed and properly disposed of either at an appropriate recycling facility (that accepts scrap metal) or landfill in accordance with federal, state, and local laws. This would be a continuation of existing conditions. It is not anticipated that the amount of solid waste generated as a result of the proposed rule amendments would exceed the capacity of Bay Area landfills, which have an estimated average of 46 percent remaining capacity (MTC and ABAG 2021: 3.14-18), because proper disposal of old appliances would continue to occur regardless of whether the Project is implemented. Therefore, no impact would occur, and this issue will not be analyzed further in the EIR.

2.20 WILDFIRE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. Wildfire.				
Is the project located in or near state responsibility areas or lands classified as high fire hazard severity zones?				
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:		☐ Yes		☒ No
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

2.20.1 Environmental Setting

In California, responsibility for wildfire prevention and suppression is shared by federal, State, and local agencies. Federal agencies are responsible for federal lands in Federal Responsibility Areas. The State of California has determined that some nonfederal lands in unincorporated areas with watershed value are of Statewide interest and have classified those lands as State Responsibility Areas (SRAs), which are managed by the California Department of Forestry and Fire Projection (CAL FIRE). All incorporated areas and other unincorporated lands are classified as Local Responsibility Areas (LRAs) (MTC and ABAG 2021: 3.9-8).

While all of California is subject to some degree of wildfire hazard, there are specific features that make certain areas more hazardous. CAL FIRE is required by law to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors (PRC Sections 4201–4204 and Government Code 51175–51189). Factors that increase an area's susceptibility to fire hazards include slope, vegetation type and condition, and atmospheric conditions.

Throughout the Bay Area, there is a full range of conditions and fire hazards, with all Bay Area counties except San Francisco having areas of High and Very High Fire Hazard in areas of CAL FIRE responsibility. The areas of greatest wildfire hazard are concentrated in the hillside areas of San Mateo, Santa Clara, Sonoma, and Napa Counties, with smaller hazard areas in Marin County, the East Bay Hills of Alameda and Contra Costa Counties, and on the slopes of Mount Diablo. CAL FIRE has also mapped Very High Fire Hazard Severity Zones in LRAs to provide guidance to local agencies.

2.20.2 Discussion

The proposed amendments to Rules 9-4 and 9-6 would affect natural gas-fired space- and water-heating appliances, including furnaces and water heaters used in single-family homes; multifamily residences; and commercial spaces, such as retail and office buildings. These appliances would be installed inside of buildings in residential and commercial areas.

a) Substantially impair an adopted emergency response plan or emergency evacuation plan?

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

c) Require the installation of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of residential and commercial buildings, which are subject to state and local building and fire codes that take wildfire hazard zones and fire protection into consideration. Installation and operation of these appliances would not change existing wildfire risks in the Bay Area. Therefore, the proposed rule amendments would not impair an adopted emergency response plan or emergency evacuation plan, would not expose people to pollutants from a wildfire or the uncontrolled spread of a wildfire, would not require the installation of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk, and would not exposure people or structures to flooding or landslides as a result of post-fire slope or drainage changes. Therefore, no impacts related to wildfires would occur, and this issue will not be analyzed further in the EIR.

2.21 MANDATORY FINDINGS OF SIGNIFICANCE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. Mandatory Findings of Significance.				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

2.21.1 Discussion

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?

No impact. The proposed amendments to Rules 9-4 and 9-6 would result in changes to the types of new furnaces and water heaters that would be allowed for sale and installation within the Bay Area. These appliances would be installed inside of buildings in residential and commercial areas. The proposed rule amendments would also not result in foreseeable changes in equipment manufacturing that would require construction of new or expanded facilities. Because there would be no construction, the Project would also not result in habitat conversion or vegetation removal. Existing biological resources, including special-status species, habitats, and wildlife corridors, within the BAAQMD's jurisdiction would not be affected. In additional, cultural or tribal cultural resources would also not be expected to occur and would not be affected by the Project. Therefore, the proposed rule amendments would not degrade the quality of the environment, reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory, as discussed in this Initial Study. As discussed in Section 2.4, "Biological

Resources," Section 2.5, "Cultural Resources," and Section 2.18, "Tribal Cultural Resources," the Project would not adversely affect biological, cultural or tribal cultural resources. No impact would occur.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

Potentially significant impact. As described in this Initial Study, the proposed amendments to Rules 9-4 and 9-6 could result in potentially significant environmental impacts related to air quality, GHG emissions, and utilities and service systems (energy resources). Therefore, Project impacts could be cumulatively considerable, and the Project could generate significant adverse cumulative impacts. The Project could have adverse environmental impacts that are limited individually, but cumulatively considerable when considered in conjunction with other regulatory control projects. These issues will be analyzed in the EIR.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

Potentially significant impact. As described in this Initial Study, the proposed amendments to Rules 9-4 and 9-6 could result in potentially significant environmental impacts related to air quality, GHG emissions, and utilities and service systems (energy resources), which could cause substantial adverse effects on human beings, either directly or indirectly. These issues will be analyzed in the EIR.

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3 REFERENCES

1 Introduction

No references were cited in this section.

2 Environmental Checklist

2.1 Aesthetics

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.2 Agriculture and Forest Resources

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.3 Air Quality

BAAQMD. *See* Bay Area Air Quality Management Agency.

Bay Area Air Quality Management Agency. 2017a. Air Quality Standards and Attainment Status. Available: https://www.baaqmd.gov/about-air-quality/research-and-data/air-quality-standards-and-attainment-status. Accessed February 2022.

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California Air Resources Board. 2020. iADAM: Air Quality Data Statistics. Available: https://www.arb.ca.gov/adam/trends/trends1.php. Accessed February 2022.

CARB. *See* California Air Resources Board.

2.4 Biological Resources

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.5 Cultural Resources

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.6 Energy

California Energy Commission. 2020a. Electricity Consumption by County. Available: https://ecdms.energy.ca.gov/elecbycounty.aspx. Accessed February 2022.

_____. 2020b. Gas Consumption by County. Available: http://www.ecdms.energy.ca.gov/gasbycounty.aspx. Accessed February 2022.

Pacific Gas and Electric Company. 2021. Corporate Sustainability Report. Available: https://www.pgecorp.com/corp_responsibility/reports/2021/pf04_renewable_energy.html. Accessed February 2022.

PG&E. *See* Pacific Gas and Electric Company.

2.7 Geology and Soils

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.8 Greenhouse Gas Emissions

BAAQMD. *See* Bay Area Air Quality Management Agency.

_____. 2017b. Spare the Air, Cool the Climate, a Blueprint for Clean Air and Climate Protection in the Bay Area. Final 2017 Clean Air Plan. Adopted April 19, 2017. Available: https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed February 2022.

_____. 2022. Reports, Data, and Documents. Available: https://www.baaqmd.gov/about-air-quality/research-and-data/emission-inventory/maps-data-and-documents. Accessed February 2022.

2.9 Hazards and Hazardous Materials

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.10 Hydrology and Water Quality

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.11 Land Use and Planning

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.12 Mineral Resources

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.13 Noise

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.14 Population and Housing

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.15 Public Services

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.16 Recreation

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.17 Transportation/Traffic

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.18 Tribal Cultural Resources

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.19 Utilities and Service Systems

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.20 Wildfire

Metropolitan Transportation Commission and Association of Bay Area Governments. 2021 (June). *Plan Bay Area 2050 Draft Program Environmental Impact Report*. State Clearinghouse No. 2020090519. Available: https://www.planbayarea.org/EIR. Accessed January 2022.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

2.21 Mandatory Findings of Significance

No references were cited in this section.

4 REPORT PREPARERS

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Scoping Comments

Jennifer Elwell

From: Laura Feinstein <lfeinstein@spur.org>
Sent: Wednesday, June 15, 2022 2:17 PM
To: Jennifer Elwell
Cc: Abby Young
Subject: Re: EIR comments

Thanks for the info, Jen. I was wondering whether it would be possible to include scenarios in which BAAQMD takes an active role in encouraging decentralized solar (and possibly storage). This can mitigate increased strain on the electrical grid.

—
Laura Feinstein, PhD (she • her • they)
Sustainability and Resilience Policy Director
1.510.827.1286
lfeinstein@spur.org

On Wed, Jun 15, 2022 at 1:12 PM Jennifer Elwell <jelwell@baaqmd.gov> wrote:

> Thanks for your comments Laura.
>
> An alternatives analysis will be included in the EIR. While we will be evaluating potential air quality impacts of potential additional electricity demand, we will also be discussing it in context of the CPUC and CEC planning processes which project renewable growth in order to meet these types of demands.
>
> Best,
>
> **Jen Elwell**
>
> Rule Developer
>
> 650-784-0107 (cell)
>
> ---
>
> **From:** Laura Feinstein <lfeinstein@spur.org>
> **Sent:** Wednesday, June 15, 2022 11:46 AM
> **To:** Jennifer Elwell <jelwell@baaqmd.gov>; Abby Young <ayoung@baaqmd.gov>
> **Subject:** EIR comments

Hi Jen and Abby,

I'm looking at the call for comments on the EIR and have a couple questions.

- The Initial Study doesn't describe what alternative scenarios will be evaluated. Are you starting to develop that list?

- Most of the potential negative impacts stem from a potential increase in electrical demand, which could stress the grid and/or generate more air pollution if electrical generation isn't clean. One way to mitigate a potential increase in demand for electricity would be to simultaneously encourage or require the adoption of solar panels. Is that something that could be evaluated as a project alternative? (I don't have enough legal knowledge of what can be considered as an alternative scenario to say whether this is a viable option - maybe someone on your legal team does).

Happy to jump on the phone if it's easier.

Laura

—

Laura Feinstein, PhD (she • her • they)

Sustainability and Resilience Policy Director

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Submitted electronically: jelwell@baaqmd.gov

June 21, 2022

***RE:* Comments on Amendments of 9-6 "Nitrogen Oxides Emissions from Natural Gas-Fired Water Heaters".**

Dear Jennifer Elwell,

On behalf of the Associated General Contractors (AGC) of California, we are submitting comments to the Bay Area Air Quality Management District in response to Rule 9-6 "Nitrogen Oxides Emissions from Natural Gas-Fired Water Heaters".

AGC of California is a member-driven organization that statewide consists of over 900 companies. Our members provide commercial construction services on a broad range of projects within vertical building, highway & transportation, and utility. We believe the construction industry is vital to the success of California. Together, our members actively create opportunities to build and strengthen our state. We are passionate about shaping policy, improving industry relationships, and developing our workforce.

AGC of California appreciates the opportunities to participate in Bay Area Air Quality Management District's regulatory process by submitting a comment letter to advocate on behalf of the construction industry. A summary of our concerns includes the lack of feasibility of heat pump water heaters and the lack of reliable electrical grid to support the increase in electrical energy demands. Please read below for more information.

1. **Concerns surrounding the requirement of heat pump water heaters.**

According to Silicon Valley Clean Energy's reservation tracker of their FutureFit Heat Pump Water Heater Program, the cost of heat pump water

heaters in relation to natural gas water heaters may be more than doubled. For instance, the average cost of an installed 50-gallon heat pump water heater can cost up to $5,868 in comparison the average of an installed 30 – 50-gallon gas-fueled water heater can cost up to $2,200. In addition to the cost, heat pump water heaters take more time to heat water than a gas-fueled water heater. According to General Electric appliances, a heat pump may only be able to recover 8 gallons of water per hour, whereas standard heating elements can recover up to 22 gallons of water per hour. Therefore, if the average shower uses approximately 16 gallons of water, the heat pump would need to run for 2 hours per shower to accommodate the household's needs. Furthermore, in the wintertime when ambient air temperatures are likely to be lower, the heat pump will have to run longer to heat the water. This may result in dissatisfied customers who do not have enough hot water to satisfy their needs which would have negative impacts on contractors and their businesses.

2. Unprepared electrical grid to support increased demands.

Another significant disadvantage is that heat pump water heaters require electricity to move heat from one place to another instead of generating heat directly. This poses as a disadvantage due to the instability of our electrical grid at this moment in time. As new regulations are adopted that will increase the demand for electricity, our electrical grid simply will not be able to accommodate. The peer-reviewed article, "Translating Climate Change and Heating System Electrification Impacts on Building Energy Use to Future Greenhouse Gas Emissions and Electric Grid Capacity Requirements in California," analyzed climate change and electrification impacts to system-wide endpoint impacts on future electric grid configurations (Tarroja, et al., 2018). They concluded that although electrification may decrease greenhouse gas emissions, it requires significant increases in electrical grid capacity. Specifically, that the large loads do not temporally align with daily renewable generation and therefore require increases in dispatchable electric grid capacity to support the electric grid configuration.

According to the CalMatter's article, "California's electric grid is not ready to meet climate goals," California's electrical grid was largely developed in the last century and was designed with natural gas fired generation located in urban areas, supplemented by remote hydro, nuclear, and geothermal energy (2022). The electrical grid was *not* designed to accommodate phasing out urban gas-fired generation and tripling the among of energy delivered from remote wind and solar energy.

The impacts of an unprepared electrical grid may result in increased blackouts which would affect millions of Californians. Bloom Energy released a California Power Outage Map based on data collected between 2017 and 2019. During that time there were over 50,000 significant power outages across the state that impacted approximately 51 million customers. Although it is commonly perceived that blackouts happen primarily in rural communities, they are becoming more common in cities as well. For instance, California's 5 largest cities including Los Angeles, San Diego, San Jose, San Francisco, and Fresno, experienced 10,417 outages impacting approximately 20% of the state's population. Additionally, San Bernadino alone experienced 1,208 backouts impacting 1.4 million customers. What is perhaps more concerning is that electrical power outages are steadily increasing. In October 2019, the blackout events increased by 80% compared to the year before and the individuals it impacted increased by 204%.

On January 13, 2021, the California Independent Systems Operator, California Public Utilities

Commission, and California Energy Commission released a report regarding the root-cause analysis of the mid-August extreme heat wave power blackouts. This report states that the root-cause was attributed to "extreme weather conditions, resource adequacy and planning processes, and market practices". Additionally, it states "[t]he energy markets can help fill the gap between planning and real-time conditions, but the West-wide nature of this extreme heat wave limited the energy markets' ability to do so". Therefore, it expresses the need to have a carefully thought-out regulation that take California's current resources into consideration, as opposed to initiating a plan that may not practical.

Lastly, AGC of California acknowledges your amendment that stipulates an interim report saying "[n]o later than two years prior to the compliance date listed in Section 9-6-301.5 and Section 9-6-303.5 of this Rule, the APCO shall present to the Air District Board of Directors for consideration at a public meeting a report that includes the technology options currently (and projected to be) available to comply with the applicable standard; the market availability of such technology; the projected costs of purchase and installation of such technology, including electrical panel upgrades, as applicable; and any incentive programs available to reduce those costs." However, AGC of California would encourage the Bay Area Air Quality Management District to consider conducting the interim report before the amendments are adopted as there are too many uncertainties. If the Bay Area determines that the amendments are infeasible after the amendments have been adopted, then that would require back peddling to remedy. We encourage a thoroughly thought-out plan to be implemented prior to adoption.

Conclusion

AGC of California appreciates Bay Area Air Quality Management District for allowing AGC of California to comment on Rule 9-6 "Nitrogen Oxides Emissions from Natural Gas-Fired Water Heaters". We assert that Bay Area Air Quality Management District consider the comments we have expressed above. If you have any questions regarding the comments, please contact Brian Mello at 603-770-9264 (email: mellob@agc-ca.org). We appreciate the opportunity to comment and hope these concerns are addressed.

Sincerely,

Brian Mello

Brian Mello
Associate Vice President of Engagement & Regulatory Affairs
Associated General Contractors of California

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June 19, 2022

Jennifer Elwell
Bay Area Air Quality Management District
375 Beale Street
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San Francisco, CA 94105

Re: AHRI Comments on Initial Study for the Proposed Amendments to Building Appliance Rules Regulation 9: Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnace, and Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters

Dear Ms. Elwell:

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) welcomes the opportunity to comment on the Bay Area Air Quality District's (BAAQMD or District) Initial Study (Study) for the Proposed Amendments to Building Appliance Rules Regulation 9: Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnace (Furnaces), and Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers (Boilers) and Water Heaters (Water Heaters) (The Initial Study).

AHRI represents more than 300 manufacturers of air conditioning, heating, commercial refrigeration, and water heating equipment. It is an internationally recognized advocate and technical resource for the heating, ventilation, air conditioning, and refrigeration (HVACR) and water heating industries and certifies the performance of many of the products manufactured in these industries. In North America, the annual economic activity resulting from the HVACR industry is approximately $256 billion. In the United States alone, AHRI's members, along with distributors, contractors, and technicians, employ more than 1.3 million people.

<u>Overview</u>

The BAAQMD Study evaluates the potential environmental impacts of the proposed requirements to reduce nitrogen oxide emissions from Furnaces, Boilers, and Water Heaters. The Study concludes that there would be benefits from reductions in nitrogen oxide emissions, and separately, there could be impacts from additional power generation facilities needed to provide electricity to new equipment, including the impact of emissions from new facilities. Loss of efficiency due to source emissions compared to on-site emissions should be included in any detailed evaluation.

As decarbonization policies become more pervasive, load on the grid increases which could limit energy reliability in California. Additional infrastructure will need to be built to support the doubling or more of demand for electricity.[1] On top of the required infrastructure upgrades, such as panel upgrades, that will be required due to the increase in electric space and water heating demands, the upgraded infrastructure will need to be developed with enough capacity to accommodate anticipated growth in building stock. This infrastructure will be particularly costly and will need to demonstrate reliability in natural disasters and high wind conditions. Additionally, grid reliability becomes increasingly more important as electricity becomes the only energy source for the public's safety and comfort. This effort will be complicated by the need for reliable power during the infrastructure upgrade process. As such, the District should ensure that grid updates and capacity are capable of meeting this increased demand prior to enacting rules that will require residents to adopt all electric appliances. The Air Districts should work together and in conjunction with other state agencies to ensure that these upgrades can be made effectively and capacity in California can be increased simultaneously before these zero NOx standards are in effect.

Separately, BAAQMD has not incorporated the impact of consumer behavior into the Study. A transition away from utilizing fossil-fuels for space and water heating presents significant challenges in terms of physical infrastructure and electricity grid modernization, on-site installation and intended application, permitting logistics, consumer awareness and acceptance, and costs. The California Public Utilities Commission (CPUC) has proposed a set of incentives that range from $7,200 to $9,200 per household and between $50,000 to $300,000 per project for multifamily and commercial installations respectively for conversions of fossil-fuel fired water heating equipment to electric heat pump water heating equipment under its Self-Generation Incentive Program (SGIP).[2] While these "electrification" costs are estimates in an evolving regulatory and private market environment, the costs associated with converting millions of housing units and commercial buildings within the District from fossil-fuel fired equipment would cost several billion dollars.[3]

Prior to the pandemic, consumers tended to make decisions to repair less efficient, more emissive equipment based primarily on cost[4]. With the advent of pandemic-related, supply chain shortages, replacement may simply not be an option, even in emergency situations,

[1] T.D. Inoue notes that the additional electric appliances in winter months can double the electricity demand for a household in cold months for heating alone without heat pump water heating demand due to the increase in the amount of heating degree days (HDD). https://tedsenergytips.com/2019/01/06/what-are-the-biggest-electricity-consumers-in-a-typical-home/ (accessed Oct. 31, 2021).

[2] *See generally,* Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the Self-Generation Incentive Program and Related Issues No. Rulemaking 20-05-012, April 16, 2021.

[3] Estimation based on 2,691,883 total housing units (single family and multifamily dwellings) in the District: U.S. Census, 2010 American Community Survey, inclusive of Alameda County, Contra Costa County, Marin County, Napa County, San Francisco County, San Mateo County, Santa Clara County, Solano County, and Sonoma County.

[4] To Repair or Not to Repair: What is the Motivation? Scott et al. as viewed June 10, 2022

including catastrophic failures, within a reasonable timeframe. Significant additional costs, such as those identified by CPUC, exacerbate this issue. The negative environmental impact was not included in the preliminary Study. AHRI observes that the California Energy Commission (CEC) has estimated that it will cost up to $40 billion dollars to provide the necessary panel and service upgrades to the State's existing building stock to reach the States' building decarbonization goals,[5] which helps to define the scope of this potential issue.

AHRI strongly recommends that BAAQMD more fully consider consumer equity impacts to its proposed Amendments. Policies and regulations dependent upon building electrification as the primary mechanism to reducing greenhouse gas emissions, if not carefully executed, will disproportionately affect low-to-moderate income households.

Appliance Replacement

As mentioned previously, HVACR and water heating equipment is often replaced on a 24-hour emergency basis. In the case of furnaces, if residents in the Bay Area are forced to install an electric heat pump system, they may find themselves unable to install an in-kind replacement of their current fossil-fuel fired equipment and will be required to hire a contractor to install the equipment and an electrician to make the expensive upgrades to their current electrical system. These services will need to be scheduled and may trigger additional permitting and inspection obligations. The same would be applicable for water heating equipment. As detailed above, the CEC and CPUC have recognized that updating electrical panels to support the adoption of heat pumps for space and water heating may cost an individual household or small business owner thousands of dollars on top of the first cost of the equipment. This will be a heavy burden for families that may have little or no savings and can least afford these changes, not to mention placing more vulnerable residents at risk without heat or hot water for long periods of time and the additional electrical work could cost thousands of dollars which they may not be able to afford[6] .

AHRI recommends that BAAQMD perform a holistic cost-benefit analysis of any decarbonization policy and ensure that any recommendations are equitable to all its residents and the cost implications on consumer behavior needs to be incorporated into any environmental analysis.

AHRI, coupled with its members' extensive market experience, are prepared to partner with the District to assist it in developing and implementing a set of amendments to its Regulation 9, Rules 4 and 6 that are achievable and balance the equity needs of District residents and

[5] Testimony of Commissioner Andrew McCallister, Assembly Utilities and Energy Committee Informational Hearing on, "Beyond New Construction: Decarbonizing California's Existing Building Stock" August 25th, 2021.
[6] According to https://homeguide.com/costs/cost-to-replace-electrical-panel: Average panel upgrades cost $1,475 but can cost up to $4,000 in some cases.

businesses with the shared goal of reducing greenhouse gas emissions to improve air quality while simultaneously assisting California to reach its climate change mitigation goals, which will assist in gaining the greatest environmental benefits.

A. Comments specific to Regulation 9 Rule 4: Nitrogen Oxides from Fan Type Residential Central Furnaces:

1. Scope of products in each phase:

The current requirements of this regulation are unclear, and clarification is required for proper understanding. Section 9-4-301 outlines the NOx standards for *Stationary Natural Gas-Fired Furnaces*; whereas, Sections 9-4-301.1 and 9-4-301.2 refer only to *Stationary Natural Gas-Fired Residential Natural Fan Type Central Furnaces*. In section 9-4-301.3, the scope is opened up to *Stationary Natural Gas-Fired Furnaces* and excludes furnaces used in *Mobile Homes*. Neither of these terms are defined, which makes it impossible to understand what furnaces need to follow this standard and which are exempt.

Moreover, the inclusion of these products in section 9-4-301.3 presents the additional question of which requirements apply to these types of furnaces prior to January 1, 2029.

Finally, there is no discussion on *weatherized* units in this section. *Weatherized* can be defined as designed for installation outside of a building, equipped with a protective jacket and integral venting, and labeled for outdoor installation.[7]

This clarification is needed for inclusion in the environmental assessment.

2. Dual Fuel Systems

Dual fuel systems are potentially an ideal solution for the ultra-low NOx requirements proposed in Section 9-4-301.2; however, the proposed regulation does not address *average NOx emissions* for a dual fuel system. The definition and calculation procedure for *average NOx emissions* should be included as dual fuel systems would lower NOx more on average than a standard gas-fired furnace. This proposed regulation should maintain focus on NOx emissions and BAAQMD's mission to improve local air quality for constituents rather than selecting specific technologies to attain those goals.

Consideration of dual fuel systems should be considered in as an option in the environmental analysis, especially given the impact to low- and medium-income consumers.

B. Comments specific to Regulation 9 Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters:

[7] SCAQMD Rule 1111-1 (b)(17).

1. **Process applications**

As proposed, the Amendment would almost exclusively require Heat Pump Water Heaters (HPWH) to meet the proposed Zero NOx standard. Intrinsically, HPWHs have a lower output temperature than their gas counter parts. While the Amendment could potentially be implemented for residential applications, provided that infrastructure stability and cost consideration obstacles could be managed, it would be difficult to use HPHWs in large commercial settings such as hospitals, healthcare facilities, universities, commercial laundries, as well as certain sized restaurants, among other installations that require high temperature water, and larger hot water loads, to comply with strict sanitation obligations. These requirements could not be met consistently, if at all, solely with current HPWH technology on the market. BAAQMD should perform an analysis on high temperature water process applications to ensure that there will be no unintended consequences of the proposed Amendment, and if any are found there should be specific exceptions for those applications.

Exceptions should be excluded from the environmental assessment.

2. **Commercial Availability**

The effective transition date for this proposed regulation, and the potential to change the ultimate compliance date, creates a moving target for the entire supply chain including manufacturers, wholesalers and distributors, contractors/installers and technicians. Although there may be some commercially available products that meet the requirements set forth by this proposal, this technology is not ready for widespread adoption in the timeframe outlined in this proposed regulation.

During public proceedings on the Amendments, the coming availability of 120V HPWHs that could be substituted as a comparable product to a households' current fossil-fuel water heater was referenced as a justification for the current less than 75,000 BTU/hr transition date of 2027. While AHRI is aware of the nascent and emerging product class of 120V HPWHs, these products are not widely available in the market and perform differently compared to a similar gallon sized gas-fired water heater in residential applications. As such, there is no historical data on which to base unit and installation cost, performance, or reliability. The District needs this information before 120V HPWHs can be used to justify a transition date.

Moreover, while 120V equipment can be plugged into a standard home outlet, there are often still added installation costs associated with the use of such equipment. For example, utility closets used to house gas water heaters typically do not have standard 120V outlets readily available. Because of this, the installation of a 120V HPWH will still require an electrician to come and install an additional outlet for service, as well as a potential panel upgrade if the house has reached its current amperage capacity. While AHRI members remain confident that

the 120V product class will have intended applications and be utilized in the marketplace, it is premature for the District to use this product class as an empirical justification for the Amendment. In commercial applications, heat pump water heaters are still evolving in design and application and have additional installation challenges that – at present – do not have a "one-size fits all" solution for existing buildings. Additionally, condensate management needs to be addressed in the analysis of these costs as older non-condensing equipment is often replaced by newer equipment that is condensing, which requires r condensate management solutions and imposes additional costs. All of these costs outlined need to be included in the cost analysis of the feasibility of these units as outlined in the interim report.

3. Timing

The effective transition date for this proposed regulation and the potential to change the compliance date creates a moving target for the entire supply chain as well as labor. Although there may be some commercial products that meet the requirements set forth by this proposal, this technology is not ready for widespread adoption in the timeframe outline in this Amendment.

Therefore, AHRI recommends that BAAQMD remove the differentiation between less than 75,000 Btu/hr and 75,001-2,000,000 BTU/hr units and create a single compliance date for this transition of January 1, 2040. This would provide the entire supply chain and labor sufficient time to ensure that any issues created by developing, testing, and commercializing these products are addressed.

C. Additional Technical Recommendations

1. Background Atmospheric NOx Measurements

Considering that the Amendments allow a pathway for fossil-fuel fired equipment to continue to be sold in the District in the interim period – as well as potentially in the future if a 0 nanogram NOx level can be certified – we recommend that emission levels set for NOx account for background atmospheric NOx. Background atmospheric NOx is not emitted directly from the combustion source, but rather formed by (photo-) chemical processes taking place in the atmosphere. If background NOx is not accounted for, even a unit that does not produce any NOx may result in measured NOx emissions and would be banned under a regulatory scheme that sets the limit at zero.[8]

[8] A similar situation arose in the context of the federal Clean Water Act, which mandates a "zero discharge" of pollutants into Waters of the United States unless authorized by a discharge permit. See Section 301. Courts were faced with the issue of whether the mere transfer of water from one body of water to another, without the addition of any additional pollutants, violated the Clean Water Act. The U.S. Supreme Court ruled that the mere removal of water from a waterbody and its subsequent return to a waterbody that is not "meaningfully distinct" does not constitute an addition of pollutants that requires a permit. *South Fla. Water Mgmt. Dist. v. Miccosukee*

2. Equipment Measurement Capability

Equipment sensitivity needs to be included in this analysis. For example, if measurement equipment is not sufficiently accurate, reported NOx levels could only be reported within a very broad tolerance. As a result, this will potentially allow for units generating higher levels of NOx to be reported as 14ng/J NOx compliant in Phase[9] and on the other hand, this issue could block compliant units from being sold into the market given the tolerance of the measurement. BAAQMD should screen the current technology on the market to determine a reasonable accuracy, noting that the more stringent this level is set the larger the impact on equipment cost due to the cost of testing equipment. Therefore, we would recommend that the District avoid setting zero NOx emission limits and rather set limits such as '< 1 ppm' that will allow for reasonable variation in test equipment.

Additional Policy Observations:

A. Effective Dates and Review Period

If any changes are required by the interim report, planned for publication two-years prior to the zero NOx standard implementation, there will not be sufficient time for manufacturers and the rest of the supply chain to make adjustments and still comply with the compliance dates set herein. While AHRI is in favor of BAAQMD adding in a method to determine readiness and any needed delays to the effective date, the proposed publication time period for the interim report is too short for industry to adequately respond to major modifications.

The two-year period also does not address the time that the District Board needs to meaningful review and then to make a determination regarding the transition. Further, this proposed regulation does not define an action required from the Board upon receipt of the interim report.

Tribe of Indians, 541 U.S. 95, 97 (2004). Subsequently, the U.S. Environmental Protection Agency (EPA) promulgated its Water Transfers Rule, 73 Fed. Reg. 33697, 33700 (June 13, 2008), to clarify that water transfers from one waterbody to another, or the movement of water within the same waterbody such as water passing through a dam, does not require Clean Water Act permits "because they do not result in the 'addition' of a pollutant." EPA's Water Transfer Rule has been upheld by both U.S. Court of Appeals for the Eleventh and Second Circuits. *See Friends of Everglades v. S. Fla. Water Mgmt. Dist*., 570 F.3d 1210, 1228 (11th Cir. 2009) and *Catskill Mountains Ch. Of Trout Unlimited, Inc. v. EPA*, 846 F.3d 492, 533 (2d Cir. 2017). Accordingly, to prevent the unintended consequence of every piece of equipment that emits ambient air from violating the zero NOx standard, the regulations should account for ambient atmospheric levels of NOx.

[9] By way of hypothetical example, a 14ng/J appliance tested on NOx combustion analyzer with an error of +/- 3ng/J could result in an unacceptable value of 17 ng/J and prohibited from sale in Bay Area, while a 20 ng/J appliance tested on an analyzer with an error of +/- 10 ng/J could result in a reported NOx of 10 ng/J and be sold in the Bay Area.

A report that could change the course of the regulation, without including the timeline for any necessary rulemaking, creates significant uncertainty for manufacturers. Manufacturers need time to develop compliant products and initiate production. Less than two years between report publication and a compliance date is not enough time for industry to accommodate any equipment redesigns that may be necessary. For example, after publication of a U.S. Department of Energy (DOE) final rule, two to five years[10] is required before the compliance period for any new regulation, acknowledging the time needed to design compliant HVAC equipment and to retool necessary manufacturing equipment.

A timeline that fails to allow for the supply chain to be prepared for any transition will prevent environmental benefits from being realized. This should be included in any environmental evaluation by BAAQMD,

Conclusion

Two fundamental pillars of industry are certainty and consistency. The above proposals address certainty for industry. Consistency can only be achieved by local air quality management district's working to align on NOx requirements so that there is one clear, consistent path forward in California for manufacturers. Early adoption should be incentivized, and programs should be put in place to help low-income households afford this transition. This approach will aid in an equitable transition and remove the main hurdle of emergency replacements. This approach will also allow for optimal environmental benefits.

AHRI recommends that all of the concerns above be addressed and that BAAQMD align its proposed regulation with the current requirements outlined in SCAQMD for Regulation 9 Rule 4 while maintaining the 2023 transition date. For Regulation 9 Rule 6, AHRI recommends BAAQMD to revise the regulation to include an effective date of January 1, 2040 to allow for proper implementation of this regulation.

We appreciate the opportunity to provide these comments. If you have any questions regarding this submission, please do not hesitate to contact me, kbergeron@ahrinet.org.

Sincerely,

Helen Walter-Terrinoni
VP Regulatory Affairs

[10] ASHRAE Products have 2 or 3 years in accordance with 42 U.S.C. 6313 § (a)(6)(D).
Residential Products have 5 years in accordance with 42 U.S.C. § 6295(I)(2).

cc: K. Bergeron
L. Petrillo-Groh
N. Harbeck
V. Cox

June 21, 2022

Jennifer Elwell
Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105

Re: Proposed Amendment to Regulation 9, Rule 6

Dear Ms. Elwell:

On behalf of Bradford White Corporation (BWC), we would like to thank you for the opportunity to comment on Bay Area Air Quality Management District's (BAAQMD) Proposed Amendment to Regulation 9, Rule 6.

BWC is an American-owned, full-line manufacturer of residential, commercial, and industrial products for water heating, space heating, combination heating, and water storage. In the Bay Area, a significant number of individuals, families, and job providers rely on our products for their hot water and space heating needs.

While the California Air Resources Board (CARB) has set forth a statewide goal to phase out the sale of NOx producing water heating equipment by 2030, we have concerns that the deadlines set by CARB and subsequent dates established in Regulation 9, Rule 6 are overly optimistic. The magnitude of the transition will place significantly more stress on an already constrained supply chain under the proposed timelines and fails to take into account several external factors that may hinder the ability of the state and the District to transition successfully. Even though California may be on the forefront transitioning to zero-emission water heating, there are other states and countries developing plans to decarbonize and reduce emissions, resulting in a much larger demand for heat pump water heaters (HPWH) than California alone. BAAQMD must consider global demand for HPWH products, not just the District's demand, in their assessment to determine a feasible timeline for transitioning to only allow the sale and distribution of zero-emission water heating technology.

In the proposed rule change, section 9-6-402.4, BAAQMD allows for manufacturers to certify compliance to the District through South Coast Air Quality Management District's (SCAQMD) certification process. This certification process excludes both 9-6-301.5 and 9-6-303.5. With the entire state headed towards zero-emission water heating over the next decade, BWC believes alignment between air districts is critical for helping manufacturers plan transitioning to zero-emission product classes. While the transition dates set forth by CARB and subsequent dates set forth by individual air districts are overly optimistic, we believe that SCAQMD's 2022 Draft Air Quality Management Plan (AQMP) includes logical steps, such as

allowing Ultra Low NOx technology where significant barriers to installing zero NOx water heaters exist. BWC strongly encourages BAAQMD to align with the strategy that SCAQMD proposed and work with the SCAQMD, CARB and other district's to establish a consistent set of rules for industry to follow. SCAQMD proposed measures R-CBM-01 and C-CMB-01, which are nearly identical in scope to BAAQMD's 9-6-301.5 and 9-6-303.5, contain language that states:

> "Allow low NOx technologies as a transitional alternative when installing a zero-emission unit is determined to be infeasible."

BWC additionally provided suggestions to SCAQMD for defining "infeasibility," as shown below.

Proposed Definition for Project "Infeasibility"

In the absence of a common definition for "infeasibility" across air districts BWC proposes the following as a starting point for a more comprehensive discussion:

> "Where a project applicant can reasonably demonstrate that all parts and equipment required to retrofit an existing, mixed fuel building with a zero-emission water heater equipment is not:
> - Commercially available;
> - More costly than commercially available gas options (20% or more);
> - Able to fit in the footprint of existing equipment
> - Able to meet the building/home water heating demand; and
> - available from suppliers within the district to replace inoperative equipment on an emergency basis.
>
> In these cases, an exception shall be granted to use readily available gas Ultra Low NOx water heating equipment."

Emergency Replacements

Approximately 90% of residential water heater replacements are done on an emergency basis where the water heater has failed and cannot be necessarily easily or cost effectively repaired. It is essential that products are available locally, as customers need to be able to have these products installed in a timely manner to satisfy their needs. Local availability is not likely if manufacturers do not have the right product mix, and those products are not stocked by local distributors and retailers, forcing the consumer or business to go without hot water for an extended period of time.

Having the right products available for the right application is only one piece of the puzzle. Barriers such as electrical infrastructure and space constraints can add to the complexity and cost of replacement and may place a significant and unfair burden on the customer. In particular, low- to medium-income homeowners and small business owners, who are simply trying to restore hot water service will be adversely affected. If BAAQMD chooses to adopt the proposed timelines, then BAAQMD must also ensure there is a robust program and funding in place to help property owners prepare for the transition well in advance of needing a new water heater.

While the state is off to a good start increasing adoption of residential HPWH technology, the commercial sector has not been addressed with the same level of attention, increasing the barriers to transition in this sector. The recently adopted 2022 Title 24, California Energy Code does not address HPWHs in existing commercial and nonresidential buildings, largely because there are very few commercially available products on the market today.

A shift to require that existing commercial and nonresidential buildings be retrofitted to use all electric water heating technology will require significant time, money, and collaboration by manufacturers and plumbing trade associations to train the workforce to ensure quality installations. This is an effort that will take many years to come to fruition, as new technology becomes commercially available, likely extending well beyond 2031. Like residential products, commercial HPWH technology will face similar challenges around product footprint, adequate free air space and electrical capacity. In cases where the challenges exist, requiring the water heater to be relocated, or in cases where an emergency replacement is not achievable, the District should have provisions in place to allow an Ultra-Low NOx alternative. While solutions to these challenges may emerge, the market for commercial HPWH equipment is even smaller than residential products and will take significant effort to develop practical solutions.

While it is reasonable to expect a building owner to plan around current laws and regulations surrounding NOx emission standards and commercially available compliant equipment, the cost to change from natural gas water heating to a heat pump water heater will be significant. This is especially the case for low- and medium-income households and small business owners even when they are able to plan the replacement of their equipment. BWC agrees with BAAQMD that incentives and financing programs will be needed to help offset these costs and encourage more early adoption of technology throughout the District. Furthermore, BWC is committed to working with the District to help inform development of programs to incentivize the transition to zero-emission water heating technology.

[Ultra] Low NOx Water Heaters as a Transitional Technology

As mentioned previously, SCAQMD has included language in their 2022 Draft AQMP allowing for Ultra Low NOx transitional technology when installing a zero-emission water heater is determined to be infeasible. BWC supports this strategy if it does not require additional NOx levels below the current rule standards. If the state of California and the District are only allowing zero-emission water heating to be sold and installed, then research and development in achieving further NOx reductions in gas fired water heating equipment is likely not worth the investment as an interim measure. If the District will allow equipment meeting the current NOx standards to be used in cases where zero-emission water heating technology is deemed infeasible, BWC and other manufacturers can focus on development of zero-emission water heating technology where the greatest need exists.

Allowing Sales of Ultra Low NOx Water Heaters

Since BAAQMD's proposed Regulation 9, Rule 6 regulates the distribution and sales of product in the District territory, aligning with SCAQMD and allowing a transitional Ultra Low NOx water heater needs to be carefully thought out. If Ultra Low NOx water heating equipment will be allowed for cases where zero-emission water heating technology is determined to be infeasible, then there will need to be available inventory of Ultra Low NOx water heaters at distributors. We support this strategy; though, if BAAQMD chooses to adopt this strategy, we have the following questions regarding enforcement:

- How will the District determine what sales are properly following the infeasibility criteria?
- Which agency(ies) will be responsible for enforcement of the rule?
- Will the District provide clear rules, so contractors are able to confidently and expeditiously make an easy decision in the field and not risk being fined?

In closing, we would like to invite BAAQMD staff to meet with BWC to discuss how we can best accomplish transitioning to zero-emission water heating equipment across all sectors. We understand the state and District's goals to reduce emissions and want to play a part in ensuring it is successful in doing so.

BWC thanks the Bay Area Air Quality Management District for the opportunity to provide feedback on the proposed Regulation 9, Rule 6. Please let me know if you have any questions or would like to schedule a meeting to discuss our comments further.

Respectfully Submitted,

Bradford White Corporation

Eric Truskoski
Senior Director of Government and Regulatory Affairs

Cc: R.B. Carnevale; R. Simons; B. Hill; L. Prader; C. VanderRoest; M. Corbett; B. Wolfer

Jennifer Elwell

From: Brenna <eastbaydwelling@gmail.com>
Sent: Tuesday, June 21, 2022 3:13 PM
To: Jennifer Elwell
Subject: Support for Amending Regulation 9, Rules 4 & 6

June 21, 2022

Jennifer Elwell
Bay Area Air Quality Management District
375 Beale Street
Suite 600
San Francisco, CA 94105

Dear Ms. Elwell,

I very much appreciate all the work done by the Bay Area Air Quality Management District toward ensuring the best possible air quality and health for Bay Area residents. As a citizen in the City of Lafayette, I'm writing in support of the proposed amendments for Rules 4 and 6 in Regulation 9, which phase out the use of fossil fuels in our buildings.

I serve on the Lafayette Environmental Task Force, where we've been looking at ways to reduce our use of fossil fuels as a significant means of addressing climate change and community health. Our findings reveal that buildings are the second biggest source of emissions in our city, and that the vast majority of these emissions come from the burning of fossil fuels for energy.

As a member of the ETF, our main reason for looking into this issue is the environment. However, we have found strong evidence for additional reasons to remove fossil fuels from our buildings, including improved health; the burning of fossil fuels in our buildings is associated with many health risks. Significantly, children raised in homes with a gas cooktop are 42% more likely to develop asthma.

I therefore fully support the phasing out of fossil fuels in our buildings, with the proposed amendments for Rules 4 and 6 of Regulation 9.

Thank you,
Brenna Shafizadeh
Lafayette, CA

Jennifer Elwell

From: Fred Bialy <fred.bialy@sonic.net>
Sent: Tuesday, June 21, 2022 3:22 PM
To: Jennifer Elwell
Subject: BAAQMD's proposed changes to Regulation 9, Rules 4 & 6

Dear Ms. Elwell,

I commend the BAAQMD's proposed changes to Regulation 9, Rules 4 & 6. They are necessary steps forward if we are serious about reducing GHG emissions and improving air quality. My only suggestion is that the changes be phased in more quickly.

If we as a society are going to adequately address the Climate Crisis and ensure a world in which we all can thrive, we need to cut GHG emissions at a rate that is unprecedented. But we must do it. It will require changes in the way we do things in all sectors of our lives and by everyone.

The ACHRI raises concerns about the ability of their industry to prepare for the changes required to decarbonize buildings. They suggest a much longer time line for phasing in the proposed changes. I think this stance comes largely from a place of not embracing the urgency of our situation. The U.S. manufacturing sector during WWII was able to redirect production in a dramatic fashion to meet the needs of a nation at war. So there is precedent for being able to ramp up development and production to address an existential threat.

PG&E raises issues of equity during a transition away from use of fossil fuels to a fully electrified society. We as a society just need to prioritize in action and not just words that vulnerable and financially disadvantaged groups are not left behind. The necessary policy and financing will follow.

I urge the BAAQMD to continue to prioritize reduction of GHG emissions and the resulting improved air quality. You will likely continue to get feedback that you need to move more slowly. But, please, embrace the urgency of our situation and forge forward with your plans.

Sincerely,

Fred Bialy
El Cerrito, CA

Jayne Parker (650) 801-9028
State Agency Relations jayne.parker@pge.com

June 21, 2022

Jennifer Elwell
Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105

RE: Pacific Gas and Electric Comments on Regulation 9: Rules 4 and 6

Pacific Gas and Electric Company (PG&E) appreciates this opportunity to comment on the Bay Area Air Quality Management District's (BAAQMD) draft amendments to Regulation 9: Rules 4 and 6 as proposed to be amended on May 19, 2022. PG&E would like to thank BAAQMD for its efforts in reducing residential NOx emissions through these proposed amendments and offers the following comments to facilitate BAAQMD's development of a robust NOx reduction plan that is comprehensive in nature and wide-ranging in approach and application.

As the State's largest energy provider, PG&E embraces our foundational role in transitioning California to a decarbonized and more climate-resilient economy. In June 2022, PG&E issued our *Climate Strategy Report*[1], which established our commitment to achieve a net zero energy system in 2040—five years ahead of the California carbon neutrality goal established in Executive Order B-55-18—and be climate and nature positive by 2050. PG&E recognizes the importance that building decarbonization must play in meeting these carbon goals and the specific leadership role that PG&E can serve in advancing zonal electrification as a part of a broader building decarbonization strategy. As E3 notes in their report *The Challenge of Retail Gas in California's Low-Carbon Future*, "Such a managed gas transition would likely require some amount of targeted or zonal electrification, to enable a reduction in the gas distribution infrastructure. Without a managed gas transition and without any effort to target electrification, it would be difficult to reduce the size or scale of gas system investments and costs.[2]" It is with commitment to 2040 zero net energy in mind that PG&E offers these comments to support BAAQMD's NOx reduction efforts and suggest additional policies to broaden the impact of amendments to Rules 4 and 6.

As PG&E seeks to define how the gas system can continue to provide safe, affordable, reliable service while meeting California decarbonization goals, we have met with a number of BAAQMD staff and board members this spring, speaking with them on our early progress and

[1] PG&E Climate Strategy Report, available at: www.pge.com/climate
[2] E3, The Challenges of Retail Gas in California's Low Carbon Future, p. 6

investigation into potential geographic zones where electrification may mitigate future gas customer rate impacts by decommissioning portions of the gas system. Through this approach—often termed "zonal electrification"—we can both decrease NOx and carbon emissions in California and also reduce the long-run costs of the gas system addressing affordability for those customers continuing to use gas.

The California Air Resources Board (CARB) also discussed the need to shrink the natural gas system in their 2022 Draft Scoping Plan Update (SPU). As staff states in Appendix D, the inability to provide comprehensive (i.e.: whole-building or zonal based) decarbonization solutions to customers presents a key challenge in long-term gas rate affordability. Staff writes, "As more households move away from using natural gas, those remaining on the natural gas system are likely to pay an increasingly larger share of systemwide costs, which could further widen the affordability gap between households that are able to decarbonize early and those that are not."[3] From an equity and affordability standpoint, PG&E urges BAAQMD to prioritize comprehensive building decarbonization opportunities that achieve both building emission reductions and gas system cost reductions. This could be done through the expansion of appliance-based regulations to *all* gas appliances in a building or by using zonal electrification as a tool to electrify whole communities while retiring gas infrastructure assets. While cooktops, dryers, or decorative fireplaces do not have considerable NOx emissions when compared to furnaces or water heaters, there is both a financial and environmental benefit to customers in being able to fully electrify their homes or businesses. BAAQMD can, and should, be a leader in this space.

In closing, PG&E applauds the efforts of BAAQMD to amend Rules 9-4 and 9-6. To promote further decarbonization and affordability for all Bay Area residents, we urge BAAQMD to work towards extending these rules to *all* gas appliances. Furthermore, we ask that BAAQMD work closely with PG&E, its member cities, towns, and counties, to prioritize zonal electrification solutions in tandem with the role out of Rules 9-4 and 9-6. We look forward to working together with BAAQMD on solutions that achieve our decarbonized future.

Thank you,

Jayne Parker

State Agency Relations

[3] CARB, Draft 2022 Scoping Plan Update, May 10, 2022, Appendix D, p. 19.

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June 21, 2022

Ms. Jennifer Elwell
Bay Area Air Quality Management District
375 Beale Street
Suite 600
San Francisco, CA 94105

RE: Bay Area Air Quality Management District Draft Amendments to Regulation 9, Rules 4 and 6: NOx Emissions from Building Appliances

Dear Ms. Elwell,

Rheem Manufacturing Company (Rheem) appreciates the opportunity to submit the following comments regarding the Initial Study for an Environmental Impact Report (EIR) and revised draft amendments to Regulation 9: Inorganic Gaseous Pollutants; Rule 4 and Rule 6 impacting nitrogen oxides (NOx) emissions from building appliances.

Rheem is an industry leader in total heating, cooling, refrigeration and water heating solutions and one of the few global brands with product offerings covering residential and commercial heating, cooling, conventional and hybrid storage water heaters, tankless water heaters, solar water heating systems, pool and spa heaters, commercial boilers, residential hydronic and geothermal systems, commercial refrigeration products, indoor air quality accessories, and replacement parts for all categories. Rheem is headquartered in Atlanta, Georgia, and has U.S. based manufacturing facilities in California as well as in Alabama, Arkansas, Connecticut, and North Carolina.

Rheem remains committed to bringing sustainable water heating and HVAC solutions to the market to achieve decarbonization goals and to provide cost-effective heating and cooling solutions for new construction and replacement applications serving a broad cross-section of residents, homeowners, and businesses. An essential component in meeting emissions reduction targets is *market readiness*, which includes technology availability, service and installation capabilities, and consumer awareness. While Rheem supports Bay Area Air Quality Management District's (BAAQMD) broader objectives to reduce NOx emissions in the region, we remain concerned about the market readiness to achieve the stated targets.

Market readiness concern: Premature zero-NOx implementation could result in net increase in GHG emissions associated with increased electricity production.

Rheem supports BAAQMD intent not to mandate specific technology solutions to achieve zero-NOx emissions, however, it is very likely the solutions will be predominately electric based technologies including electric heat pump systems. As such, Rheem is concerned that a full implementation of the proposed rule amendments could generate a net increase in GHG emissions associated with increased electricity production. Rheem agrees that further technical study and evaluation is needed to ensure no adverse impacts on the environment and to inform use of "near- zero" emissions or dual fuel solutions that include some types of natural gas.

Market readiness concern: Manufacturing technology assessment should occur *prior* to finalizing targets and dates.

To reiterate our prior comments, the range of technologies needed to meet the proposed zero NOx requirements and implementation dates has not been established. For example, while there are residential heat pump water heaters that can be used today to meet these targets in many new homes, there are no known technologies to replace all commercial applications. Rheem supports the Air Pollution Control Officer (APCO) requirement for the interim reports within the draft regulation, to be completed no later than two years prior to the compliance date. However, we believe the first report should be completed *prior* to finalizing the proposed rule, and more frequently thereafter, to provide appropriate planning and a proper development horizon. Typical product development cycles are five years—significantly longer than the two years outlined in the BAAQMD regulation.

Market readiness concern: Equipment scope should be narrowed to ensure available solutions.

Additionally, the scope of the Regulation 9, Rules 4 and 6, is far reaching including residential, commercial, and industrial equipment with up to 2 million Btu/h, impacting multiple product types used for various single family, multi-family and commercial business applications. Rheem recognizes that a very small subset of products included already have zero-NOx replacement solutions and that with sufficient development time and incentives this offering will grow. However, there is also a significant portion of the products and applications covered by the regulation that cannot easily or cost-effectively be transitioned within the proposed timeframe. In particular, large water heating equipment installations, especially those used for commercial applications, will not meet the deadlines used by BAAQMD and could provide significant cost impacts to consumers and businesses where replacements or retrofit products are not available.

Market readiness concern: Installation challenges need to be addressed, especially for replacements.

Staff should consider and recognize that there are multiple applications and installation challenges that need to be overcome and addressed prior to the compliance date. Key installation challenges already noted include:

- Emergency replacement of failed HVAC and water heating equipment, funding, product availability, ease of installation and contractor timing for service
- Electric wiring and panel upgrades and insufficient power supply with older homes
- Larger installation footprints, provisions for air flow for heat pumps and renovation costs
- Need for high temperature water supply for commercial processes, restaurants, laundry, hospitals, and healthcare facilities.
- Compliance path for large commercial and rooftop HVAC units which have not traditionally been subject to NOx restrictions and have limited replacement options

Market readiness concern: Compliant solutions should include "near-zero" emissions pathways for maximum effectiveness.

Staff should continue to consider and allow for "near" zero emissions solutions, which could include some types of natural gas, to achieve significant NOx reductions, while at the same time preserving energy resilience and emergency back-up for the larger equipment. Where applications cannot easily be decarbonized, certain 'off-ramps' may need to be included.

Rheem commends Staff for their inclusion of hybrid (dual fuel furnace) heat pumps that comply on an average basis, recognizing the readiness and effectiveness of this technology to reduce emissions. Rheem recommends that a definition and calculation procedure for average NOx emissions be included. Rheem also requests that hybrid (dual fuel) heat pumps for water heating equipment be included. This would apply to installations where a small percentage of the total heating load is provided by a gas fired water heater/boiler for the purposes of emergency back-up and peak loads. Electric heat pumps with storage tanks used to replace gas fired equipment usually require much larger installation footprints and will typically comprise of multiple units. Utilizing gas equipment for some portion of the total load would provide for a simplified installation and lower cost. As with air hybrid heat pumps, compliance for such water heating equipment could be determined on an average basis.

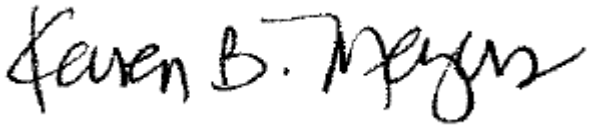
Rheem continues to support a harmonized California state and BAAQMD coordinated compliance plan with the following recommendations:

- More narrowly tailor definitions for a specific subset of residential equipment types, sizes and applications with known replacement solutions and costs
- Better define compliance parameters for hybrid dual fuel furnaces and provide a compliance path for dual fuel water heating equipment
- Outline incentives and funding for adoption and installation of new equipment for replacement applications, especially for affordable housing, and including electric panel upgrades and emergency replacements
- Provide exceptions for commercial and industrial applications, including those requiring high temperature water

Rheem appreciates BAAQMD's effort in further developing the proposal and completing the EIR. We look forward to collaborating further with staff in the rulemaking process, including participating in a working group to address implementation, and would be happy to discuss our comments.

If there are questions, please do not hesitate to contact me directly.

Sincerely,



Karen Meyers
Vice President, Government Affairs
Rheem Manufacturing Company

cc: BAAQMD Board of Directors c/o Marcy Hiratzka, Clerk of the Boards, Executive & Administrative Resources
Joe Boros
Allison Skidd

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May 20, 2022

Jennifer Elwell
Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105

Re: 2022050430, Amendments to Rule 9-4 and Rule 9-6 Project, Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties

Dear Ms. Elwell:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).

2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.

3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).

4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:

- **a.** The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
- **b.** Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (https://ohp.parks.ca.gov/?page_id=30331) for an archaeological records search. The records search will determine:

- **a.** If part or all of the APE has been previously surveyed for cultural resources.
- **b.** If any known cultural resources have already been recorded on or adjacent to the APE.
- **c.** If the probability is low, moderate, or high that cultural resources are located in the APE.
- **d.** If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.

- **a.** The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
- **b.** The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.

b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.

c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Cody.Campagne@nahc.ca.gov.

Sincerely,

Cody Campagne

Cody Campagne
Cultural Resources Analyst

cc: State Clearinghouse

Appendix B

Air Quality Calculations

Proposed Amendments to Regulation 9, Rule 4 and Rule 6
Calculation of Emissions Reductions

Emissions reductions associated with the proposed rule amendments were calculated utilizing an annual emissions baseline developed from the 2018 Air District emissions inventory. Adjustments were made to this 2018 emissions inventory to account for emissions changes that are expected to occur prior to the effective dates under the proposed rule amendments. These adjustments are described in further detail below.

2018 Emissions Inventory

The 2018 Air District emissions inventory can be seen in Table 1, below.

Table 1
2018 District NOx Emissions from Natural Gas Combustion in Buildings

Description	2018 Annual NOx Emissions (tons per year)
Commercial – space heating	552.8
Commercial – water heating	475.7
Commercial – other	552.8
Commercial subtotal	*1,581.3*
Residential – space heating	2,410.0
Residential – water heating	828.3
Residential – cooking	213.9
Residential – other	193.5
Residential subtotal	*3,645.6*
Grand Total	*5,266.9*

Adjustments to the Emissions Inventory

Adjustments were made to this 2018 emissions inventory to account for emissions changes that are expected to occur prior to the effective dates of the proposed rule amendments. These anticipated changes are due to existing Air District requirements on water heaters under the current version of Rule 9-6, which was amended in 2007. The Air District anticipates that over the next few years, some existing water heaters will continue to be replaced with lower emission units to comply with the current requirements. Because these emission reductions are a result of the current requirements, these reductions are not attributable to the proposed rule amendments, and appropriate adjustments must be made to the 2018 emissions inventory to reflect the remaining NOx emissions reductions attributable to the 2007 amendments.

The current Rule 9-6 requirements were adopted in 2007. At that time, Rule 9-6 was amended to include the following emissions standards:

9-6-301.4 Natural Gas-Fired Storage Tank Water Heaters with a Rated Heat Input Capacity of 75,000 BTU/Hour or Less: No person shall sell, install, or offer for sale within the District any natural gas-fired storage tank water heater that is manufactured after January 1, 2011, and that emits more than 10 nanograms of nitrogen oxides (calculated as NO_2) per joule of heat output. This subsection shall not apply to water heaters used for mobile homes.

9-6-303.4 Natural Gas-Fired Boilers and Water Heaters with a Rated Heat Input Capacity of 75,001 to 2,000,000 BTU/Hour: No person shall sell, install, or offer for sale within the District any large natural gas-fired boiler, storage tank water heater, or instantaneous water heater with a rated heat input capacity from 400,001 to 2,000,000 BTU/Hour, inclusive, manufactured after January 1, 2013, that emits more than 14 nanograms of nitrogen oxides (calculated as NO_2) per joule of heat output, or more than 20 ppm NO_x at 3% O_2, dry.

Based on a 2019 Energy and Environmental Economics report[1], an average lifetime of 18 years was assumed for furnaces and 13 years for water heaters throughout the analysis for the proposed rule amendments. Using this timeline, Air District staff accounted for the continued phase in of the 2007 amendments, which is assumed to be complete in 2026. A yearly emission adjustment from this continued phase in was calculated for residential and commercial water heaters. To calculate the adjustment for each year, the baseline emissions were multiplied by the emission reduction expected for all units installed in that year and then divided by the average expected lifetime of the equipment to represent the fraction of units expected to be replaced in that year. This general calculation is shown below.

Equation 1: Yearly Emissions Adjustment for Expected Reductions

$$Yearly\ emissions\ reduction = \frac{Baseline\ annual\ emissions * Expected\ \%\ reduction}{Lifetime\ of equipment}$$

Using this calculation methodology, an updated emissions baseline for water heaters was established. Table 2 represents the updated baseline that accounts for complete phase-in of the 2007 amendments. Note that space heating emissions remain unchanged from Table 1, as the most recent amendments to Rule 9-4 occurred in 1983 and are assumed to be completely phased in at this time based on the estimated average lifetime of space heaters.

Table 2
Adjusted 2018 Baseline for District NO_x Emissions from Natural Gas Combustion in Buildings

Description	Annual NOx Emissions (tons per year)
Commercial – space heating	552.8
Commercial – water heating	240.4
Commercial – other	552.8
Commercial subtotal	*1,346.1*
Residential – space heating	2,410.0
Residential – water heating	487.2
Residential – cooking	213.9
Residential – other	193.5
Residential subtotal	*3,304.6*
Grand Total	*4,650.7*

NOx Emission Reductions from Proposed Rule Amendments

Using the adjusted emissions baseline presented in Table 2, staff calculated the estimated emission reductions from the proposed rule amendments. Using the methodology presented in Equation 1, a yearly emissions reduction was calculated for the phase in of the proposed rule amendments for residential space heating, residential water heating, commercial space heating and commercial water heating.

Ultra-low NOx Emission Reduction Estimate Methodology

For the time period of 2024 to 2026, staff assumed that all new space heaters installed will result in a 65 percent reduction from the 2018 baseline emissions. This is due to the ultra-low NOx requirement of 14 ng/J beginning in 2024 in the proposed amendments to Rule 9-4. The current requirement is 40 ng NO_x/J of useful heat delivered to the space.

[1] Energy and Environmental Economics. 2019 (April). Residential Building Electrification in California: Consumer Economics, Greenhouse Gases and Grid Impacts. San Francisco, CA. Available: https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf. Accessed December 13, 2021.

Zero-NOx Emission Reduction Estimate Methodology

In order to calculate expected emission reductions for replacements with zero-NO_x appliances, Air District staff assumed that these replacements would be with electric units. Air District staff utilized the current power content mix from the community choice aggregator local to the customer, or direct from Pacific Gas and Electric. This assumption provides a conservative estimate of emission reductions, as the proportion of carbon- and NO_x-free electricity in California is anticipated to grow over time. The power content mix of each of the electricity providers, as well as their contribution to projected Bay Area electric load, is shown below in Table 3. The resulting weighted average is 85 percent carbon- and NO_x-free electricity generation. The other 15 percent of electricity is assumed to be provided from natural gas-fired power plants meeting a best available control technology NO_x emissions limit of 5 ppm[2].

Table 3
Bay Area Electricity Generation Resources

	Solar, Wind & Geothermal	Hydro	Nuclear	Biomass	System Power	Bay Area Usage[1]
Marin Clean Energy[2]	53%	38%	1%	6%	2%	14%
Sonoma Clean Power[3]	38%	41%	1%	11%	9%	6%
East Bay Community Energy[4]	42%	16%	0%	1%	40%	17%
Peninsula Clean Energy[5]	40%	51%	0%	9%	0%	9%
Silicon Valley Clean Energy[6]	36%	64%	0%	0%	0%	9%
SF Clean Power[7]	54%	39%	0%	0%	7%	8%
San Jose Clean Energy[8]	50%	23%	23%	3%	1%	10%
PG&E[9]	43%	6%	39%	4%	8%	27%

[1] Values calculated via data from California Public Utilities Commission, Integrated Resource Plan. https://www.cpuc.ca.gov/irp/

[2] Marin Clean Energy, Light Green Plan. https://www.mcecleanenergy.org/60-renewable/. Accessed November 2022.

[3] Sonoma Clean Power, CleanStart Plan. https://sonomacleanpower.org/uploads/documents/Power-Content-Label-2021-Web.pdf

[4] East Bay Community Energy, Bright Choice Plan. https://ebce.org/our-power-mix/. Accessed November 2022.

[5] Peninsula Clean Energy, ECOplus Plan. https://www.peninsulacleanenergy.com/power-mix/. Accessed November 2022.

[6] Silicon Valley Clean Energy, SVP Residential Plan. https://www.siliconvalleypower.com/svp-and-community/about-svp/power-content-label. Accessed November 2022.

[7] SF Clean Power, Green Plan. https://static1.squarespace.com/static/5a79fded4c326db242490272/t/632e3e4c508cf816fc26e5d8/1663974989563/CleanPowerSF_Product+Content+Label+2022_Green_All+Languages.pdfhttps://static1.squarespace.com/static/5a79fded4c326db242490272/t/632e3e4c508cf816fc26e5d8/1663974989563/CleanPowerSF_Product+Content+Label+2022_Green_All+Languages.pdf

[8] San Jose Clean Energy, GreenSource Plan. https://sanjosecleanenergy.org/wp-content/uploads/2022/09/SJCE_2021-Power-Content-Label.pdf

[9] Pacific Gas and Electric Power Mix via East Bay Community Energy. https://ebce.org/our-power-mix/. Accessed November 2022.

Based on the overall Bay Area power content mix shown in Table 3, staff calculated the net emission reduction expected from the implementation of zero-NO_x standards for space heating and water heating appliances. This net emission reduction is calculated using Equation 2 shown below, which accounts for the percentage of carbon- and NO_x-free electricity (% CFE) and the percentage of electricity assumed to be provided from natural gas-fired power plants. For the electricity provided from natural gas-fired power plants, a correction factor is applied to account for the difference between the power plant NO_x emission levels (assumed to be equivalent to a BACT level of 5 ppm NO_x) and the existing appliance NO_x standard (e.g., a NO_x standard equivalent to 20 ppm for water heaters under current Rule 9-6). This calculation results in an overall NO_x reduction of 96.3 percent for water heaters and 98.7 percent for space heaters.

Equation 2: Overall NO_x Reduction

$$\%\ NOx\ Reduction = \%\ CFE + (1 - \%\ CFE) * \frac{Exisiting\ Reg\ 9\ Standard - Power\ Plant\ BACT}{Existing\ Reg\ 9\ Standard}$$

[2] California Air Resources Board, Stationary Source Division. Report to the Legislature: Gas-Fired Power Plant NOx Emission Controls and Related Environmental Impacts. May 2004. https://ww2.arb.ca.gov/sites/default/files/classic/research/apr/reports/l2069.pdf.

From 2027 to 2029, it is assumed that all new residential water heaters installed will achieve a 96.3 percent reduction due to the proposed zero-NO_x standard for water heaters less than 75,000 BTU/hr.

From 2027 to 2029 it is expected that new residential space heaters will continue to achieve a 65 percent reduction based on the ultra-low NO_x standard for these units under the proposed amendments.

Starting in 2029, the proposed zero-NO_x standard for space heaters becomes effective, and the expected reduction for new residential space heaters installed is expected to be 98.7 percent from the baseline (as described above). Commercial space heating reductions will also begin in 2029 at the same 98.7 percent rate of emissions reduction for 50 percent of the units installed. District staff assumes that 50 percent of commercial space and water heating appliances are governed by Rule 9-7 and are therefore not impacted by the proposed rule amendments.

Starting in 2031, with the final zero-NO_x requirement for large water heaters up to 2,000,000 BTU/hr beginning on January 1, 2031, 96.3 percent emission reductions from the baseline are expected for 50 percent commercial water heaters installed after that date (as above).

Based on the assumed lifetimes of equipment, District staff calculations assume that all residential water heaters will be replaced with zero-NO_x appliances by 2039, commercial water heating by 2043, and residential and commercial space heating by 2046. The results of these calculations are shown in Table 4, below.

Table 4
Commercial and Residential Space and Water Heating Projected NO_x Emission Reductions (Tons NO_x/year)

	Residential Space Heating	Residential Water Heating	Commercial Space Heating	Commercial Water Heating	Yearly Reduction	Cumulative Reduction
2023	-	-	-	-	-	-
2024	87.03	-	-	-	87.0	87
2025	87.03	-	-	-	87.0	174
2026	87.03	-	-	-	87.0	261
2027	87.03	36.11	-	-	123.1	384
2028	87.03	36.11	-	-	123.1	507
2029	132.1	36.11	15.15	-	183.4	691
2030	132.1	36.11	15.15	-	183.4	874
2031	132.1	36.11	15.15	8.91	192.3	1,066
2032	132.1	36.11	15.15	8.91	192.3	1,259
2033	132.1	36.11	15.15	8.91	192.3	1,451
2034	132.1	36.11	15.15	8.91	192.3	1,643
2035	132.1	36.11	15.15	8.91	192.3	1,835
2036	132.1	36.11	15.15	8.91	192.3	2,028
2037	132.1	36.11	15.15	8.91	192.3	2,220
2038	132.1	36.11	15.15	8.91	192.3	2,412
2039	132.1	36.11	15.15	8.91	192.3	2,605
2040	132.1	-	15.15	8.91	156.2	2,761
2041	132.1	-	15.15	8.91	156.2	2,917
2042	45.15	-	15.15	8.91	69.2	2,986
2043	45.15	-	15.15	8.91	69.2	3,055
2044	45.15	-	15.15	-	60.3	3,116
2045	45.15	-	15.15	-	60.3	3,176
2046	45.15	-	15.15	-	60.3	3,236

The emission reductions shown in Table 2 above are subtracted from the baseline annual emissions to estimate the anticipated emissions. These emissions and related figures are shown in the main body of the Staff Report.

Potential Greenhouse Gas Emission Reductions

Potential greenhouse gas emission reductions that could be achieved through implementation of the proposed rule amendments are also estimated using a similar methodology. The 2018 baseline greenhouse gas emissions used to calculate estimated potential emissions reductions are shown below in Table 5. Note that the adjustments made to NOx emission inventory, as described previously, are not applicable to the GHG emissions inventory; the continued implementation of existing Air District NOx requirements on water heaters are not anticipated to result in changes to GHG emissions, and therefore no adjustments have been made to the 2018 GHG emissions inventory.

Table 5
2018 District Greenhouse Gas Emissions from Natural Gas Combustion in Buildings

	Category	Million metric tons/year (MMT/yr)
Residential		5.41
	Space Heating	2.84
	Water Heating	2.32
	Cooking	0.25
Commercial		2.03
	Water Heating	0.77
	Space Heating	0.63
	Other	0.63

Any potential greenhouse gas emissions reductions from the proposed rule amendments are contingent on potential installation of electric appliances in place of existing natural gas appliances upon replacement. As described in the NOx emission reduction calculations above, the current community choice aggregator and Pacific Gas and Electric weighted average of 85 percent carbon free electricity was also used to estimate greenhouse gas emissions reductions. For the other 15 percent of electricity assumed to be generated at a natural gas-fired power plant, a correction factor was applied to account for differences in GHG emissions associated with natural gas-fired appliances and natural gas turbines at power plants. For this calculation, the following emission factors (EF) were used:

Natural gas-fired appliances: 116.65 lb CO_2/MMBTU[3]
Natural gas-fired single cycle turbine: 130.49 lb CO_2/MMBTU[4]

Equation 3, below, shows the use of these values as correction factors to the grid mix to determine the percentage by which greenhouse gas emissions are expected to decrease. The percentage of carbon free electricity is represented below as "% CFE". This calculation results in an overall potential GHG reduction of 83.6 percent.

Equation 3: Overall GHG Reduction

$$\%\ GHG\ Reduction = \%\ CFE + (1 - \%\ CFE) * \frac{Appliance\ EF - Turbine\ EF}{Appliance\ EF}$$

The same methodology described above for estimating NOx emission reductions was applied to estimate the phase in of potential emission reductions for greenhouse gases. While the proposed ultra-low NOx standards first become effective in 2024, these requirements are anticipated to be met through the use of natural gas-fired furnaces, and would not result in greenhouse gas emission reductions. Therefore, potential greenhouse gas emission reductions are

[3] U.S. Energy Information Administration. Carbon Dioxide Emissions Coefficients. https://www.eia.gov/environment/emissions/co2_vol_mass.php
[4] Department of Energy, Gas Turbines In Simple Cycle and Combined Cycle Applications. https://netl.doe.gov/sites/default/files/gas-turbine-handbook/1-1.pdf

expected to begin with the implementation of proposed zero NOx standards for residential water heaters in 2027. Using the methodology presented in Equation 1, the potential yearly GHG emission reductions was calculated using the assumed equipment lifetimes described previously and the overall potential GHG reduction of 83.6 percent calculated above.

This calculation results in the results shown below in Table 6.

Table 6
Commercial and Residential Space and Water Heating Potential GHG Emission Reductions (MMT CO_2e/yr)

	Residential Space Heating	Residential Water Heating	Commercial Space Heating	Commercial Water Heating	Yearly Reduction	Cumulative Reduction
2027	—	0.149	—	—	0.149	0.15
2028	—	0.149	—	—	0.149	0.30
2029	0.132	0.149	0.015	—	0.296	0.59
2030	0.132	0.149	0.015	—	0.296	0.89
2031	0.132	0.149	0.015	0.018	0.314	1.20
2032	0.132	0.149	0.015	0.018	0.314	1.52
2033	0.132	0.149	0.015	0.018	0.314	1.83
2034	0.132	0.149	0.015	0.018	0.314	2.14
2035	0.132	0.149	0.015	0.018	0.314	2.46
2036	0.132	0.149	0.015	0.018	0.314	2.77
2037	0.132	0.149	0.015	0.018	0.314	3.09
2038	0.132	0.149	0.015	0.018	0.314	3.40
2039	0.132	0.149	0.015	0.018	0.314	3.71
2040	0.132		0.015	0.018	0.164	3.88
2041	0.132		0.015	0.018	0.164	4.04
2042	0.132		0.015	0.018	0.164	4.21
2043	0.132		0.015	0.018	0.164	4.37
2044	0.132		0.015		0.147	4.52
2045	0.132		0.015		0.147	4.66
2046	0.132		0.015		0.147	4.81

The potential greenhouse emission reductions shown in Table 6 above are subtracted from the baseline annual emissions to estimate the anticipated emissions. These emissions and related figures are shown in the main body of the Staff Report.

Appendix C

Electrical Study

Bay Area Air Quality Management District

Electric Infrastructure Impacts from Proposed Zero NOx Standards

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Acronyms

Acronym	Definition
AC	Air Conditioning
ACC	(CPUC) Avoided Cost Calculator
ACS	American Community Survey
ATB	(NREL) Annual Technology Baseline
BAAQMD	Bay Area Air Quality Management District
BAU	Business as Usual
CA	California
CARB	California Air Resources Board
CAISO	California Independent System Operator
CCA	Community Choice Aggregator
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
GHG	Greenhouse Gas
HP	Heat Pump
HSPF	Heating Seasonal Performance Factor
HVAC	Heating, Ventilation, and Air Conditioning
IRP	(CPUC) Integrated Resource Planning
LCOE	Levelized Cost Of Electricity
NREL	National Renewable Energy Laboratory
NOx	Nitrogen Oxides
PCAF	Peak Capacity Allocation Factor
PG&E	Pacific Gas & Electric
PV	Photovoltaic

1. Executive Summary

The Bay Area Air Quality Management District (BAAQMD) is evaluating proposed zero NOx standards for residential and commercial space and water heating devices. Today, the only technologies that meet zero NOx standards for these end uses are electric devices, although gas-fired technologies that meet zero NOx standards could be developed in the future. For the purposes of this study, E3 has assumed that electric heat pump devices are used to comply with the proposed standards. E3 has analyzed the potential electric load increases from space heating, water heating, and air conditioning as well as the associated electric grid impacts. This analysis will be used to support an assessment of the potential conservative (upper end) impacts of the proposed standards on electric infrastructure under the California Environmental Quality Act (CEQA). If gas-fired technologies are developed that meet the proposed zero NOx standards and these devices are adopted by some customers, the overall impacts on electric infrastructure would be smaller than estimated here.

All potential electric grid impacts were evaluated relative to two reference scenarios: a Low Policy Reference, which assumes no major state policy changes in support of building electrification, and a High Policy Reference, which assumes major state policy support for building electrification by the 2030s.

There are two broad results from this study:

- The potential electric grid impacts of the proposed zero NOx standards are highly dependent on what other policies California enacts around building electrification to meet the state's climate goals.
    - Relative to the Low Policy Reference, the zero NOx standards would result in incremental load impacts, capacity impacts, and infrastructure needs by 2050.
    - Relative to the High Policy Reference, the zero NOx standards would result in load, capacity, and infrastructure impacts occurring earlier than would otherwise be expected, but there would be very small net impacts by 2050.
- The largest potential impacts of the proposed standards would be from increased electric loads and the associated need for additional zero-carbon generation, assumed in this study to be utility-scale solar, to meet these electric loads.
    - There would also be some incremental peak loads, leading to additional impacts for generation capacity, transmission capacity, and distribution capacity.

Table 1 summarizes the potential electric grid impacts that were determined in this study. While the distribution capacity impacts described in the table would occur within the BAAQMD's geographic region, the transmission capacity impacts may occur outside the Bay Area and the utility-scale solar and battery storage impacts would be spread across California and the Western United States.

Table 1: Summary of potential 2050 electric grid impacts of proposed zero NOx standards

	Impact relative to Low Policy Reference	Impact relative to High Policy Reference
Utility-scale solar *to serve electric loads*	2,180 MW new solar by 2050	70 MW new solar by 2050 *+ accelerated build in 2030s & 2040s*
4-hour battery storage *for generation capacity*	680 MW new batteries by 2050	< 10 MW new batteries by 2050 *+ accelerated build in 2030s & 2040s*
Transmission Capacity	460 MW impact by 2050	< 10 MW impact by 2050 *+ accelerated build in 2030s & 2040s*
Distribution Capacity	420 MW impact by 2050	< 10 MW impact by 2050 *+ accelerated build in 2030s & 2040s*

2. Background

The BAAQMD is evaluating amendments to rules 9-4 and 9-6, which govern nitrogen oxide (NOx) emissions from residential and commercial space and water heating systems. The proposed amendments would introduce zero NOx standards for devices covered under these rules. Today, the only technologies that meet zero NOx standards for these end uses are electric space and water heating devices. In the future, gas-fired technologies that meet the proposed standards could be developed. In this study, to determine potential conservative (upper end) impacts on electric infrastructure, it is assumed that gas space heating and water heating devices would be replaced by electric heat pump devices upon burnout.

The following rule changes were proposed:

- Rule 9-4 governs emissions from gas-fired furnaces.
    - BAAQMD proposes zero NOx standards for all residential and commercial gas-fired furnaces, applicable on January 1, 2029.
- Rule 9-6 governs emissions from gas-fired water heaters and boilers with heat input capacity less than 2,000,000 Btu/hr.
    - BAAQMD proposes zero NOx standards for water heaters and boilers with heat input capacity less than 75,000 Btu/hr, applicable on January 1, 2027.
    - BAAQMD proposes zero NOx standards for water heaters and boilers with heat input capacity between 75,000 Btu/hr and 2,000,000 Btu/hr, applicable on January 1, 2031.

In this study, E3 has analyzed the electric grid impacts of the proposed standards, assuming that covered gas devices would be replaced by electric heat pumps at device retirement. A widespread shift to electric heat pumps would result in electric load growth, requiring new infrastructure to support these loads.

Electric grid impacts have been considered in four categories:

- **Electric load**: generation resources to serve new electric loads, not necessarily during peak hours
- **Generation capacity**: resources to serve new electricity needs at times of peak demand
- **Transmission capacity**: new electric transmission infrastructure to deliver electricity from generators to the distribution system, associated with new peak loads
- **Distribution capacity**: new electric distribution infrastructure to deliver electricity from the transmission system to retail customers, associated with new peak loads

3. Heat Pump Adoption Scenarios

Technology Assumptions

This modeling assumed a baseline gas technology for each end use: residential space heating, residential water heating, commercial space heating, and commercial water heating. The modeling also includes assumptions regarding the heat pumps that would replace gas devices under the proposed zero NOx standards. Details on the technology assumptions are provided in the section **Appendix: Detailed Methodology**.

Zero NOx Standard Dates and Coverage

Table 2 illustrates key modeling assumptions regarding the proposed zero NOx standards. The implementation dates for the proposed standards are based on the proposed rule amendments, as described above in the section **Background**. Coverage reflects the share of natural gas usage assumed to be covered by the amendments. This analysis assumes that 50% of commercial water heating would be served by large water heaters with capacity greater than 2 MMBtu/hr and thus would not be covered under these standards.

Table 2: Zero NOx standard implementation dates and assumed coverage

End use	Zero NOx standard implementation date	Coverage (%)
Residential Space Heating	Jan 1, 2029	100%
Residential Water Heating	Jan 1, 2027	100%
Commercial Space Heating	Jan 1, 2029	100%
Commercial Water Heating	Jan 1, 2031	50%

Sensitivities were also performed considering implementing the standards in 2026 or in 2035. Results of these sensitivities are included in the section **Appendix: Sensitivities on Implementation Year**.

Reference Scenarios and Proposed Standards Scenario

The impact of the proposed zero NOx standard should be evaluated relative to a reference scenario in which the proposed standards were not implemented. Absent the zero NOx standards, some level of heat pump adoption would nevertheless occur, driven by economics, customer preferences, and/or other policy changes. E3 measured the impact of the proposed zero NOx standards as the *incremental* impact on electric load, infrastructure development, and land use above what would otherwise have occurred.

Reference Scenarios

Due to uncertainty regarding future state policies to support building electrification, there is a wide range of plausible heat pump adoption levels absent the proposed zero NOx standards. To reflect this uncertainty, this study considered two reference scenarios of heat pump adoption for space and water heating. Both scenarios come from the California Air Resource Board (CARB) 2022 Draft Scoping Plan Update.[1]

- The **Low Policy Reference** assumes heat pump adoption consistent with the 2022 Draft Scoping Plan BAU Reference Scenario. This case represents a business-as-usual (BAU) future in which California does not meet its 2030 or 2045 greenhouse gas (GHG) emissions targets. Regarding heat pumps, this case reflects existing and planned levels of incentives for heat pumps and no major policy changes supporting building electrification, resulting in relatively low heat pump adoption through 2045.
- The **High Policy Reference** assumes heat pump adoption consistent with the 2022 Draft Scoping Plan Proposed Scenario.[2] This case reflects major policy changes to decarbonize all sectors of California's economy aligned with achieving the state's GHG emissions targets. State-level policies drive a fast pace of heat pump adoption in the High Policy Reference.

While the Low Policy Reference sees significant levels of gas devices sold through 2045, the High Policy Reference reflects the goal that "all new appliances sold in California would be zero-emission by 2035 for installation in residential buildings and by 2045 for installation in commercial buildings." More details on these sales targets, including policy considerations, are provided in the Scoping Plan Appendix on Building Decarbonization.[3]

Proposed Zero NOx Standards Scenario

Heat pump adoption under the proposed standards was assumed to follow the Low Policy Reference until the implementation year for the relevant zero NOx standard, after which it would grow following a simplified linear adoption trajectory over the number of years of the corresponding gas device lifetime. As an example, residential gas furnaces were modeled to have a 16-year lifetime and a proposed zero NOx standard taking effect on January 1, 2029. Thus, residential heat pump adoption for space heating in the Proposed Standards scenario follows a linear trajectory from 5.9% in 2028 (the level of the Low Policy Reference) to 100% by 2044 (16 years later).

Residential Heat Pump Space Heating Sales and Adoption

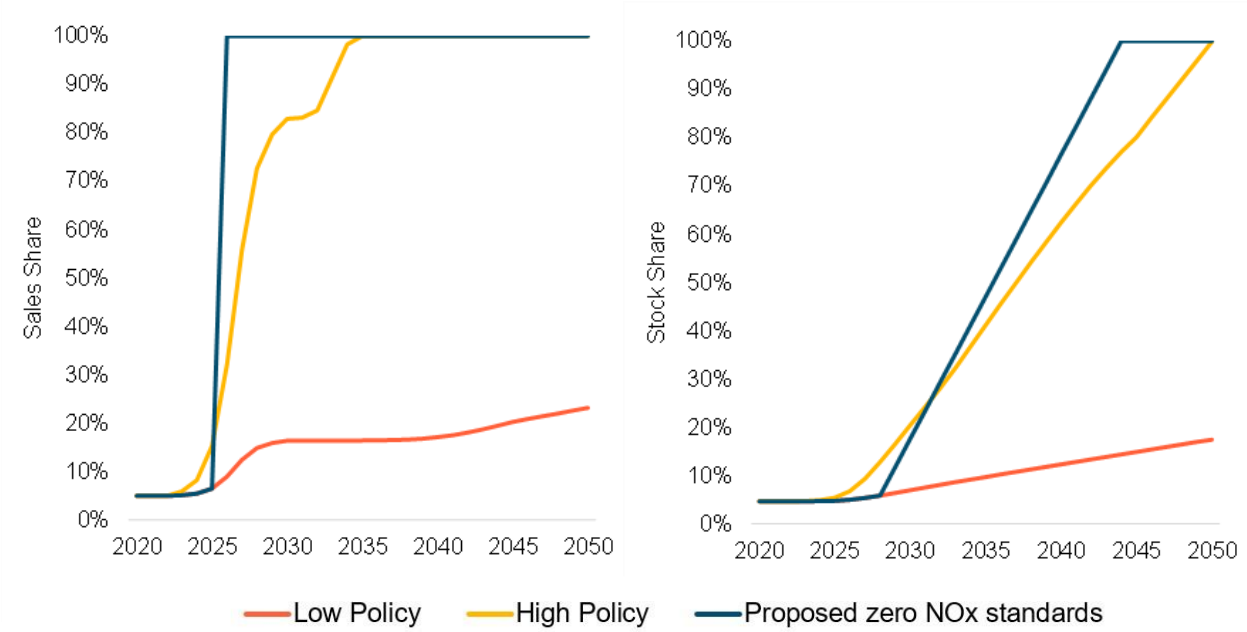
Figure 1 illustrates the annual *sales share* and *stock share* of heat pumps for residential space heating over time. The sales share indicates how many heat pumps are sold every year as a share of all residential space

[1] https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents
[2] The Proposed Scenario was formerly known as "Alternative 3." Policy measures are outlined here: https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp-appendix-c-ab-197-measure-analysis.pdf
[3] https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp-appendix-f-building-decarbonization.pdf

heating devices sold. The stock share indicates the annual level of adoption of heat pumps among residential space heating devices installed in buildings, measured at the end of the year.

Assuming that heat pumps are installed to comply with the zero NOx standards, there would be a direct impact on the sales share of heat pumps once the proposed standards are implemented. However, it is the stock share that determines electric system impacts, as it describes the physical adoption levels of heat pumps in buildings. The stock share of heat pumps lags the sales share, as building devices have a relatively long lifetime and are assumed to be replaced at the end of this lifetime. This means that, after the implementation of zero NOx standards, it would take years for heat pumps to reach high adoption levels and cause corresponding electric system impacts.

Figure 1: Potential residential heat pump space heating sales share (left) and stock share (right)



In the Low Policy Reference, heat pump sales reach 16% of sales of residential spaces heating devices by 2030 and grow to 23% of sales by 2050. Adoption levels reach 7% of residential space heating devices by 2030, increasing to 18% by 2050. In the High Policy Reference, heat pumps sales make up 83% of residential space heating devices sold in 2030, increasing to 100% of sales by 2050. This rapid sales trajectory results in heat pump adoption levels growing to 20% of residential space heating devices by 2030 and achieving 100% saturation by 2050. Under the proposed zero NOx standards and assuming that heat pumps are used to comply with the proposed standards, heat pump sales follow the Low Policy scenario and then shift to 100% of space heating devices sold in 2029 and after. Heat pump adoption then increases linearly over the next 16 years, reaching 100% by the end of 2044.

The linear adoption trajectory used here is a simplification and neglects that device lifetime distributions are generally “long-tailed,” meaning that a small percentage of gas devices will last significantly longer than the average lifetime. Thus, our analysis using a linear adoption trajectory can be seen as a conservative (upper end) estimate of potential grid impacts associated with heat pump adoption by 2050.

More details on the reference scenarios, as well as sales shares and stock shares for residential water heating, commercial space heating, and commercial water heating, are provided in the section **Appendix: Detailed Methodology**.

4. Electric Load Impacts and Solar Energy Needs

Load Impact Methodology

Space Heating and Water Heating Loads

Maximum potential space heating and water heating load impacts are calculated based on gas usage data provided to BAAQMD by Pacific Gas and Electric (PG&E). These data include annual gas usage in BAAQMD's territory for four end uses: residential space heating, residential water heating, commercial space heating, and commercial water heating. For each end use, the maximum potential load impact assumes that 100% of gas demand for that end use shifts to heat pumps and is adjusted for the device performance characteristics of gas devices and heat pumps, as described in the section **Appendix: Detailed Methodology**. Annual load impacts are then calculated for each end use as a percentage of the maximum potential load impact, based on the incremental heat pump adoption relative to a reference scenario in that year.

As the maximum potential load impacts are based on existing data on gas usage, the modeling only reflects existing buildings. Excluding the impact of the proposed zero NOx standards on new buildings is a simplification that reflects the trend toward all-electric reach codes in many Bay Area municipalities and the potential for an all-electric building code in the next CEC code cycle, as the proposed zero NOx standards would not have any impact on buildings that are already all-electric.

Air Conditioning Loads

Air conditioning (AC) is a major source of electric load and a key driver of system peaks in warm climates. Heat pump HVAC units provide both space heating and space cooling in a single device. Some homes in the Bay Area do not currently have AC. Since customers who install a heat pump are assumed to make use of the cooling function, heat pump adoption is modeled to result in new air conditioning load for these households.

Conversely, heat pumps installed in residential buildings that currently have air conditioning may decrease cooling loads for the building, as new heat pump technologies generally perform better than existing air conditioners. More details are provided in the section **Appendix: Detailed Methodology**.

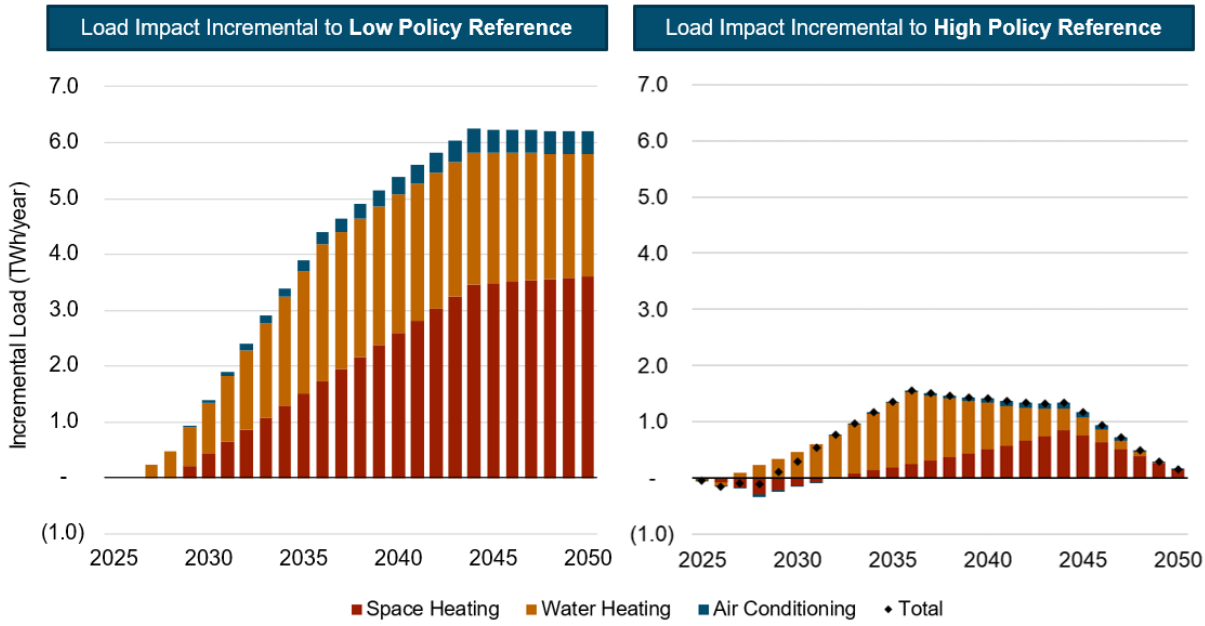
Current levels of AC adoption and estimates of future adoption are based on data from the CEC's 2019 Residential Appliance Saturation Survey (RASS).[4] Average per-building air conditioning loads were calculated from the National Renewable Energy Laboratory (NREL) ResStock and ComStock databases[5]. More details are provided in the section **Appendix: Detailed Methodology**.

[4] https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-ES.pdf
[5] https://resstock.nrel.gov/, https://comstock.nrel.gov/

Electric Load Impacts

Figure 2 depicts the potential annual load impact of the proposed zero NOx standards by end use, relative to each reference scenario. This analysis considers loads from residential and commercial space heating, water heating, and air conditioning for buildings within BAAQMD's boundaries. The figure shows incremental loads for these end uses, *i.e.*, the difference between potential loads under the proposed zero NOx standards versus loads in each reference scenario. These incremental loads drive incremental infrastructure needs, as described in later sections of this document.

Figure 2: Potential annual load impact relative to reference scenarios



Relative to the Low Policy Reference, the proposed zero NOx standards could result in 6.2 TWh (terawatt-hours) per year of additional electric load by 2050. For comparison, California's 2020 electric load was approximately 280 TWh/year[6] and is modeled to grow to 338 TWh/year by 2045 in the Low Policy Reference.[7] Table 3 illustrates the potential impact of this additional load on statewide electric loads in 2020 and 2045.

Space heating has the largest contribution to these load impacts, with water heating also contributing a large share and air conditioning representing a small share of the load impact. The air conditioning load impact is much smaller than the other two end uses because air conditioning is already widespread in the warmest Bay Area counties.

[6] https://ecdms.energy.ca.gov/elecbycounty.aspx
[7] https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents

Table 3: Potential impact of proposed standards on statewide electric load in 2020 and 2045.

Statewide Load	Low Policy Reference	Low Policy Reference + BAAQMD Proposed Standards
2020	280 TWh/year	280 TWh/year
2045	338 TWh/year (21% growth from 2020)	344 TWh/year (23% growth from 2020)

The impacts are different when considering the High Policy Reference. Relative to the High Policy Reference, the zero NOx standards result in *earlier* load growth, seeing 1.5 TWh/year of incremental load in the 2030s. However, the incremental load falls to near zero load impact by 2050 as heat pump adoption reaches high levels in the reference. Note that *negative* incremental load occurs in some years, meaning that the High Policy Reference scenario has higher loads in those years than loads modeled from the zero NOx standards.

Utility-Scale Solar Modeled to Meet Incremental Loads

Studies indicate that solar generation will be the predominant generation resource built to serve electric energy needs in California, although other zero-carbon resources are likely to be developed as well, potentially including land-based wind, offshore wind, geothermal, biomass, or other resources. This study modeled the impacts associated with the procurement of new utility-scale solar to meet all incremental heat pump loads. The following subsections provide more detail for this assumption.

Significant battery storage is also likely to be developed to meet generation capacity needs, as described below in the section **Generation Capacity**.

Zero-carbon Electricity to Meet New Loads

Although there is no state law requiring that new loads be met exclusively by zero-carbon electricity, the current resource planning paradigm requires electric utilities to procure zero-caron electricity on an annual basis corresponding to all new loads that can be reasonably forecast.

In California, utility resource planning occurs in the California Public Utilities Commission's (CPUC) Integrated Resource Planning process (IRP), where the CPUC reviews resource plans for both investor-owned utilities and community choice aggregators (CCAs).[8] In IRP, utilities and CCAs submit resource plans for how they will meet their load forecasts. Importantly, these resource plans are subject to a fixed GHG emissions cap. In the most recent phase of IRP, utilities submitted plans aligned with a 2030 electric-sector emissions cap of 38 million metric tons CO_2, which is understood to be aligned with the state's

[8] CCAs are local nonprofit public agencies that procure power on behalf of customers, with the incumbent utility (*e.g.,* PG&E) retaining responsibility for transmission and distribution infrastructure and for customer metering and billing. CCAs are widespread in the Bay Area, where they serve the majority of customer load.[11]

economywide emissions targets. Importantly, the same emissions cap was assumed across different sensitivities on load levels.[9] The IRP base case is planned to have some level of gas-powered generation that exactly meets the GHG emissions cap. Thus, any additional electric load from heat pumps would require incremental procurement of zero-carbon electricity so as not to increase gas generation and exceed the emissions cap.

More evidence that electrification loads will be met by zero-carbon resources comes from utility and CCA voluntary emissions targets. PG&E as well as many CCAs have committed to achieving certain emissions targets or 100% decarbonized portfolios regardless of load growth.[10] Although these targets may be for different years, they are aligned with the IRP planning paradigm that zero-carbon resources should be procured to serve new loads.

Municipal utilities such as the City of Palo Alto and Alameda Municipal Power are not subject to CPUC oversight in resource planning. However, these utilities make up less than 5% of electric load in the Bay Area.[11]

Utility-scale Solar as the Marginal Zero-carbon Generation Resource

Resource planning studies have considered the mix of new electric generation resources that will be developed in California. The IRP developed a Preferred System Plan that describes the optimal resource build through 2032. This plan includes the development of the following energy resources: 19 GW of utility-scale solar, 5 GW of land-based wind (including 1.5 GW out of state), 2 GW of offshore wind, 1 GW of geothermal, and 0.1 GW of biomass.[12] In addition, battery storage, pumped hydro storage, and demand response are developed to provide generation capacity.

While the IRP is focused on resource needs over the next decade, the 2021 "SB100 Joint Agency Report" considers resource needs through 2045.[13] This report documents a joint study by the California Energy Commission (CEC), CPUC, and CARB, investigating electric generation resource needs to meet the SB100 requirement that 100% of electric retail sales be from zero-carbon resources by 2045. Results of this study indicate that energy needs will be met through a mix of utility-scale solar, customer solar, land-based wind, and offshore wind, with utility-scale solar representing the majority of resource additions.[14]

Together, these studies indicate that utility-scale solar will be the predominant generation resource built to serve new loads in California, although some amount of land-based wind, offshore wind, geothermal, biomass, and/or other resources may also be developed. As a simplifying assumption, this study models

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[9] Figure 4 (p91) shows different load sensitivities modeled using the 38 million metric tons GHG cap in 2030. Other emission caps (46 MMT, 30 MMT) were considered but not adopted in this decision (Section 4.1, p72). https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M451/K412/451412947.PDF

[10] See targets for PG&E, East Bay Community Energy (Alameda County), MCE (Marin, Napa, Solano, Contra Costa), Clean Power SF (San Francisco County), and Peninsula Clean Energy (San Mateo County).

[11] See for example Form 1.1c of the California Energy Commission's Integrated Energy Policy Report. https://efiling.energy.ca.gov/GetDocument.aspx?tn=241383&DocumentContentId=75340

[12] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M451/K412/451412947.PDF

[13] https://efiling.energy.ca.gov/EFiling/GetFile.aspx?tn=237167&DocumentContentId=70349

[14] See ref. 13, Figure 3

the impacts of utility-scale solar as the sole generation resource developed to serve potential new loads resulting from the proposed zero NOx standards.

Utility-scale Solar Impacts

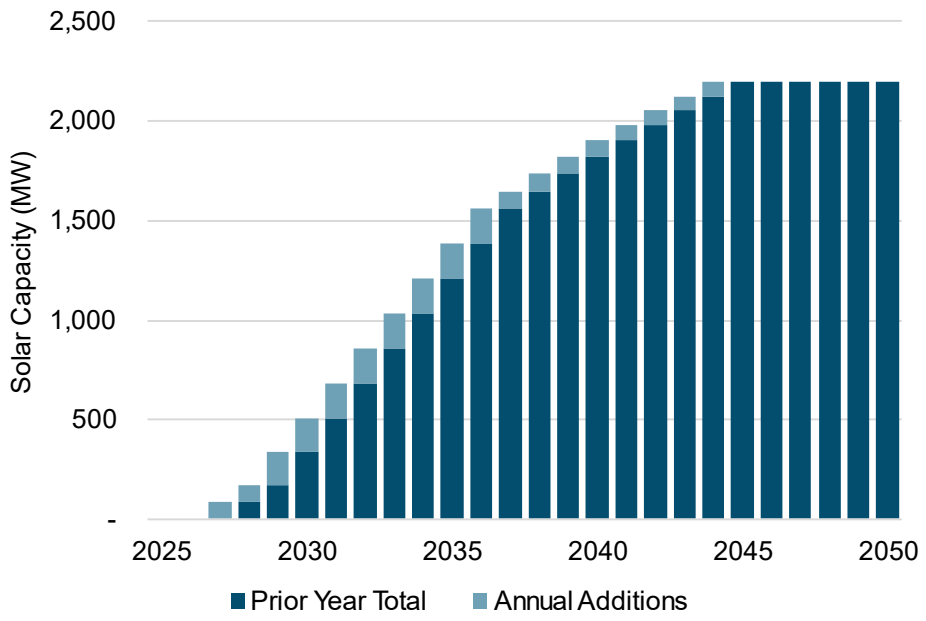
Note that this study does not aim to assess the total amount of solar generation needed to meet all customer loads. Rather, it aims to determine the additional solar generation needed to meet potential incremental loads from the proposed zero NOx standards beyond what would already be required in the reference scenarios.

The size of a solar power plant is described by its *nameplate capacity* and measured in MW (megawatts). The nameplate capacity describes the maximum potential output of the plant under optimal conditions. The average output from a solar plant is lower than the nameplate capacity and will depend on the plant's location and the technologies used. Solar technology characteristics used in the analysis are discussed in the section **Appendix: Detailed Methodology**.

Figure 3 shows the cumulative incremental solar capacity relative to the Low Policy Reference over time, breaking out the annual additions in each year. Relative to the Low Policy Counterfactual, 2,180 MW of incremental utility-scale solar capacity would be required by 2050. This amount of new solar capacity would generate 6.2 TWh/year of electricity, corresponding to the incremental loads relative to the Low Policy Reference (see Figure 2).

Relative to the High Policy Reference, 70 MW of incremental solar capacity would be needed by 2050.

Figure 3: Potential incremental utility-scale solar capacity relative to Low Policy Reference



As context for these incremental solar needs, the 2021 SB100 Joint Agency Report, described above, found that 70,000 MW of utility-scale solar capacity would be developed by 2045 in an optimal portfolio.[13]

Table 4 describes the potential 2050 utility-scale solar impacts from the proposed zero NOx standards. In addition to showing the potential impacts on solar capacity needs, Table 4 also describes the potential cost and land use impacts.

Table 4: Potential utility-scale solar impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Utility-Scale Solar (MW)	2180 MW	70 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$1,860	$390 *Due to accelerated build*
Land Use (acres)	19,500	700

The costs in this table are calculated based on annual incremental load impacts and the levelized cost of energy (LCOE) of utility-scale solar, as described in the section **Appendix: Detailed Methodology**. Costs reported here reflect cumulative costs through 2050, incremental to the Reference.

To evaluate the land use impacts associated with utility-scale solar, E3 drew on an NREL report that evaluated the direct land use impacts of solar, *i.e.*, the land directly occupied by solar project infrastructure.[15] The study found the direct land-use impact of utility-scale solar to be 9.0 acres per MW. The incremental utility-scale solar needs described above correspond to direct land use impacts of 79 km^2 (19,500 acres) relative to the Low Policy Reference, and 3 km^2 (700 acres) relative to the High Policy Reference. For more details on NREL report, see the section **Appendix: Detailed Methodology**.

The land requirements of renewable generation resources are well understood, and environmental restrictions on renewable project siting are an active topic of discussion among policymakers and stakeholders. In 2019, The Nature Conservancy published a report called "The Power of Place," which considered the land impacts of renewable generation needed to achieve California's climate goals and evaluated scenarios with different environmental exclusions for renewable development.[16] Across the scenarios evaluated, the study found 1.6 million to 3.1 million acres of land would be developed by 2050 for solar and wind generation.[17]

The report also explored where in-state resources may be developed, indicating that utility-scale solar development would likely focus in areas of high solar resource quality in the Central Valley, Inland Empire, and Mojave Desert, with little to no utility-scale solar development within the Bay Area.[18] The CPUC has also evaluated where new resources are likely to be developed on a ten-year timeframe, indicating similar

[15] https://www.nrel.gov/docs/fy13osti/56290.pdf
[16] https://www.scienceforconservation.org/products/power-of-place
[17] See p6, https://www.scienceforconservation.org/assets/downloads/Executive_Summary_Power_of_Place.pdf
[18] See figure 9, https://www.scienceforconservation.org/assets/downloads/Technical_Report_Power_of_Place.pdf

in-state locations for utility-scale development as well as some out-of-state locations in Arizona and Nevada.[19]

[19] See figure 1, https://files.cpuc.ca.gov/energy/modeling/Modeling_Assumptions_2022-2023_TPP_V.2022-2-7.pdf

5. Capacity-Related Impacts and Infrastructure Needs

Capacity Impact Methodology

County-level Load Disaggregation

For this section of the analysis, annual load impacts were disaggregated to the nine Bay Area counties. There are two reasons why this disaggregation was done:

+ Different hourly load shapes were used for each county, as described in more detail in the section **End-Use Load Profiles**.
+ Different distribution capacity avoided costs were used for each county based on the corresponding CEC climate zone, as described in more detail in the section **Evaluating Capacity Impacts**.

More details of this load disaggregation are provided in the section **Appendix: Detailed Methodology**. County-level impacts have not been calculated in this study. All results are provided for the full BAAQMD territory, with the county-level loads used as an intermediate step to reflect the distinctions in load shapes and distribution capacity avoided costs across the Bay Area counties.

End-Use Load Profiles

Hourly end-use load profiles were developed based on building simulations from the NREL ResStock and ComStock databases.[20] These databases contain building energy simulation data for the entire US, evaluated with county-level weather data and broken out by census tract. The goal of the databases is to approximately represent the entire US building stock through hourly simulations of building loads.

More details on the load profiles are provided in the section **Appendix: Detailed Methodology.**

Evaluating Capacity Impacts

E3 leveraged the California Public Utility Commission's (CPUC's) 2021 Avoided Cost Calculator (ACC) to calculate the potential impacts of incremental heat pump loads on generation capacity, transmission capacity, and distribution capacity. The Avoided Cost Calculator (ACC) is a spreadsheet model designed to evaluate the impacts of distributed energy resources on the grid.[21] Although initially developed to evaluate programs that reduce load, the ACC is increasingly being used to evaluate the marginal costs and benefits of load growth measures, including building and vehicle electrification. E3 maintains the ACC on behalf of the CPUC.

The ACC provides hourly marginal costs for generation capacity, transmission capacity, and distribution capacity, reflecting how capacity costs in each category are allocated over peak hours where load growth

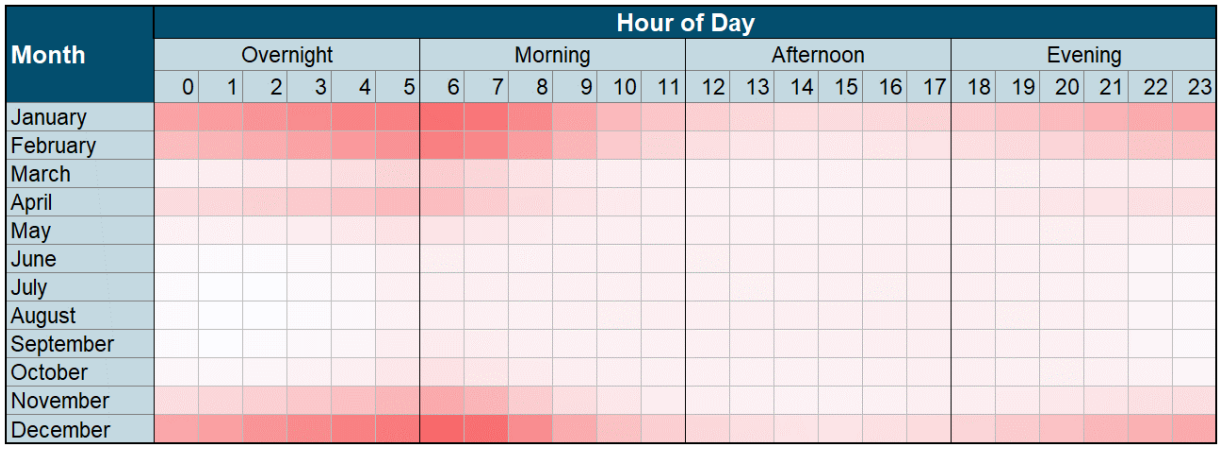
[20] https://resstock.nrel.gov/, https://comstock.nrel.gov/
[21] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/idsm

would drive a need for new investment. The ACC reflects distinct peak hours for generation capacity, transmission capacity, and distribution capacity, with distribution capacity further differentiated among climate zones within California.

Hourly Load Impacts

Figure 4 shows the hourly distribution of potential load impacts by 2050 relative to the Low Policy Reference. This figure shows how the 6.2 TWh/year of additional loads would be distributed over the months of the year (vertical) and hours of the day (horizontal). Due to the timing of space heating loads, the largest potential load impacts are calculated to be in winter night and morning hours.

Figure 4: Heat map showing the distribution of potential 2050 load impacts relative to Low Policy Reference



Capacity-Related Infrastructure Needs

Generation Capacity

Table 5: Potential generation capacity impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Generation Capacity (MW)	410 MW	< 10 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
4-Hour Battery Storage (MW)	680 MW	< 10 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$90	$30 *Due to accelerated build*
Land Use (acres)	8	< 0.1

Table 5 describes the potential 2050 generation capacity impacts associated with the proposed zero NOx standards. Generation capacity describes the need for generation resources to serve electricity needs at times of peak demand. Because California's electric system peaks in summer afternoons and evenings, only load impacts in those hours contribute to generation capacity needs.

Relative to the Low Policy Reference, potential heat pump adoption under the proposed standards would lead to 410 MW of additional generation capacity need by 2050. This describes the need for "perfect capacity," *i.e.*, capacity of an idealized perfectly firm resource that never suffers outages. The ACC assumes that 4-hour batteries will be the marginal resource to provide generation capacity, but forecasts that the capacity contribution of these batteries will fall to 60% by 2050.[22] As a result, 680 MW (nameplate capacity) of 4-hour batteries would be required to provide 410 MW of (perfect) generation capacity.

Battery storage costs are also estimated based on the ACC. Battery costs in the ACC reflect that investments in utility-scale batteries would be financed over the lifetime of the assets. Costs reported here reflect cumulative payments through 2050 on financed battery storage systems, incremental to the Reference.

Utility-scale batteries are containerized systems and have much smaller land impacts than utility-scale solar. Using specifications for the Tesla Megapack battery,[23] 680 MW of battery storage would have an 8-acre footprint.

[22] Details in the 2021 ACC documentation (https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/demand-side-management/acc-models-latest-version/2021-acc-documentation-v1b.pdf) and model (https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/demand-side-management/acc-models-latest-version/2021-acc-electric-model-v1b.xlsb)

[23] https://www.tesla.com/blog/introducing-megapack-utility-scale-energy-storage

Relative to the High Policy Reference, there is an accelerated need for generation capacity in the 2030s and 2040s but only a negligible capacity impact (< 10 MW) and land impact (<0.1 acres) by 2050.

As context for these battery storage needs, the SB100 Joint Agency Report indicates that 49,000 MW of battery storage capacity would be built in California by 2045 as part of an optimal resource portfolio.[24]

Transmission Capacity

Table 6: Potential transmission capacity impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Transmission Capacity (MW)	460 MW	< 1 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$100	$25 *Due to accelerated build*
Associated infrastructure	Costs reflect one transformer upgrade **or** 10-20% of a 100-mile transmission project	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*

Table 6 describes the potential 2050 transmission capacity impacts associated with the proposed zero NOx standards. Transmission capacity describes the need for new transmission investments to support increased peak loads on the transmission system. Because California's electric system peaks in summer afternoons and evenings, only load impacts in those hours contribute to transmission capacity needs.

This analysis finds that, relative to the Low Policy Reference, potential heat pump adoption under the proposed standards would require infrastructure to support 460 MW of incremental transmission capacity need by 2050. Relative to the High Policy Reference, there is an accelerated need for transmission capacity in the 2030s and 2040s but only a negligible capacity impact (< 1 MW) and infrastructure impact by 2050.

Transmission costs are also estimated based on the ACC. Transmission costs in the ACC reflect that utility investments in transmission would be financed by an electric utility and recovered from ratepayers over the lifetime of the asset. Costs reported here reflect cumulative ratepayer costs through 2050, incremental to the Reference.

There is not a simple picture of what infrastructure would be required to provide 460 MW of transmission capacity (incremental to the Low Policy Reference). As shown in Table 6, this transmission capacity would come at a cumulative cost of $100 million in real (inflation-adjusted) 2021 dollars. This cost estimate can be used to understand the scope of investment needed to provide this level of transmission capacity.

[24] https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity

Projects to increase transmission capacity are generally expensive large-scale projects and may cost hundreds of millions or billions of dollars. Thus, the transmission capacity impacts described here may reflect the need for only a fraction of a transmission project. To understand these infrastructure impacts, E3 considered the CA Independent System Operator (CAISO) 20-Year Transmission Outlook, a document that considers transmission needs over the next 20 years to meet load and renewable energy growth aligned with state policy.[25] This plan describes $11 billion in upgrades to the existing CAISO transmission footprint over the 20-year timeframe. Based on the project details included in the study, the $100 million additional transmission system costs relative to the Low Policy Reference would correspond to a single transformer upgrade *or* 10-20% of the project cost associated with a 100-mile transmission project.

The $11 billion figure also provides a reference point to understand the scale of transmission investments that are forecast over the next two decades in the CAISO footprint, which covers ~80% of California's electric load.

[25] http://www.caiso.com/InitiativeDocuments/20-YearTransmissionOutlook-May2022.pdf

Distribution Capacity

Table 7: Potential distribution capacity impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Distribution Capacity (MW)	420 MW	< 10 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$380	$100 *Due to accelerated build*
Estimated Banks (New, by 2050)	6 New Banks	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Feeders (New, by 2050)	45 New Feeders	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Line Sections (New, by 2050)	10 New Line Section	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Banks (Upgrades, by 2050)	31 Bank Upgrades	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Feeders (Upgrades, by 2050)	42 Feeder Upgrades	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Line Sections (Upgrades, by 2050)	35 Line Section Upgrades	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*

Table 7 summarizes the potential distribution infrastructure needs estimated to result from the proposed zero NOx standards from 2026 through 2050. Distribution capacity describes the need for investments to support increased peak loads on the distribution system. While generation capacity and transmission capacity needs are only triggered by summer afternoon and evening loads, the ACC indicates that distribution capacity needs may be affected by loads across a broader set of hours in all four seasons. In addition, distribution capacity costs and peak hours used in this study are differentiated by CEC climate zone.

This analysis finds that potential growth from heat pump adoption would result in incremental distribution capacity requirements of 420 MW by 2050 relative to the Low Policy Reference. As with transmission capacity, the associated infrastructure needs can be evaluated by considering the associated cost of distribution capacity. The 420 MW of distribution capacity needs reflect a cumulative (simple sum) cost of $380 million by 2050 (real 2021 dollars).

Relative to the High Policy Reference, there is an accelerated need for distribution capacity in the 2030s and 2040s but only a negligible capacity impact (< 10 MW) and cost impact by 2050.

Distribution costs are also estimated based on the ACC. Distribution costs in the ACC reflect that utility investments in distribution would be financed by an electric utility and recovered from ratepayers over

the lifetime of the asset. Costs reported here reflect cumulative ratepayer costs through 2050, incremental to the Reference.

Utility spending on distribution capacity reflects various infrastructure projects to accommodate increased peak loads on the system. Distribution infrastructure projects range from upgrades or replacements of existing equipment, which occur in existing rights of way, to greenfield construction of new line sections, distribution feeders, or substations, which may have a more significant environmental impact. For this study, E3 used the planned investments in PG&E's 2021 Distribution Deferral Opportunities Report (DDOR) filing[26] to evaluate how distribution capacity costs may be invested into distribution infrastructure projects. The list of projects in the DDOR was categorized according to whether projects represented new build or upgrades, and then further divided into three general project categories: distribution banks, feeders, and line sections. The costs of these projects were used to estimate the number and type of projects built per million dollars of distribution-system investment. The project counts shown in Table 7 reflect, in aggregate, an estimate of how $380 million may be spent on distribution-system infrastructure.

As a point of reference for these distribution-system cost estimates, the 2021 DDOR reflects $400 million *per year* in distribution capacity-related costs in PG&E's service territory, covering ~30% of statewide load.

[26] https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M400/K593/400593924.PDF

6. Conclusion

This study evaluated the electric grid impacts of heat pump adoption that could result from the proposed zero NOx standards. The results indicate that the potential electric grid impacts of the proposed zero NOx standards are highly dependent on what other policies California enacts around building electrification to meet the state's climate goals.

Relative to the Low Policy Reference, a scenario where the state's climate goals are not met, the proposed standards would result in incremental load impacts, capacity impacts, and infrastructure impacts by 2050. The Low Policy Reference only assumes existing policies and incentives to support building electrification and reflects a future in which California fails to meet our climate targets. Thus, these results provide a conservative upper-bound estimate of the impacts that could be attributed to the proposed zero NOx standards.

Conversely, relative to the High Policy Reference, a scenario in line with achieving the state's climate goals, the proposed standards would result in some acceleration of grid impacts, but almost no net impacts by 2050. This reflects future state policies assumed in the High Policy Reference would result in near-100% heat pump adoption as well as significant electric grid impacts by 2050, even without the proposed zero NOx standards.

7. Appendix: Sensitivities on Implementation Year

Sensitivity 1: Zero NOx standards take effect in 2026

In this sensitivity, all zero NOx standards are assumed to take effect January 1, 2026. As in the main analysis, this sensitivity assumes that only 50% of gas used for commercial water heating would be covered by the zero NOx standards.

Figure 5 illustrates the load impacts for this sensitivity. Compared to the main analysis (Figure 2), load impacts begin earlier due to the earlier implementation of the zero NOx standards.

Figure 5: Potential annual load impact relative to reference scenarios (sensitivity 1)

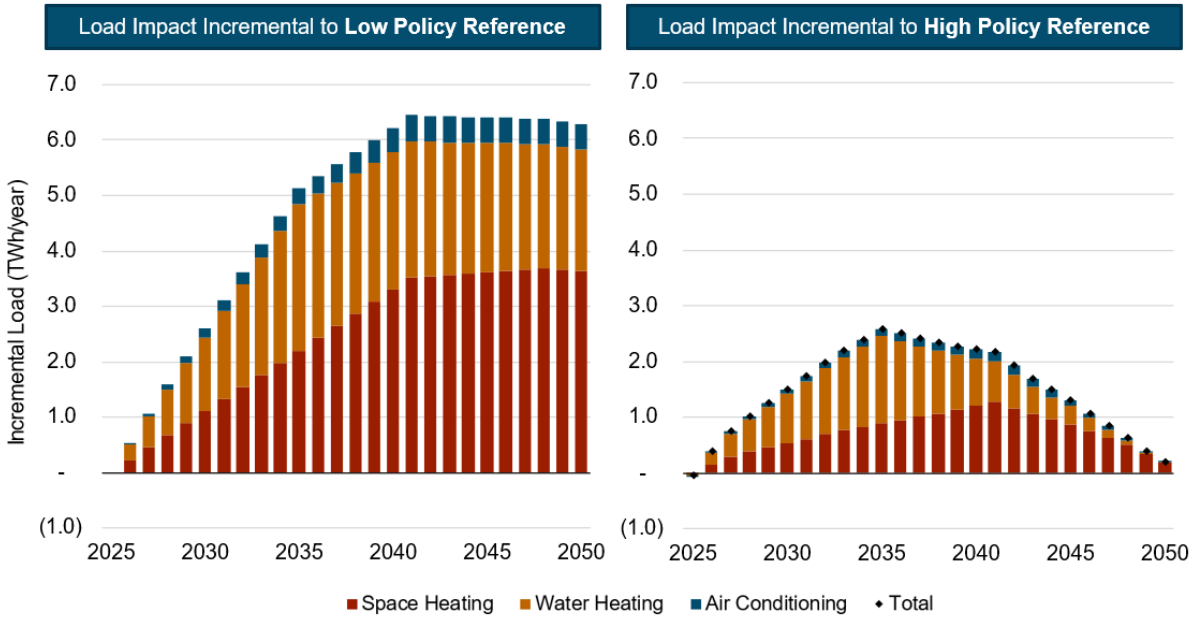


Table 8 provides a summary of 2050 electric grid impacts in this sensitivity. Compared to the main analysis (Table 1), implementing the zero NOx standards in 2026 would accelerate electric grid impacts but would result in similar overall impacts by the year 2050. This is because, even with the proposed zero NOx standard applicable dates from 2027-2031, nearly 100% of customers would have heat pumps installed by 2050.

Table 8: Summary of potential 2050 electric grid impacts of zero NOx standards (sensitivity 1)

	Impact relative to Low Policy Reference	Impact relative to High Policy Reference
Utility-scale solar *to serve electric loads*	2,240 MW new solar by 2050	120 MW new solar by 2050 *+ accelerated build in 2030s & 2040s*
4-hour battery storage *for generation capacity*	700 MW new batteries by 2050	< 10 MW new batteries by 2050 *+ accelerated build in 2030s & 2040s*
Transmission Capacity	460 MW impact by 2050	< 10 MW impact by 2050 *+ accelerated build in 2030s & 2040s*
Distribution Capacity	440 MW impact by 2050	< 10 MW impact by 2050 *+ accelerated build in 2030s & 2040s*

Sensitivity 2: Zero NOx standards take effect in 2035.

In this sensitivity, all zero NOx standards are assumed to take effect January 1, 2035. As in the main analysis, this sensitivity assumes that only 50% of gas used for commercial water heating would be covered by the zero NOx standards.

Figure 6 illustrates the load impacts for this sensitivity. Compared to the main analysis (Figure 2), load impacts begin later due to the later implementation of the zero NOx standards.

Figure 6: Potential annual load impact relative to reference scenarios (sensitivity 2)

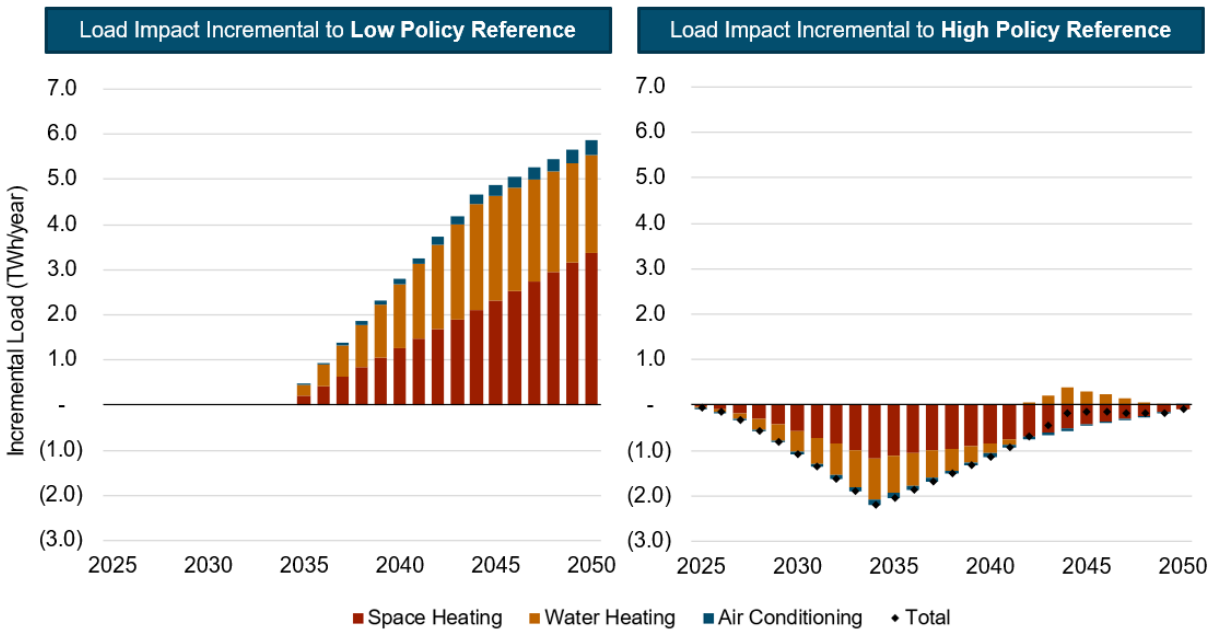


Table 9 provides a summary of 2050 electric grid impacts in this sensitivity. Compared to the main analysis (Table 1), implementing the zero NOx standards in 2035 would delay electric grid impacts and would result

in 5-10% smaller impacts by the year 2050. Based on the device lifetimes used in this analysis, implementing the standards in 2035 would still result in 100% adoption levels for residential heat pumps as well as commercial heat pump water heaters by 2050, with only commercial space heating not achieving 100% adoption by 2050.

Table 9: Summary of potential 2050 electric grid impacts of zero NOx standards (sensitivity 2)

	Impact relative to Low Policy Reference	**Impact relative to High Policy Reference**
Utility-scale solar *to serve electric loads*	2,010 MW new solar by 2050	-60 MW new solar by 2050 *(less need than in reference)*
4-hour battery storage *for generation capacity*	650 MW new batteries by 2050	~0 new batteries by 2050 *(less need than in reference)*
Transmission Capacity	420 MW impact by 2050	~0 MW impact by 2050 *(less need than in reference)*
Distribution Capacity	390 MW impact by 2050	~0 MW impact by 2050 *(less need than in reference)*

8. Appendix: Detailed Methodology

Technology Assumptions

Table 10 illustrates modeling assumptions for baseline gas technologies. Device lifetime and performance metrics are based on representative building equipment data from the Energy Information Administration (EIA).[27] Where lifetime ranges were provided by EIA, E3 selected a conservative (short) lifetime from within the range.

Table 10: Baseline gas technologies modeled for each end use

End use	Representative technology	Device Lifetime (years)
Residential Space Heating	Gas furnace	16
Residential Water Heating	Gas storage water heater	10
Commercial Space Heating	Gas furnace or rooftop unit	23
Commercial Water Heating	Gas storage water heater	10

For the heat pumps that could replace these gas devices, assumptions regarding performance for water heating and air conditioning are also based on EIA data.[27] For space heating performance, E3 modeled high-end heat pumps in today's market, which are meant to reflect representative technologies that would be installed in the late 2020s and beyond.

Reference Scenarios

Although the CARB scenarios reflect statewide adoption, they were used as-are for this work due to the lack of available forecasts specifically for the Bay Area. The electric load impacts developed in this study are based on the adoption *trajectories* rather than *absolute adoption levels* and are benchmarked to 2019 gas usage data for BAAQMD's territory. Thus, the load impacts developed in this study should be reflective of the Bay Area even if CARB's statewide scenarios do not reflect the absolute levels of heat pump adoption in the region.

[27] https://www.eia.gov/analysis/studies/buildings/equipcosts/

In addition, the CARB scenarios were only provided through 2045. As this analysis was performed through 2050, the Low Policy and High Policy Reference scenarios were extrapolated through 2050 using an exponential smoothing algorithm.

Sales share and stock share trajectories for residential heat pump space heating is presented in the section **Reference Scenarios and Proposed Standards Scenario**. The following figures present the potential sales share and stock share for residential heat pump water heating (Figure 7), commercial heat pump space heating (Figure 8), and commercial heat pump water heating (Figure 9).

Figure 7: Potential sales share (left) and stock share (right) for residential heat pump water heating

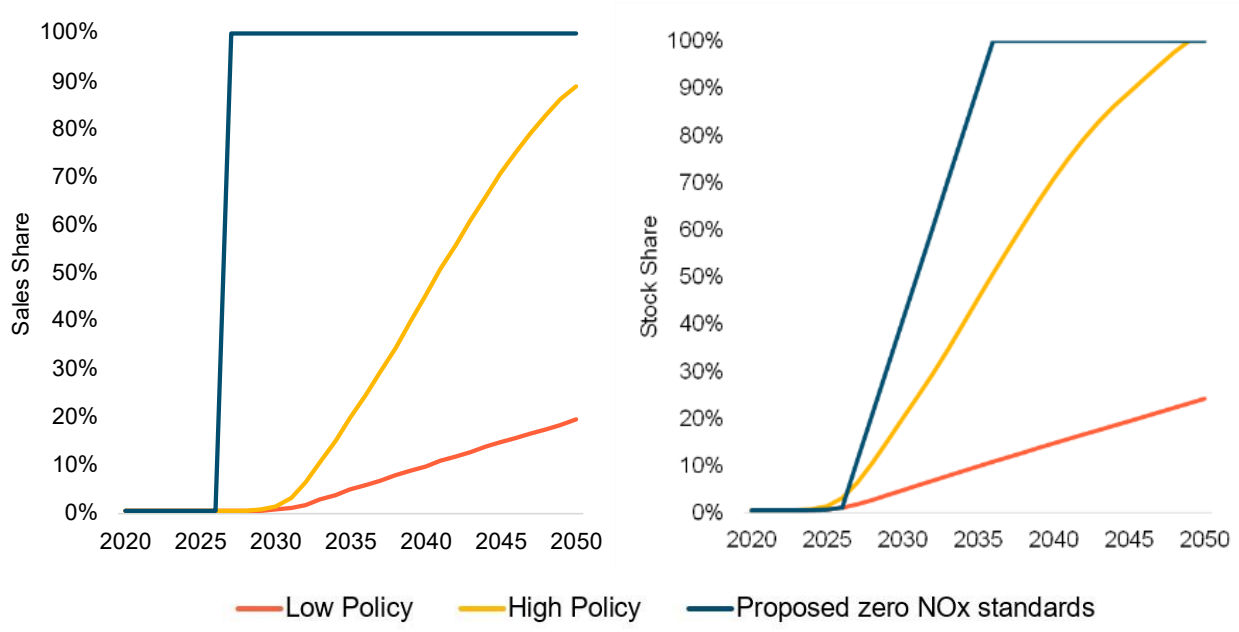
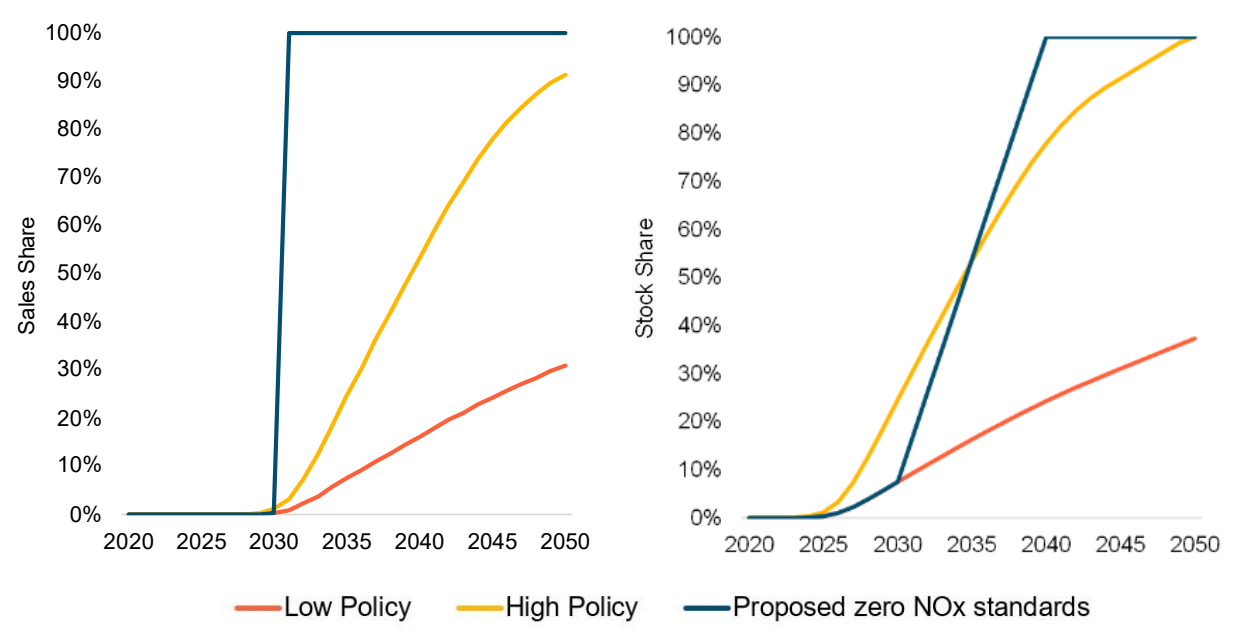


Figure 8: Potential sales share (left) and stock share (right) for commercial heat pump space heating

Figure 9: Potential sales share (left) and stock share (right) for commercial heat pump water heating



Air Conditioning Loads

To estimate current levels of residential AC adoption, E3 used data from the CEC's 2019 Residential Appliance Saturation Survey[28] (RASS) on AC adoption by CEC climate zone among homes in PG&E's gas service territory. Each of the nine Bay Area counties was assigned to one CA climate zone as illustrated in Table 11 above.

To estimate future residential AC adoption in the reference scenarios, E3 compared AC saturation data for the same set of buildings (pre-2000 vintage) between the 2009 and 2019 vintages of the RASS.[29] This enabled the development of a decadal AC adoption rate for each climate zone. Note that this does not reflect potential for the acceleration of AC adoption due to climate change or other factors. However, this does reflect a conservative (upper end) assumption for the potential for AC load growth due specifically to heat pump adoption.

Commercial buildings were assumed to already have 100% AC adoption. Although some smaller commercial building may not have air conditioning, this assumption reflects that the largest energy users among commercial buildings are likely to already have air conditioning.

Finally, average per-building air conditioning loads were calculated from the National Renewable Energy Laboratory (NREL) ResStock and Comstock databases.[30] Average annual AC load was calculated among residential buildings and commercial buildings that currently have AC in each Bay Area county. Residential buildings without AC that install a heat pump were assumed to add slightly less than the average per-building AC load. Residential buildings with AC that install a heat pump were assumed to slightly reduce their AC load.

Solar Technology Modeling

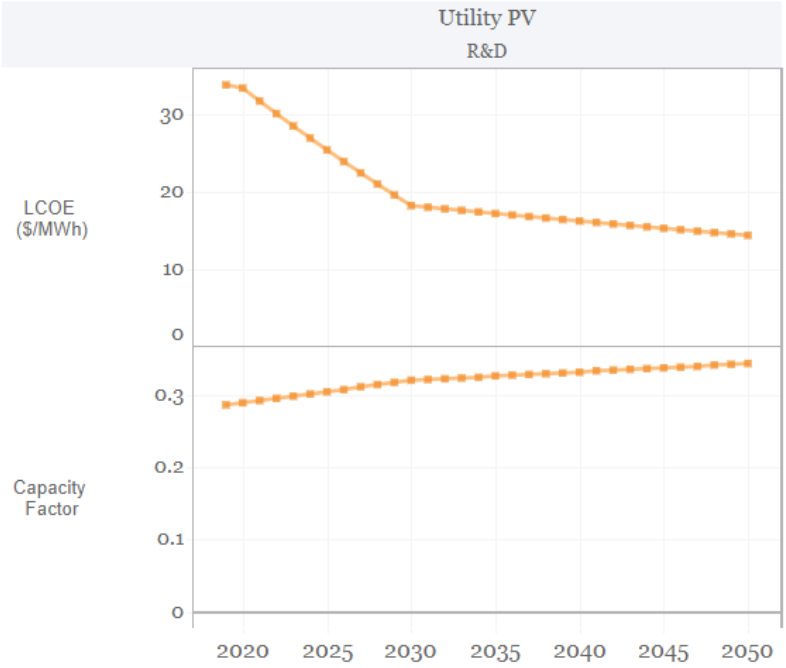
In this modeling, cost and performance data for solar generation come from the National Renewable Energy Laboratory's 2021 Annual Technology Baseline (NREL ATB), which provides standardized forecasts of energy technology development over time.[31] The modeling uses the "Moderate" technology development trajectory for "Class 3 Utility-Scale PV." (PV, or photovoltaic, reflects the main technology used in solar electricity generation). The specific data used are Levelized Cost Of Electricity (LCOE), which reflects the cost of solar energy, and capacity factor, which reflect the average amount of energy produced by 1 MW of solar capacity. These data are shown in Figure 10.

Both cost and capacity factor are forecast to steadily improve, with LCOE falling and capacity factor increasing over time. Our modeling assumes that new solar is built to serve incremental energy needs in every year, using each year's solar cost and capacity factor. As a result, some amount of incremental

[28] https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-ES.pdf
[29] https://webtools.dnv.com/CA_RASS/Default.aspx
[30] https://resstock.nrel.gov/, https://comstock.nrel.gov/
[31] https://atb.nrel.gov/electricity/2021/utility-scale_pv

energy need in 2030 would result in greater solar capacity impacts and greater cost impacts (in real dollars) than a need for the same amount of energy in 2040.

Figure 10: Solar LCOE and capacity factor over time, from NREL ATB



Land density for utility-scale solar is modeled as 27.5 MW / km^2 based on the 2013 NREL report "Land-Use Requirements for Solar Power Plants in the United States."[32] This report estimates both the *total* and *direct* land area required for solar generation projects in the US, explaining: "The total area corresponds to all land enclosed by the site boundary. The direct area comprises land directly occupied by solar arrays, access roads, substations, service buildings, and other infrastructure." This study uses the *direct* area required for "Large PV" (*i.e.*, utility-scale) and assumes that 1-axis tracking systems are used.[33] The report's figure of 9.0 acres / MW corresponds to 27.5 MW / km^2.

County-level Load Disaggregation

County-level loads were disaggregated using data from the 2019 American Community Survey (ACS),[34] which reports the number of households with gas space heating for each census tract in California. E3 considered census tracts subject to the proposed standards if the centroid of the census tract fell within the boundaries of the BAAQMD territory, as delineated in a shapefile provided to E3 by BAAQMD. Covered

[32] https://www.nrel.gov/docs/fy13osti/56290.pdf
[33] Based on the 2021 early release data from EIA-860, 76% of utility-scale solar generation capacity in CA currently uses 1-axis tracking. https://www.eia.gov/electricity/data/eia860/
[34] See https://www.census.gov/programs-surveys/acs/data.html

census tracts were aggregated to the county level to determine the number of gas-heated residential buildings in each county that would be covered by the proposed standards.

Table 11 shows the numbers of gas-heated households covered by BAAQMD. These figures were used to allocate the total load impacts for residential and commercial space and water heating over the nine Bay Area counties. In addition, each county was assigned to a single CEC Title 24 Climate Zone meant to reflect most of the buildings within that county.

This is a coarse methodology for load disaggregation and county-level results have not been calculated. All results are provided for the full BAAQMD territory, with the county-level loads used as an intermediate step to reflect the distinctions in load shapes and distribution capacity avoided costs across the Bay Area counties.

Table 11: Number of gas-heated households per county in BAAQMD territory and assigned climate zones

County	Gas-Heated Households	Climate Zone
Alameda	397,155	3
Contra Costa	270,465	12
Marin	73,325	2
Napa	31,191	2
San Francisco	214,061	3
San Mateo	174,341	3
Santa Clara	295,819	4
Solano	72,262	12
Sonoma	113,004	2

End Use Load Profiles

A five-step approach was used to develop heat pump load profiles for this study.

1. Space heating, water heating, and space cooling load profiles from ResStock and ComStock were aggregated for each of the nine Bay Area counties. To reflect energy demands for buildings that currently use gas for space and water heating, E3 utilized hourly load profiles corresponding to natural gas usage for those end uses.
2. To maintain accurate correlation between weather and energy usage, E3 developed a random forest regression model to map load simulations from the NREL databases onto the standardized weather data used in the Avoided Cost Calculator. Random forest models are popular for regression

modelling of electric loads as they provide reasonable results with minimal parameter tuning.[35,36] The model was validated using ResStock and ComStock simulations performed on two different sets of weather data.

3. Heat pump performance varies as a function of outdoor air temperature. E3 considered a high-end heat pump in today's market and reflective of representative technologies that would be installed in the 2030s. Using this technology and associated weather data, the hourly natural gas load profiles were converted into corresponding heat pump electric load profiles.
4. Load profiles were normalized by dividing by the sum of loads over the year. This results in normalized load profiles for each end use and each county, aligned with the weather data used in the Avoided Cost Calculator.
5. For each end use, normalized load profiles were multiplied by the annual load impacts allocated to each county. This results in county-level hourly load impacts for each end use and year.

[35] https://www.researchgate.net/publication/280555451_Random_forests_model_for_one_day_ahead_load_forecasting
[36] https://res.mdpi.com/d_attachment/algorithms/algorithms-13-00274/article_deploy/algorithms-13-00274.pdf