SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Staff Report

Proposed Amended Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters, Small Boilers and Process Heaters

May 2024

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South Coast AQMD Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters, Small Boilers and Process Heaters (Rule 1146.2), regulates oxides of nitrogen (NOx) emissions from natural gas-fired large water heaters, small boilers, and process heaters that have a rated heat input capacity of less than or equal to two million British thermal units (Btu) per hour. This rule does not regulate residential gas-fired tank type water heaters rated at less than 75,000 Btu/hr heat input, which are regulated under Rule 1121 – Control of Nitrogen Oxides from Residential-Type, Natural Gas-Fired Water Heaters (Rule 1121); however, instantaneous water heaters and pool heaters used in residential structures are regulated by Rule 1146.2 due to the higher Btu ratings of those type of units. The provisions of Rule 1146.2 are applicable to manufacturers, distributors, retailers, installers, refurbishers, and operators.

Rule 1146.2 was initially adopted in January 1998. A Best Available Retrofit Control Technology (BARCT) assessment was conducted for the 2006 amendment where the NOx emission limits were lowered from 30 parts per million by volume (ppmv) to 20 ppmv, except for pool heaters, which remained at 55 ppmv. The rule was last amended in 2018 to remove the exemption for facilities in the REgional CLean Air Incentives Market (RECLAIM) and to require applicable new installations in RECLAIM facilities to meet the 20 ppmv NOx emission limits.

Proposed Amended Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters, Small Boilers and Process Heaters (PAR 1146.2), seeks further NOx emission reductions and implements the 2022 Air Quality Management Plan (AQMP) Control Measure C-CMB-01-Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Commercial Water Heating (Control Measure C-CMB-01).

For PAR 1146.2, staff conducted a comprehensive BARCT assessment which included an analysis of the technical feasibility and cost-effectiveness of zero-emission NOx technologies. PAR 1146.2 proposes to divide the applicable large water heaters, small boilers, and process heaters into different categories and require zero-emission (0 ppmv) limits for new installations based on future effective dates depending on the commercial availability of zero-emission technologies. The zero-emission compliance dates are further differentiated for units installed in new or existing buildings. The future effective dates will allow time for the technology to mature, with longer timelines provided for the technologies that are not widely commercially available at this time. PAR 1146.2 also proposes zero-emission limits for existing units that will reach the end of unit age after the zero-emission compliance dates, with an exemption for units used for residential structures and small businesses and provides alternative compliance options and a low-use exemption to address challenges transitioning to zero-emission technologies. In addition, PAR 1146.2 clarifies and updates rule language, restructures the rule, and removes obsolete language.

PAR 1146.2 will affect approximately 1,070,000 units in the South Coast AQMD. Staff estimates that upon full implementation, PAR 1146.2 will reduce NOx emissions by 5.6 tons per day (tpd). The public process for PAR 1146.2 consisted of five working group meetings, a public workshop, a public consultation, and multiple meetings with industry stakeholders and technology vendors to obtain feedback.

CHAPTER 1: BACKGROUND

INTRODUCTION

REGULATORY BACKGROUND

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INTRODUCTION

Rule 1146.2 limits NOx and carbon monoxide (CO) emissions from natural gas-fired large water heaters, small boilers, and process heaters that have a rated heat input capacity less than or equal to two million Btu per hour (MMBtu/hr). The rule was initially adopted in January 1998, and beginning on January 1, 2000, the provisions of the rule were applicable to manufacturers, distributors, retailers, refurbishers, installers, and operators of new units. Beginning July 1, 2002, the provisions of the rule were also applicable to operators of existing Type 2 units.

In Rule 1146.2, units are split into two categories based on rated heat input capacity: Type 1 units for units rated at less than or equal to 400,000 Btu per hour (kBtu/hr) and Type 2 units for units rated at greater than 400 kBtu/hr and less than or equal to 2 MMBtu/hr. Rule 1146.2 does not regulate residential gas-fired tank type water heaters rated less than 75,000 Btu/hr heat input, which are regulated under South Coast AQMD Rule 1121. However, instantaneous water heaters, also known as tankless water heaters, and pool heaters used in residential structures are regulated by Rule 1146.2 due to the higher Btu ratings of those type of units. Units used in recreational vehicles are exempt from the requirements of Rule 1146.2.

REGULATORY BACKGROUND

Rule 1146.2 was initially adopted in 1998 and has been amended three times: in 2005, 2006, and 2018. The table below summarizes the current NOx and CO emission limits required in Rule 1146.2.

Table 1-1. Current Rule 1146.2 NOx and CO Emission Limits

Equipment Category	NOx Emission Limit*	CO Emission Limit*
Type 1 Units, excluding Pool Heaters	14 ng/J or 20 ppmv	N/A**
Type 1 Pool Heaters	40 ng/J or 55 ppmv	N/A**
Type 2 Units	14 ng/J or 20 ppmv	400 ppmv

* Nanograms per Joule (ng/J) of NOx (calculated as NO_2) of heat output or the specified ppmv of NOx or CO at three percent oxygen (O_2) correction, on a dry basis

** Type 1 units are not subject to a CO limit by Rule 1146.2 but may be subject to CO limits by other South Coast AQMD rules.

South Coast AQMD developed the Rule 1146.2 Certification Program in 1998 which requires manufacturers to submit documentation for new unit models, including source test reports, to South Coast AQMD to demonstrate compliance with Rule 1146.2 emission limits.

Rule 1146.2, as adopted in January 1998, required new Type 2 water heaters or boilers to meet an emission limit of 30 ppmv of NOx or 0.037 pound NOx per million Btu of heat input and 400 ppmv of CO. New Type 1 units were required to meet a NOx emission limit of 55 ppmv of NOx or 40 ng/J of heat output. Compliance dates for the emission limits were based on the date of unit manufacture. Following rule adoption, staff prepared three implementation studies as required by

the rule. A working group comprised of manufacturers, end-users, utilities, and other interested parties was convened to provide input and guidance to staff during each of the three implementation studies. The purpose of the third and final implementation study, Phase III Implementation Study, was to evaluate the requirement for retrofit of units greater than 400 kBtu/hr and less than or equal to 1 MMBtu/hr (smaller Type 2 units). The findings of the Phase III Implementation Study were presented at the July 2004 Governing Board meeting. The Phase III Implementation Study recommended modifying retrofit requirements and evaluating whether lower NOx emission limits were feasible for new equipment.

Based on the findings of the Phase III Implementation Study, Rule 1146.2 was amended on January 7, 2005, to require existing in-use equipment to comply with the emission limit once the unit reached 15 years of unit age, and to address technical and cost issues for the retrofit of existing units. The rule was amended to require smaller Type 2 units up to 1 MMBtu/hr manufactured prior to January 1, 2000 with unit age over 15 years to be retrofitted to meet 30 ppmv NOx limit and 400 ppmv CO limit; and require larger Type 2 units up to 2 MMBtu/hr manufactured on and after 1992 with unit age over 15 years to be retrofitted to meet 30 ppmv NOx limit and 400 ppmv CO limit. Lower emission limits for new equipment were not considered for the January 7, 2005, rule amendment because additional time was needed to evaluate low NOx technologies and their cost-effectiveness.

Rule 1146.2 was amended again in May 2006 to establish lower NOx emission limits for new equipment. Staff noted that the technology to reduce NOx emissions was available, that many of the new Rule 1146.2 boilers and heaters sold met the proposed 20 ppmv limit, and that the proposed amended rule allowed manufacturers four to six years to design equipment which would meet the proposed limit. New manufactured units rated greater than 400 kBtu/hr were required to meet a NOx emission limit of 20 ppmv effective January 1, 2010, and new manufactured units rated less than or equal to 400 kBtu/hr, with the exception for pool heaters, had to meet a 20 ppmv (less than 14 ng/J heat output) NOx limit effective January 1, 2012. The NOx limit for pool heaters rated less than or equal to 400 kBtu/hr remained at 55 ppmv (or 40 ng/J heat output) because it was deemed not cost-effective for this category to meet a 20 ppmv NOx limit at the time of the rulemaking, primarily due to the small number of hours these units operate each year.

Rule 1146.2 was amended in 2018 along with Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters, and Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters. The 2018 rule amendments were to create landing rules in anticipation of the sunset of the RECLAIM program when facilities would be transitioned to a command-and-control regulatory structure. The amendment for Rule 1146.2 extended the applicability to the RECLAIM facilities and required the RECLAIM facilities to meet applicable NOx emission limits by December 31, 2023, for new installations. The 2018 amendment also committed staff to conduct a BARCT technology assessment by January 2022 to determine if a more stringent BARCT requirement should be applied to existing Type 2 units operated in RECLAIM facilities. About 80 RECLAIM facilities have been identified to operate one or more Rule 1146.2 units.

A technology assessment for Rule 1146.2 was completed by January 1, 2022, determining that the NOx emission limits should be lowered in order to satisfy BARCT requirements. Staff evaluated water heaters and boilers rated less than or equal to 2 MMBtu/hr in both non-RECLAIM and RECLAIM facilities and reviewed certification test reports submitted in recent years to understand

the actual emission levels of certified models and the potential for achieving NOx emission reductions. Staff reviewed 137 source tests conducted since 2017 for units required to be certified at 20 ppmv for NOx emissions and found that 39 units (28 percent of units) had NOx concentrations less than 12 ppmv and 21 units (15 percent of units) had NOx concentrations less than 10 ppmv. As part of the 2021 technology assessment, staff met with stakeholders seeking their input and conducted a working group meeting on December 16, 2021. Staff recommended a future rule amendment and BARCT assessment to evaluate the potential for further NOx emission reductions.

2022 AIR QUALITY MANAGEMENT PLAN

The 2022 Air Quality Management Plan (AQMP) adopted on December 2, 2022, set forth a path for improving air quality and meeting federal air pollution standards by striving for zero-emission technologies across all sectors. The 2022 AQMP included Control Measure C-CMB-01, which seeks further NOx emission reductions from commercial building water heating sources subject to Rule 1146.2. Control Measure C-CMB-01 proposed an emission reduction of NOx by 70 to 75 percent by 2037. The control strategy focused on a combination of long-term regulation and short-term incentives with a focus on replacing existing water heaters with new zero-emission units. The incentive approach would achieve additional emission reduction, encouraging use and further technology development of zero-emission water heating for existing buildings. PAR 1146.2 will implement the 2022 AQMP Control Measure C-CMB-01.

AFFECTED INDUSTRIES

Rule 1146.2 is applicable to manufacturers, distributors, refurbishers, retailers, resellers, installers, and operators of natural gas-fired large water heaters, small boilers, and process heaters less than or equal to 2 MMBtu/hr. The affected industries include water heater and boiler manufacturing and supply industries, professional installers, and facilities and residents that operate these types of water heaters and boilers. Nearly all industries will be affected by PAR 1146.2. Staff estimated a total of 1,070,000 units in the South Coast AQMD are regulated by PAR 1146.2.

PUBLIC PROCESS

PAR 1146.2 was developed through a public process that began in the second quarter of 2023 and included a series of working group meetings, individual stakeholder meetings, and site visits to affected facilities. South Coast AQMD staff held five working group meetings on April 26, 2023, June 7, 2023, August 30, 2023, October 19, 2023, and December 13, 2023. The working group is composed of representatives from manufacturers, trade organizations, permit stakeholders, businesses, environmental groups, public agencies, consultants, and other interested parties. The purpose of the working group meetings was to present and discuss staff's BARCT assessment and the development of the proposed amendments and NOx limits for PAR 1146.2. Staff presented initial preliminary draft rule language at the working group meeting on December 13, 2023. A public workshop was held on February 7, 2024, and a public consultation was held on February 23, 2024. Staff presented PAR 1146.2 to the Stationary Source Committee on March 15, 2024, and April 19, 2024, and will present it to the committee on May 17, 2024. The table below summarizes the public meetings held throughout the development of PAR 1146.2 and provides a summary of the key topics discussed at each of the working group meetings.

Table 1-2. Summary of Working Group Meetings

Date	Meeting Title	Highlights
April 26, 2023	Working Group Meeting #1	• Rule Development Process • Rule 1146.2 background • Rule approach • Unit types and NOx emissions • BARCT analysis overview • Initiated BARCT Assessment
June 7, 2023	Working Group Meeting #2	• Follow-up to stakeholder comments from Working Group Meeting #1 • Discussion on alignment with rules and strategies of other agencies • Discussion on cost and electric grid infrastructure
August 30, 2023	Working Group Meeting #3	• Follow-up to stakeholder comments from Working Group Meeting #2 • Discussion on manufacturer survey • Federal, state, and utility incentives for commercial appliances • Discussion on technologies and other regulatory requirements • Continuation of the BARCT Assessment • Presented cost-effectiveness methods, assumptions, and initial results
October 19, 2023	Working Group Meeting #4	• Follow-up to stakeholder comments from Working Group Meeting #3 • Continued BARCT Assessment • Further discussion on applications • Further discussion on and updates to cost-effectiveness • Key rule proposal for BARCT limits for categories

Date	Meeting Title	Highlights
December 13, 2023	Working Group Meeting #5	• Follow-up to stakeholder comments from Working Group Meeting #4 • Updates to baseline emissions and cost-effectiveness • Rule language key revisions overview
January 19, 2024		Released Preliminary Draft Rule and Staff Report
February 7, 2024		Public Workshop
February 23, 2024		Public Consultation
March 15, 2024	Stationary Source Committee	
April 19, 2024	Stationary Source Committee	
May 17, 2024	Stationary Source Committee	

In addition, staff held numerous individual meetings with stakeholders who may be impacted by this rulemaking and conducted multiple site visits to various stakeholders, which are listed in the table below.

Table 1-3. Summary of Site Visits

Date	Location
March 15, 2023	SCE Energy Education Center
June 8, 2024	SCE Energy Education Center
June 29, 2023	Parker Boiler Co.
August 29, 2023	Rheem Manufacturing Company, Raypak
September 27, 2023	Cedars-Sinai Medical Center
September 29, 2023	Boeing, Seal Beach
October 3, 2023	Disneyland
November 1, 2023	South Coast AQMD Boiler Room
December 8, 2023	Oakridge Mobile Home Park
January 11, 2024	Lake Los Serranos Mobile Home Park
January 11, 2024	Food 4 Less, La Puente
January 11, 2024	Extended Stay America, Chino Hills
January 17, 2024	Corona Del Rey Apartments
March 14, 2024	The Fountains Mobile Home Park
March 27, 2024	Berkeley Square Cleaners
April 17, 2024	Milt and Edie’s Dry Cleaners
April 17, 2024	Perfect Cleaners
May 1, 2024	Amped Kitchens
May 1, 2024	All Day Baby (Restaurant)
May 2, 2024	Jia (Multifamily)
May 2, 2024	Pearl MDR (Multifamily)

CHAPTER 2: BARCT ASSESSMENT

INTRODUCTION OF BARCT ASSESSMENT

The purpose of a BARCT assessment is to assess available pollution controls to establish emission limits for specific equipment categories consistent with state law. Under Health and Safety Code Section 40406, BARCT is defined as:

> "an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source."

The BARCT assessment follows a framework through the rule development process and includes public participation. The figure below illustrates the overall BARCT assessment approach.

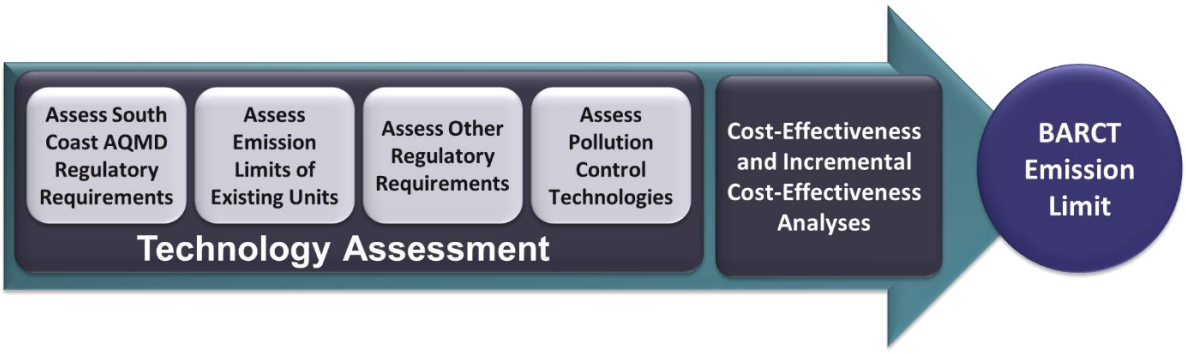

Figure 2-1. BARCT Assessment Approach

For PAR 1146.2, staff conducted a thorough technology assessment to evaluate the NOx control technologies that will achieve the BARCT level equipment subject to PAR 1146.2. The technology assessment consists of four steps including the assessment of South Coast AQMD requirements, a complete assessment of emission limits of existing units, review of other regulatory requirements, and assessment of available pollution control technologies. Cost-effectiveness was estimated for each control technology which staff has referenced for the proposed BARCT emission limit.

EQUIPMENT CATEGORIES

One of the first steps in the BARCT assessment is to establish the category of equipment. Staff collaborated with the stakeholders to establish the categories by accounting for the type of equipment and other unique features of the units. Compared with the current Rule 1146.2, PAR 1146.2 defines Type 1 and Type 2 units by the same heat input capacities, except that additional categories are defined for Type 1 and Type 2 units for different implementation schedules. Staff categorized the equipment subject to PAR 1146.2 as presented in Table 2-1:

Table 2-1. PAR 1146.2 Equipment Categories

Equipment Category	Description
Type 1 Unit	Units with rated heat input capacity less than or equal to 400 kBtu/hr as defined in the rule. For zero-emission limit requirements, Type 1 high temperature units, Type 1 pool heaters, and instantaneous water heaters are divided out for different implementation dates.
Type 2 Unit	Units with rated heat input capacity greater than 400 kBtu/hr and up to and including 2 MMBtu/hr as defined in the rule. For zero-emission limit requirements, Type 2 high temperature units and instantaneous water heaters are divided out for different implementation dates.
Type 1 Pool Heater	Units with rated heat input capacity less than or equal to 400 kBtu/hr that are used for pool heating. Note that pool heaters in the Type 2 size range are covered under the Type 2 water heater category.
Type 1 High Temperature Unit	Referring to Type 1 units that are high temperature units, which are units used to produce steam or to heat water above 180 degrees Fahrenheit.
Type 2 High Temperature Unit	Referring to Type 2 units that are high temperature units.
Instantaneous Water Heater ≤ 200,000 Btu/hr	Units sized at or under 200 kBtu/hr that heat water only when water flows through a heat exchanger. There is no storage tank for this type of unit.
Instantaneous Water Heater > 200,000 Btu/hr	Units sized at or under 2 MMBtu/hr but greater than 200 kBtu/hr that heat water only when water flows through a heat exchanger. There is no storage tank for this type of unit.

BARCT ASSESSMENT

Assessment of South Coast AQMD Regulatory Requirements

Staff reviewed existing South Coast AQMD NOx regulations for large commercial water heaters, boilers, process heaters, and similar equipment. The following table summarizes the current South Coast AQMD NOx rules that staff evaluated as part of the BARCT technology assessment. Staff presented the assessment of South Coast AQMD regulatory requirements in Working Group Meeting #1 on April 26, 2023.

Rules 1146, 1146.1, and 1121

Rule 1146 establishes emission limits for boilers, steam generators, and process heaters fueled by gaseous fuels, which are segregated into three different groups based on heat input capacity:

- Group I (greater than or equal to 75,000,000 Btu/hr, excluding thermal fluid heaters and units operated at schools and universities),
- Group II (greater than or equal to 20,000,000 Btu/hr and less than 75,000,000 Btu/hr, excluding units burning digester and landfill gases and thermal fluid heaters and units operated at schools and universities) and

- Group III (greater than or equal to 5,000,000 Btu/hr and less than 20,000,000 Btu/hr, excluding units burning digester and landfill gases and atmospheric units and thermal fluid heaters).

By the 2008 amendment, Rule 1146 Group I units were required to meet a lower NOx emission limit of 5 ppmv. Group II and III are subject to the 9 ppmv NOx limit.

Rule 1146.1 establishes emission limits for small industrial, institutional, and commercial boilers, steam generators, and process heaters with rated heat input greater than 2 MMBtu/hr and less than 5,000,000 Btu/hr. Most of the Rule 1146.1 units are subject to the 9 ppmv NOx limit.

Both Rules 1146 and 1146.1 include a limit of 12 ppmv NOx for atmospheric units and a limit of 30 ppmv for thermal fluid heaters. All units subject to Rule 1146 and 1146.1 fired by landfill gases were required to meet NOx emissions limits of 25 ppmv by January 1, 2015, and units fueled by digester gas were required to meet 15 ppmv by January 1, 2015.

Rule 1121 establishes NOx emissions limits for natural gas-fired water heaters with heat input rates less than 75,000 Btu/hr which are mostly tank type water heaters used in residential buildings. Rule 1121 requires a NOx emission limit of 10 ng/J (15 ppmv) with an exemption for water heaters in recreational vehicles.

Table 2-2. South Coast AQMD Regulatory Requirements

Regulation/Rule Title	Relevant Unit/Equipment Size	Current NOx Emission Limits in ng/J or ppmv at 3% O_2, dry
Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters	Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (greater than or equal to 5,000,000 Btu/hr rated heat input capacity)	• 7-9 ppm for units burning gaseous fuels 5,000,000 to less than 20,000,000 Btu/hr; • 5-9 ppmv for units burning gaseous fuels greater than 20,000,000 Btu/hr and less than 75,000,000 Btu/hr; • 5 ppmv for units burning natural gas greater than or equal to 75,000,000 Btu/hr; • 12 ppmv for thermal fluid heaters burning gaseous fuels; • 40 ppmv for nongaseous fuels; • 12 ppmv for atmospheric units; • 15 ppmv for units burning digester gas; • 25 ppmv for units burning landfill gas

Regulation/Rule Title	Relevant Unit/Equipment Size	Current NOx Emission Limits in ng/J or ppmv at 3% O_2, dry
Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters	Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (greater than 2 MMBtu/hr and less than 5 MMBtu/hr rated heat input capacity)	• 7-9 ppmv for units greater than 2 MMBtu/hr and less than 5 MMBtu/hr burning natural gas; • 12 ppmv for atmospheric units; • 12 ppmv for thermal fluid heaters; • 15 ppmv for units burning digester gas; • 25 ppmv for units burning landfill gas
Rule 1146.2 – Emissions of Oxides of Nitrogen (NOx) from Large Water Heaters, Small Boilers and Process Heaters	Large Water Heaters, Small Boilers and Process Heaters (less than or equal to 2 MMBtu/hr rated heat input capacity, excluding tank type water heaters subject to Rule 1121)	14 ng/J; 20 ppmv (except for Type 1 pool heaters which are at 40 ng/J or 55 ppmv)
Rule 1121 – Control of Nitrogen Oxides from Residential-Type, Natural Gas-Fired Water Heaters	Residential-Type, Natural Gas-Fired Water Heaters (less than 75 kBtu/hr rated heat input capacity)	10 ng/J; 15 ppmv (except for water heaters used in recreational vehicles)

Emission Level of Existing Units

The next step of the BARCT assessment is to evaluate the emission of existing units operating within the South Coast AQMD. For this step, staff evaluated current South Coast AQMD NOx regulations for other similar combustion equipment to assess potential technology transfer. Staff reviewed 137 source tests conducted since 2017, as shown in the figure below. For Type 1 and Type 2 units required to be certified at 20 ppmv for NOx emissions, staff found that 39 units (28 percent of units) had tested under 12 ppmv and 21 units (15 percent of units) had tested under 10 ppmv. Reviewing certification tests conducted since 2017 indicated that 33 percent of certified pool heaters tested under 12 ppmv, with some testing at 3.3 ppmv.

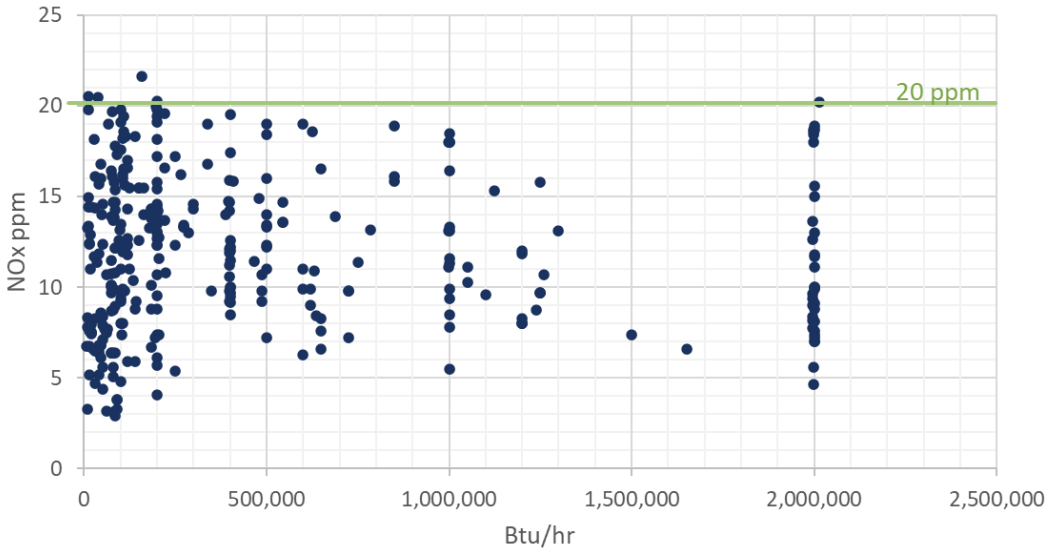

Figure 2-1. Source Test Data: NOx ppmv at 3 percent Oxygen from Certifications

Assess Other Regulatory Requirements

Other Regulatory Requirements

The next step of the assessment is to identify other agencies that regulate the same or similar equipment and compare the regulatory requirements and emissions limits. The purpose of this step is to evaluate if there are applicable emissions limits lower than the current South Coast AQMD limits that should be considered. The table below includes the list of regulations by other agencies which staff reviewed for applicable emissions limits. The specific emission limits and their impact on the BARCT assessment included for each category are discussed later for each of the equipment categories.

With regards to zero-emission standards for building appliances, other agencies are considering or have already adopted similar rules, and a South Coast AQMD rule cannot be less stringent than a state-wide rule. The California Air Resources Board (CARB) has commenced its rulemaking process for potential state-wide standards to "develop and propose zero-emission standards for space and water heaters sold in California" with potential implementation in 2030 as committed in the 2022 State Strategy for the State Implementation Plan.[1] CARB held its first public workshop on May 10, 2023.[2] The California Energy Commission's (CEC) 2022 Building Energy Efficiency Standards (Energy Code) apply to newly constructed buildings and additions and alterations to existing buildings. The 2022 Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, and more.[3] Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Energy Code. There are mandatory requirements for electric ready and heat pump ready multifamily buildings, and the Energy Code discourages use of electric

[1] California Air Resources Board, 2022 State SIP Strategy, p. 30, https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf

[2] California Air Resources Board, Zero-Emission Appliances Meetings & Workshops, https://ww2.arb.ca.gov/our-work/programs/building-decarbonization/zero-emission-appliance-standards/meetings-workshops

[3] California Energy Commission, 2022 Building Energy Efficiency Standards, https://www.energy.ca.gov/sites/default/files/2022-12/CEC-400-2022-010_CMF.pdf

resistance heating when an alternative method of heating is available. The Energy Code is contained in Title 24, Part 6 of the California Code of Regulations and is updated every three years.

Bay Area Air Quality Management District (BAAQMD) adopted Rule 9-6 – Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters in March 2023 with zero-emission limits for 2031 implementation. The BAAQMD analysis found that zero-NOx 240-volt heat pump water heaters are widely commercially available at sizes equivalent to existing natural gas systems on market for commercial spaces; technology development and field testing is still needed to bring compliant appliances of larger water heaters and boilers up to 2 MMBtu/hr to market; and BAAQMD staff expects that the availability of zero-NOx units will increase, and costs will decrease over time. BAAQMD committed to an Implementation Working Group and reporting back to their Board on technology developments and availability. Staff presented the assessment of other regulatory requirements in Working Group Meetings #1 and #2, detailed in the tables below.

Table 2-3. Other Regulatory Requirements

Regulatory Entity	Regulation/Rule	Relevant Emission Limits
San Joaquin Valley Air Pollution Control District (Valley Air District)[4]	Rule 4308 – Boilers, Steam Generators, and Process Heaters (units with a total rated heat input capacity of greater than or equal to 75 kBtu/hr and less than 2 MMBtu/hr) – Exempts units installed in manufactured homes, units installed in recreational vehicles, and hot water pressure washers	20 ppmv (except for pool heaters greater than or equal to 75 kBtu/hr and less than or equal to 400 kBtu/hr, which are at 55 ppmv)
Bay Area Air Quality Management District (BAAQMD)[5]	Rule 9-6 – Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (units with total rated heat input capacity of 75 kBtu/hr – 2 MMBtu/hr) adopted in March 2023	Zero-emission limits with implementation in 2031 – Exempts units installed in manufactured homes (40 ng/J limit), units installed in recreational vehicles, and pool/spa heaters with less than 400 kBtu/hr rated heat input capacity used exclusively to heat swimming pools, hot tubs, or spas

[4] San Joaquin Valley Air Pollution Control District, Rule 4308, https://ww2.valleyair.org/media/o5pdu0oe/rule-4308.pdf

[5] Bay Area Air Quality Management District, Rule 9-6, https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces/2021-amendments/documents/20230315_rg0906-pdf.pdf?rev=436fcdb037324b0b8f0c981d869e684d&sc_lang=en

Regulatory Entity	Regulation/Rule	Relevant Emission Limits
California Air Resources Board (CARB)[6]	2022 State Strategy for the State Implementation Plan (adopted September 22, 2022) proposed measures for residential and commercial buildings; Anticipating Board consideration for rule adoption in 2025	Proposed zero-emission limits (GHG, NOx) for new equipment and appliances sold for use in both residential and commercial buildings, with implementation in 2030

On the local level, over 60 cities and counties across California are considering policies to support zero-emission appliances for new construction.

Assessment of Pollution Control Technologies

The next step is to research the commercially available emission control technologies and seek information on any emerging emission control technologies. As part of this assessment, staff met with multiple manufacturers. South Coast AQMD Rule 1146.2 is technology and fuel neutral and is focused on achieving the maximum NOx emission reductions possible.

Staff assessed different pollution control technologies as part of the BARCT assessment. Staff presented and discussed the pollution control technology assessment in working group meetings. The objective is to identify and evaluate control technologies, approaches, and potential emission reductions.

Emerging Technology and Zero-Emission Technology

Zero-emission technologies such as heat pumps, electric resistance, and fuel cell technologies were explored as part of the BARCT assessment. Staff conducted internet searches, met with stakeholders, and sent a survey to manufacturers to gather more information on emerging and zero-emission technology.

Manufacturer Survey

On May 10, 2023, staff sent a survey to space and water heating manufacturers to gather information on zero-emission technologies, after sending an initial draft survey to stakeholders for feedback on April 28, 2023. The survey covered types of zero-emission technology; applications for installation in residential or commercial buildings; available models; energy efficiency ranges; current annual sales in the South Coast AQMD region; incremental manufacturing cost for the technology; concerns for the technology; and focus of current and future development.[7] Staff received eight responses to the manufacturer survey and presented the aggregate and anonymized responses in the working group meeting on August 30, 2023. Manufacturers who responded to the survey reported that they provided air source and water source heat pump water heater units and hybrid heating, cooling, and water heating, including split system units with heating capacity between 60,000 to 250,000 Btu/hr; variable speed; ducted or ductless; indoor or outdoor; and

[6] California Air Resources Board, 2022 State SIP Strategy, p. 30, https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf

[7] South Coast AQMD, Proposed Amended Rule 1146.2, Manufacturer Survey, http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/manufacturer-survey---may-10.xlsx?sfvrsn=6

modular units (that can dynamically adjust their capacity) up to 2.2 MMBtu/hr. Manufacturers also reported integrated units with up to 2 MMBtu/hr output. Manufacturers reported plans for future heat pump water heater development, including: reduce necessary storage tank capacity; improve capacity and efficiency at lower ambient temperatures; improve efficiency through variable speed compressor and pump control; increase outlet water temperature; utilize alternate refrigerants that allow lower ambient and higher output temperature operation; expand integrated and split-system all-electric heat pumps (air-to-water) to units with larger heating capacities; expand water source in addition to air source technology; and expand efforts in modular design and commercial hydronic heating heat pumps.

Manufacturers who responded to the survey also reported that they provided electric resistance elements for boilers; electric resistance single-stage compressor and fan for pool heating; and all-electric air-to-water heat pumps for pool heating. Manufacturers who responded to the survey reported that they provide electric resistance storage water heater products up to 900 kW input (approximately 3 MMBtu/hr) and electric resistance instantaneous water heater products up to 150 kW (approximately 500,000 Btu/hr).

Based on the feedback from manufacturers, staff understands that there is a range of heat pump and electric resistance units available to replace gas units subject to this rule. However, manufacturers will continue development to improve and expand zero-emission products.

Heat Pump Technology

Common zero-emission water heating technology includes heat pumps. Heat pumps operate like a refrigerator or air conditioning unit by moving heat from one place (such as air, water, or ground) to another. This technology can be over three times more efficient than conventional appliances and can be used for water heating, space heating, and cooling. For pool heating, heat pump pool heaters are an option and are significantly more efficient than electric resistance pool heating.

An integrated heat pump with a water tank packaged as a single unit, as shown in the image below, can be sized for commercial applications and be located indoors. Another type of heat pump is a split system with a water tank that can be located as far as fifty feet away from the heat pump, as shown in the image below. In split systems the heat pump takes heat from outdoor air rather than indoor air.

Figure 2-2. Examples of Integrated Heat Pump (Left) and Split System Heat Pump (Right)

Some stakeholders have expressed concerns over how well heat pumps will operate in colder climates, such as the high-altitude locations within the South Coast AQMD. There are heat pump products available in the market that can operate at low temperatures, and the Northwest Energy Efficiency Alliance's Qualified Products List includes heat pump water heater products that are energy efficient in cold climates and products that can produce hot water via heat pump at negative 25 degrees Fahrenheit. Cold climate heat pumps can pull heat from the air even at below-zero temperatures and are utilized in colder climates in the U.S. and abroad. Maine has one of highest per capita heat-pump adoption rates, outpacing Scandinavian countries, with rebates incentivizing installation of approximately 116,000 heat pumps in a state that has fewer than 600,000 occupied housing units. Heat pump technology is also being adopted in states such as Vermont and Alaska, and according to the International Energy Agency, 60 percent of Norway's buildings are fitted with a heat pump.

One concern is whether sufficiently high-water temperatures needed to meet certain commercial applications could be achieved by using a heat pump water heater. One common practice is to use a booster heater, which can be electric, to increase water temperature up to 180 degrees Fahrenheit. This would satisfy the domestic water temperature requirements for dietary, laundry, and dishwashing. There are also products existing and emerging in the market that can meet the high-water temperature demand. For example, an internet search of units sold or installed in U.S. or Southern California with focus on high water temperatures found products providing water temperature between 160- and 248-degrees Fahrenheit, with waste heat recycling systems capable of achieving up to 248 degrees Fahrenheit. This is a type of technology where a heat pump extracts wasted heat from a heat source (chilled water, cooling tower water, or any consistent waste heat)

and raises the temperature to a useful level. The heat pump allows reuse of low-temperature heat (less than 140 degrees Fahrenheit). Through the refrigeration cycle of the heat pump, hot water temperature can be increased up to 248 degrees Fahrenheit.[8] Applications of waste heat include sterilization; hot and chilled water for hotels, hospitals, schools, and universities; boiling processes for food manufacturing; and other industrial processes. Waste heat application is opted for only when there is an existing source that provides waste heat. It is not intended for large combustion units to be installed with the sole purpose of creating waste heat for a zero-emission unit. The energy efficiency of these products varies, with Coefficient of Performance (COP) between 4.3 and 6.0, or between 4.3 to 6 times more efficient than electric resistance units. For many commercial processes, heat pumps are a viable technology.

Staff recognizes that for steam, heat pump technology may not be viable in the market yet, and for certain industrial processes, heat pump technology is not as mature and electric resistance options are more expensive to operate due to the energy demand. As part of the BARCT assessment, including discussions with manufacturers, staff determined that a temperature threshold was necessary to provide more time for the zero-emission technology market to mature for high temperature applications. As discussed above, zero-emission technologies for providing water temperatures up to 180 degrees Fahrenheit are available. Further discussion in a later section indicates that California plumbing code hot water temperature requirements are also up to 180 degrees Fahrenheit. For PAR 1146.2, staff suggested a temperature threshold of 180 degrees Fahrenheit for special consideration on high temperature applications, to align with the Code of Federal Regulations definition for "residential-duty commercial water heater" for outlet water temperature. PAR 1146.2 provides a definition for high temperature units used to produce steam or heat water above 180 degrees Fahrenheit, and the compliance schedule for zero-emission limits differentiates high temperature units with further implementation dates. Staff intends to conduct a technology assessment prior to the proposed implementation dates for high temperature units to gather information on changes in technology development and availability.

Zero-emission technology for commercial and industrial applications is continuing to develop, with New Belgium Brewing in Colorado partnering with AtmosZero on a pilot study to replace their gas boiler with industrial electric heat pump technology in 2024.[9] The facility is currently operating at 329 degrees Fahrenheit. An air source heat pump water heater can be used to generate steam (greater than 212 degrees Fahrenheit), operate in sub-zero temperatures, with potential applications including breweries, dairies, plastics, pharmaceuticals, food, paper, and more. The pilot study hopes to result in an off-the-shelf product at a comparable price to a combustion unit. The current unit is larger than the size range for 1146.2 units, with some potential for further technology development for smaller units. The International Energy Agency's Technology Collaboration Programme on Heat Pumping Technologies expects high-temperature heat pump technologies to become more commercially available and implemented in coming years.[10]

Electric Resistance Technology

Another common zero-emission water heating technology is electric resistance water heating with storage. Generally, this consists of an insulated steel tank with two electric resistance elements that

[8] Armstrong International Inc., https://armstronginternational.com/products-landing/heat-pump-packages/

[9] The Colorado Sun, New Belgium Brewing prepares for industrial heat pump that could cut its greenhouse gas emissions, https://coloradosun.com/2023/09/11/new-belgium-greenhouse-gases-atmoszero-heat-pump/

[10] Annex 58, Task 1: Technologies, https://heatpumpingtechnologies.org/annex58/task1/

heat the water. These units are available in a large range of sizes for the commercial market. For a commercial electric boiler, no air intake or exhaust venting is required. There are also instantaneous/mini-tank (point-of-use) electric water heaters which provide hot water at the consumption point and only heat water when necessary. For pool heating, electric resistance swimming pool heaters are a more efficient option than gas-fired pool heaters.

There are also commercial hybrid electric water heaters which utilize heat pump heating and electric resistance heating. These units pull heat from the surrounding air to heat water and use less energy than a standard electric water heater. A commercial heat pump boiler would consist of an all-electric heat pump with an optional built-in backup electric boiler for very cold days.

Solar Water Heating Technology

Solar water heating is another option, where solar thermal hot water systems range in size from conventional-sized systems to large industrial applications and consist of flat plate collectors, a controller, pump, storage. There are also swimming pool solar heaters which consist of solar collectors, filters, pumps, and control valves. They can be standalone units, with collectors mounted on roofs or anywhere near the pool.

Fuel Cell Technology

Fuel cells have a broad range of applications from multi-megawatt systems to small units and continue to expand with emerging technologies.[11] Cost and durability are still critical challenges, and studies have indicated price ranges between $4,000 to $20,000 per kW. Natural gas fuel cells produce some NOx emissions. Staff recognizes the applications of zero-emission fuel cells and that this is an emerging technology. Over 100,000 fuel cells have been deployed in Europe and over 300,000 units in Japan primarily for residential applications.[12] Fuel cell adoption in California currently is limited. However, fuel cell technology has the potential to replace existing units to meet the zero-emission limits, and it is especially promising for future high temperature applications.

COST-EFFECTIVENESS AND INCREMENTAL COST-EFFECTIVENESS

Initial BARCT Emission Limit and Other Considerations

After completing the technology assessment, staff recommends an initial BARCT NOx emission limit established using information gathered from the technology assessment. All provided emission concentration values (i.e., initial and final) in this report refer to concentration in terms of parts per million by volume (ppmv) based on a dry basis. Additionally, staff evaluates other considerations that could affect the emission limits that represent BARCT, including limits for those units operating close to the BARCT NOx limits. Heat pump technologies are still the main technologies that can achieve in the nearer-term the NOx concentration limits proposed in PAR 1146.2. Summary of the BARCT assessment and staff's recommendations based on feasibility is shown below.

[11] U.S. Department of Energy, Multi-Year Research, Development, and Demonstration Plan, https://www.energy.gov/sites/default/files/2017/05/f34/fcto_myrdd_fuel_cells.pdf

[12] PACE, Fuel Cell micro-Cogeneration reaches another milestone in Japan, https://pace-energy.eu/fuel-cell-micro-cogeneration-reaches-another-milestone-in-japan/

Method for Cost-Effectiveness and Incremental Cost Effectiveness Analysis

The South Coast AQMD routinely conducts cost-effectiveness analyses for proposed rules and proposed amended rules and regulations that result in the reduction of criteria pollutants (NOx, SOx, VOC, PM, and CO). The analysis is used as a measure of the relative effectiveness of a proposal. It is generally used to compare and rank rules, control measures, or alternative means of emissions control relating to the cost of purchasing, installing, and operating control equipment to achieve the projected emission reductions. The major components of the cost-effectiveness analysis are capital costs, emission reductions, discount rate, and equipment useful life. The cost-effectiveness for PAR 1146.2 was completed using the discounted cash flow method, explained below:

Discounted Cash Flow (DCF)

The DCF method converts all costs, including initial capital investments and costs expected in the present and all future years of useful life, to present value. Conceptually, it is as if calculating the number of funds that would be needed at the beginning of the initial year to finance the initial capital investments and to set aside to pay off the annual costs as they occur in the future. The fund that is set aside is assumed to be invested and generates a rate of return at the discount rate chosen. The final cost-effective measure is derived by dividing the present value of total costs by the total emissions reduced over the useful life. The equation below is used for calculating cost-effectiveness with DCF. The equation was presented in the 2022 AQMP Socioeconomic Report Appendix 2-B (p. 2-B-3):

$$Cost - effectiveness = \frac{Initial\ Capital\ Investments\ +\ (Annual\ O\&M\ Costs\ \times\ PVF)}{Annual\ Emission\ Reductions\ \times\ Years\ of\ Equipment\ Life}$$

Where O&M = Operation and Maintenance; and
PVF = Present Value Factor.

Equation 2-1. Discounted Cash Flow Cost Effectiveness Equation

And the PVF is calculated as follows:

$$PVF = \frac{(1+r)^N - 1}{r * (1+r)}$$

Where r = real interest rate (discount rate); and
N = years of equipment life.

Equation 2-2. PVF Equation

Finally, Health and Safety Code Section 40920.6 (a)(3) states that an incremental cost-effectiveness assessment should be performed on identified potential control options that meet air quality objectives. To determine the incremental cost-effectiveness under this paragraph, South Coast AQMD calculates the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option. Once the BARCT assessment is complete and NOx limits are established, staff considers incrementally more stringent options to demonstrate

that the NOx limit represents the "maximum degree of reduction achievable by each class or category." The equation for incremental cost-effectiveness is below:

$$I\text{-}CE\left(\$/_{tons\ NOx\ reduced}\right) = \frac{Incremental\ Difference\ in\ Cost\ (Present\ Worth\ Value)}{Incremental\ Difference\ in\ Emission\ Reductions\ (Lifetime\ Reductions)}$$

Where I-CE = Incremental Cost-Effectiveness

Equation 2-3. Incremental Cost Effectiveness Equation

For PAR 1146.2, staff did not identify multiple control options that would meet the air quality objectives. The 2022 AQMP's objective is to transition to zero-emission technologies wherever feasible and staff identified technically feasible zero-emission control options for each category of equipment subject to Rule 1146.2; therefore, staff did not conduct an incremental cost-effectiveness assessment.

Summary of Cost-Effectiveness Analysis and Incremental Cost-Effectiveness Analysis

In order to determine cost-effectiveness for the proposed BARCT limits, cost information and estimates for the control equipment were obtained. Staff met with multiple manufacturers and stakeholders to gather cost data and estimates for various types of units. In addition, staff also sent out a survey to the facilities to gather equipment data and cost information for recent NOx control projects. After cost information was obtained, a bottom-up approach evaluated each unit category subject to PAR 1146.2 and cost-effectiveness analysis was conducted on a per equipment basis. Baseline emissions for each equipment were calculated using the assumption methodology outlined in Chapter 4.

Natural Gas-Fired Unit Efficiency

A major manufacturer recommended utilizing 95 percent efficiency for gas-fired units in cost effectiveness calculations. Currently products in the market range from 80 to 95 percent, with older units being less efficient. Some products in the market can reach a 95 percent efficiency, and manufacturers suggested that future U.S. Department of Energy (U.S. DOE) or CEC standards may be raised to require 95 percent efficiency. As not all units currently achieve 95 percent efficiency, this assumption results in an overestimate of the cost to switch to zero-emission technologies; however, the cost-effectiveness assessment is for future available technologies, so staff agreed to use the 95 percent efficiency assumption. For Type 1 pool heaters, staff utilized 84 percent efficiency to align with the U.S. DOE standard.

Capacity Factors

The capacity factor is the proportion of time the unit is expected to operate. Consistent with the rule development process for the Rule 1146.2 amendments in 2006, the analysis assumed the capacity factor for Type 1 and Type 2 natural gas-fired water heaters and boilers to be 21.5 percent, meaning the unit is estimated to operate 21.5 percent of time at maximum heat input capacity. This assumption was taken from a manufacturer survey conducted during the previous Rule 1146.2 rule development.

Instantaneous on-demand units operate at high heat for less time than tank-type units operate. The Energy Star's estimated annual usage for the natural gas-fired instantaneous water heater example is 178 therms or 17.8 MMBtu. The analysis divided 17.8 MMBtu by 8,760 hours in a year which

resulted in approximately 2,032 Btu/hr. This number is used to estimate the capacity factor for a typical instantaneous water heater rated at 150,000 Btu/hr: 2,032 Btu/hr ÷ 150,000 Btu/hr = 0.0135.

Incremental Installation, Maintenance, and Labor Cost

The PAR 1146.2 analysis previously considered negligible incremental maintenance and labor costs, since the requirement for zero-emission units is at the end of natural gas-fired useful life, when similar costs will be required for another natural gas-fired unit. Stakeholders commented that installation costs for heat pumps are higher than for gas units, not including equipment costs, and staff increased the unit capital cost of the zero-emission units in the cost-effectiveness analysis by 20 percent to represent additional installation and other costs. For some units this may be an overestimate, for some it may be an underestimate so applying the additional costs to all units is a conservative assumption. As heat pump installations become more commercially available and common, installation costs are anticipated to be comparable to installation costs for conventional units.

Electrical Panel Upgrade Cost

In some instances, the transition to zero-emission units will require the electrical panel to be upgraded, which will add costs for the owner or operator of the units. For the cost-effectiveness analysis, the analysis relied on the panel upgrade cost estimate of $5,000 from the 2022 AQMP and considered a useful life of 30 years for the panel. However, the cost of an electrical panel upgrade was adjusted to account for this longer useful life of the electrical panel versus the unit. For panel upgrade cost in the PAR 1146.2 cost-effectiveness calculation, $2,500 was utilized for pool heaters (considering the 15-year useful life) and $4,200 was utilized for other categories (considering the 25-year useful life). For some categories involving residential units, the panel cost was split in half to account for use by multiple residential appliances. Additionally, staff assumed that 50% of residential buildings would require a panel upgrade. Data from TECH Clean California, the state-wide heat pump rebate program, showed that 9% of residential buildings required a panel upgrade. Staff expects 50% to be an overestimate but is utilizing the more conservative estimate in the analysis. Electrical panel upgrades will not be required for all instances where conventional units are replaced with zero-emission units, so staff assessed the cost-effectiveness with and without the estimated cost of the upgrades.

Applicable Units Recategorization

PAR 1146.2 defines additional categories for Type 1 and Type 2 units, shown in the figure below.

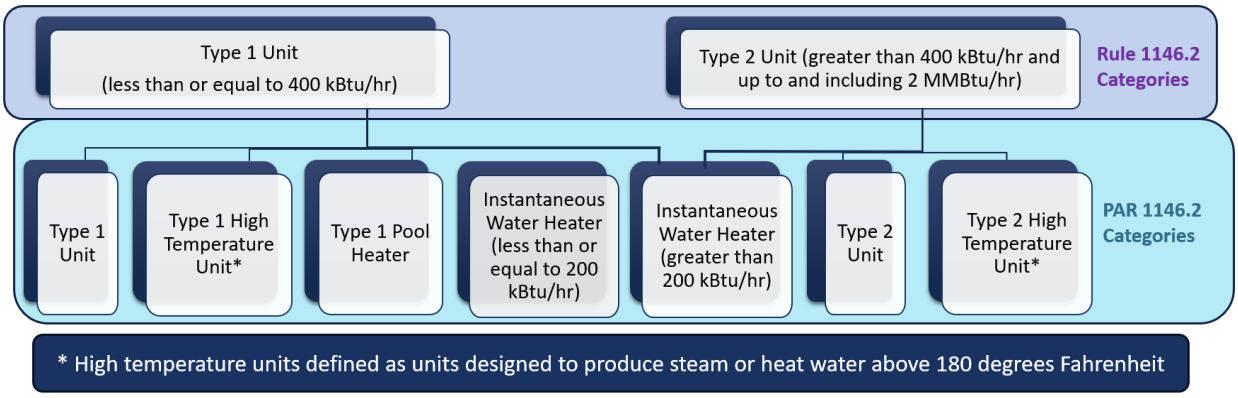

Figure 2-3. PAR 1146.2 Applicable Units Recategorization

Type 1 Water Heaters

For storage water heaters, U.S. DOE estimates a useful life of 10 to 15 years.[13] For the 2022 AQMP Control Measure C-CMB-01 development, the analysis assumed 15 years of useful life for commercial water heaters.[14] For this reason, the analysis for Type 1 water heaters assumes a 15-year useful life and four percent discount rate and thus a PVF of 11.118, as calculated per Equation 2-2, and the estimated cost of an electrical panel upgrade of $2,500.

Type 2 Water Heaters

Meetings and site visits with manufacturers during the rulemaking process indicated useful life estimates of under and over 25 years for gas-fired water heaters. For Type 2 water heaters, the analysis assumes a 25-year useful life and four percent discount rate thus a PVF of 15.622, as calculated per Equation 2-2, and the estimated cost an electrical panel upgrade of $4,200.

Type 1 Pool Heaters

According to U.S. DOE, heat pump swimming pool heaters work efficiently as long as the outside temperature remains above the range of 45 to 50 degrees Fahrenheit. The cooler the outside air that a heat pump draws in, the less efficient it is. However, as outdoor pools are more frequently used during warm and mild weather, this reduced efficiency is generally not an issue. Heat pump pool heaters may cost more than natural gas-fired pool heaters, but they typically have much lower annual operating costs due to their higher efficiency. With proper maintenance, heat pump pool heaters typically last longer than gas pool heaters. U.S. DOE estimates that with proper installation and maintenance, heat pump pool heaters can last 10 or more years.[15] For Type 1 pool heaters, the analysis assumes a 15-year useful life and four percent discount rate and thus a PVF of 11.118, as calculated per Equation 2-2, and the estimated cost for an electrical panel upgrade of $2,500. If splitting the panel cost between pool heating and other residential appliances, the panel cost is $2,500 ÷ 4 = $625. The analysis also utilizes the residential utility rate forecast for Type 1 pool heaters.

Type 1 and Type 2 High Temperature Units

Meetings and site visits with manufacturers during the rulemaking process indicated useful life estimates of under and over 25 years for gas-fired boilers, or high temperature units. For Type 1 and Type 2 high temperature units, the analysis assumes a 25-year useful life and four percent discount rate and thus a PVF of 15.622, as calculated per Equation 2-2, and the estimated cost for an electrical panel upgrade of $4,200.

Instantaneous Water Heaters

U.S. DOE estimates a useful life of more than 20 years for instantaneous water heaters.[16] For instantaneous water heaters, the analysis assumes a 25-year useful life and four percent discount rate and thus a PVF of 15.622, as calculated per Equation 2-2, and the estimated cost of an

[13] U.S. Department of Energy, Tankless or Demand-Type Water Heaters, https://www.energy.gov/energysaver/tankless-or-demand-type-water-heaters

[14] South Coast AQMD, 2022 AQMP, https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/appendix-iv-a.pdf?sfvrsn=18

[15] U.S. Department of Energy, Heat Pump Swimming Pool Heaters, https://www.energy.gov/energysaver/heat-pump-swimming-pool-heaters

[16] U.S. Department of Energy, Tankless or Demand-Type Water Heaters, https://www.energy.gov/energysaver/tankless-or-demand-type-water-heaters

electrical panel upgrade of $4,200. If splitting the panel cost between pool heating and other residential appliances, the panel cost is $4,200 ÷ 4 = $1,050.

Estimating Fuel Switching Cost

The analysis considered the cost impacts of transitions from conventional combustion heating that uses natural gas to zero-emission technologies that use electricity as part of the cost-effectiveness assessment. For this assessment, the analysis relied upon the fuel price estimates which are based on a combination of CEC's 2023 Integrated Energy Policy Report and Energy Information Administration (EIA) national level forecasts. The current CEC forecast extends to 2050. Electricity forecasts are based on the Los Angeles Department of Water and Power (LADWP) and Southern California Edison (SCE) planning areas. Natural gas forecasts are only based on Southern California Gas company forecasts, as Southern California Gas company is the primary gas utility in the region. Forecasted prices will not match observed electric and natural gas prices in any given year and may differ materially. Current prices are affected by demand and supply shocks, geopolitical factors, and other considerations which are all unforecastable. However, the CEC forecasts are created through a rigorous modeling process and reflect the best available expectation for future prices in the region. CEC forecasts are released every two years.

The analysis utilizes the residential utility rate forecast for Type 1 pool heaters and instantaneous water heaters, and commercial utility rate forecast for other units.

Since the forecasted prices for LADWP and SCE differ, staff calculated a weighted average price based on the population served by each utility as follows:

- LADWP: 4 million ÷ 17.2 million (Population served by LADWP ÷ regional population) = 0.23
- SCE: 13.2 million ÷ 17.2 million = 0.77

To estimate the fuel switching cost by category for replacement of natural gas-fired units with zero-emission technology, the analysis:

1. Estimated the daily electricity demand (in kWh) of the electric unit which will be replacing the existing natural gas fired unit;
2. Estimated the daily natural gas demand (in therms) of the existing natural gas fired unit;
3. Multiplied the daily demand for each fuel type by the number of operating days in a year to estimate the annual energy demand of each unit;
4. Multiplied the annual energy demand in each year and for each fuel type by the forecasted price of each fuel in that year to estimate the annual fuel cost for each unit;
5. Netted the difference between the total electricity cost and total natural gas cost to estimate incremental fuel switching cost in each year.

The list of steps explains the process to estimate switching costs of a single unit. The analysis also utilized a bottom-up calculation with individual units that fill similar roles from different categories. The daily electricity and natural gas demand values were estimated by the following approaches, where applicable.

Energy Input Estimate Method

With this method, the fuel switching costs for electric replacement units were estimated based on electric input values (kWh) provided by the unit manufacturer.

Energy Input Calculation Method

For situations where the energy input was not provided by a unit manufacturer, an alternate, more conservative method than the Energy Input Estimate Method was relied upon to calculate fuel switching cost, which is referred to here as the "Energy Input Calculation Method." There are certain factors that this alternate method does not take into account. For example, while the Energy Input Calculation Method assumes the same amount of energy output for the gas unit and electric replacement unit via hot water, the oversizing of heat pumps replacing gas-fired units and cycling losses may not be represented. To calculate daily kWh input:

Gas Unit Rating in Btu/hr × 24 hours × Gas Unit Capacity Factor ÷ 3,412.14 Btu/kWh × Gas Unit Efficiency ÷ COP Heat Pump Efficiency

Equation 2-4. Energy Input Calculation Method Equation

Note that 1 kWh = 3,412.14 Btu.

Cost and Cost-Effectiveness

Cost-Effectiveness Screening Threshold

The 2022 AQMP established a cost-effectiveness screening threshold of $325,000 per ton of NOx reduced based on 2021 dollars. The 2022 AQMP stated that this screening threshold will be adjusted based on the annual California Consumer Price Index (CPI). PAR 1146.2 currently considers a $349,000 per ton of NOx reduced cost-effectiveness screening threshold using 2022 dollars. The 2022 AQMP threshold is neither considered a starting point for control costs, nor an absolute cap.

Type 1 Water Heater

The analysis considered the potential replacement of a 76,000 Btu/hr natural gas-fired Type 1 water heater with a zero-emission heat pump water heater. The capital cost for a natural gas-fired unit is estimated at $7,000, which was derived from the Rule 1146.2 May 2006 final staff report which estimated the cost for a unit with a heat rating ranging from 100,000 to 300,000 Btu/hr and adjusted to present value by the CPI Inflation Calculator. A manufacturer provided the capital cost of $11,000 for a zero-emission indoor packaged commercial heat pump unit with a COP of 4.2. The annual energy input of 5,841 kWh was provided by the manufacturer for the unit. The unit water use is 350 gallons per day.[17] Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $13,200 for the zero-emission unit.

By applying the Energy Input Estimate Method, the calculation for kWh of daily energy input is 5,841 kWh ÷ 365 days = 16 kWh daily input. Fuel switching cost savings are $11,000. In terms of cost-effectiveness, without a panel upgrade, there are cost savings of $190,000 per ton of NOx reduced; with a panel upgrade, cost savings are $93,000 per ton of NOx reduced.

For contrast, by applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 76,000 Btu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit

[17] AO Smith, https://assets.hotwater.com/damroot/Original/10003/AOSZE55000.pdf

efficiency ÷ 3412.14 Btu/kWh ÷ 4.2 heat pump COP = 26 kWh daily input. Fuel switching cost savings is $1,000. In terms of cost-effectiveness, without a panel upgrade, there is a cost of $201,000 per ton of NOx reduced; with a panel upgrade, the cost is $298,000 per ton of NOx reduced.

Type 2 Water Heater

Type 2 Water Heater Scenario 1: Replacement with Six Integrated Heat Pumps

The analysis considered the potential replacement of a 500,000 Btu/hr natural gas-fired Type 2 water heater with six 76,000 Btu/hr zero-emission integrated heat pump water heaters. The capital cost for a natural gas-fired commercial tank type high efficiency unit is estimated at $14,000, which was derived from the Rule 1146.2 May 2006 final staff report which estimated the cost for a unit with a heat rating ranging from 400,000 to 500,000 Btu/hr and adjusted to present value by the CPI Inflation Calculator. The analysis also considered a case presented by an installer where two 500,000 Btu/hr units were replaced with seven integrated heat pumps. In this case, the second 500,000 Btu/hr unit and the seventh heat pump were for redundancy purposes, so the analysis considered the replacement of one 500,000 Btu/hr natural gas-fired unit with six zero-emission heat pumps. A manufacturer provided the capital cost of $11,000 for one zero-emission indoor packaged commercial integrated heat pump unit with a COP of 4.2; the capital cost for the six zero-emission heat pumps is $66,000, which is the cost of the individual heat pump multiplied by six. The annual energy input of 5,841 kWh was provided by the manufacturer for one unit. Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $79,200 for the zero-emission units.

By applying the Energy Input Estimate Method, the calculation for kWh of daily energy input is 5,841 kWh ÷ 365 days × 6 units = 96 kWh daily input. Fuel switching cost savings are $116,000. In terms of cost-effectiveness, without a panel upgrade, the cost savings will be $178,000 per ton of NOx reduced; with a panel upgrade, the cost savings will be $164,000 per ton of NOx reduced.

By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 500,000 Btu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh ÷ 4.2 heat pump COP = 171.03 kWh daily input. Fuel switching cost savings are $9,000. In terms of cost-effectiveness, without a panel upgrade, the cost is $197,000 per ton of NOx reduced; with a panel upgrade, the cost is $212,000 per ton of NOx reduced.

Type 2 Water Heater Scenario 2: Replacement with Two Split Heat Pumps

A major manufacturer recommended a different replacement case for Type 2 water heaters and recommended replacing one 500,000 Btu/hr natural gas-fired unit with two large split heat pumps with a COP of 4.38 paired with a 400-gallon tank for an anticipated capital cost of $70,000.[18] Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $84,000 for the zero-emission unit. Capital cost for the natural gas-fired commercial tank type high efficiency unit is estimated at $14,000, taken from the Rule 1146.2 May 2006 staff report estimated cost for the 400,000-500,000 Btu/hr unit range and adjusted to present value by the CPI Inflation Calculator.

[18] Lochinvar, https://www.lochinvar.com/products/commercial-heat-pump-water-heaters/veritus-air-source-commercial-heat-pump-water-heater/

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 500,000 Btu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh ÷ 4.38 heat pump COP = 164 kWh daily input. Fuel switching cost savings are $19,000. In terms of cost-effectiveness, without a panel upgrade, the cost is $179,000 per ton of NOx reduced; with a panel upgrade, the cost is $194,000 per ton of NOx reduced.

Scenario 2 provides a cost-effectiveness value estimate less than the 2022 AQMP cost-effectiveness screening threshold of $349,000 per ton of NOx reduced. Scenario 2 has a slightly higher capital cost of $4,800 greater than Scenario 1.

Type 1 Pool Heater

The analysis considered the potential replacement of a 125,000 Btu/hr natural gas-fired pool heater with a 90,000 Btu/hr zero-emission heat pump pool heater. As of December 2023, an internet search for a 125,000 Btu/hr natural gas-fired unit indicated that the capital cost is $1,800.[19] The table below presents other natural gas water heater cost examples obtained via an internet search. For example, as of December 2023, an internet search for a 90,000 Btu/hr zero-emission heat pump indicated that the capital cost is $4,100.[20] The heat pump has a COP of 5.7. Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $4,920 for the zero-emission unit.

Table 2-4. Natural gas water heater cost examples from internet search

Heat Output Btu/hr	Price ($)	Heat Output Btu/hr	Price ($)	Heat Output Btu/hr	Price ($)
105,000	2,000	206,000	2,000	300,000	4,000
125,000	2,000	240,000	3,000	333,000	4,000
156,000	2,000	264,000	3,000	360,000	4,000
180,000	3,000	266,000	3,000	404,000	4,000

By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 125,000 Btu/hr × 24 hours × 0.024 capacity factor × 0.84 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh ÷ 5.7 heat pump COP = 3.11 kWh daily input. Fuel switching cost savings are $3,000. In terms of cost-effectiveness, without a panel upgrade, the cost is $11,000 per ton of NOx reduced; with a panel upgrade, the cost is $58,000 per ton of NOx reduced. When splitting the panel cost between residential appliances, with a quarter of the panel cost for pool heating, the cost-effectiveness estimate is cost savings of $4,000 per ton of NOx reduced.

[19] In the Swim, https://intheswim.com/p/ec-462024-mastertemp-low-nox-125k-btu-natural-gas-pool-spa-heater-with-cord---limited-warranty/387225.html

[20] In the Swim, https://intheswim.com/p/w3hp21004t-heatpro-90k-btu-230v-titanium-digital-electric-pool-heat-pump/340101.html

Type 1 High Temperature Unit

Type 1 High Temperature Unit Scenario 1: Replacement with Heat Pump Unit

The analysis considered the potential replacement of a 399,000 Btu/hr natural gas-fired Type 1 boiler with a 365,000 Btu/hr heat pump. A manufacturer provided a capital cost of $24,000 for a 399,000 Btu/hr natural gas-fired Type 1 boiler. A manufacturer provided a capital cost to consumer of $185,000 for a 365,000 Btu/hr heat pump using waste heat with a COP of 6.3.[21] Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $222,000 for the zero-emission unit.

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 399,000 Btu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh ÷ 6.3 heat pump COP = 90.99 kWh daily input. Fuel switching cost savings are $72,000. In terms of cost-effectiveness, without a panel upgrade, the cost is $559,000 per ton of NOx reduced; with a panel upgrade, there is a cost of $578,000 per ton of NOx reduced.

Type 1 High Temperature Unit Scenario 2: Replacement with Electric Resistance Unit

The analysis considered replacement of a 399,000 Btu/hr natural gas-fired Type 1 boiler with a 358,000 Btu/hr electric boiler. A manufacturer provided a capital cost of $24,000 for a 399,000 Btu/hr natural gas-fired Type 1 boiler. As of December 2023, an internet search for a 358,000 Btu/hr electric resistance boiler indicated that the capital cost is $25,000.[22] The analysis also assumed a 100 percent efficiency for electric resistance units. Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $30,000 for the zero-emission unit.

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 399,000 Btu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh = 573.22 kWh daily input. Fuel switching cost is $610,000. In terms of cost-effectiveness, without a panel upgrade, the cost is $2,734,000 per ton of NOx reduced; with a panel upgrade, the cost is $2,753,000 per ton of NOx reduced.

Type 2 High Temperature Unit

Type 2 High Temperature Unit Scenario 1: Replacement of 1 MMBtu Unit with Heat Pump

The analysis considered the potential replacement of a 1 MMBtu/hr natural gas-fired Type 2 boiler with a 1,709,000 Btu/hr heat pump. A manufacturer provided a capital cost of $32,500 for a 1 MMBtu/hr natural gas-fired Type 2 boiler. A manufacturer provided a capital cost to consumer of $280,000 for a 1,709,000 Btu/hr heat pump using waste heat with a COP of 5.9. Adding an

[21] Armstrong International, Inc., https://armstronginternational.com/products/armstrongcombitherm-heat-pumps/
[22] ecomfort, https://www.ecomfort.com/Electro-Industries-EB-NB-105-208/p18338.html

additional 20 percent to the zero-emission unit cost to address installation cost results in $336,000 for the zero-emission unit.

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 1 MMBtu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh ÷ 5.9 heat pump COP = 243.5 kWh daily input. Fuel switching cost savings are $158,000. In terms of cost-effectiveness, without a panel upgrade, there is a cost of $257,000 per ton of NOx reduced; with a panel upgrade, the cost is $264,000 per ton of NOx reduced.

Type 2 High Temperature Unit Scenario 2: Replacement of 1 MMBtu Unit with Electric Resistance

The analysis considered replacement of a 1 MMBtu/hr natural gas-fired Type 2 boiler with a 1 MMBtu/hr electric boiler. A manufacturer provided a capital cost of $32,500 for a 1 MMBtu/hr natural gas-fired Type 2 boiler. As of December 2023, an internet search for a 1 MMBtu/hr electric resistance boiler indicated that the capital cost is $34,000.[23] Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $40,800 for the zero-emission unit.

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 1 MMBtu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh = 1,436.64 kWh daily input. Fuel switching cost is $1,530,000. In terms of cost-effectiveness, without a panel upgrade, there is a cost of $2,722,000 per ton of NOx reduced; with a panel upgrade, there is a cost of $2,812,000 per ton of NOx reduced.

Type 2 Boiler Scenario 3: Replacement of 2 MMBtu Unit with Heat Pump

The analysis considered the replacement of a 2 MMBtu/hr natural gas-fired Type 2 boiler with a 2,286,000 Btu/hr heat pump. A manufacturer provided a capital cost of $43,500 for a 2 MMBtu/hr natural gas-fired Type 2 boiler. A manufacturer provided a capital cost to consumer of $462,000 for a 2,286,000 Btu/hr heat pump using waste heat with a COP of 6.1. Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $554,400 for the zero-emission unit.

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 2 MMBtu/hr × 24 hours × 0.215 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh ÷ 6.1 heat pump COP = 471.03 kWh daily input. Fuel switching cost savings are $339,000. In terms of cost-effectiveness, without a panel upgrade, there is a cost of $152,000 per ton of NOx reduced; with a panel upgrade, there is a cost of $156,000 per ton of NOx reduced.

Instantaneous Water Heater

Instantaneous Water Heater Scenario 1: Replacement with Electric Resistance Tank Type Unit

[23] ecomfort, https://www.ecomfort.com/Electro-Industries-EB-NB-300-480/p18335.html

The analysis assumed that a 150,000 Btu/hr natural gas-fired instantaneous water heater could be replaced with a 75-gallon electric resistance tank type unit. The analysis also assumed that the installation cost would be approximately 25 percent of the project cost. Drawing from an E3 study, the natural gas-fired unit capital cost is $3,700 × 0.75 = $2,775 for a 150,000 Btu/hr instantaneous water heater.[24] As of December 2023, an internet search for a 75-gallon electric resistance tank type unit indicated that the capital cost is $2,100.[25] Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $2,520 for the zero-emission unit.

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 150,000 Btu/hr × 24 hours × 0.0135 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh= 13.53 kWh daily input. Fuel switching cost is $17,000. In terms of cost-effectiveness, without a panel upgrade, there is a cost of $3,078,000 per ton of NOx reduced; with a panel upgrade, there is a cost of $3,275,000 per ton of NOx reduced.

Instantaneous Water Heater Scenario 2: Replacement with Electric Resistance Instantaneous Unit

The analysis assumed that a 150,000 Btu/hr natural gas-fired instantaneous water heater could be replaced by an electric resistance instantaneous unit. The analysis assumed that installation cost is approximately 25 percent of the project cost. Drawing from the E3 study, the natural gas-fired unit capital cost is $3,700 × 0.75 = $2,775 for a 150,000 Btu/hr instantaneous water heater. As of December 2023, an internet search for an electric resistance instantaneous unit indicated that the higher end capital cost is $2,300.[26] Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $2,760 for the zero-emission unit.

The energy input (kWh) for this scenario was not provided by the manufacturer, so the analysis did not apply the Energy Input Estimate Method. By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 150,000 Btu/hr × 24 hours × 0.0135 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh= 13.53 kWh daily input. Fuel switching cost is $17,000. In terms of cost-effectiveness, without a panel upgrade, there is a cost of $3,123,000 per ton of NOx reduced; with a panel upgrade, there is a cost of $3,320,000 per ton of NOx reduced.

Instantaneous Water Heater Scenario 3: Replacement with Heat Pump Tank Type Unit

The analysis assumed that a 150,000 Btu/hr natural gas-fired instantaneous water heater could be replaced with a residential 65-gallon storage volume heat pump with a COP of 3.0. The analysis also assumed that the installation cost is approximately 25 percent of the project cost. Drawing from an E3 study, the natural gas-fired unit capital cost is $3,700 × 0.75 = $2,775 for a 150,000 Btu/hr instantaneous water heater. Energy Star by U.S. EPA provided information on a 64-gallon

[24] E3, Residential Building Electrification in California, Page 32, Figure 2-7, https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf

[25] The Home Depot, https://www.homedepot.com/p/Rheem-Marathon-Eclipse-Light-Duty-75-gal-Commercial-277-Volt-12kW-Field-Convertible-Non-Metallic-Electric-Water-Heater-MELD75-TB-277-Volt-12-kW/305422236

[26] Carbon Switch, Tankless Water Heater Buyer's Guide, https://carbonswitch.com/tankless-water-heater-buyers-guide/

storage volume heat pump with a Uniform Energy Factor of 3.64, which has a capital cost of around $2,000 from internet search.[27] Energy Star provides 178 therms per year for instantaneous and 1,233 kwh for an equivalent heat pump. Adding an additional 20 percent to the zero-emission unit cost to address installation cost results in $2,400 for the zero-emission unit.

By applying the Energy Input Estimate Method, the calculation for kWh of daily energy input is 1,233 kWh ÷ 365 days = 3.4 kWh daily input. Fuel switching cost is cost savings of $600. In terms of cost-effectiveness, without a panel upgrade, cost savings are $185,000 per ton of NOx reduced; with a panel upgrade, the cost is $12,000 per ton of NOx reduced.

When splitting the panel cost between residential appliances, with a quarter of the panel cost for pool heating, the cost-effectiveness estimate is cost savings of $63,000.

By applying the Energy Input Calculation Method, the calculation for kWh of daily energy input is 150,000 Btu/hr × 24 hours × 0.0135 capacity factor × 0.95 natural gas-fired unit efficiency ÷ 3412.14 Btu/kWh ÷ 3.0 heat pump COP = 4.51 kWh daily input. Fuel switching cost is $1,000. In terms of cost-effectiveness, without a panel upgrade, there is a cost of $101,000 per ton of NOx reduced; with a panel upgrade, there is a cost of $298,000 per ton of NOx reduced.

When splitting the panel cost between residential appliances, with a quarter of the panel cost for pool heating, the cost-effectiveness estimate is cost of $223,000 per ton of NOx reduced.

When applying the Energy Input Calculation Method for gas-fired instantaneous units replaced by heat pumps, there is a higher energy input (kWh) and higher fuel switching cost which may result from oversizing. The energy input (kWh) may be overestimated.

Summary of Cost-Effectiveness

The following table summarizes the cost-effectiveness estimates for each category.

Table 2-5. Cost-Effectiveness for PAR 1146.2 Categories

Category	Replace with	Cost-Effectiveness ($,Ton), No Panel Upgrade		Cost-Effectiveness ($,Ton), With Panel Upgrade	
		Energy Input Estimate Method	Energy Input Calculation Method	Energy Input Estimate Method	Energy Input Calculation Method
Type 1 Water Heater	Heat Pump	(190,000)	201,000	(93,000)	298,000
Type 2 Water Heater	Six Heat Pumps (Integrated)	(178,000)	197,000	(164,000)	212,000
	Two Heat Pumps (Split)	-	179,000	-	194,000

[27] Energy Star, https://www.energystar.gov/productfinder/product/certified-water-heaters/details/2408601

Category	Replace with	Cost-Effectiveness ($,Ton), No Panel Upgrade		Cost-Effectiveness ($,Ton), With Panel Upgrade	
		Energy Input Estimate Method	Energy Input Calculation Method	Energy Input Estimate Method	Energy Input Calculation Method
Type 1 Pool Heater	Heat Pump	-	11,000	-	58,000
	Heat Pump and Split Panel Cost	-		-	(4,000)
Type 1 High Temperature Unit	Heat Pump	-	559,000	-	578,000
	Electric Resistance	-	2,734,000	-	2,753,000
Type 2 High Temperature Unit (1 MMBtu)	Heat Pump	-	257,000	-	264,000
	Electric Resistance	-	2,722,000	-	2,812,000
Type 2 High Temperature Unit (2 MMBtu)	Heat Pump	-	152,000	-	156,000
Instantaneous Water Heater	Heat Pump	(185,000)	101,000	12,000	298,000
	Heat Pump and Split Panel Cost	-	-	(63,000)	223,000
	Electric Resistance Tank Type	-	3,078,000	-	3,275,000
	Electric Resistance Instantaneous	-	3,123,000	-	3,320,000

The cost-effectiveness values for most categories in PAR 1146.2 were less than the $349,000 per ton of NOx screening threshold; thus, zero-emission (0 ppmv) technologies are considered cost-effective. While some cost-effectiveness values are greater than the 2022 AQMP screening threshold of $349,000 per ton of NOx reduced, future effective compliance dates will allow for market growth in the next 10 years. Market growth for emerging technologies typically includes a price decrease. Currently, the market supply is limited and some of the zero-emission units staff evaluated require preplanning and adjustment prior to installation, which will involve a considerably higher cost. Once more units are commercialized and sold as off-the-shelf units, staff

expect costs to drop. Staff is proposing to conduct a technology assessment prior to the implementation of the zero-emission units that had a high cost-effectiveness and will reassess costs at that time.

Proposed BARCT Emission Limit

Health and Safety Code Section Sections 40920.6(a)(1) and 40920.6(a)(2) require that prior to adopting rules to meet the requirement of BARCT, one or more potential control options which achieve the emission reduction objectives of the rule must be identified and the cost-effectiveness assessment of the potential control option(s) must be conducted. The final proposed BARCT emission limit for each class and category is the emission limit that achieves the maximum degree of emission reductions and is determined to be cost-effective. The following table summarizes the proposed NOx limits that represent BARCT and the applicable CO limits for each class and category. The zero-emission technologies staff evaluated operate on electricity and have zero CO emissions in addition to zero NOx emissions; hence, staff is proposing zero-emission limits for both pollutants.

Table 2-6. Proposed BARCT NOx and CO Emission Limits, Compliance Schedule, and Unit Age

Equipment Category	NOx and CO Emission Limits (ppmv)	Building Type	Compliance Date	Unit Age (years)
Type 1 Unit*	0	New	January 1, 2026	15
		Existing	January 1, 2029	
Instantaneous Water Heater ≤ 200,000 Btu/hr	0	New	January 1, 2026	25
		Existing	January 1, 2029	
Instantaneous Water Heater > 200,000 Btu/hr	0	New	January 1, 2028	25
		Existing	January 1, 2031	
Type 1 Pool Heater	0	New	January 1, 2028	15
		Existing	January 1, 2031	
Type 2 Unit**	0	New	January 1, 2028	25
		Existing	January 1, 2031	
Type 1 High Temperature Unit	0	New	January 1, 2029	25
		Existing	January 1, 2033	
Type 2 High Temperature Unit	0	New	January 1, 2029	25
		Existing	January 1, 2033	

* Referring to a Type 1 unit that is not a high temperature unit, pool heater, or instantaneous water heater.

** Referring to a Type 2 unit that is not a high temperature unit or instantaneous water heater.

Future implementation dates will allow for an increase in the supply of zero-emission technology in the market. Manufacturers are already producing heat pumps and may adjust business operations based on policy direction and market conditions. There is an expectation for the supply chain to adjust to changing market conditions. Furthermore, staff is proposing to require the zero-emissions technologies at end of unit age, with unit expected age of potentially 15 to 25 years depending on the type of unit; therefore, staff does not expect a sudden peak in demand. PAR 1146.2 proposes longer timeframes for end-of-unit-age replacements in existing buildings versus installations in new buildings and also proposes zero-emission limits for retrofits and burner modification after the proposed compliance dates.

Some of the proposed emission limits for some of the equipment categories subject to PAR 1146.2 are considered technology-forcing, meaning the emission limits are based on a technology that is not widely commercially available at the time of amending the rule. When South Coast AQMD adopts rules with technology-forcing emission limits, the limits are given a future implementation date to allow time for the technology to develop. BARCT limits evolve over time as the technology

improves or new pollution control technologies emerge; setting future effective emission limits is an approach that has been used and upheld in other rules. For example, South Coast AQMD adopted VOC limits in Rule 1113 – Architectural coatings in 2002 with a future effective date of July 1, 2006, based on emerging technology (e.g., reformulated coatings). The technology to meet the lower VOC limits was commercially available at the time of rule development but had performance issues that had yet to be overcome. The American Coatings Association sued the South Coast AQMD for adopting technology-forcing BARCT limits, but the South Coast AQMD prevailed in the Supreme Court of California, which upheld the ability to adopt technology-forcing BARCT limits. Furthermore, staff will include a requirement to conduct a technology assessment prior to the zero-emission compliance dates.

Staff proposes to conduct a technology assessment, which will be included as part of the Governing Board resolution adopting PAR 1146.2. The technology assessment would assess any change in capital cost or technology development for certain high temperature applications; assess any change in cost-effectiveness for certain categories; and monitor market supply and growing opportunities for contractor training. Staff will also reassess the fuel switching costs. Utility rates tend to fluctuate over time and are difficult to predict, so an evaluation of utility rates would be appropriate. The technology assessment will evaluate the status of zero-emission technology for all equipment categories and address any equity issues.

ADDITIONAL BENEFITS AND CHALLENGES

Electric Grid Infrastructure

In 2021, renewable generation accounted for 33.6 percent of the total California Power Mix, not including solar photovoltaic systems installed on residential and commercial buildings that are less than one megawatt (MW) as they are typically considered distributed generation and not required to report to CEC.[28] The California Power Mix is the percentage of specified fuel types derived from the California Energy Mix, and the California Energy Mix is the total in-state electric generation plus energy imports. There is expected to be more renewables adoption by states in the future, and California Senate Bill 100 called for a Renewables Portfolio Standard of 60 percent by 2030. Electricity imports account for approximately 30 percent of total system electric generation, with other states pursuing Renewable Portfolio Standards and state energy goals.

The CEC, California Public Utilities Commission (CPUC), and CARB are working to coordinate across efforts, identify issues not covered by ongoing efforts, and assess needed actions to better align the energy system with the state's climate targets. Related initiatives include the CPUC's proceeding to support decarbonizing buildings in California (R.19-01-011), which eliminated gas line extension subsidies for new gas hookups to homes and commercial buildings effective July 1, 2023.[29] In February 2023, the CPUC ordered load serving entities to procure an additional 4,000 MW of Net Qualifying Capacity for 2026 and 2027, in addition to the mid-term reliability procurement requirements ordered in 2021 (11,500 MW, enough to power approximately 2.5 million homes). The CPUC also approved four energy storage contracts totaling 372 MW for SCE and recommended an electric resource portfolio for use in the California Independent System

[28] California Energy Commission, 2021 Total System Electric Generation, https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-generation

[29] California Public Utilities Commission, Press Release, https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M496/K979/496979465.PDF

Operator's (CAISO) 2023-24 Transmission Planning Process. The recommended portfolio includes over 85 gigawatts (GW) of new resources by 2035, including 54,000 MW of renewable resources; over 28,000 MW of batteries; 2,000 MW of long-duration storage; and 1,100 MW of demand response.

The CEC adopts an Integrated Energy Policy Report (IEPR) every two years and an update every other year. The 2022 IEPR has recognized the proposed zero-emission requirements for residential and commercial buildings in California and included recommendations and updates to the energy demand forecast.[30] The IEPR update released on January 1, 2024, provided forecasts for future natural gas and electricity rates, which staff utilized in the cost-effectiveness analysis. Staff used the cost averages for the period of 2024 – 2050, which are $1.71 per therm or 5.84 cents/kWh for natural gas and 24.81 cents/kWh for electricity commercial rates. For residential rates, used for Type 1 pool heaters and instantaneous water heaters, staff used the cost averages for the period of 2024 – 2050, which are $2.31 per therm or 7.88 cents/kWh for natural gas and 29.85 cents/kWh for electricity. Previously, staff relied on 2021 IEPR for PAR 1146.2 cost effectiveness assessment. The update impacted the cost estimates to switch from natural gas-fired units to heat pumps, as the newest IEPR projected the natural gas rate to increase 40% and electricity rate to have a more moderate increase of 28%. This resulted in a decrease in cost-effectiveness estimates from the initial assessment due to the increase in cost savings from fuel switching.

Under Assembly Bill 3232 (Friedman, Chapter 373, Statutes of 2018), the CEC must assess the feasibility of reducing greenhouse gas emissions in residential and commercial buildings 40 percent below 1990 levels by January 1, 2030. Statewide electricity consumption was over 280,000 GWh in 2021 and is forecasted to be 358,738 GWh in 2035. The 2022 Planning Scenario peak forecast for CAISO, which manages roughly 80 percent of California's load, reaches 55,117 MW by 2035. CAISO is planning $11 billion in transmission capacity projects over the next 20 years, which covers 80 percent of the entire state service area. The 20-Year Transmission Outlook document from May 2022 considers transmission needs to meet load and renewable energy growth aligned with state policy. The plan describes $11 billion in upgrades to the existing CAISO transmission footprint.[31] In addition, solar photovoltaic generation continues to increase as shown in the figure below.[32] Between 2022 and 2035, behind-the-meter photovoltaic generation is expected to grow on average by about six percent, reaching annual photovoltaic generation of 55,740 GWh by 2035.

[30] California Energy Commission, 2022 Integrated Energy Policy Report Update, https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2022-integrated-energy-policy-report-update

[31] California ISO, 20-Year Transmission Outlook, http://www.caiso.com/InitiativeDocuments/20-YearTransmissionOutlook-May2022.pdf

[32] California Energy Commission, 2022 Electric Generation and Capacity, https://www.energy.ca.gov/media/3757

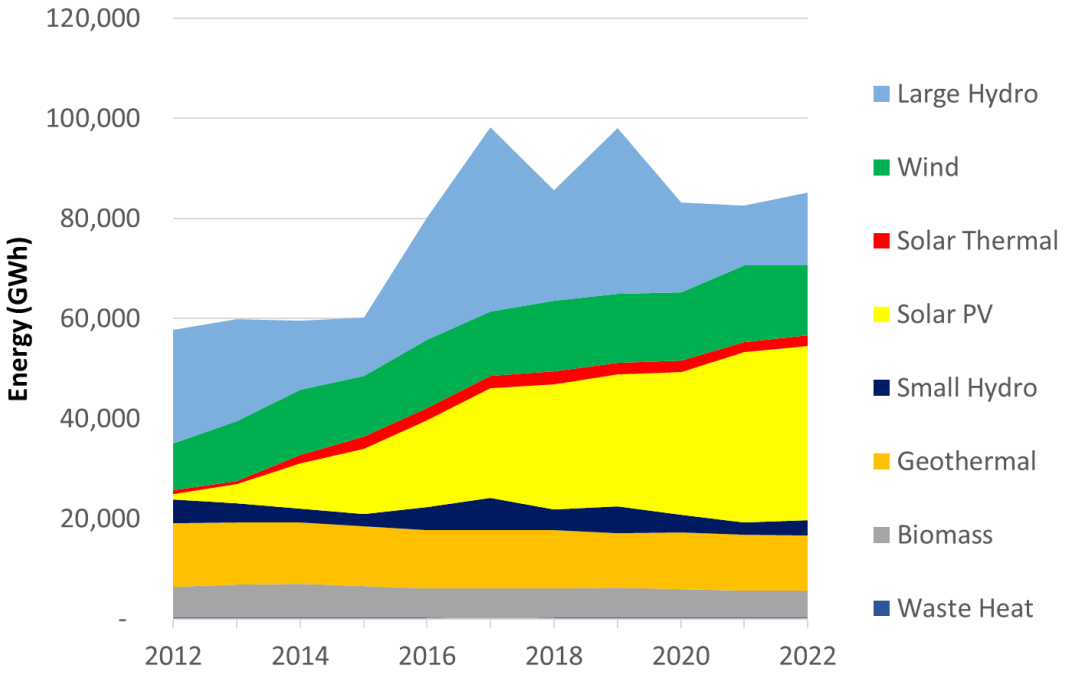

Figure 2-4. In-State Electric Generation – Select Fuel Types, Sourced from CEC Quarterly Fuels and Energy Reporting Regulations

According to SCE's 2021 Sustainability Report, SCE is expected to invest over $5 billion annually in the electric grid, with approximately 3,400 MW of energy storage installed or contracted. In 2021, SCE procured 530 MW of energy storage through three new contracts from third parties and in the same year, entered into an engineering, procurement, and construction agreement to construct approximately 535 MW of utility-owned storage. SCE also expected increases in Distributed Energy Resources such as residential solar.[33] In the Pathway to 2045 document, SCE expected a 60 percent increase in electricity load and 40 percent increase in peak load by 2045, with building electrification responsible for 15 percent of load by 2045. SCE noted that the grid will still be summer peaking due to air conditioning.[34]

Staff recognizes the importance of electric grid reliability for electric units, but also for natural gas units, which often require electricity to operate. In 2021, the CPUC created new programs and modified existing programs to reduce energy demand and increase energy supply during critical hours of the day.[35] Per Senate Bill 350 (De León, 2015), the CPUC developed an integrated resource planning process to ensure that California's electric sector meets its greenhouse gas reduction goals while maintaining reliability at the lowest possible costs.[36] Staff recognizes that there are externalities for both electric and natural gas production and distribution. Staff also

[33] SCE, Sustainability Report, https://www.edison.com/sustainability/sustainability-report
[34] SCE, Pathway 2045, https://www.edison.com/our-perspective/pathway-2045
[35] California Public Utilities Commission, CPUC Ensures Electricity Reliability During Extreme Weather for Summers 2022 and 2023, https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-ensures-electricity-reliability-during-extreme-weather-for-summers-2022-and-2023
[36] California Public Utilities Commission, CPUC Approves Long Term Plans To Meet Electricity Reliability and Climate Goals, https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-approves-long-term-plans-to-meet-electricity-reliability-and-climate-goals

recognizes the need for regulation of emissions from electricity generation. South Coast AQMD Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities, is a rule that aims to lower emissions from electricity generation.[37] Regarding the natural gas system, natural gas leaks into the atmosphere from natural gas wells, storage tanks, pipelines, and processing plants. In 2020, methane emissions from natural gas and petroleum systems and from abandoned oil and natural gas wells were source of approximately 33 percent of U.S. methane emissions and approximately four percent of U.S. greenhouse gas emissions. In the South Coast AQMD region, there have been examples of large leaks such as Aliso Canyon, where 109,000 metric tons of methane emissions were released between October 2015 and February 2016.

For this rulemaking, staff did not conduct lifecycle analyses related to the BARCT assessment for either the electricity or natural gas systems as a lifecycle analysis is not required under California Health and Safety Code Section 40406 for a BARCT assessment. However, other organizations have conducted lifecycle analyses which show overall NOx reductions when moving to zero-emissions. A 2021 Northeast States for Coordinated Air Use Management (NESCAUM) study estimating NOx reductions for residential scenarios where fossil fuel-burning furnaces are replaced with heat pumps found significant reductions in NOx along with sulfur dioxide and carbon dioxide.[38] A 2023 NESCAUM study also found emission reductions for different scenarios.[39] A 2022 Energy Innovation Policy & Technology study found that switching to heat pumps for industrial processes reduces NOx emissions.[40]

Considerations for Dry Cleaners

Staff has been engaging in discussion with representatives of the dry cleaning industry to discuss challenges PAR 1146.2 may pose to their operations. The dry cleaners' primary concern is the high upfront cost to install a new zero-emission unit. Staff acknowledges some zero-emission technologies have higher upfront costs, but as zero-emission technologies become more mature and more widely adopted in the market, there will be less cost impact. In addition, staff is projecting lifetime utility savings based on future projected natural gas and electricity prices. The cost to operate heat pumps is lower than most electric appliances because they are so energy efficient; over the lifetime of the unit, that initial cost increase could be recovered. In addition, there are federal, state, and local incentive funding specifically to incentivize the switch from combustion to heat pump technologies. South Coast AQMD is also developing a rebate program to help lower the cost for some consumers and small businesses and will be centralizing information for incentive and financing opportunities offered by other agencies and organizations.

[37] South Coast AQMD, Rule 1135, http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1135.pdf?sfvrsn=4

[38] NESCAUM, Estimating the Emissions Benefits of Switching to Heat Pumps for Residential Heating, https://otcair.org/upload/Documents/Reports/nescaum-otc-emission-reduction-analysis-for-residential-heating-202106.pdf

[39] NESCAUM and OTC, Residential Building Electrification in the Northeast and Mid-Atlantic, https://otcair.org/upload/Documents/Reports/Residential%20Building%20Electrification%20Final%20Report%20August%202023.pdf

[40] Energy Innovation Policy & Technology LLC, https://energyinnovation.org/wp-content/uploads/2022/10/Decarbonizing-Low-Temperature-Industrial-Heat-In-The-U.S.-Report-2.pdf

Staff proposed several alternative compliance options, a limited exemption for small businesses, and a longer compliance timeline, further detailed in Chapter 3, that dry cleaners would be able to utilize, including:

- Paragraph (i)(1) provides an alternative compliance option for when utility upgrades delay compliance with zero-emission limits. When the applicable utility company is unable to provide the necessary power which is beyond the owner or operator's reasonable control, the owner or operator can request an extension of up to 36 months for compliance.
- Paragraph (i)(4) provides an alternative compliance option for emergency replacement when an owner or operator requires a short-term replacement due to sudden unit failure after the applicable Table 3 compliance date if an electrical upgrade is needed to operate a unit that complies with Table 2 emission limits. In this situation, the owner or operator may elect to install and operate a temporary unit that complies with Table 1 emission limits for up to six months.
- For a dry cleaner in a property under lease, paragraph (i)(6) provides another alternative compliance option that allows an extension of up to 24 months to comply with the Table 2 emission limits, if the installation is delayed beyond the reasonable control of the owner or operator of the unit.
- There is also an exemption in paragraph (k)(5) that the provisions of paragraph (d)(3) regarding replacing existing units once they reach their defined unit age in the rule shall not apply to units installed in facilities that meet the Rule 102 definition of a small business. For small businesses, existing units can be operated until their natural replacement after the applicable Table 3 compliance date.
- Boilers operated by dry cleaners are categorized as high temperature units, for which PAR 1146.2 has proposed a later zero-emission implementation date (i.e., 2033 for existing buildings).

Staff will continue to monitor all the challenges for zero-emission implementation and will conduct a technology check-in and report the findings to the Stationary Source Committee by January 1, 2028, before the compliance dates for the high temperature units go into effect.

Considerations for Low-Use

The existing rule includes a low-use exemption for existing older Type 2 units with annual fuel use of 9,000 therms. Those units were manufactured prior to January 1, 2000, with NOx emissions higher than 30 ppmv NOx. PAR 1146.2 proposes to phase out the existing 9,000 therms exemption when zero-emission implementation starts and include a new low-use exemption as a transitional option. The new low-use exemption from Table 2 zero-emission requirements is for an existing Type 2 unit installed prior to the date of rule adoption that meets Table 1 emission limits (i.e., 20 ppmv NOx and 400 ppmv CO) with fuel use meeting a low-use threshold for annual fuel use. This low-use threshold is 3,000 therms per year for units with a rated heat input capacity greater than 1 MMBtu/hr, but less than or equal to 2 MMBtu/hr, or 2,000 therms per year for units with a rated heat input capacity greater than 400 kBtu/hr, but less than or equal to 1 MMBtu/hr. For context,

annual use of 3,000 therms is about 16 percent of normal fuel use for a 1 MMBtu/hr unit and 2,000 therms is about 27 percent of normal fuel use for a 400 kBtu/hr unit. This low-use provision provides another transitional option for phasing in existing units to the zero-emission requirement.

Hot Water Requirements for Health Facilities and Use in Hospitals

The 2022 California Plumbing Code includes sections on Water Supply and Distribution; Domestic Hot-Water Distribution Systems for Health Facilities and Clinics. For laundry, 160 degrees Fahrenheit hot water is acceptable, or 140 degrees Fahrenheit hot water if the laundry also passes through a tumbler dryer at 180 degrees Fahrenheit. Hot water between 158 to 176 degrees Fahrenheit is used to reprocess cloths and mop heads.[41] For dishwashing equipment, 180 degrees Fahrenheit is acceptable, and 125 to 180 degrees Fahrenheit booster heaters are acceptable as a second piece of equipment for dishwashing. There is a redundancy requirement for dishwashing and minimum patient services such as handwashing and bathing. The California Plumbing Code hot water use temperature requirements for health facilities and clinics are displayed in the following table.

Table 2-7. California Plumbing Code Hot Water Temperature Requirements (Degrees Fahrenheit)

Clinical	Dietary	Laundry	Dishwashing
105-120	120	160	180

Staff visited a hospital in Los Angeles with sixteen natural gas-fired units below 2 MMBtu/hr, spread between two buildings. The units included four for domestic hot water and 12 for space heating, with the highest water temperature output at 180 degrees Fahrenheit. This also included redundant units, and units are often oversized. Hospital steam for sterilization is usually generated by larger boilers permitted under Rule 1146. The hospital is considering replacing conventional domestic hot water Type 1 units with heat pumps. One challenge is that it may take five to seven years for the California Department of Health Care Access and Information project approval to replace a boiler or hot water heater.

Staff also contacted the all-electric University of California, Irvine (UCI) Medical Center, which is anticipated to be operational in 2025 with the Acute Care Center and Central Utility Plant operational in 2024.[42] Future plans include fuel cells and battery storage. The heat pump COP is three, or 300 percent more efficient than a conventional unit. The team noted lower maintenance costs of $338,000 for all-electric distributed steam compared to $1,751,000 for gas-fired, and $737,000 annual operational cost savings. There was an estimated 3.8-year simple payback. In addition to zero-emission space and water heating, electric appliances were installed in the kitchen. The team working on the UCI project mentioned they obtained approval from the California Department of Health Care Access and Information for the initial phase in about one year. The experience they shared is to have early planning and good communication and to implement the project in phases.

[41] CDC, Best Practices for Environmental Cleaning in Healthcare Facilities, https://www.cdc.gov/hai/pdfs/resource-limited/environmental-cleaning-RLS-H.pdf

[42] Building Design+Construction, UC Irvine takes sustainability to new level with all-electric medical center, https://www.bdcnetwork.com/uc-irvine-takes-sustainability-new-level-all-electric-medical-center

Hot Water Requirements and Use in Restaurants

Requirements for restaurant hot water are included in the California Retail Food Code.[43, 44, 45] Hot water generation and distribution systems must be sufficient to meet the peak hot water demands throughout the food facility. In sizing the water heater, the peak hourly demands for all sinks, dishwashing machines, etc., are added together to determine the minimum required recovery rate. A minimum of 120 degrees Fahrenheit should be supplied from the faucet and a minimum of 100 degrees Fahrenheit for handwashing.

Restaurant dishwashers use a majority of the hot water and require 180 degrees Fahrenheit. Restaurants can use electric "booster heaters" to achieve the required temperature. Restaurants may also choose to utilize a distributed generation water system to save on water use and cost. A distributed generation water system consists of the primary heat pump water heater serving key points such as kitchen sinks and point-of-use electric heaters serving most others.

Staff visited a facility with a restaurant which utilized 500,000 Btu to 2 MMBtu sized units. Electric booster heaters were used for dishwashing to increase the temperature from 120 to 170 degrees Fahrenheit, as shown in the image below. For restaurant sanitation, 120 degrees Fahrenheit water is used so there was no need for hot water at a temperature above 180 degrees Fahrenheit.

Another potential option for commercial kitchens and other facilities are products which can use heat recovery from air conditioners or chillers to provide hot water. This technology recovers waste heat from refrigeration systems and uses it to heat water. The products include tanks with built-in heat recovery and stand-alone remote units that can connect to any tank. A heat pump could supplement for high demand situations.[46]

[43] California Legislative Information, Health and Safety Code, https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC&sectionNum=113953

[44] California Legislative Information, Health and Safety Code, https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC&sectionNum=114192

[45] California Legislative Information, Health and Safety Code, https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC&sectionNum=114195

[46] HotSpot, Heat Recovery Water Heating & Pool Heating, https://www.hotspotenergy.com/commercial-heat-recovery/

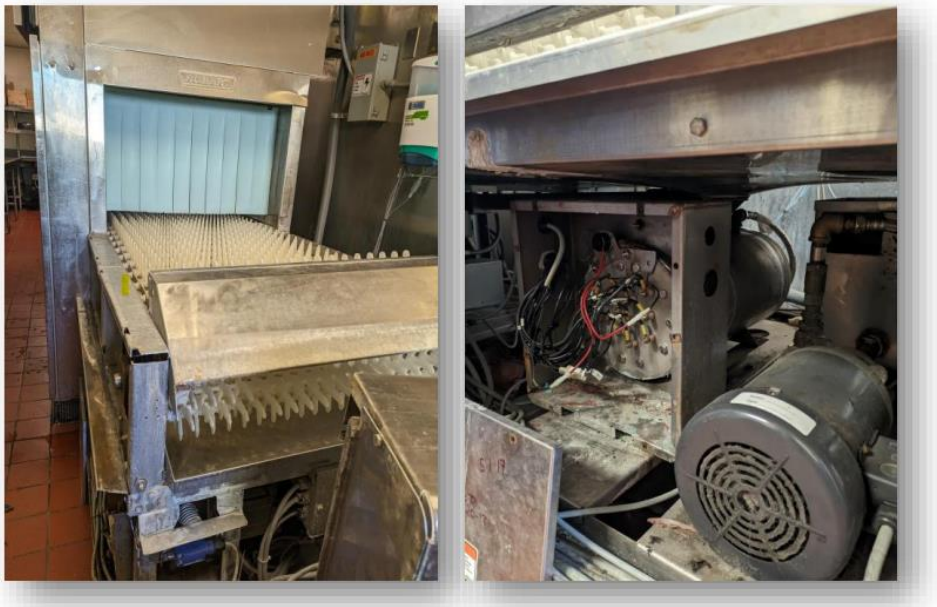

Figure 2-5. Examples of Dishwashing Unit (Left) and Electric Booster Heater (Right)

School Districts

Heat pump technology can be utilized in many applications for space and water heating, including in schools. Department of Energy Better Buildings® has presented a case study for commercial building heat pump implementation by the Los Angeles Unified School District (LAUSD).[47] LAUSD utilizes electric heat pump rooftop and wall-hung units, and other heat pump technologies, as the primary option for space heating and cooling systems for its school and administrative facilities. LAUSD has been transitioning to unitary heat pumps for space heating of buildings with a capacity of three to ten tons with plans to expand to larger spaces as larger heat pumps become commercially available. LAUSD started by replacing the smaller gas units ranging from five to ten tons as they reached the end of their life with electric units. LAUSD has replaced sixty-five percent of their decentralized HVAC units with electric heat pumps, with plans to achieve one hundred percent by 2040. Since the beginning of the project, LAUSD has saved around $139,000 per month on utility costs. The lifecycle costs of each heat pump are projected to be twelve percent lower than the lifecycle cost of the gas heating units at current utility rates. They have also utilized on-site solar PV systems to offset the increase in electricity operating costs from the electric unitary heat pumps. As utility rates and initial costs have shifted, capital and operating costs are now lower for the electric units. Moving forward, when the options for high-capacity heat pumps become available, they will create a comprehensive plan to update electrical capacity to accommodate heat pump RTUs for larger spaces. In addition, LAUSD has started heat pump training for their engineering and maintenance staff to ensure any issues can be addressed quickly.

[47] U.S. DOE Better Buildings Case Study, https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/LAUSD%20Heat%20Pump%20Rooftop%20Units_.pdf

They have equipped all of their electric units with advanced controls that allow for centralized monitoring to facilitate maintenance and ensure efficient operations.

Incentives

There are several federal and state incentives for zero-emission commercial appliances. Section 179D of the Internal Revenue Code allows deductions for energy-efficient commercial buildings, including new or existing buildings.[48] The Inflation Reduction Act extended and expanded these tax deductions.[49] TECH Clean California launched more state-wide incentives for multifamily and commercial water heating in 2023.[50] Other state programs can provide more incentives such as for new construction of all-electric multifamily pool heating.[51] There are also utility incentives for appliances in commercial buildings, including SCE's Willdan Commercial Energy Efficiency Program, which incentivizes replacement of an existing electric resistance or gas-fired water heater with a packaged heat pump water heater.[52] San Diego Gas and Electric's Comprehensive Energy Management Solutions Program provides heat pump water heater rebates.[53]

[48] U.S. Department of Energy, 179D Commercial Buildings Energy-Efficiency Tax Deduction, https://www.energy.gov/eere/buildings/179d-commercial-buildings-energy-efficiency-tax-deduction
[49] IRS, Inflation Reduction Act of 2022, https://www.irs.gov/inflation-reduction-act-of-2022
[50] TECH Clean California, Incentives, https://techcleanca.com/incentives/multifamily-information/
[51] California Energy Commission, California Electric Homes Program, https://caelectrichomes.com/
[52] Willdan Commercial Energy Efficiency Program, https://willdanefficiency.com/commercial/
[53] Comprehensive Energy Management Solutions, http://www.savingwithcems.com/

CHAPTER 3: SUMMARY OF PROPOSALS

INTRODUCTION

PROPOSED AMENDED RULE STRUCTURE

PROPOSED AMENDED RULE 1146.2

INTRODUCTION

The main objective of PAR 1146.2 is to propose NOx limits that represent BARCT for the applicable equipment. PAR 1146.2 also deletes outdated rule language and reorganizes the rule structure to be consistent with recently amended or adopted rules. The proposed revised rule structure and key provisions are discussed below.

PROPOSED AMENDED RULE STRUCTURE

- *(a) Purpose*
- *(b) Applicability*
- *(c) Definitions*
- *(d) Requirements*
- *(e) Unit Age*
- *(f) Certification*
- *(g) Demonstrations of Compliance with Emission Limits*
- *(h) Identification of Compliant Units*
- *(i) Alternative Compliance Options*
- *(j) Labeling, Reporting, and Recordkeeping Requirement*
- *(k) Exemptions*

PROPOSED AMENDED RULE 1146.2

The proposed amended rule separates the purpose and applicability to be consistent with recently adopted and amended rules.

The table below shows the emission limits for new units in the current Rule 1146.2 and proposed revisions in PAR 1146.2.

Table 3-1. Summary of Emission Limits for New Units in Rule 1146.2 and New Revisions in PAR 1146.2

Rule 1146.2 Current Section	Unit Type	Compliance Date	Emission Limit (ppmv at 3%O_2, dry)	PAR 1146.2 Revision*
Rule 1146.2 (c)(1)	Type 2	2000	30 ppmv NOx; 400 ppmv CO	Obsolete; section removed
Rule 1146.2 (c)(2)	Type 1	2001	40 ng/J NOx (55 ppmv NOx)	Obsolete (except for pool heaters); section removed

Rule 1146.2 (c)(2)	Type 1 Pool Heaters	2001	40 ng/J NOx (55 ppmv NOx)	Current limits; now included in PAR 1146.2 (d)(1) and Table 1
Rule 1146.2 (c)(7)	Type 2	2010	14 ng/J NOx (20 ppmv NOx)	
Rule 1146.2 (c)(8)	Type 1 (excluding Pool Heaters)	2012	14 ng/J NOx (20 ppmv NOx)	

* PAR 1146.2 zero-emission requirements for new units installed in new and existing buildings are included in PAR 1146.2 (d)(2).

The table below shows the phase-out/retrofit requirements in the current rule and proposed revisions in PAR 1146.2. Phase-out/retrofit was required in Rule 1146.2 for unregulated old units to phase into the emission limits.

Table 3-2. Summary of Phase-out/Retrofit Requirements in Rule 1146.2 and New Revisions in PAR 1146.2

Rule 1146.2 Current Section	Unit Type and Age	Compliance Date	Emission Limit (ppmv at 3%O_2, dry)	PAR 1146.2 Revision*
Rule 1146.2 (c)(3)-(c)(5)	Type 2; Manufactured prior to 2000	2002-2006	30 ppmv NOx	Should have met the limits; now included in PAR 1146.2 (d)(6) as a compliance tool if a non-compliant unit is found
Rule 1146.2 (c)(11)	Type 2; Manufactured and purchased prior to 2000 and sold/installed by December 31, 2010	Until Dec 31, 2010	20 ppmv NOx	Obsolete; section removed

* Additionally, PAR 1146.2 will require units reaching their unit age after PAR 1146.2 Table 3 zero-emission compliance dates of their applicable categories to phase into zero-emission requirement as specified in PAR 1146.2 (d)(3).

PAR 1146.2 Purpose [Subdivision(a)]

The purpose of this rule is to reduce NOx emissions from water heaters, boilers, and process heaters as defined in this rule.

PAR 1146.2 Applicability [Subdivision(b)]

The provisions of this rule are applicable to manufacturers, distributors, retailers, resellers, installers, owners, and operators of units that have a rated heat input capacity less than or equal to 2 MMBtu/hr. Those units could be sold through physical stores or online. An installer installing a noncompliant unit purchased online is in violation of the rule.

The provisions of the rule are primarily enforced through the supply chain (manufacturers, distributors, installers, etc.); however, enforcement staff also enforces the rule at commercial and industrial facilities that own and operate Rule 1146.2 units, especially if those facilities also own and operate other units that require a South Coast AQMD permit to operate.

Refurbishers were also subject to Rule 1146.2 but have been removed from PAR 1146.2 applicability to avoid redundancy. The term reseller has been added to PAR 1146.2 applicability. A refurbisher can be a manufacturer, reseller, or installer; therefore, removing the term refurbisher and adding the term reseller does not change the applicability.

PAR 1146.2 Definitions [Subdivision(c)]

The following are key new definitions for Proposed Amended Rule 1146.2. For all definitions, refer to PAR 1146.2 released with the staff report.

COMPLIANCE PORTAL in paragraph (c)(3), which means:

> *"the dedicated webpage on the South Coast AQMD website for submitting reports, notifications, or any documents to comply with South Coast AQMD rule(s)"*

EXISTING BUILDING in paragraph (c)(4), which means:

> *"a building that is not a New Building as defined in this rule. Existing Building includes any structures on the property including, but not limited to, sheds, detached garages, pools, and spas"*

HIGH TEMPERATURE UNIT in paragraph (c)(8), which means:

> *"any Unit that is designed and used to produce steam or to heat water above 180 degrees Fahrenheit"*

INSTALL in paragraph (c)(10), which means:

> *"the action of an Installer to place a Unit in a position ready for use"*

INSTALLER in paragraph (c)(11), which means:

> *"a person who Installs a Unit and is required to obtain a license issued by the Department of Consumer Affairs Contractors State License Board for a classification related to buildings and appliances"*

Potential license requirements for installers include Department of Consumer Affairs Contractors State License Board Licensing Classifications C-4 - Boiler, Hot Water Heating and Steam Fitting Contractor; C-53 – Swimming Pool Contractor; and other license classifications.

MOBILE HOME in paragraph (c)(13), which means:

> *"a prefabricated structure on a permanently attached chassis"*

NEW BUILDING in paragraph (c)(14), which means:

"a building that is newly constructed or a building with a major alteration which changes the occupancy classification of a building, which means a change in the formal designation of the primary purpose of the building pursuant to 2022 Title 24 California Building Code Part 2 Chapter 3 for occupancy classification and use, and that does not have a Unit installed prior to the applicable Table 3 compliance dates. New Building comprises any structures on the property including, but not limited to sheds, detached garages, pools, and spas"

SMALL BUSINESS in paragraph (c)(25), which is:

"as defined by Rule 102"

At the time of rule adoption, the definition of a Small Business in Rule 102 states, "a business which is independently owned and operated and meets the following criteria, or if affiliated with another concern, the combined activities of both concerns shall meet these criteria: (A) the number of employees is 10 or less; and (B) the total gross annual receipts are $500,000 or less; or (C) not-for-profit training center."

STANDARD CONDITIONS in paragraph (c)(26), which is:

"as defined by Rule 102"

At the time of rule adoption, the definition of Standard Conditions in Rule 102 states, "gas temperature of 60°F and a gas pressure of 760 mm Hg (14.7 pounds per square inch) absolute."

PAR 1146.2 Requirements [Subdivision(d)]

Paragraph (d)(1) – Current Rule 1146.2 Emission Limit

The provisions that were originally included in paragraphs (c)(2), (c)(7), and (c)(8) in Rule 1146.2 have been moved to paragraph (d)(1) in PAR 1146.2 to display current emission limits. Paragraph (d)(1) provides that no person shall manufacture, supply, sell, offer for sale, or install, for use within the South Coast AQMD, any unit subject to this rule, unless the unit is certified pursuant to subdivision (f) not to exceed the applicable NOx and CO emission limits specified in PAR 1146.2 Table 1, prior to the compliance dates specified in PAR 1146.2 Table 3.

Table 3-3. PAR 1146.2 Table 1 (NOx and CO Emission Limits)

Equipment Category	NOx Emission Limit*	CO Emission Limit*
Type 1 Units, excluding Pool Heaters	14 ng/J or 20 ppmv	N/A**
Type 1 Pool Heaters	40 ng/J or 55 ppmv	N/A**
Type 2 Units	14 ng/J or 20 ppmv	400 ppmv

* Ng/J of NOx (calculated as NO_2) of heat output or the specified ppmv of NOx or CO at three percent oxygen (O_2) correction, on a dry basis.

** Type 1 units are not subject to a CO limit by Rule 1146.2 but may be subject to CO limits by other South Coast AQMD rules.

Paragraph (d)(2) – PAR 1146.2 BARCT Emission Limit for New Installations

PAR 1146.2 establishes updated BARCT NOx and CO emission limits for applicable equipment as shown in Table 2. This paragraph provides that no person shall manufacture, supply, sell, offer for sale, or install, for use in the South Coast AQMD, any unit subject to this rule, unless such unit complies with the applicable Table 2 emission limits by Table 3 compliance dates.

Since the rule regulates units fired with, or designed to be fired with, natural gas, the emission limits only apply to the natural gas-fired mode for a dual fuel system. On and after the applicable compliance dates in PAR 1146.2 Table 3, any dual-fuel unit capable of being fired on natural gas and another gas, at the end of its unit age, would not be allowed to operate in natural gas-fired mode if that mode does not meet the zero-emission limit. In this case, the owner or operator could restrict the unit from operating in such a mode.

Table 3-4. PAR 1146.2 Table 2
(Zero-Emission Limits, Compliance Schedule, and Unit Age)

Equipment Category	NOx and CO Emission Limits (ppmv)	Compliance Schedule	Unit Age (years)
Type 1 Unit*	0	Phase I	15
Instantaneous Water Heater ≤ 200,000 Btu/hr	0		25
Instantaneous Water Heater > 200,000 Btu/hr	0	Phase II	25
Type 1 Pool Heater	0		15
Type 2 Unit**	0		25
Type 1 High Temperature Unit	0	Phase III	25
Type 2 High Temperature Unit	0		25

* Referring to a Type 1 Unit that is not a High Temperature Unit, Type 1 Pool Heater, or Instantaneous Water Heater.

** Referring to a Type 2 Unit that is not a High Temperature Unit or Instantaneous Water Heater.

Table 3-5. PAR 1146.2 Table 3 (Compliance Dates for Zero-Emission Limits)

Phase	Building Type	Compliance Date
Phase I	New Buildings	January 1, 2026
	Existing Buildings	January 1, 2029
Phase II	New Buildings	January 1, 2028
	Existing Buildings	January 1, 2031
Phase III	New Buildings	January 1, 2029
	Existing Buildings	January 1, 2033

Paragraph (d)(3) – Zero-Emission for Existing Units after Their Unit Age

PAR 1146.2 requires units reaching their unit age after the Table 3 compliance dates of their applicable categories to phase into the zero-emission requirement. On and after the Table 3 compliance dates, an owner or operator of a unit shall not operate a unit which exceeds Table 2 emission limits once the unit age determined pursuant to subdivision (e) is greater than or equal to the applicable Table 2 unit age. All units installed prior to the applicable Table 3 compliance dates will be subject to this requirement, including older Type 1 units installed prior to 2010 and all existing units in RECLAIM and former RECLAIM facilities. Units installed or used for residential structures or facilities meeting the Rule 102- Definitions (Rule 102) definition of a small business are exempted from this requirement pursuant to paragraph (k)(4) or (k)(5), those units will have to meet the Table 2 emission limits upon natural replacement.

For example, if an existing Type 1 unit is not used in a residential structure or small business facility, it is subject to the paragraph (d)(3) requirement. If this unit is 18 years old (i.e., beyond its unit age as indicated in PAR 1146.2 Table 2) by January 1, 2029, the Phase II zero-emission compliance date, it must comply with the zero-emission requirement no later than January 1, 2029.

Another example is also for an existing Type 1 unit subject to the paragraph (d)(3) requirement that is not used in a residential structure or small business facility. If this unit is 12 years old (i.e., before end of unit age as indicated in PAR 1146.2 Table 2) on January 1, 2029, the Phase II zero-emission compliance date, it is not subject to the zero-emission requirement until 2032 at its unit age.

Paragraph (d)(4) – Emission Demonstration at Unit Modification

Paragraph (d)(4) of PAR 1146.2 provides guidance for an owner or operator to demonstrate that a modified unit meets the NOx and CO emission limits in subdivision (d).

Paragraph (d)(5) – Emission Limits at Burner Modification or Replacement

Paragraph (d)(5) specifies the applicable emission limit when an owner or operator modifies or replaces a burner for any unit. If the modification or replacement occurs prior to the applicable compliance dates in Table 3 or before the unit reaches its unit age, the emission limit in Table 1 will apply. If the modification or replacement occurs on and after the applicable compliance dates in Table 3 and when the unit has reached its unit age in Table 2, the emission limit in Table 2 will apply. This provision addresses stranded assets by allowing a unit that has not reached the end of its unit age but requires a burner replacement after the Table 2 limits have gone into effect, to be

retrofit to continue operation. Once the unit reaches the end of its unit age, it will have to meet the Table 2 emission limits.

Paragraph (d)(6) – Type 2 Unit Manufactured Prior to January 1, 2000

The provisions that were originally included in paragraphs (c)(3), (c)(4), and (c)(5) in Rule 1146.2 have been converted into paragraph (d)(6) in PAR 1146.2. These units should already comply with the emission limits, and this provision is included in PAR 1146.2 (d)(6) as a compliance tool if a non-compliant unit is found. Paragraph (d)(6) provides that except for units at a RECLAIM or former RECLAIM facility, an owner or operator shall not operate any Type 2 unit manufactured prior to January 1, 2000, in the South Coast AQMD which does not meet the emission limit of 30 ppmv (corrected at 3 percent O_2 correction, on a dry basis) or 0.037 pound NOx per million Btu of heat input and no more than 400 ppmv of carbon monoxide (at 3 percent O_2, dry).

Paragraph (d)(7) – If Failing to Meet the Exemption Criteria

An owner or operator of a unit that elects to comply with the exemptions in paragraph (k)(2), (k)(3), or (k)(5) will lose the exemption and be subject to the applicable emission limits within 180 days if they fail to demonstrate meeting the criteria for the exemption. The owner or operator of the unit shall not operate the unit that exceeds the applicable Table 1 emission limits within 180 days of failing to demonstrate compliance with paragraph (k)(2) pursuant to paragraph (g)(2); shall not operate the unit that exceeds the applicable Table 2 emission limits within 180 days of failing to demonstrate compliance with paragraph (k)(3) pursuant to paragraph (g)(2); or shall not operate the unit that does not comply with paragraph (d)(3) within 180 days of failing to meet the Rule 102 definition of a small business. Paragraph (d)(7) sets a backstop if the exemption criteria cannot be demonstrated and requires a timeline of up to 180 days for the compliance of applicable emission limits.

PAR 1146.2 Unit Age [Subdivision(e)]

Subdivision (e) provides guidance for an owner or operator of a unit to determine unit age.

Paragraph (e)(1) – Unit Age Determination

Paragraph (e)(1) provides guidance for an owner or operator of a unit to determine unit age. Unit age shall be based on the original date of manufacture determined by an invoice from purchase of unit provided by the manufacturer; the original unit manufacturer's identification or rating plate permanently affixed to the unit; or any other method of determining unit age that can be substantiated through written information as approved by the Executive Officer. The unit shall be deemed at the end of its unit age as of January 1, 2025, for any unit where the unit age cannot be determined pursuant to subparagraph (e)(1)(A).

PAR 1146.2 Certification [Subdivision(f)]

Subdivision (f) provides guidance to manufacturers regarding unit certification. Subdivision (f) in PAR 1146.2 was originally subdivision (d) in Rule 1146.2.

Paragraph (f)(1) – Independent Testing Laboratory

The manufacturer shall obtain confirmation from an independent testing laboratory prior to applying for certification for a natural gas unit that each unit model or retrofit kit complies with the applicable requirements of subdivision (d). This confirmation shall be based upon emission

source tests of a randomly selected unit of each model, and the protocol shall be adhered to during the confirmation testing of all units subject to this rule.

Paragraph (f)(2) – Applying for Unit Certification

When applying for unit(s) certification, the manufacturer shall submit to the Executive Officer the following: a statement that the model is in compliance with subdivision (d), signed and dated, attesting to the accuracy of all statements; general information including name and address of manufacturer, brand name, and model number as it appears on the unit rating plate; a description of each unit being certified; and a source test report verifying compliance with the emission limits in subdivision (d) for each model to be certified. The source test report shall be prepared by the confirming independent testing laboratory and shall contain all the elements identified in the protocol for each unit tested.

Paragraph (f)(3) – Timeline

When applying for unit certification, the manufacturer shall submit the items identified in paragraph (f)(2) no more than 180 days after the date of the source test identified in subparagraph (f)(2)(D).

Paragraph (f)(4) – Unit Certification

The Executive Officer shall certify a unit model which complies with the provisions of subdivision (d) and of paragraphs (f)(1), (f)(2), and (f)(3).

PAR 1146.2 Demonstrations of Compliance with Emission Limits [Subdivision(g)]

Paragraph (g)(1) – Source Test Report

The owner or operator that elects to demonstrate compliance pursuant to subparagraph (d)(4)(B) shall maintain a copy of the South Coast AQMD approved source test report or make it available to the Executive Officer upon request. The source test report shall, at a minimum, include: the emissions limit of the unit in ppmv or ng/J of NOx or ppmv of CO of heat output; the South Coast AQMD approved test method and Independent Testing Laboratory for the source test; the model and serial numbers of the unit(s); and the rated heat input capacity of the unit(s).

Paragraph (g)(2) – Demonstrate Compliance for Exemption in Paragraph (k)(2) or (k)(3)

The owner or operator of a unit that elects to comply with the exemption in paragraph (k)(2) or (k)(3), shall demonstrate compliance with the annual therm limit determined using one of the following methods: fuel usage recorded by a non-resettable totalizing fuel meter, corrected to standard conditions; fuel usage calculated by multiplying the number of hours recorded by a non-resettable totalizing time meter and the rated heat input capacity of the unit, as calculated using Equation 1 in the rule; or monthly fuel billing statement or equivalent documentation, which can include an e-statement or a download from the utility website. The fuel meter or time meter is required to be non-resettable and calibrated according to the manufacturer's recommendation. The owner or operator also shall maintain the fuel usage records for a period of not less than three years as specified in subparagraph (j)(4)(D).

PAR 1146.2 Identification of Compliant Units [Subdivision(h)]

Subdivision (h) outlines the procedure and requirements for identification and verification of compliant units. Subdivision (h) in PAR 1146.2 was originally subdivision (f) in Rule 1146.2.

Paragraph (h)(1) – Newly Manufactured Units

The manufacturer shall display the model number of the unit complying with subdivision (d) on the shipping carton and permanent rating plate. The manufacturer shall also display the certification status on the shipping carton and on the unit.

Paragraph (h)(2) – Certified Retrofit Kits

The manufacturer shall display the model number of the retrofit kit and manufacturer and model of applicable units on the shipping carton and in a plainly visible portion of the retrofit kit.

PAR 1146.2 Alternative Compliance Options [Subdivision(i)]

Subdivision (i) provides alternative compliance options for different considerations, including utility upgrade, multiple units, emergency replacement, mobile homes, property under lease, and construction upgrade.

Paragraph (i)(1) – Alternative Compliance Option for Utility Upgrades

Paragraph (i)(1) provides an alternative compliance option when an owner or operator of a unit required to meet the Table 2 emission limits will encounter delays beyond their reasonable control and cannot meet the applicable Table 3 compliance date, or paragraph (d)(3) requirement, because a utility upgrade is required to provide the necessary power to operate the unit.

The owner or operator shall notify the Executive Officer through the compliance portal and request an extension pursuant to subparagraph (i)(1)(A) and obtain a letter from the Executive officer pursuant to subparagraph (i)(1)(B). The owner or operator shall notify the Executive Officer at least 90 days prior to the unit's applicable compliance date in Table 3 or paragraph (d)(3) to request an extension of no more than 18 months from the applicable compliance date and obtain a letter from the Executive Officer prior to the unit's compliance date approving the extension. If the need for the utility upgrade was discovered when a unit is being replaced due to sudden unit failure, the owner or operator of the unit shall notify the Executive officer through the compliance portal 30 days after the date the unit became non-operational to request an extension of no longer than 18 months from the date of unit failure. In this case, the owner or operator shall obtain a letter from the Executive Officer through the compliance portal within 90 days of the notification.

Furthermore, if the utility upgrades will not be completed within the initial 18-month extension approved pursuant to subparagraph (i)(1)(A), the owner or operator may request an additional extension of no more than 18 months through the compliance portal at least 90 days prior to the end of the initial 18-month extension; obtain a letter from the Executive Officer through the Compliance Portal prior to the end of the initial extension; and provide a progress report to the Executive Officer every six months after the start of additional extension. This progress report would include but not be limited to the status of the utility upgrade; update to the estimated date the utility provider will complete the utility upgrade; and documentation which justifies the update to estimated date for completion.

The owner or operator also shall provide a follow-up notification to the Executive Officer through the Compliance Portal no later than 72 hours after the unit complying with the Table 2 emission limits has been installed; and maintain records pursuant to paragraph (j)(6). If a unit is not operational during the extension approved pursuant to subparagraph (i)(1)(B) or clause (i)(1)(C)(ii), the owner or operator may elect to operate a temporary unit during the extension, provided the temporary unit complies with Table 1 emission limits; no later than 72 hours after the

date the temporary unit was installed, notify the Executive Officer through the compliance portal; and no later than 72 hours after the date the temporary unit was disconnected, notify the Executive Officer through the compliance portal.

Paragraph (i)(2) – Alternative Compliance Option for Multiple Units

Paragraph (i)(2) provides an alternative compliance option for when an owner or operator has five or more units across facilities that are required to meet the Table 2 emission limits within two consecutive calendar years pursuant to paragraph (d)(3). That means within a period of two consecutive calendar years, those units are reaching their unit age and should be replaced with zero-emission units. The owner or operator may submit an alternative compliance plan requesting alternative compliance date(s) by submitting the alternative compliance plan at least one year prior to the earliest compliance date, with a filing fee payment pursuant to Rule 306 – Plan Fees; and specifying compliance date(s) in the alternative compliance plan for the number of units to meet the Table 2 emission limits as three or at least 30 percent of the units by the latest applicable compliance date, at least 30 percent of the units one year after the latest applicable compliance date, and the remaining units two years after the latest applicable compliance date.

Additionally, if a unit meets the requirements to apply for the alternative compliance option for utility upgrades pursuant to paragraph (i)(1), the owner or operator may elect to include a request in their alternative compliance plan for an extension of no longer than 18 months from the earliest compliance due date of the units in the alternative compliance plan, by including the documentation listed in paragraph (j)(6) with the application for an alternative compliance plan. If the utility upgrades will not be completed within the 18-month extension in the approved alternative compliance plan, the owner or operator may submit a revised alternative compliance plan at least 180 days prior to the end of the initial 18-month extension to request an additional extension of no more than 18 months before initiating the alternative compliance schedule specified in subparagraph (i)(2)(B), with a filing fee payment pursuant to Rule 306 – Plan Fees. The owner or operator must obtain written approval from the Executive Officer, as specified in paragraph (i)(3), prior to the earliest compliance due date of all units included in the alternative compliance plan, and if an additional extension was requested pursuant to clause (i)(2)(C)(ii), prior to the end of the initial approved 18-month extension, for any unit included in the alternative compliance plan.

Paragraph (i)(3) – Approval of Alternative Compliance Option for Multiple Units

Paragraph (i)(3) provides language on the approval of the alternative compliance option for multiple units in paragraph (i)(2). The Executive Officer shall review the request for alternative compliance date submitted pursuant to paragraph (i)(2) and provide written approval or disapproval based on whether the following criteria are met: the owner or operator demonstrated they are operating five or more units that are required to be replaced based on unit age pursuant to paragraph (d)(3) to meet Table 2 emission limits within two calendar years; the request was submitted at least one year prior to the earliest applicable compliance date; and the proposed alternative compliance date meets the criteria specified in subparagraph (i)(2)(B) or subparagraph (i)(2)(C), if applicable.

Paragraph (i)(4) – Alternative Compliance Option for Emergency Replacements

Paragraph (i)(4) provides an alternative compliance option for emergency replacement when an electrical upgrade for more power supply capacity is required to comply with zero-emission limits. An owner or operator of a unit that requires a short-term replacement due to sudden unit failure after the applicable Table 3 compliance date and an electrical upgrade to increase the power supply capacity to operate a unit that complies with Table 2 emission limits, excluding units utilizing alternative compliance options specified in paragraphs (i)(1), (i)(6), and (i)(7) may elect to, for units used in buildings that are not residential structures: install and operate a temporary unit that complies with Table 1 emission limits for up to six months prior to installing a unit that complies with Table 2 emission limits; no later than 72 hours after the date the temporary unit was installed, report the date the existing unit failed and the date the temporary unit was installed through the compliance portal; and no later than 72 hours after the date the temporary unit was disconnected, report the date the temporary unit was disconnected through the compliance portal; and report the date the unit complying with Table 2 emission limits was installed through the Compliance Portal no later than 72 hours after the date the new unit was installed. For units sold for use in residential structures, a unit that complies with Table 1 emission limits can be offered for rent for up to six months prior to installing a unit that complies with Table 2 emission limits.

Paragraph (i)(5) – Alternative Compliance Option for Mobile Homes

Paragraph (i)(5) provides an alternative compliance option with more time to comply with zero-emission limits for mobile homes with an existing instantaneous water heater. An owner or operator of an instantaneous water heater manufactured prior to the date of rule adoption that is installed in a mobile home may elect to install an instantaneous water heater with rated heat input capacity of less than or equal to 200,000 Btu/hr that complies with the Table 1 emission limits until January 1, 2033, in lieu of the applicable compliance date in Table 3 or paragraph (d)(3). On and after January 1, 2033, any instantaneous water heater with rated heat input capacity of less than or equal to 200,000 Btu/hr manufactured, supplied, sold, offered for sale, or installed for use in a mobile home must meet the Table 2 emission limits upon replacement.

Paragraph (i)(6) – Alternative Compliance Option for Units at a Property Under Lease

Paragraph (i)(6) provides an alternative compliance option for an owner or operator of a unit, when the unit is in a property under lease. The owner or operator of the unit shall be provided an extension of no more than 24 months to comply with the Table 2 emission limits, if the installation is delayed beyond the reasonable control of the owner or operator of the unit, provided the owner or operator: occupies the property under a lease as a tenant before and after the applicable compliance date in Table 3 or paragraph (d)(3); reports the date the existing unit is required to comply no later than 90 days prior to the applicable compliance date in Table 3 or paragraph (d)(3) through the compliance portal; and reports the date the new unit was installed to comply with the Table 2 emission limits through the compliance portal no later than 72 hours after the date the new unit was installed. The intent of this provision is for commercial facilities, such as dry cleaners who typically rent their space, and need additional time to transition to zero-emissions units while the property owner provides utility upgrades. The landlord of residential rentals has a legal obligation to provide safe and habitable living conditions for the tenants, including providing clean water and functioning heating systems. The provision is not designed for residential rentals, as

most renters are not responsible for purchasing large appliances such as water heaters; however, residents are not precluded from utilizing the provision. If a unit is non-operational during the extension specified in paragraph (i)(6), the owner or operator may elect to operate a temporary unit during the extension, provided the temporary unit complies with Table 1 emission limits, and the owner or operator notifies the Executive Officer through the compliance portal no later than 72 hours after the date the temporary unit was installed and no later than 72 hours after the date the temporary unit was disconnected.

Paragraph (i)(7) – Alternative Compliance Option for Construction

Paragraph (i)(7) provides an alternative compliance option for an extension of no more than six months to comply with the Table 2 emission limits if the installation is delayed because construction is required to expand the space designed to house the Unit, and associated equipment necessary for operating the Unit, excluding Units utilizing the alternative compliance options specified in paragraphs (i)(1), (i)(2), (i)(5), and (i)(6).

The owner or operator electing to utilize this provision shall: report the existing unit is required to be replaced to comply with the Table 2 emission limits through the compliance portal no later than 90 days prior to the applicable compliance date in Table 3 or paragraph (d)(3); report the date the new unit was installed to comply with the Table 2 emission limits through the compliance portal; and maintain records pursuant to paragraph (j)(8). If a unit is non-operational during the extension provided by this provision, the owner or operation may install and operate a temporary unit that complies with Table 1 emission limits for up to six months prior to installing a unit that complies with Table 2 emission limits; no later than 72 hours after the date the temporary unit was installed, notify the Executive Office through the compliance portal; and no later than 72 hours after the date the temporary unit was disconnected, notify the Executive Office through the compliance portal.

Paragraph (i)(8) – If failing to comply with the alternative compliance option requirements

Paragraph (i)(8) provides clarification regarding compliance when the owner or operator of a unit elects to use any of the alternative compliance options in subdivision (i) but fails to comply with the specified requirements. When that occurs, the owner or operator can no longer use the alternative compliance option and must meet the zero-emission requirements according to paragraph (d)(2) or (d)(3), whichever applicable.

PAR 1146.2 Labeling, Reporting, and Recordkeeping Requirement [Subdivision(j)]

Subdivision (j) addresses labeling, reporting, and recordkeeping requirements.

Labeling requirements are common for area source rules. For example, Rule 1111 has several labeling requirements. Labeling requirements are important tools for enforcement, especially when some units distributed to the market can only be installed under certain conditions. While manufacturers ship units into many markets, to ensure the labels are only included on units sold into or within the South Coast AQMD, they may elect to send a sticker or label to their distributors so they can be applied at the point of sale. PAR 1146.2 is proposing a labeling requirement under the new subdivision (j) for the period between the new building compliance date and the existing building compliance date of an equipment category, and the extended period for tankless water heaters being installed in mobile homes.

Paragraph (j)(1) – Labeling Schedule

Pursuant to the labeling schedule in Table 4, any Unit that is supplied or offered for sale for use within the South Coast AQMD prior to the applicable Table 3 compliance dates that complies with the Table 1 emission limits, but not the Table 2 emission limits, shall prominently display the statement "If installed in South Coast AQMD: For Installation and Use in Existing Buildings Only."

Table 4 – Labeling Schedule

Unit's Compliance Schedule	Labeling Requirements	
	Start Date	End Date
Phase I	January 1, 2026	January 1, 2029
Phase II	January 1, 2028	January 1, 2031
Phase III	January 1, 2029	January 1, 2033

Paragraph (j)(2) – Labeling for Instantaneous Water Heaters in Mobile Homes

Effective January 1, 2029, to January 1, 2033, an instantaneous water heater with rated heat input capacity of less than or equal to 200,000 Btu/hr supplied or offered for sale for use in a mobile home within the South Coast AQMD and complying with the alternative compliance date in paragraph (i)(5) shall prominently display the statement "If installed in South Coast AQMD: For Installation and Use in Mobile Homes Only."

Paragraph (j)(3) – Annual Reporting Requirement

Effective on and after the Table 3 compliance dates for Existing Buildings, manufacturers of natural gas-fired unit(s) shall submit a report by March 1st of the following calendar year to the Executive Officer through the compliance portal. The report shall include: 1) name of the product manufacturer; 2) list of product model(s); 3) number of units and rated heat input capacity of each model that was sold into or within the South Coast AQMD; and 4) the applicable equipment category in Table 2.

Paragraph (j)(4) – General Recordkeeping Requirement

The owner or operator of a unit shall maintain on-site a copy of the manufacturer's and/or distributor's written instructions and retain a record of the maintenance activity and fuel use records for a period of not less than three years for low-use demonstration. The owners or operators shall also maintain copy of a government-issued document (e.g., building permit) that grants permission to an individual or organization to initiate a construction project which determines the eligibility of new building or existing building for the compliance of the rule.

Paragraph (j)(5) – Rated Heat Input Capacity Documentation

The owner or operator of a unit shall maintain on-site, or provide upon the Executive Officer's request, a copy of all documents identifying the unit's rated heat input capacity including: manufacturer's or distributor's manual or invoice; and maintain documentation of the rated heat input capacity for a unit modified pursuant to paragraph (d)(5), signed by the licensed person

modifying the unit, including description of all unit modifications, dates the unit was modified, and calculation of rated heat input capacity.

Paragraph (j)(6) – Recordkeeping for Alternative Compliance Option for Utility Upgrades

If an owner or operator of a unit elects to comply with the provision in paragraph (i)(1), the owner or operator shall maintain records on-site, or make them available to the Executive officer upon request, until three years after the end date of the approved extension(s), that demonstrate the power supply and the utility provider's progress on providing the necessary power, including but not limited to an official document signed by the responsible party of the utility company that services the facility that includes: an explanation of the utility upgrades required by the utility company; communications with the utility provider when the utility upgrade was requested; the estimated date the utility provider will complete the utility upgrades; additional information to substantiate that additional time is necessary; and documentation which demonstrates that the delays are outside of the reasonable control of the owner or operator.

Paragraph (j)(7) – Recordkeeping for Alternative Compliance Option for Units at a Property Under Lease

If an owner or operator of a unit elects to comply with the provision in paragraph (i)(6), the owner or operator shall maintain records on-site, or make them available to the Executive Officer upon request, until three years after reporting through the compliance portal pursuant to subparagraph (i)(6)(B), including but not limited to: a legally binding contract that explains the terms and duration of the lease under which the owner or operator of the unit is a tenant renting a property from a landlord; and documentation which demonstrates that the delays are beyond the reasonable control of the owner or operator.

Paragraph (j)(8) – Recordkeeping for Alternative Compliance Option for Construction

If an owner or operator elects to comply with the provision in paragraph (i)(7), the owner or operator shall maintain records on-site, or make them available to the Executive Officer upon request, until three years after reporting through the compliance portal pursuant to subparagraph (i)(7)(A), including but not limited to: images that show the activity of construction and the expansion of the space for the unit and associated equipment by the construction; and documentation which demonstrates the construction, which could be a construction permit or contract.

Paragraph (j)(9) – Small Business Registration

If an owner or operator of a unit elects to utilize the small business exemption from paragraph (d)(3) for end of unit life replacement pursuant to paragraph (k)(5), the owner or operator must register their facility as a small business at least 90 days prior to the unit reaches its unit age, maintain related records on-site, or make them available to the Executive Officer upon request, until three years after registering through the Compliance Portal. Paragraph (j)(9) specifies the records as business legal owner and contract information, number of current employees, the total gross annual receipts, and if the business is a non-for-profit training center.

Paragraph (j)(10) – Reporting through 1-800-CUT-SMOG®

Staff expects to establish an online reporting platform to accommodate the reporting requirements in paragraphs (i)(1), (i)(4), (i)(6), (i)(7), (j)(3), or (j)(9) prior to their effective dates. However, staff

understands that there are situations where the online reporting platform might not be operational, or the owner or operator of a unit cannot use the online reporting platform. Paragraph (j)(10) allows the owner or operator to report the required information by calling 1-800-CUT-SMOG® if the compliance portal is not available or not allowing entering of the necessary information, or if the owner or operator does not have the access to the compliance portal.

PAR 1146.2 Exemptions [Subdivision(k)]

Subdivision (k) has been updated to clarify exemptions and phase in new emission limits. Subdivision (k) in PAR 1146.2 was originally subdivision (h) in Rule 1146.2.

Paragraph (k)(1) – Units in Recreational Vehicles, Units Subject to Rule 1121, and Units subject to Rule 1179.1

The provisions of this rule shall not apply to units used in recreational vehicles; units subject to the limits in South Coast AQMD Rule 1121 – Control of Nitrogen Oxides from Residential Type, Natural Gas-fired Water Heaters; and units subject to a NOx emission limit in Rule 1179.1 – Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities.

Paragraph (k)(2) – Low-Use Exemption – 9,000 therms per year

This existing exemption in Rule 1146.2 was intended for Type 2 units manufactured prior to January 1, 2000, with NOx emissions higher than 30 ppm NOx. The 9,000 therms per year low-use threshold is about 50 percent of typical annual fuel use for a medium size Type 2 unit, which is no longer justifiable as low-use. Staff proposes to phase out this provision when zero-emission requirements become effective.

Until the applicable Table 3 compliance dates, the Table 1 emission limits shall not apply to Type 2 units manufactured prior to January 1, 2000, that are demonstrated to use less than 9,000 therms during every calendar year. Subparagraph (g)(2)(D) addresses the recordkeeping requirements for paragraph (k)(2).

Paragraph (k)(3) – Low-Use Exemption – 2,000 or 3,000 therms per year

Paragraph (k)(3) provides a new low-use exemption from Table 2 zero-emission requirements for existing units installed prior to the date of rule adoption. Annual use of 3,000 therms is about 16 percent normal fuel use for a 1 MMBtu/hr unit and 2,000 therms is about 27 percent normal fuel use for a 400 kBtu/hr unit. The provisions of paragraphs (d)(2) and (d)(3) and subparagraph (d)(5)(B) shall not apply to the following existing units installed prior to the date of rule adoption that meet Table 1 emission limits: units with a rated heat input capacity greater than 1 MMBtu/hr, but less than or equal to 2 MMBtu/hr that are demonstrated to use less than 3,000 therms during every calendar year for; or units with a rated heat input capacity greater than 400 kBtu per hour, but less than or equal to 1 MMBtu/hr that are demonstrated to use less than 2,000 therms during every calendar year. Subparagraph (g)(2)(D) addresses the recordkeeping requirements for paragraph (k)(3).

Paragraph (k)(4) – Residential Structures

The provisions of paragraphs (d)(3), (d)(4), (d)(5), (d)(6), (d)(7) and the recordkeeping and reporting provisions in paragraphs (j)(4) through (j)(9) shall not apply to Units installed or used for Residential Structures. The retrofit requirement is intended for installations in industrial and commercial settings; therefore, units for residential structures are exempted from this requirement.

Paragraph (k)(5) – Zero-Emission for Existing Units after Their Unit Age for Small Businesses

The provisions of paragraph (d)(3) shall not apply to units installed in facilities that meet the Rule 102 definition of a small business if the owners or operators of the units register their facilities as small business and meet the specified recordkeeping requirements.

Paragraph (k)(6) – Certification Requirements

Certification requirements specified in paragraphs (f)(1) through (f)(4) shall not apply to units complying with Table 2 emission limits.

CHAPTER 4: IMPACT ASSESSMENT

INTRODUCTION

PAR 1146.2 is expected to impact 1,070,000 units located in the South Coast AQMD region.

EMISSIONS INVENTORY AND EMISSION REDUCTIONS

The total NOx inventory for the RECLAIM and non-RECLAIM units affected by PAR 1146.2 is estimated to be 5.6 tpd. For context, the 2022 AQMP indicated a total of 351 tpd of NOx emitted from all sources in the region in 2018, the base-year of the emissions inventory and modeling analysis in the plan. Appliances used in residential and commercial buildings emit about 22.1 tpd of NOx, which is about 54 percent of 2037 NOx emissions from all stationary and area sources that South Coast AQMD regulates. Those appliances are primarily space and water heaters, cooking devices, and some other appliances combusting natural gas. The estimated baseline emissions for PAR 1146.2 are around nine percent of the total stationary source inventory, as shown in the figure below.

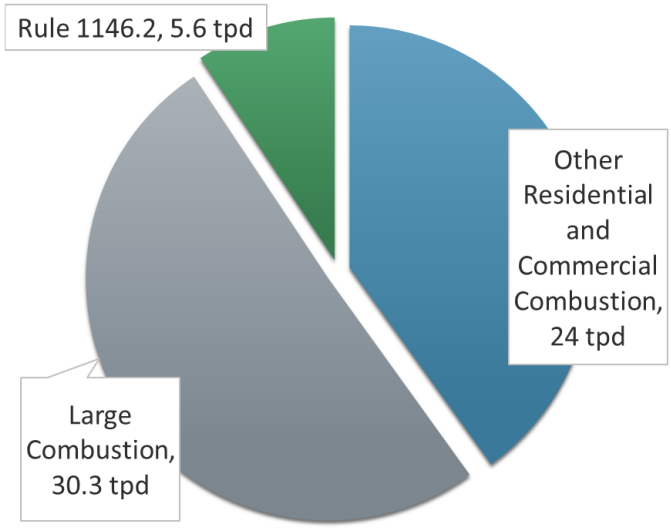

Figure 4-1. 2018 NOx Emissions from Stationary Sources (tons per day)

Baseline Emissions

PAR 1146.2 will impact 1,070,000 units, the applicable large water heaters, small boilers, and process heaters. To estimate baseline emissions, staff evaluated the following information:

- Estimated universe by category and categories' percentage of universe
- Unit size (MMBtu/hr) of the gas unit being replaced in each category
- Baseline Emission Factor (lb/MMBtu)
- Capacity Factor (or Usage Factor)
- Unit Age (years)

The following table was presented in Working Group Meeting #5 and has since been updated to reflect new data and assumptions:

Table 4-1. Baseline Emission Estimates

Equipment Category	Estimated Universe	Baseline Emissions Estimate (tpd)
Type 1 Units (not Type 1 Pool Heaters, Instantaneous Water Heaters, or High Temperature Units)	60,000	0.50
Type 1 High Temperature Units		0.19
Type 2 Units (not Instantaneous Water Heaters)		1.39
Type 1 Pool Heaters	710,000	3.25
Instantaneous Water Heaters	300,000	0.28
Total	**1,070,000**	**5.61**

Staff estimated the Type 1 pool heater universe and updated the baseline emission estimate in Working Group Meeting #5. According to the 2019 CEC Residential Appliance Saturation Study (RASS), seven percent of homes in the SoCalGas region have spas with gas heaters and five percent have pools with gas heaters.[54] There are approximately 5.9 million homes in the region from the U.S. Census' 2021 American Housing Survey. Staff estimated approximately 710,000 Type 1 pool heaters in the region and baseline emissions of 3.25 tpd for this category as 5.9 million homes × 0.12 = 708,000, rounding to 710,000. Based on the U.S. DOE estimate for units in California and the new DOE 84% efficiency requirement for gas pool heaters by 2028, staff calculated 211 annual operating hours for pool and spa heater units in California. Staff had previously used a capacity factor of 7.16% or 627 operating hours based on the previous Rule 1146.2 2004 implementation study, and staff had previously used 95% for gas pool heater efficiency. The updated pool and spa heater universe, annual operating hours of 211, and 84% pool heater efficiency inform the pool heater baseline emission estimate of 3.25 tpd, which is lower than the previous estimate of 5.66. This affects the total baseline emission estimate for PAR 1146.2 which is updated to 5.61 tpd.

[54] 2019 CEC Residential Appliance Saturation Study, Page 11, Table ES-3: Natural Gas UECs and Appliance Saturation Summaries by Gas Utility, https://www.energy.ca.gov/data-reports/surveys/2019-residential-appliance-saturation-study

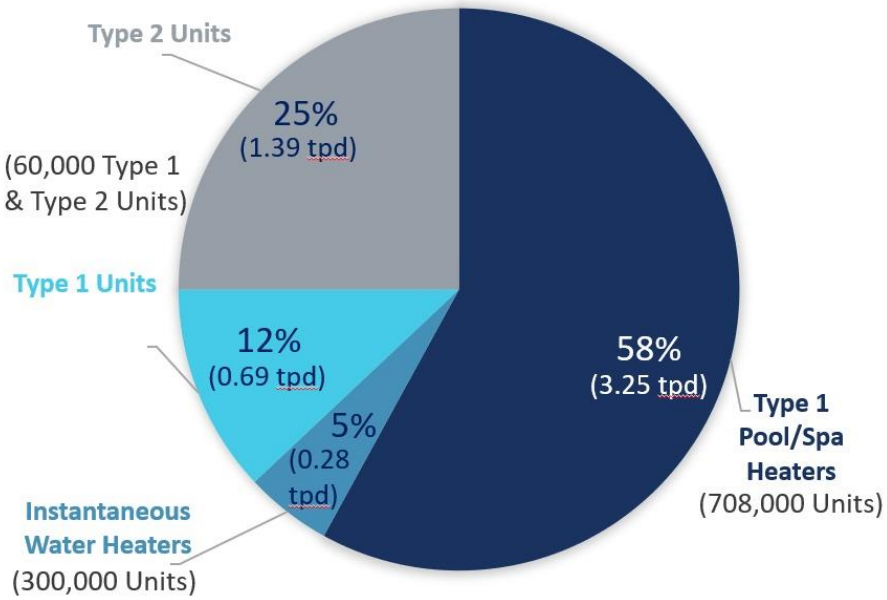

Figure 4-2. Percent of Baseline NOx Emissions Estimate

Analysis during the 2006 rule amendment estimated around 40,000 Type 1 units and 22,000 Type 2 units in the South Coast AQMD based on data provided by SoCalGas. For PAR 1146.2, staff updated the Type 1 and Type 2 water heater and boiler categories' percentages of universe based on Air-Conditioning, Heating, and Refrigeration Institute (AHRI) certifications data. Staff estimates there are approximately 60,000 Type 1 and Type 2 water heaters and boilers.

In recent years, adoption of residential instantaneous water heaters has increased with state and federal energy efficiency regulations. Staff estimated the instantaneous water heater universe to be approximately 300,000 instantaneous water heaters in the South Coast AQMD region using the 2019 California Residential Appliance Saturation Study (RASS) from the CEC and the Residential Energy Consumption Survey (RECS) from the U.S. Energy Information Administration.[55][56]

The baseline emission was estimated per unit by category as: Lifetime NOx Baseline Emission (tons) = Unit Size (MMBtu/hr) × Baseline Emission Factor (lb/MMBtu) × Capacity Factor (or usage factor) × Annual Hours × Unit Age (years) ÷ 2,000 pounds per ton.

For Type 1 units and instantaneous water heaters, 0.238 MMBtu/hr was the Type 1 mid-range unit size utilized in the calculation. For Type 2 units (not instantaneous water heaters), 1.2 MMBtu/hr was the Type 2 mid-range unit size utilized in the calculation.

The baseline emission factor (pounds per MMBtu) taken from previous Rule 1146.2 rulemaking was 0.067 pound of NOx per MMBtu for 20 ppmv at 3% oxygen for Type 1 pool heaters and 0.024 pound of NOx per MMBtu for 20 ppmv at 3% oxygen for other categories.

[55] California Energy Commission, 2019 California Residential Appliance Saturation Study, https://www.energy.ca.gov/publications/2021/2019-california-residential-appliance-saturation-study-rass

[56] U.S. Energy Information Administration, 2020 Residential Energy Consumption Survey Data, https://www.eia.gov/consumption/residential/data/2020/

The analysis also assumed 100 percent emission reduction for zero-emission units. The estimated emission reduction is 5.61 tpd at full implementation. For context, the 2022 AQMP indicated a total of 351 tpd of NOx emitted in 2018, the base-year of the emissions inventory and modeling analysis in the plan.

Zero-Emission Co-Benefits

South Coast Air Basin has been classified as "extreme" nonattainment for the 2015 ozone standard. Ozone is formed when NOx and VOC react in the presence of sunlight. While both NOx and VOC contribute to ozone, the key to attaining the ozone standard in the Basin is to reduce NOx.[57] While PAR 1146.2 is focused on zero-NOx standards, air quality co-benefits of zero-emission standards include reducing other emissions such as greenhouse gas (GHG) and particulate matter (PM) emissions. CARB's current rulemaking for potential statewide zero-emission appliance standards would be focused on zero-GHG and zero-NOx, while also quantifying the air quality co-benefits of reducing criteria pollutants such as smog-forming NOx, CO, and toxic air contaminant emissions.[58] The PAR 1146.2 zero-emission standard will also be considered as a control strategy for the South Coast AQMD to attain the 2012 annual PM 2.5 national ambient air quality standard by 2030.

COST-EFFECTIVENESS

Health and Safety Code Section 40920.6 requires a cost-effectiveness analysis when establishing BARCT requirements. The cost-effectiveness of a control technology is measured in terms of the control cost in dollars per ton of air pollutant reduced is measured in terms of the control cost in dollars per ton of air pollutant reduced for each class and category of equipment. The costs for the control technology include purchasing, installation, operating, and maintaining the control technology.

As detailed in chapter two, the South Coast AQMD typically relies on the DCF method which converts all costs, including initial capital investments and costs expected in the present and all future years of unit age, to a present value. The DCF calculation is detailed in Chapter 2.

The table below summarizes the cost-effectiveness estimates for each category.

Table 4-2. Cost-Effectiveness for PAR 1146.2 Categories

Category	Replace with	Cost-Effectiveness ($,Ton), No Panel Upgrade		Cost-Effectiveness ($,Ton), With Panel Upgrade	
		Energy Input Estimate Method	Energy Input Calculation Method	Energy Input Estimate Method	Energy Input Calculation Method
Type 1 Water Heater	Heat Pump	(190,000)	201,000	(93,000)	298,000

[57] South Coast AQMD, 2022 AQMP, https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/final-2022-aqmp.pdf?sfvrsn=16

[58] California Air Resources Board, Zero-emission Appliances, https://ww2.arb.ca.gov/our-work/programs/building-decarbonization/zero-emission-appliance-standards/faq

Category	Replace with	Cost-Effectiveness ($,Ton), No Panel Upgrade		Cost-Effectiveness ($,Ton), With Panel Upgrade	
		Energy Input Estimate Method	Energy Input Calculation Method	Energy Input Estimate Method	Energy Input Calculation Method
Type 2 Water Heater	Six Heat Pumps (Integrated)	(178,000)	197,000	(164,000)	212,000
	Two Heat Pumps (Split)	-	179,000	-	194,000
Type 1 Pool Heater	Heat Pump	-	11,000	-	58,000
	Heat Pump and Split Panel Cost	-	-	-	(4,000)
Type 1 High Temperature Unit	Heat Pump	-	559,000	-	578,000
	Electric Resistance	-	2,734,000	-	2,753,000
Type 2 High Temperature Unit (1 MMBtu)	Heat Pump	-	257,000	-	264,000
	Electric Resistance	-	2,722,000	-	2,812,000
Type 2 High Temperature Unit (2 MMBtu)	Heat Pump	-	152,000	-	156,000
Instantaneous Water Heater	Heat Pump	(185,000)	101,000	12,000	298,000
	Heat Pump and Split Panel Cost	-	-	(63,000)	223,000
	Electric Resistance Tank Type	-	3,078,000	-	3,275,000
	Electric Resistance Instantaneous	-	3,123,000	-	3,320,000

The proposed BARCT emission limits will take effect at the end of the presumed unit age of the equipment that is currently being used; therefore, the majority if the cost impacts are at the natural turnover of the equipment. The facilities will incur some cost to upgrade the equipment, but some of the cost will already be incurred due to end-of-unit-age replacement.

SOCIOECONOMIC IMPACT ASSESSMENT

A socioeconomic impact assessment has been conducted and was released for public review and comment at least 30 days prior to the South Coast AQMD Governing Board Hearing for PAR 1146.2, which is anticipated to be heard on June 7, 2024 (subject to change).

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS SUMMARY

Pursuant to the California Environmental Quality Act (CEQA) and South Coast AQMD's certified regulatory program (Public Resources Code Section 21080.5, CEQA Guidelines Section 15251(l) and South Coast AQMD Rule 110), the South Coast AQMD, as lead agency, reviewed the proposed project (PAR 1146.2) and determined that: 1) PAR 1146.2 implements the 2022 AQMP Control Measure C-CMB-01 – Commercial Water Heating; and 2) the Final Program Environmental Impact Report (EIR) for the 2022 AQMP evaluated Control Measure C-CMB-01 and analyzed its potential environmental impacts. Since PAR 1146.2 does not involve any new or modified impacts when compared to what was previously analyzed in the Final Program EIR for Control Measure C-CMB-01, PAR 1146.2 qualifies as a later activity within the scope of the program approved earlier for the 2022 AQMP per CEQA Guidelines 15168 (c), and the Final Program EIR for the 2022 AQMP adequately describes the activity for the purposes of CEQA such that no new environmental document will be required. The analysis supporting this conclusion is provided in Appendix A of this Staff Report.

DRAFT FINDINGS UNDER HEALTH AND SAFETY CODE SECTION 40727

Requirements to Make Findings

Health and Safety Code Section 40727 requires that prior to adopting, amending, or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing, and in the staff report.

Necessity

PAR 1146.2 is needed to establish BARCT requirements and achieve emission reductions proposed by 2022 AQMP Control Measure C-CMB-01 in order to meet the National Ambient Air Quality Standards for ozone.

Authority

The South Coast AQMD Governing Board has authority to adopt amendments to Rule 1146.2 pursuant to Health and Safety Code Sections 39002, 40000, 40001, 40440, 40702, 40725 through 40728, and 41508.

Clarity

PAR 1146.2 is written or displayed so that its meaning can be easily understood by the persons directly affected by it.

Consistency

PAR 1146.2 is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.

Non-Duplication

PAR 1146.2 will not impose the same requirements as any existing state or federal regulations. The proposed amended rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference

In amending Rule 1146.2, the following statutes which the South Coast AQMD hereby implements, interprets, or makes specific are referenced: Health and Safety Code Sections 39002, 40000, 40001, 40440, 40702, 40725 through 40728, and 41508.

COMPARATIVE ANALYSIS

Under Health and Safety Code Section 40727.2, the South Coast AQMD is required to perform a comparative analysis when adopting, amending, or repealing a rule or regulation. The comparative analysis is relative to existing federal requirements, existing or proposed South Coast AQMD rules and air pollution control requirements and guidelines which are applicable to combustion equipment subject to PAR 1146.2. There is no equivalent federal regulation applicable to be included in the table below.

Table 4-3. Comparative Analysis

Rule Element	Rule 1121	PAR 1146.2	Rule 1146.1	Rule 1146	Bay Area AQMD Rule 9-6	CARB In-Progress Rulemaking
Applicability	Natural gas-fired water heaters with heat input rates less than 75 kBtu/hr	Large water heaters, small boilers and process heaters less than or equal to 2 MMBtu/hr	Boilers, steam generators, and process heaters with maximum rated heat input capacities greater than 2 MMBtu/hr and less than 5 MMBtu/hr	Boilers, steam generators, and process heaters with maximum rated heat input capacities greater than or equal to 5 MMBtu/hr	Natural gas-fired water heater, rated heat input capacity 75 kBtu/hr – 2 MMBtu/hr	TBD: Anticipated 2030 for new equipment and appliances sold for use in both residential and commercial buildings
Requirements (All parts per million (ppmv) emission limits are referenced at 3 percent volume stack gas oxygen on a dry basis averaged over a period of 15 consecutive minutes)	NOx limits: Natural gas: 15 ppmv	NOx and CO limits: Natural gas: 0 ppmv (zero-emission)	NOx limits: Digester gas: 15 ppmv Landfill gas: 25 ppmv Natural gas: 7 or 9 ppmv, 12 ppmv for atmospheric, and 12 ppmv for thermal fluid heaters All others: 30 ppmv CO limit: 400 ppmv	NOx limits: Digester gas: 15 ppmv Landfill gas: 25 ppmv Natural gas: 5 ppmv for ≥75 MMBtu/hr, 7 or 9 ppmv for 20–75 MMBtu/hr, 12 ppmv for atmospheric, and 12 ppmv for thermal fluid heaters For other types of fuels: 30 ppmv for other gaseous fuels; 40 ppmv for nongaseous fuels CO limit: 400 ppmv	NOx limits: Natural gas: 0 ppmv (zero-emission)	TBD: Anticipated zero-emission (GHG, NOx)
Reporting	None	Manufacturers every year	None	Every 6 months for units greater	None	TBD

Rule Element	Rule 1121	PAR 1146.2	Rule 1146.1	Rule 1146	Bay Area AQMD Rule 9-6	CARB In-Progress Rulemaking
		after Table 3 compliance dates – product models, unit number, rated heat input capacity, applicable equipment category		than or equal to 40 MMBtu/hr and an annual heat input greater than 200 x 109 Btu per year (Rule 218)		
Monitoring	None	Source test report Requirements by alternative compliance options	Source testing once every 5 years	A continuous in-stack NOx monitor for units greater than or equal to 40 MMBtu/hr and an annual heat input greater than 200 x 109 Btu per year Source testing once every 3 – 5 years for other units	None	TBD
Recordkeeping	None	Maintenance records = 3 years Rated heat input capacity & modification documentation	Source test records = 2 years (5 years if Title V) Monitoring data = 2 years (5 years if Title V)	Source test records Maintenance & emission records = 2 years Monitoring data = 2 years (5 years if Title V)	None	TBD

APPENDIX A: DETAILED CEQA ANALYSIS

INTRODUCTION

The California Environmental Quality Act (CEQA) is comprised of Public Resources Code Section 21000 et seq. and the CEQA Guidelines which are codified at Title 14 California Code of Regulations, Section 15000 et seq. CEQA requires the evaluation of all potential adverse environmental impacts of proposed projects and the identification and implementation of methods to reduce or avoid significant adverse environmental impacts of these projects, if feasible. [Public Resources Code Section 21061.1 and CEQA Guidelines Section 15364 defining feasible]. The purpose of the CEQA process is to inform decision makers, public agencies, and interested parties of potential adverse environmental impacts that could result from implementing a proposed project and to identify feasible mitigation measures or alternatives, when an impact is significant.

Control Measure C-CMB-01 of the 2022 AQMP seeks to deploy zero-emission water heating units for new and existing commercial buildings. South Coast AQMD is technology and fuel neutral, and is focused on achieving NOx emission reductions. Should zero-NOx natural gas technologies be developed and adopted, consumers would have the opportunity to choose between newly designed natural gas and other zero-emission appliances. The zero-emission water heating units with high energy efficiency appropriate for use in commercial applications could be integrated heat pump water heaters, which have water tanks packaged with them as single units, or split heat pump water heaters with water tanks located up to 50 feet away. These devices would increase electricity demand.

PAR 1146.2 implements Control Measure C-CMB-01 of the 2022 AQMP and proposes to achieve NOx emission reductions by requiring zero-emission (0 ppmv) limits for new installations based on future effective dates depending on the commercial availability of zero-emission technologies, and zero-emission limits for existing units that will reach the end of unit age after the zero-emission compliance dates, with an exemption for units used for residential structures and small businesses. PAR 1146.2 affects approximately 1,070,000 units in the South Coast AQMD jurisdiction, and full implementation of PAR 1146.2 is expected to reduce NOx emissions by 5.6 tons per day (tpd) by 2058. A technology assessment by 2028 would provide the Stationary Source Committee with an update on the technology and market readiness for the rule.

The 2022 AQMP[59] was considered a "project" as defined by CEQA Guidelines Section 15378, and the South Coast AQMD was lead agency under CEQA because it was the "public agency that has the principal responsibility for carrying out or approving a project that may have a significant effect upon the environment." [Public Resources Code Section 21067]. Further, since the South Coast AQMD Governing Board had the primary responsibility for approving the entirety of the project, the South Coast AQMD was the most appropriate public agency to act as lead agency for the project. [CEQA Guidelines Section 15051(b)].

The 2022 AQMP: 1) had environmental impacts which were evaluated in a Final Program Environmental Impact Report (Program EIR); and 2) was a discretionary action which was considered and approved by the South Coast AQMD Governing Board.

[59] South Coast AQMD, 2022 Air Quality Management Plan, December 2022. https://www.aqmd.gov/home/air-quality/air-quality-management-plans/air-quality-mgt-plan

Therefore, the proposed project, PAR 1146.2, is integrally related to the 2022 AQMP for which a previous environmental analysis has been prepared in the Final Program EIR for 2022 AQMP, which was certified by the South Coast AQMD Governing Board on December 2, 2022.[60]

The Final Program EIR for the 2022 AQMP identified potentially significant impacts, and mitigation measures were adopted. Further, since mitigation measures were adopted for the 2022 AQMP, a Mitigation, Monitoring, and Reporting Plan for the 2022 AQMP, pursuant to Public Resources Code Section 21081.6 and CEQA Guidelines 15097 was also required and adopted.

Further, because the Final Program EIR concluded that the 2022 AQMP will have potentially significant and unavoidable adverse impacts on the environment, Findings were made pursuant to CEQA Guidelines Section 15091, and a Statement of Overriding Considerations pursuant to CEQA Guidelines Section 15093 was adopted.

The 2022 AQMP, along with the December 2022 Final Program EIR for the 2022 AQMP (State Clearinghouse No. 2022050287) and its corresponding Findings, Statement of Overriding Considerations, and Mitigation, Monitoring, and Reporting Plan, upon which the analysis of the PAR 1146.2 relies, are incorporated by reference pursuant to CEQA Guidelines Section 15150 and are available from the South Coast AQMD's website at:

December 2022 Final Program EIR for the 2022 AQMP
Master webpage: https://www.aqmd.gov/home/research/documents-reports/lead-agency-scaqmd-projects/south-coast-aqmd-projects---year-2022

> **December 2022 Final Program EIR for the 2022 AQMP (including Appendices)**
> https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-final-peir.pdf
>
> **Findings, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Plan:** https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-attachment1toresolution.pdf
>
> **2022 AQMP:** https://www.aqmd.gov/home/air-quality/air-quality-management-plans/air-quality-mgt-plan

Copies of these documents may also be obtained from:

> Derrick Alatorre, Deputy Executive Officer/Public Advisor
> South Coast AQMD 21865 Copley Drive, Diamond Bar, CA 91765
> Phone: (909) 396-2432
> Email: publicadvisor@aqmd.gov

A Program EIR was considered to be the appropriate document for the 2022 AQMP pursuant to CEQA Guidelines Section 15168(a)(3) because the 2022 AQMP constituted a series of actions that can be characterized as one large project in connection with the issuance of rules, regulations,

[60] South Coast AQMD, Final Program Environmental Impact Report for the 2022 Air Quality Management Plan, December 2022. https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-final-peir.pdf

plans, or other general criteria required to govern the conduct of a continuing program. In addition, the use of a Program EIR had the following advantages by:

- Providing an occasion for a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action;
- Ensuring a consideration of cumulative impacts that might be slighted in a case-by-case analysis;
- Avoiding duplicative reconsideration of basic policy considerations;
- Allowing consideration of broad policy alternatives and program-wide mitigation measures at an early time when the Lead Agency has greater flexibility to deal with basic problems of cumulative impacts; and
- Allowing its use with a later activity if the later activity is within the scope of the project analyzed in the Program EIR without requiring further environmental documents.

Because PAR 1146.2 implements a previously adopted 2022 AQMP Control Measure C-CMB-01, this chapter examines whether PAR 1146.2 qualifies as a later activity within the scope of the analyses in the Final Program EIR for the 2022 AQMP, pursuant to CEQA Guidelines 15168(c) – Use with Later Activities.

As such, this chapter: 1) compares the proposed later activity of PAR 1146.2 with the previously approved program, Control Measure C-CMB-01 which was adopted in the 2022 AQMP; 2) summarizes the environmental impacts analyzed in the Final Program EIR for the 2022 AQMP for Control Measure C-CMB-01; 3) identifies the differences, if any, between the analysis of the environmental impacts in the Final Program EIR for 2022 AQMP for Control Measure C-CMB-01 and PAR 1146.2 and as needed, identifies any other impact areas which may require further analysis; and 4) considers the evidence and determines whether: a) PAR 1146.2 is a later activity within the scope of the program approved earlier for the 2022 AQMP; and b) the Final Program EIR for the 2022 AQMP adequately describes the later activity of PAR 1146.2 for the purposes of CEQA such that no new environmental document will be required.

SUMMARY OF ENVIRONMENTAL IMPACTS

The CEQA Guidelines require environmental documents to identify significant environmental effects that may result from a proposed project. [CEQA Guidelines Section 15126.2(a)]. Direct and indirect significant effects of a project on the environment should be identified and described, with consideration given to both short- and long-term impacts. The discussion of environmental impacts may include, but is not limited to, the resources involved; physical changes; alterations of ecological systems; health and safety impacts caused by physical changes; and other aspects of the resources involved including water, scenic quality, and public services. If significant adverse environmental impacts are identified, the CEQA Guidelines require a discussion of measures that could either avoid or substantially reduce any adverse environmental impacts to the greatest extent feasible. [CEQA Guidelines Section 15126.4].

The categories of environmental impacts to be studied in a CEQA document are established by CEQA [Public Resources Code Section 21000 et seq.] and the CEQA Guidelines [codified in Title

14 California Code of Regulations Section 15000 et seq]. Under the CEQA Guidelines Appendix G: Environmental Checklist Form, there are 20 environmental topic areas categories in which potential adverse impacts from a project are evaluated. The South Coast AQMD, as lead agency, has taken into consideration the environmental checklist questions in Appendix G, but has reorganized the contents to consolidate the environmental topic areas to avoid repetition. For example, South Coast AQMD's customized the environmental checklist by: 1) combining the topics of "air quality" and "greenhouse gas emissions" into one section; 2) combining the topics of "cultural resources" and "tribal cultural resources" into one section; 3) separating the "hazards and hazardous materials" topic into two sections: "hazards and hazardous materials" and "solid and hazardous waste;" and 4) distributing the questions from the topic of "utilities/service systems" into other more specific environmental areas such as "energy," "hydrology and water quality," and "solid and hazardous waste." For each environmental topic area, per CEQA Guidelines Section 15064.7(a), "[a] threshold of significance is an identifiable quantitative, qualitative, or performance level of a particular environmental effect, noncompliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant." The South Coast AQMD has developed unique thresholds of significance for the determination of significance in accordance with CEQA Guidelines Section 15064.7(b).

The CEQA Guidelines also includes provisions for the preparation of Program EIRs in connection with the issuance of plans, such as the 2022 AQMP, to govern the conduct of a continuing program, including adoptions of broad policy programs as distinguished from those prepared for specific types of projects such as land use projects, for example. [CEQA Guidelines Section 15168]. A Program EIR also allows for the consideration of broad policy alternatives and program-wide mitigation measures at an early time when an agency has greater flexibility to deal with basic problems or cumulative impacts. [CEQA Guidelines Section 15168 (b)(4)]. Lastly, a Program EIR also plays an important role in establishing a structure within which a CEQA review of future related actions can be effectively conducted. A Program EIR, by design, provides the basis for future environmental analyses and will allow future project-specific CEQA documents, if necessary, to focus solely on the new effects or detailed environmental issues not previously considered. If an agency finds that no new effects could occur, or no new mitigation measures would be required, the agency can approve the activity as being within the scope of the project covered by the Program EIR and no new environmental document would be required. [CEQA Guidelines Section 15168(c)(2)].

The Final Program EIR for the 2022 AQMP analyzed the impacts of implementing the various control measures in the 2022 AQMP on 19 environmental topic areas: aesthetics, agriculture and forestry resources, air quality and greenhouse gas emissions, biological resources, cultural and tribal cultural resources, energy, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, public services, recreation, solid and hazardous waste, transportation, wildfire, and mandatory findings of significance. The Final Program EIR for the 2022 AQMP concluded that the implementation of all of the control measures in the 2022 AQMP would result in potentially significant impacts for the following environmental topic areas: air quality and greenhouse gas (GHG), energy, hazards and hazardous materials, hydrology and water quality, noise, and solid and hazardous waste. All other environmental topic areas were either concluded to have less than significant impacts or no impact. Mitigation measures to minimize significant impacts from implementation of the 2022

AQMP were adopted in the Mitigation, Monitoring, and Reporting Plan which can be found in Attachment 1 to the Governing Board Resolution for the Final Program EIR for the 2022 AQMP.[61]

Table A-1 summarizes the analysis in the Final Program EIR for the 2022 AQMP associated with the Control Measure C-CMB-01: physical changes expected, environmental topic areas affected according to level of significance impact, and the applicable mitigation measures. It should be noted that Control Measure C-CMB-01 was determined to have potentially significant impacts to the environmental topic areas of air quality and GHG, energy, noise, and solid and hazardous waste; but no impact to the environmental topic areas of hazards and hazardous materials, and hydrology and water quality. However, the Final Program EIR for the 2022 AQMP concluded potential significant impacts to hazards and hazardous materials, and hydrology and water quality as a result of implementing other control measures.

[61] South Coast AQMD, Attachment 1 to the Governing Board Resolution for the Final Program Environmental Impact Report for the 2022 Air Quality Management Plan, December 2022. https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-attachment1toresolution.pdf

Table A-1. Analysis of Control Measure C-CMB-01 in the Final Program EIR for the 2022 AQMP

Physical Changes Expected From C-CMB-01		Environmental Topic Areas with Potentially Significant Impacts	Environmental Topic Areas with Less than Significant Impacts	Environmental Topic Areas with No Impacts	Applicable Mitigation Measures
Construction	Demolition or removal of existing building components or structures, and water heating systems	- Air Quality - Energy - Noise - Solid and Hazardous Waste	- GHG - Transportation	All other environmental topic areas not listed to be potentially significantly impacted, or less than significantly impacted	Air Quality and GHG: AQ-1 to AQ-26 Energy: E-3 to E-5, and E-7 Noise: NS-1 to NS-14 Solid and Hazardous Waste: SHW-1 to SHW-3
	Installation of new water heating systems	- Air Quality - Energy - Noise			Air Quality and GHG: AQ-1 to AQ-26 Energy: E-3 to E-5, and E-7 Noise: NS-1 to NS-14
Operation	Increased use of electricity and natural gas to produce electricity	- Energy	- Air Quality and GHG		Energy: E-1 to E-4, and E-7 to E-9

Table A-2 summarizes the physical changes expected, environmental topic areas affected, and the applicable mitigation measures associated with implementation of PAR 1146.2 and compares the similarities to those analyzed for Control Measure C-CMB-01 in the Final Program EIR for the 2022 AQMP. The replacement of existing water heating equipment is expected to occur at the end of unit age such that operators will remove the existing equipment and install a new water heating system regardless of implementation of PAR 1146.2, and the upgrades to electrical panels and other building components to enable the increased use of zero-emission equipment are not expected to require trenching or other construction requiring soil movement. Therefore, of the above physical changes contemplated from Control Measure C-CMB-01, implementation of PAR 1146.2 is only expected to result in the increased use of electricity and natural gas to produce electricity.

Table A-2. Comparison of Environmental Impacts between C-CMB-01 and PAR 1146.2

Physical Changes Expected from PAR 1146.2	Similarity to Environmental Topic Areas with Potentially Significant Impacts	Similarity to Environmental Topic Areas with Less than Significant Impacts	Similarity to Environmental Topic Areas with No Impacts	Similarity to Applicable Mitigation Measures
Increased use of electricity and natural gas to produce electricity *Because PAR 1146.2 does not require replacement of water heating systems before the end of unit age:* *1) demolition and removal of existing building components or structures, and water heating systems; and* *2) installation of new water heating systems* *are physical changes that will occur regardless of implementation of PAR 1146.2.*	- Energy *Implementation of PAR 1146.2 is expected to result in the same potentially significant impacts as anticipated for increased electrical demand from Control Measure C-CMB-01 of the 2022 AQMP.*	- Air Quality and GHG *Implementation of PAR 1146.2 is expected to result in the same less-than-significant impacts as anticipated for increased electrical demand from Control Measure C-CMB-01 of the 2022 AQMP.*	- Aesthetics - Agriculture and Forestry Resources - Biological Resources - Cultural and Tribal Cultural Resources - Geology and Soils - Hydrology and Water Quality - Hazards and Hazardous Materials - Land Use and Planning - Mineral Resources - Noise - Population and Housing - Public Services - Recreation - Solid and Hazardous Waste - Transportation - Wildfire *Same as for increased electrical demand from Control Measure C-CMB-01*	Energy: E-1 to E-4, and E-7 to E-9 *The mitigation measures minimizing impact on increased electricity demand from Control Measure C-CMB-01 of the 2022 AQMP are expected to apply to PAR 1146.2.*

While PAR 1146.2 implements Control Measure C-CMB-01 of the 2022 AQMP, because the proposed amended rule does not require replacement of water heating systems before the end of unit age and is not expected to require trenching or other construction requiring soil movement, the physical changes resulting from PAR 1146.2 will be fewer than those contemplated under the analysis in the Final Program EIR for the 2022 AQMP for Control Measure C-CMB-01. Further, the analysis of environmental impacts for Control Measure C-CMB-01 covers the breadth of impacts resulting from PAR 1146.2 such that no new physical impacts need to be evaluated.

The Final Program EIR for the 2022 AQMP determined that the increased electricity demand from implementation of Control Measure C-CMB-01 has the potential to generate significant adverse energy impacts, less than significant air quality and GHG impacts, and no impact to all other environmental topic areas.

ENVIRONMENTAL TOPIC AREA WITH POTENTIALLY SIGNIFICANT IMPACTS

The Final Program EIR for the 2022 AQMP analyzed the potential environmental impacts that may occur from implementing all of the control measures which comprise the 2022 AQMP and its goal to address the 2015 federal 8-hour ozone standard to satisfy the planning requirements of the federal Clean Air Act (CAA), and concluded that its implementation would result in potentially significant impacts for the following environmental topic areas: air quality and GHG, energy, hazards and hazardous materials, hydrology and water quality, noise, and solid and hazardous waste. Specific to the implementation of Control Measure C-CMB-01, the Final Program EIR for the 2022 AQMP analyzed and concluded potentially significant impacts to the environmental topic of energy.

Since PAR 1146.2 implements Control Measure C-CMB-01 without adding new or modifying the previously analyzed impacts for each environmental topic area, the overall conclusion of potentially significant impacts for the topic of energy in the Final Program EIR for the 2022 AQMP will remain unchanged if PAR 1146.2 is implemented.

The following section summarizes the analysis of potentially significant impacts for the topic of energy in the Final Program EIR for the 2022 AQMP.

Energy

The Final Program EIR for the 2022 AQMP identified the following potential significant energy impacts associated with implementation of PAR 1146.2: 1) increase in electricity demand due to increased usage of zero-emission technologies installed in residential and commercial settings, and 2) increase in natural gas demand to produce electricity.

Impact to Electricity Demand

The Final Program EIR for the 2022 AQMP estimated potential electricity use associated with residential and commercial water heating where sufficient data was available to make reasonable estimates. Table A-3 is a subset of Table 4.3-2. Potential Increase in Electricity Use for Residential and Commercial Equipment, from the Final Program EIR for the 2022 AQMP.

Table A-3. Potential Increase in Electricity Use for Residential and Commercial Water Heating Estimated in the Final Program EIR for the 2022 AQMP

Equipment/ Source Category	Estimated Number of Affected Units	Estimated Electricity Use Per Unit (1)	Estimated Total Electricity Use (GWh/yr)
Residential Water Heating	Of 2 million water heaters installed, 50% of residences will be zero-emission and 50% will be low NOx water heaters (2)	380 - 500 kWh/month	6,000
Residential – Other Combustion Sources (pool heaters)	200,000 pool heaters(3)	1.5 kWh/hr	60
Commercial Water Heating	96,000(4): 64,000 Tier I (less than 400 kBtu/hr) 32,000 Tier II (400 kBTU/hr to 2 MMBTU/hr)	Tier I: 1.4 kWh/hr Tier II: 6.8 kWh/hr	Tier I: 98 Tier II: 238

Source: Final Program EIR for the 2022 AQMP, see Chapter 4, page 4.3-11, Table 4.3-2.

(1) https://www.siliconvalleypower.com/residents/save-energy/appliance-energy-use-chart.
(2) For purposes of calculating maximum electricity increases, all new units are assumed to be third-party provided power even though some portions will be solar powered.
(3) Assumes pool heaters are used 200 hours per year.
(4) Assumes water heaters operates 3 hours per day.

While Table A-3 presents estimates on the total electricity use from residential water heaters and pool heaters, and commercial water heaters, the Final Program EIR for the 2022 AQMP considered Basin-wide electricity use to form its conclusion regarding energy impacts due to electricity demand. Statewide electricity consumption was more than 279,000 GWh in 2020, with approximately 118,200 GWh (42 percent) in the South Coast Air Basin. [CEC, 2021]. CEC estimated an increase in electricity demand of about 1.6 percent annually through 2035. [CEC, 2021]. By applying that growth rate, the total electricity use in California would be approximately 354,000 GWh by 2035. Approximately 150,000 GWh (42 percent) of that would be within the South Coast Air Basin (assuming the percentage attributed to the South Coast Air Basin remains the same). The 2022 AQMP control measures would then increase the electricity demand by an additional estimated 13,429 GWh (approximately 11 percent over 2020 consumption and nine percent over the CEC projected growth) and this amount did not take into account the electricity that may be needed to operate additional air pollution control equipment or to convert combustion equipment to fully electric. Thus, the overall potential increase in electricity demand could be higher.

In order for utilities to be able to provide sufficient electricity to meet future demands, the use of additional energy storage systems (e.g., battery arrays) is also a key component for being able to store electricity at the time when resources are available (e.g., when the sun shines and the wind blows), and to use that stored electricity at a later time. Further, the analysis in the Final Program EIR for the 2022 AQMP conservatively assumed that all sources affected by a control measure with the potential to increase demand for electricity, would use electricity rather than other forms

of energy. In addition, any increase in electricity demand would likely result in a concurrent reduction in demand for other types of fuels, particularly petroleum fuels. Because the control measures in the 2022 AQMP were developed with the goal of attaining the federal ozone standard, the successful implementation of some of the control measures relied on the use of electricity in order to reduce NOx emissions, an overall air quality benefit for the region. Therefore, the 2022 AQMP was expected to result in a substantial depletion of existing energy (specifically electricity) resource supplies.

Even with energy conservation programs in effect in California, additional electricity would be needed, and power plants would be required to supply the projected increase in electricity demand and general population growth. While increased demand for electricity would occur due to general population growth, additional increases in electricity demand beyond general population growth would be expected if the control measures in the 2022 AQMP, such as C-CMB-01, were implemented. The implementation of all the control measures was expected to result in an overall increase of greater than the approximately 11 percent of the existing electricity use discussed for residential, commercial, and mobile sources. This increase, along with the increases in electricity associated with other state programs and mandates, was expected to exceed the electrical generating capacity of the system. Thus, the energy impacts from the implementation of the 2022 AQMP were expected to be significant for electricity demand.

Because the energy impacts from the implementation of the 2022 AQMP are expected to be significant for electricity demand, the Final Program EIR for the 2022 AQMP provided feasible mitigation measures E-1 to E-7 for reducing impacts related to potential electricity demand. Because mitigation measure E-5 minimizes impacts from charging electric vehicles and mobile sources, and mitigation measure E-6 pertains to use of electrical transportation systems, and these two sources are not affected by Control Measure C-CMB-01, only mitigation measures E-1 to E-4, and E-7 are applicable to minimizing energy impacts from increased electricity demand due to implementation of PAR 1146.2.

The Final Program EIR for the 2022 AQMP concluded that significant adverse electricity demand impacts would be created by the 2022 AQMP because the potential increase in electricity usage would exceed baseline electricity consumption by up to 11 percent. Even after mitigation measures E-1 to E-7 were applied, electricity demand impacts would remain significant.

The data in Table A-3 is extracted from Table 4.3-2 of the Final Program EIR for the 2022 AQMP and was forecasted based on the best information available at the time. Development of PAR 1146.2 has clarified that there are currently 708,000 existing pool and spa heaters in the South Coast Basin, and that each of these pool and spa heaters operate approximately 211 hours per year. If all 708,000 of the pool and spa heaters are replaced with technology that relies on electricity from the power grid, then the energy use estimate will increase from 60 GWh/year to 224 GWh/year. Overall, this change in the number of pool and spa heaters would increase the electricity demand from all 2022 Control Measures from 13,429 GWh (approximately 11 percent over 2020) to 13,593 GWh (approximately 11.5 percent over 2020 consumption).

Thus, this projected increase in the number of affected equipment from 200,000 pool heaters to 708,000 pool and spa heaters, and the increase in the operating hours per year from 200 to 211 does not substantially change the overall energy impacts analysis or conclusions, because: 1) the

Final Program EIR for the 2022 AQMP already considered an 11% increase in overall Basin-wide use of electricity at a minimum, stating that overall potential electricity use for all control measures implemented together could be higher; 2) PAR 1146.2 does not specify the type of technology that may be employed to achieve the NOx emission standards so solar pool and spa heaters may be part of the technology mix which if employed, would mean electricity sourced from the power grid may not be needed for the entire universe of existing pool and spa heaters being replaced and that the locations relying on solar technology would have a lesser demand for electricity that is sourced from the grid; 3) pool and spa heaters are typically used in the colder months and evenings which is generally outside of peak daily electricity demand; and 4) the timing when pool and spa heaters are expected to be replaced will occur over an extended implementation schedule between 2031 and 2046. Implementation of the 2022 AQMP was concluded to have significant energy impacts due to electricity demand, and based on the preceding update to the analysis, the increase in number of potentially affected units and operating hours does not change this conclusion.

Impact to Natural Gas Demand

Control measures in the 2022 AQMP, such as C-CMB-01, were expected to result in: 1) an increase in demand for natural gas primarily associated with the production of electricity in the short term; and 2) a decreased demand for natural gas appliances in commercial and residential setting. Control measure C-CMB-01 was expected to require additional electricity. While the electrical grid needs to generate electricity that is comprised of 100 percent renewable energy by 2045 per Senate Bill 100 (SB 100, De León)[62] (and short-term natural gas usage for the production of electricity will cease), additional sources of electricity would be required in order to meet the 2035 goals of the 2022 AQMP.

The potential for growth in electrification poses considerable uncertainty on when, where, and how large the impact on natural gas demand in California will be. For the residential and commercial building sectors, electrification of various appliances such as water heating would have the potential to decrease the use of natural gas. However, while there will be a shift from utilizing natural gas in these types of appliances for residential and commercial land uses to electricity, the potential for increased electrification of buildings would also contribute to an overall increase in electricity demand which could require natural gas-fired turbines and engines to ramp up operations to meet the increased load. This load increase could cause additional use of natural gas in electricity generation equipment. [California Gas and Electric Utilities, 2020].

SoCal Gas projects total gas demand to decline at an annual rate of one percent between 2020 and 2035. The decline in natural gas demand is due to modest economic growth and California Public Utilities Commission (CPUC)-mandated energy efficiency standards and programs. Other factors that contribute to the downward trend are more stringent standards established in the revised Title 24 Building Codes, renewable electricity goals, a decline in core commercial and industrial demand, and conservation savings. [California Gas and Electric Utilities, 2020].

There are critical interdependencies between electricity and the natural gas system reliability in California. Natural gas-fired electricity generation has been an integral part of the electricity system, providing baseload power. It has also served as the backstop during drought conditions that reduce the availability of hydroelectric power generation. The role of natural gas-fired

[62] Senate Bill 100, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB100.

electricity generation in the electricity system is shifting with the addition of large amounts of renewable generation, primarily solar and wind. The large influx of renewable energy on the grid has reduced natural gas produced electricity from 53 percent of total electric generation in 2010 to 48 percent in 2020. Renewables have displaced a portion of daytime generation previously provided by natural gas, but the intermittency of solar and wind resources necessitates flexible resources that can quickly come on-line when the sun sets, or winds stop blowing. [CEC, 2021].

Total electric generation load (including large cogeneration and non-cogeneration electric generation for a normal hydro year) is expected to decline from 245 billion cubic feet in 2020 to 182 billion cubic feet in 2035, a decrease of 2.0 percent per year. The main factors for the decline are an increasing renewable energy target level, retirement of older natural gas-fired plants, and the addition of more efficient natural gas-fired plants. [California Gas and Electric Utilities, 2020].

Ultimately, as natural gas is generally widely available, natural gas supplies were not expected to be limited if the 2022 AQMP was implemented. The combined increase in natural gas demand needed for producing electricity and hydrogen and for fueling vehicles could be somewhat offset over the long-term by a decrease in demand for natural gas appliances in commercial and residential settings. However, over the short term, the natural gas demand was expected to increase. Based upon these considerations, significant adverse energy impacts relating to natural gas demand were expected from implementing the 2022 AQMP.

Because the energy impacts from the implementation of the 2022 AQMP are expected to be significant for natural gas demand, the Final Program EIR for the 2022 AQMP provided the feasible mitigation measures E-8 to E-9 for reducing impacts related to potential natural gas demand.

The Final Program EIR for the 2022 AQMP concluded that significant adverse natural gas demand impacts would be created by the 2022 AQMP because of the potential increase in natural gas usage for electricity and hydrogen production. Even after mitigation measures E-8 and E-9 were applied, natural gas demand impacts would remain significant.

Mitigation Measures

E-1 Project sponsors should pursue incentives to encourage the use of energy efficient equipment and vehicles and promote energy conservation during electricity generation.

E-2 Utilities should increase the capacity of existing transmission lines to meet forecast demand that supports sustainable growth where feasible and appropriate in coordination with local planning agencies.

E-3 Project sponsors should submit projected electricity calculations to the local electricity provider for any project anticipated to require substantial electricity consumption. Any infrastructure improvements necessary should be completed according to the specifications of the electricity provider.

E-4 Project sponsors should include energy analyses in environmental documentation with the goal of conserving energy through the wise and efficient use of energy.

E-5 Project sponsors should evaluate the potential for reducing peak energy demand by encouraging charging of electrical vehicles and other mobile sources during off-peak hours.

E-6 Project sponsors should evaluate the potential for reducing peak energy demand by encouraging the use of catenary or way-side electrical systems developed for transportation systems to operate during off-peak hours.

E-7 Project sponsors should evaluate the potential for reducing peak energy demand by encouraging the use of electrified stationary sources during off-peak hours.

E-8 Projects that require a substantial increase in natural gas demand should consider the use of renewable gas, where available and feasible, including biofuel landfill gas and gas produced from renewable fuels projects.

E-9 Project sponsors should submit projected natural gas demand use to the local natural gas provider for any project anticipated to require substantial natural gas consumption. Any infrastructure improvements necessary should be completed according to the specifications of the natural gas provider.

Cumulative Impacts

The Final Program EIR for the 2022 AQMP concluded that implementation of the 2022 AQMP could result in significant adverse electricity consumption impacts because the potential electricity usage increase would exceed baseline electricity consumption by an estimated 11 percent. Significant impacts were also concluded for natural gas and hydrogen demand. When combined with the Southern California Association of Governments (SCAG) Connect SoCal Plan[63], the CARB Proposed 2022 State SIP Strategy[64], state policies, and other past, present, and reasonably foreseeable activities, the 2022 AQMP would result in a significant increase in electricity, natural gas, and hydrogen demand which may not currently be available, and would contribute to cumulatively considerable impacts. No additional mitigation measures to reduce the significant cumulative impacts to energy were identified. Cumulative impacts to energy demand for past, present, and reasonably foreseeable future projects would remain significant and unavoidable for electricity, natural gas, and hydrogen demand. Because hydrogen use is not contemplated in implementation of PAR 1146.2, PAR 1146.2 does not contribute to cumulative impacts to energy from hydrogen demand.

[63] Southern California Association of Governments, Connect SoCal (2020–2045 Regional Transportation Plan/Sustainable Communities Strategy), May 2020. https://scag.ca.gov/read-plan-adopted-final-connect-socal-2020

[64] California Air Resources Board, 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy), September 2022. https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy

Table A-4. Summary of Energy Analysis

Significance Criteria	Potential Significant Impacts	MMs	Cumulative Impacts
Energy impacts are significant if any of the following conditions occur: • The project conflicts with adopted energy conservation plans or standards. • The project results in substantial depletion of existing energy resource supplies. • An increase in demand for utilities impacts the current capacities of the electric and natural gas utilities. • The project uses non-renewable energy resources in a wasteful and/or inefficient manner.	Implementation of PAR 1146.2 would cause potential significant energy impacts from: • Increase in electricity demand due to increased usage of zero-emission technologies installed in residential and commercial settings, and • Increase in natural gas demand to produce electricity	E-1 to E-4, and E-7 to E-9	Cumulative impacts to energy demand for past, present, and reasonably foreseeable future projects would remain significant and unavoidable for electricity and natural gas demand.

ENVIRONMENTAL TOPIC AREA WITH LESS THAN SIGNIFICANT IMPACTS

Since PAR 1146.2 implements Control Measure C-CMB-01 without adding new or modifying the previously analyzed impacts for each environmental topic area, the overall conclusion of less than significant impacts for the topics of air quality and greenhouse gas emissions in the Final Program EIR for the 2022 AQMP will remain unchanged if PAR 1146.2 is implemented.

The following summarizes the analysis of less than significant impacts for the environmental topic of air quality and greenhouse gas emissions in the Final Program EIR for the 2022 AQMP.

Air Quality and Greenhouse Gas Emissions

The Final Program EIR for the 2022 AQMP concluded that implementation of the 2022 AQMP control measures, such as Control Measure C-CMB-01, would generate potentially significant air quality impacts during construction, less than significant operational air quality impacts, and potentially significant short-term increases in GHG emissions that would be offset and eventually result in a long-term net reduction in GHG emissions.

Impact to Construction Air Quality

The Final Program EIR for the 2022 AQMP contemplated that implementation of Control Measure C-CMB-01 would require construction including demolition or removal of existing building components or structures, and water heating systems, and installation of new water heating systems. These physical changes are caused by implementation of Control Measure C-CMB-01 if equipment is replaced earlier than the end of unit age. For PAR 1146.2, because replacement of existing water heating equipment is expected occur at the end of unit age such that operators will remove the existing equipment and install a new water heating system regardless of the proposed amended rule, and because upgrades to electrical panels and other building components to enable the increased use of zero-emission equipment are not expected to require trenching or other construction requiring soil movement, implementation of PAR 1146.2 is not expected to cause construction air quality impacts.

Impact to Operational Air Quality

The Final Program EIR for the 2022 AQMP contemplated that implementation of 2022 AQMP control measures would result in potential NOx emission reductions but with a corresponding increased demand for electricity if combustion sources in residential and commercial settings were replaced with electrified equipment. The control measures were evaluated for NOx emission reductions at the regional level using statewide data. Due to a variety of factors such as the number of pieces of equipment, the size of the equipment, and the type of the operations, etc., it was difficult to quantify all potential electricity demand impacts. Nonetheless, for the equipment which has electricity use data available, electricity demand impacts were quantified but these estimates only provide a partial quantification of the overall potential electricity demand impacts from electrified equipment used in residential and commercial settings; see Table A-3. It was concluded that as more electric residential and commercial equipment is deployed, the demand for electricity would increase, while the demand for natural gas and its corresponding emissions would decrease, resulting in an overall net reduction in combustion emissions from residential and commercial equipment.

In addition to the increased electricity demand from electrification of residential and commercial equipment, the Final Program EIR for the 2022 AQMP also evaluated increased electricity demand from large industrial combustion equipment including hydrogen production, concluding that it would result in potentially significant air quality impacts, and mobile source conversion, concluding that it would result in less than significant air quality impacts.

The South Coast AQMD air quality significance thresholds for mass daily emissions of criteria pollutants are in units of pounds per day[65]. The 2022 AQMP quantified NOx reductions in tons per day (2,000 pounds = 1 ton). The 2022 AQMP was designed to attain the 8-hour ozone standard by reducing NOx and to a lesser degree VOC emissions. Other emissions of criteria pollutants (i.e., CO, SOx, PM10, and PM2.5) were also expected to be reduced. While most of the activities associated with the 2022 AQMP control measures were individually projected to have air quality impacts that were less than significant, activities associated with implementation of some individual control measures (i.e., increased electricity demand for large combustion equipment including hydrogen production) could result in potentially significant impacts. The precise magnitude of those emissions increases is dependent on the type and size of projects designed to comply with the control measures. Nonetheless, when the effects of all of the proposed control measures were considered together, a net NOx emission reduction of 124 tons per day was expected, which was an order of magnitude greater than any of the adverse air quality impacts from some of the individual control measures such that the 2022 AQMP was expected to result in an air quality benefit. Thus, operational activities resulting from implementation of control measures in the 2022 AQMP were expected to generate less than significant criteria pollutant air quality impacts. Since no significant air quality impacts relating to operational activities were identified, no mitigation measures were necessary or required.

Impact to Greenhouse Gas (GHG) Emissions

The Final Program EIR for the 2022 AQMP contemplated implementation of Control Measure C-CMB-01 to involve construction activities which may emit GHGs. The physical changes are only attributed to implementation of Control Measure C-CMB-01 if equipment is replaced earlier than the end of unit age. For PAR 1146.2, because replacement of existing water heating equipment is expected occur at the end of unit age such that operators will remove the existing equipment and install a new water heating system regardless of the proposed amended rule, and because upgrades to electrical panels and other building components to enable the increased use of zero-emission equipment are not expected to require trenching or other construction requiring soil movement, implementation of PAR 1146.2 is not expected to cause construction GHG impacts.

Operational GHG emission increases are projected from energy demand increases to power zero-emission technologies. As mentioned in the Energy section, the Final Program EIR for the 2022 AQMP estimated that, compared to the 2018 baseline for electricity demand, implementation of the 2022 AQMP control measures is expected to increase electricity use by 13,429 GWh, approximately an 11 percent increase, by 2037 which will produce approximately 2.76 million metric tons (MMT) of GHG emissions.[66] The electricity needed to power zero-emission

[65] South Coast AQMD, South Coast AQMD Air Quality Significance Thresholds, https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf

[66] 2020 eGRID data of 453 lb/MWh for SCE, U.S. EPA, 2022, https://epa.gov/egrid/download-data.

equipment, such as zero-emission water heaters, is expected to be provided by public utility companies. Most existing power generating facilities are subject to Assembly Bill 32 and will be required to reduce their GHG emissions. Moreover, any future power generating stations that may be built in response to meeting the future electricity demand would be subject to stringent emission control requirements, including those for GHG emissions. It is important to note that the 2022 AQMP also accelerates the penetration of zero- and near-zero-emission vehicles, and a reduction in the use of petroleum-based fuels will reduce criteria pollutants, toxics, and GHG emissions which will concurrently offset the projected increases in criteria pollutants, toxics, and GHG emissions from the use of more electricity. Converting gasoline- and diesel-fired sources to electrified equipment reliant on electricity that is primarily generated by natural gas and renewable sources is expected to result in an overall decrease of GHG emissions. Therefore, after taking into consideration the short-term increases in GHG emissions which will be offset by substantial reductions of GHG emissions from the decreased use of gasoline and diesel fuels combined with the overarching goal of transitioning to electricity sourced with 100 percent renewables by 2045 as required by Senate Bill 100 (SB 100, De León) the additional electricity that may be needed to implement the 2022 AQMP control measures has been determined to generate less than significant GHG emission impacts. Since no significant GHG impacts were identified, no mitigation measures were necessary or required.

In summary, relative to cumulative impacts, the Final Program EIR for the 2022 AQMP concluded that implementation of the 2022 AQMP, when combined with past, present, and reasonably foreseeable activities, would contribute to impacts to air quality during construction, but would not contribute to cumulatively considerable impacts to air quality during operation or GHG emissions.

However, since implementation of Control Measure C-CMB-01 of PAR 1146.2 is expected to have no air quality impacts during construction and GHG emissions, and a net benefit to air quality during operation, there are no new impacts which would change the previous conclusions of the Final Program EIR for the 2022 AQMP regarding cumulatively considerable impacts to air quality. Further, no new mitigation measures would be required. Therefore, the cumulative impacts to air quality would remain significant and unavoidable.

ENVIRONMENTAL TOPIC AREAS WITH NO IMPACTS

The 2022 AQMP was designed to reduce emissions from existing emission sources and promote the use of the cleanest technology available. The 2022 AQMP control measures focused on maximizing the implementation of existing zero-emission and low NOx technologies, recognizing that new zero-emission and ultra-low NOx technologies may still need to be invented or made commercially available to achieve the necessary reductions required to attain the 70 ppb ozone standard. The 2022 AQMP would accelerate the replacement of high-emitting mobile sources with low NOx and zero-emission mobile sources; encourage the use of lower-emitting alternative fuels; affect stationary sources at existing commercial/industrial facilities and residential developments; develop incentives to remove/replace higher emitting equipment; establish greater control of industrial stationary sources; control indirect sources of emissions; improve energy efficiency; improve emission leak detection and maintenance procedures; and establish educational and outreach programs. The analysis provided in the Final Program EIR for 2022 AQMP concluded that implementation of Control Measure C-CMB-01 would have no impacts to the following

environmental topic areas: aesthetics, agriculture and forestry resources, biological resources, cultural and tribal cultural resources, geology and soils, hydrology and water quality, hazards and hazardous materials, land use and planning, mineral resources, noise, solid and hazardous waste, population and housing, public services, recreation, transportation, and wildfire. Since no impacts were identified, no mitigation measures are necessary or required for these environmental topic areas. Since PAR 1146.2 implements Control Measure C-CMB-01 without adding new or modifying the previously analyzed impacts for each environmental topic area, the overall conclusions of no impacts for these environmental topic areas in the Final Program EIR for the 2022 AQMP will remain unchanged if PAR 1146.2 is implemented.

The following summarizes the conclusions of no impacts in the Final Program EIR for the 2022 AQMP for each of these environmental topic areas.

Aesthetics: The majority of control measures implemented within South Coast AQMD's jurisdiction would typically affect industrial, institutional, or commercial facilities located in appropriately zoned areas (e.g., industrial and commercial areas) that are not usually associated with scenic resources. Further, modifications would typically occur inside buildings, within the confines of the affected facilities, or because of the nature of the business (e.g., commercial or industrial), can easily blend in with the facilities with little or no noticeable effect on adjacent areas. In addition, the 2022 AQMP contained control measures which focus on certain residential sources of air pollution (e.g., water heaters), and any modifications needed would occur inside buildings or in the case of energy efficiency improvements such as installing solar, on the roofs of residential buildings. Also improved air quality would provide benefits to scenic vistas and resources throughout South Coast AQMD's jurisdiction. Implementation of the 2022 AQMP control measures, such as Control Measure C-CMB-01, was not expected to create additional demand for new lighting or exposed combustion sources (e.g., flares) that could create glare, adversely affecting day or nighttime views in any areas. Facilities affected by the 2022 AQMP control measures typically make modifications to light sources within property borders, so any new light sources would typically be inside a building or not noticeable because of the presence of existing outdoor light sources. Based on these considerations, no significant aesthetic impacts were expected due to the implementation of the 2022 AQMP.

Agriculture and Forestry Resources: Implementation of 2022 AQMP control measures, including C-CMB-01, was not expected to generate any new construction of buildings or other structures that would require conversion of farmland to non-agricultural use, conflict with zoning for agricultural uses, or a Williamson Act contract. Further, 2022 AQMP control measures would typically affect existing facilities that are located in appropriately zoned areas. Any new facilities that may be affected by 2022 AQMP control measures would be constructed and operated for reasons other than complying with the control measures. Improvements would continue to be subject to project-level review, including review of agricultural impacts under CEQA. Therefore, implementation of the 2022 AQMP would not affect Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, or conflict with a Williamson Act contract, if implemented. Physical changes associated with the 2022 AQMP were expected to occur at previously developed sites and would not warrant construction in undeveloped areas where agricultural and forest resources are more likely to exist. The 2022 AQMP control measures, including control measures related to mobile sources, would have no direct or indirect effects on agricultural or forest land resources because their focus is on achieving emission reductions by increasing the penetration of

zero and low NOx technologies into market. The 2022 AQMP could provide benefits to agricultural and forest land resources by improving air quality in the region, thus reducing the adverse oxidation impacts of ozone on plants and animals.

Biological Resources: Implementation of the 2022 AQMP control measures, including C-CMB-01, was not expected to result in habitat modification, adversely affect any riparian habitat, or interfere with the movement of any native resident or migratory fish or wildlife species. Facilities affected by the 2022 AQMP control measures have already been disturbed and typically do not contain open space, water features, or natural vegetation. Sites might contain landscaping that consists of ornamental trees, vegetation, and turf. The sites of the affected facilities that would be subject to the control measures were not expected to support riparian habitat, federally protected wetlands, or migratory corridors because they are existing, developed, and established industrial and commercial facilities. Additionally, special status plants, animals, or natural communities identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service were not expected to be found on or in close proximity to the affected facilities. Construction projects that impact affected species were not reasonably foreseeable as part of implementation of the 2022 AQMP. Any new development potentially affecting biological resources would not be as a result of the 2022 AQMP control measures and approval of those projects, including evaluation of their environmental impacts, would occur regardless of the 2022 AQMP and would be subject to project-level CEQA review. Based upon these considerations, significant adverse biological resources were not expected from implementing the 2022 AQMP.

Cultural and Tribal Cultural Resources: Commercial and industrial areas are generally not located in historic districts, and implementation of the 2022 AQMP control measures, including C-CMB-01, was not expected to cause a substantial adverse change in the significance of a historical resource. The South Coast AQMD also provided a formal notice of the 2022 AQMP to all California Native American Tribes (Tribes) that requested to be on the Native American Heritage Commission's (NAHC) notification list per Public Resources Code Section 21080.3.1(b)(1). The NAHC notification list provides a 30-day period during which a Tribe may respond to the formal notice, in writing, requesting consultation on the proposed project. No Tribes requested consultation during the 30-day comment period. The provisions of CEQA, Public Resources Code Section 21080.3.1 et seq. (also known as AB 52), require meaningful consultation with California Native American Tribes on potential impacts to tribal cultural resources, as defined in Public Resources Code Section 21074. Tribal cultural resources are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either eligible or listed in the California Register of Historical Resources or local register of historical resources. As part of the AB 52 process, Native American tribes must submit a written request to the relevant lead agency if it wishes to be notified of projects that require CEQA public noticing and are within its traditionally and culturally affiliated geographical area. Construction resulting from implementation of the proposed control measures would need to obtain city or county planning department approvals prior to commencement of any construction activities, and would be subject to project-level review, including separate tribal consultation pursuant to AB 52, as applicable, to address site-specific requests identified by the tribes. Therefore, impacts to tribal cultural resources were considered to be less than significant, and the 2022 AQMP was not expected to cause any impacts to significant historic cultural resources.

Geology and Soils: The 2022 AQMP control measures, including C-CMB-01, would not directly or indirectly expose people or structures to earthquake faults, seismic shaking, seismic-related ground failure including liquefaction, lateral spreading, landslides, mudslides, or substantial soil erosion. Most facilities affected by 2022 AQMP control measures would be located on previously disturbed industrial and commercial sites where there is little likelihood of identifiable artifacts. It is possible, however, that cultural or archaeological resources or human remains may nevertheless be discovered. New installations of air pollution control equipment or infrastructure for zero-emission and low-NOx equipment are unlikely to require substantial soil excavation and would be located on already disturbed and developed industrial land uses. Therefore, no significant impact would occur. Further, projects implemented as a result of the 2022 AQMP would be subject to project-level review, including review of both geological and paleontological impacts under CEQA, as applicable. Therefore, implementation of the 2022 AQMP was not expected to directly or indirectly destroy a unique paleontological resource or site or unique geological feature or result in other significant adverse geology or soils impacts.

Hydrology and Water Quality: No potential impacts were expected as a result of implementing Control Measure C-CMB-01 of the 2022 AQMP. Implementation of the Control Measure C-CMB-01 would not involve the following activities which were concluded in the Final Program EIR for the 2022 AQMP to collectively cause potentially significant hydrology and water quality impacts: 1) potential increase in water demand; 2) potential increase in wastewater discharge and related water quality impacts; 3) water quality impacts associated with increased use of and accidental releases of alternative fuels; 4) water quality impacts associated with accidental releases of ammonia from operation of SCR technology; 5) water quality impacts associated with accidental releases from battery disposal and processing including acid spills; and, 6) water quality impacts associated the use and clean-up of reformulated products. Therefore, the implementation of Control Measure C-CMB-01 was not expected to create significant impact on hydrology and water quality.

Hazards and Hazardous Materials: No potential impacts were expected as a result of implementing Control Measure C-CMB-01 of the 2022 AQMP. Implementation of the Control Measure C-CMB-01 would not involve with the following activities which were concluded in the Final Program EIR for the 2022 AQMP to collectively cause potentially significant hazardous and hazardous materials impacts: 1) the routine transport, storage, and use of ammonia in air pollution control equipment; 2) the production, storage, and use of alternative fuels including but not limited to natural gas and hydrogen to produce electricity and to fuel on- and off-road mobile sources; 3) disposal of batteries, fluids, and spent catalyst; 4) increased use of lower-VOC containing products reformulated with flammable materials; and 5) conducting chipping and grinding of wood and greenwaste in fire hazard area. Therefore, Control Measure C-CMB-01 was not expected to create significant impact on hazardous and hazardous materials.

Land Use and Planning: Since the 2022 AQMP does not require construction of major new land use developments in any areas within South Coast AQMD's jurisdiction, none of the control measures, including C-CMB-01, were expected to physically divide any established communities within South Coast AQMD's jurisdiction. Potential land use impacts associated with the 2022 AQMP could come from the construction of support systems (e.g., catenary overhead electrical lines or magnetic infrastructure related to operation of zero- and low-NOx transport systems). For purposes of evaluating potential land use impacts, the analysis assumed that no new rail or truck

traffic routes would be constructed, but rather that existing truck and rail routes and corridors would be modified. The truck and rail corridors likely to be involved are primarily associated with rail yards and intermodal facilities in industrial zones within the Southern California area. Since only existing transportation routes would likely be modified (e.g., electric lines installed) and no new transportation routes were anticipated, no land use conflicts, or inconsistencies with any general plan, specific plan, local coastal program, or zoning ordinance were expected. Activities that result from implementing the various 2022 AQMP control measures would be subject to project-level review that would assess consistency with adopted land use regulations, including review of impacts to land use and planning under CEQA, as applicable. Any proposed modification to an existing rail or truck traffic route/corridor would require a separate CEQA evaluation. No significant land use impacts were identified because any activities undertaken to implement the 2022 AQMP control measures would be expected to comply with, and not interfere with, applicable land use plans, policies, or regulations of an agency with jurisdiction over the project, including, but not limited to the general plans, specific plans, local coastal programs or zoning ordinances.

Mineral Resources: There were no provisions in the 2022 AQMP that would result in the loss of availability of a known mineral resource of value to the region and the residents of the state, or of a locally-important mineral resource recovery site delineated in a local general plan, specific plan, or other land use plan. The 2022 AQMP provides incentives for the penetration of low-NOx and zero-emission technologies into the market which are not expected to result in an increase in the use of mineral resources. The 2022 AQMP was not expected to have any significant effects on the use of important minerals. Therefore, no new demand for mineral resources was expected to occur and no significant adverse mineral resources impacts from implementing the proposed project were anticipated.

Noise: Implementation of a project would be considered to have significant adverse noise impacts if any of the following conditions occur: 1) construction noise levels exceed the local noise ordinances or, if the noise threshold is currently exceeded, project noise sources increase ambient noise levels by more than three decibels (dBA) at the site boundary. Construction noise levels will be considered significant if they exceed federal Occupational Safety and Health Administration (OSHA) noise standards for workers; and 2) the proposed project operational noise levels exceed any of the local noise ordinances at the site boundary or, if the noise threshold is currently exceeded, project noise sources increase ambient noise levels by more than three dBA at the site boundary. The Final Program EIR for the 2022 AQMP concluded that implementation of 2022 AQMP control measures could result in significant noise and vibration impacts from construction activities, so mitigation measures were proposed. Potential operational noise impacts were concluded to be less than significant so that no mitigation measures were required. Control Measure C-CMB-01 of the 2022 AQMP was contemplated to have potential noise impacts during construction, and this would be the result if equipment was replaced prior to the end of its unit age. PAR 1146.2 schedules equipment replacement at the end of the existing equipment's unit age. Construction associated with demolition or removal of existing building components or structures, and water heating systems; and installation of new water heating systems, would occur regardless of PAR 1146.2 and therefore are not results of implementing the proposed amended rule. Electrical panel upgrades resulting from implementation of PAR 1146.2 are not expected to require trenching or other construction such that significant noise would be generated. Therefore, implementation of PAR 1146.2 is not expected to have an effect on noise.

Population and Housing The 2022 AQMP control measures were not anticipated to generate any significant effects, either direct or indirect, on the population or population distribution of people living in the South Coast AQMD's jurisdiction as no additional workers were anticipated to be required in order to implement any of the 2022 AQMP control measures. Consistent with past experience, it was expected that the existing labor pool within the southern California area would accommodate the labor requirements for any modifications requiring construction at affected facilities. Additionally, the 2022 AQMP control measures, including C-CMB-01, contain no provisions that would cause displacement of substantial numbers of people or housing necessitating construction of replacement housing elsewhere. Accordingly, population and housing impacts were not expected from the implementation of the 2022 AQMP.

Public Services: Fire protection and emergency medical services are provided to affected facilities and residential developments by local county and city fire departments. All activities undertaken as a result of implementing the 2022 AQMP control measures, including C-CMB-01, would be required to comply with fire-related safety features in accordance with the applicable provisions of the adopted California Fire Code, any county or city ordinances, and standards regarding fire prevention and suppression measures related to water improvement plans, fire hydrants, fire access, and water availability. Based on the preceding discussion, implementation of the 2022 AQMP control measures would not adversely affect the ability of local fire protection to provide adequate service and impacts would be less than significant. Implementation of the 2022 AQMP control measures would not result in an increase in calls for police protection. Implementation of the 2022 AQMP control measures occur at existing facilities or promote transition to cleaner emitting equipment at new developments but would not facilitate the construction of new development. At existing industrial facilities, on-site security is typical and would be expected to continue with the same demand for police department support as is currently needed. Furthermore, implementation of the 2022 AQMP control measures would not induce population growth either directly or indirectly. Therefore, with no increase in local population, there would be no additional demand for new or expanded schools, parks, and libraries and no other adverse population or housing impacts were expected.

Recreation: Demand for parks and recreational facilities in an area is usually determined by the area's population. Per Population and Housing section, the implementation of the 2022 AQMP control measures does not include the development of new homes, which would lead to an increase in population and thereby, the need for additional park and recreation facilities. Therefore, the implementation of the 2022 AQMP control measures, including C-CMB-01, would not increase the use of existing neighborhood and regional parks or other recreational facilities, nor would it require construction of new or expanded parks or recreational facilities. No impacts to park and recreational facilities would occur and no mitigation measures were necessary.

Solid and Hazardous Waste: Implementation of a project would be considered to have significant solid and hazardous waste impacts if the generation and disposal of hazardous and non-hazardous waste exceeds the capacity of designated landfills. The Final Program EIR for the 2022 AQMP concluded that implementation of 2022 AQMP control measures could result in significant solid and hazardous waste impacts, so mitigation measures were proposed. Control Measure C-CMB-01 of the 2022 AQMP was contemplated to have potential solid and hazardous waste impacts during construction activities and from disposal of old equipment, and this would be the result if equipment was replaced prior to the end of its unit age. PAR 1146.2 schedules equipment

replacement at the end of the existing equipment's unit age. Construction associated with demolition or removal of existing building components or structures, and water heating systems would occur regardless of PAR 1146.2 and therefore are not results of implementing the proposed amended rule. Electrical panel upgrades resulting from implementation of PAR 1146.2 are not expected to require trenching or other construction such that significant waste would be generated. Therefore, implementation of PAR 1146.2 is not expected to have an effect on solid and hazardous waste.

Transportation: Implementation of the 2022 AQMP control measures, including C-CMB-01, was not expected to substantially alter vehicle mileage or transportation routes. The 2022 AQMP builds upon transportation and related Transportation Control Measure (TCMs) developed by Southern California Association of Governments (SCAG) and included in the SCAG Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Therefore, the 2022 AQMP control measures would not conflict with a program plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. The 2022 AQMP revised the previous motor vehicle emissions budgets with new emission calculations using the latest motor vehicle emission factors and planning assumptions. The U.S. EPA's Transportation Conformity Rule requires that transportation plans and projects must not exceed SIP motor vehicle emission budgets for attaining and maintaining health-based air quality standards or a conformity lapse would occur (preventing further funding of transportation projects). By avoiding a conformity lapse, the region would continue to receive federal funding for future transportation projects, which would generally improve traffic flow. Implementation of the 2022 AQMP control measures has the potential to result in an increase in transportation related to construction of new or modified air pollution control equipment. Construction trips and vehicle miles traveled (VMT) are associated with contractors and vendors delivering and installing equipment at affected facilities. Construction activity impacts are temporary in nature and will vary depending on the number and location of facilities, and the size of the construction workforce needed. The CARB Technical Advisory on Evaluating Transportation Impacts in CEQA to comply with CEQA Guidelines Section 15064.3 focuses on permanent, new employee VMT. [California Office of Planning and Research, 2018]. Because of the temporary nature of construction activities, any increase in VMT related to construction activities would occur on a short-term basis at each location. In general, temporary construction-related increases in VMT are not considered to be a transportation impact or inconsistent with the requirements in CEQA Guidelines Section 15064.3, as they do not have a permanent impact on regional VMT. Additionally, discretionary projects at affected facilities could be subject to project-level review under CEQA. Therefore, temporary effects of construction-related vehicles would not conflict with the state's GHG reduction and associated VMT goals for the transportation sector. CEQA Guidelines Section 15064.3(a) clarifies that the primary consideration in evaluating a project's transportation impacts for CEQA purposes is the amount and distance that a project might cause people to drive. This captures two measures of transportation impacts: number of automobile trips generated and VMT. Additional permanent employees were not expected to be required to operate equipment that may require additional air pollution control equipment, due to implementation of the 2022 AQMP. As discussed in the Population and Housing paragraph, implementation of the 2022 AQMP was not expected to generate additional employee or population increases. Therefore, no increase in vehicle trips or VMT was expected. Therefore, less than significant impacts from the implementation of the 2022 AQMP control measures were expected to occur.

Wildfire: Activities that result from implementation of the 2022 AQMP control measures, including C-CMB-01, would not block or otherwise interfere with the use of evacuation routes; nor would they interfere with operations of emergency response agencies or with coordination and cooperation between such agencies. Therefore, there would be no impacts on emergency activities. For the 2022 AQMP control measures that affect residential land uses, any modifications needed would occur inside the buildings or in the case of energy efficiency improvements would not be expected to create any greater risk of wildland fires than the existing residential developments themselves. Moreover, the proposed residential control measures may involve replacing gas-fired water heaters and other combustion sources with electric devices, which would reduce the use of fuel and the potential to cause wildland fires.

In summary, relative to cumulative impacts, the Final Program EIR for the 2022 AQMP concluded that implementation of the 2022 AQMP, when combined with past, present, and reasonably foreseeable activities, would not contribute to cumulative considerable impacts to the following environmental topic areas: aesthetics, agriculture and forestry resources, biological resources, cultural and tribal cultural resources, geology and soils, hydrology and water quality, hazards and hazardous material, land use and planning, mineral resources, noise, population and housing, public services, recreation, solid and hazardous waste, transportation, and wildfire.

Since implementation of Control Measure C-CMB-01 of PAR 1146.2 is expected to have no impact on any of the above environmental topic areas, there are no new impacts which would change the previous conclusions of the Final Program EIR for the 2022 AQMP regarding cumulatively considerable impacts. Further, no new mitigation measures would be required. Therefore, there are no cumulative impacts to the environmental topic areas of aesthetics, agriculture and forestry resources, biological resources, cultural and tribal cultural resources, geology and soils, hydrology and water quality, hazards and hazardous material, land use and planning, mineral resources, noise, population and housing, public services, recreation, solid and hazardous waste ,transportation, and wildfire.

CONCLUSION

PAR 1146.2 implements Control Measure C-CMB-01 that was previously adopted in the 2022 AQMP. There are no new or modified physical changes that would result from implementing PAR 1146.2 which were not previously analyzed in the Final Program EIR for the 2022 AQMP specific to Control Measure C-CMB-01. Further, implementation of Control Measure C-CMB-01 contemplated additional physical changes which would not be expected to occur if PAR 1146.2 is implemented because equipment replacements will occur at the end of the existing equipment's unit age. Construction associated with demolition or removal of existing building components or structures and water heating systems, and the installation of new water heating systems would occur regardless of PAR 1146.2 and therefore, these activities are not the consequence of implementing PAR 1146.2. Electrical panel upgrades resulting from implementation of PAR 1146.2 are not expected to require trenching or other construction requiring soil movement.

Control Measure C-CMB-01 of the 2022 AQMP was previously analyzed in the Final Program EIR for the 2022 AQMP, and implementation of PAR 1146.2 is not expected to result in new or modified physical changes or impacts that were not previously analyzed in the Final Program EIR for the 2022 AQMP.

The Final Program EIR for the 2022 AQMP concluded potentially significant impacts to the environmental topic areas of air quality and greenhouse gas emissions, energy, hazards and hazardous materials, hydrology and water quality, noise, and solid and hazardous waste. However, the Final Program EIR for the 2022 AQMP concluded that implementation of Control Measure C-CMB-01 would have no impacts to the environmental topics of hazards and hazardous materials, and hydrology and water quality. Further, because PAR 1146.2 contemplates the replacement of existing equipment at the end of its unit age, plus new installations of water heating systems would be installed regardless of the proposed amended rule, implementation of PAR 1146.2 would have no impact to air quality during construction, noise, or solid and hazardous waste. The Final Program EIR for the 2022 AQMP concluded implementation of Control Measure C-CMB-01would have potentially significant energy impacts due to increased electricity use and increased natural gas use to produce electricity, and less than significant impact to operational air quality and greenhouse gas emissions due to use of electricity and combustion of natural gas, and these impacts are the same as what would occur if PAR 1146.2 is implemented.

For environmental topic areas which were concluded in the Final EIR for the 2022 AQMP to have potentially significant impacts, mitigation measures were adopted. Nonetheless, no environmental topic area identified as having a potentially significant impact in the Final Program EIR for the 2022 AQMP was concluded to be capable of being mitigated to less than significant levels. When combined with the Connect SoCal Plan, the SIP strategies, state policies, and other past, present, and reasonably foreseeable activities, implementation of the 2022 AQMP would result in significant environmental impacts. No additional feasible mitigation measures to reduce the significant cumulative impacts were identified, and cumulative impacts to the environmental topic areas of air quality and greenhouse gas emissions, energy, hazards and hazardous materials, hydrology and water quality, noise, and solid and hazardous waste remained significant and unavoidable.

Therefore, the environmental impacts associated with implementing PAR 1146.2 are within the scope of what was previously analyzed in the Final Program EIR for the 2022 AQMP for Control Measure C-CMB-01. Thus, no new Initial Study would need to be prepared leading to either an EIR or a Negative Declaration pursuant to CEQA Guidelines Section 15168(c)(2). PAR 1146.2 does not introduce new information which will cause new significant effects or substantially worsen or make more severe significant effects that were previously analyzed in the Final Program EIR for the 2022 AQMP. There is no change to the mitigation measures or alternatives previously considered in the Final Program EIR for the 2022 AQMP. Thus, in accordance with CEQA Guidelines Section 15168(c)(2), a subsequent EIR would not be required pursuant to CEQA Guidelines Section 15162.

Based on the preceding analysis, pursuant to CEQA Guidelines Section 15168(c)(2), PAR 1146.2 is considered a later activity within the scope of the 2022 AQMP which was analyzed in the Final Program EIR for the 2022 AQMP. The mitigation measures developed in the Final Program EIR for the 2022 AQMP for the previously adopted Control Measure C-CMB-01 in the 2022 AQMP upon which PAR 1146.2 relies are also applicable to the implementation of PAR 1146.2 and will remain in effect. [CEQA Guidelines Section 15168(c)(3)].

Therefore, PAR 1146.2 is considered a later activity within the scope of the Final Program EIR for the 2022 AQMP and the Final Program EIR for the 2022 AQMP adequately describes the later activity for the purposes of CEQA such that no new environmental document will be required.

REFERENCES

The 2022 AQMP, along with the December 2022 Final Program EIR for the 2022 AQMP (State Clearinghouse No. 2022050287) and its corresponding Findings, Statement of Overriding Considerations, and Mitigation, Monitoring, and Reporting Plan, upon which the analysis of PAR 1146.2 relies, are incorporated by reference pursuant to CEQA Guidelines Section 15150 and are available from the South Coast AQMD's website at:

December 2022 Final Program EIR for the 2022 AQMP

Master webpage: https://www.aqmd.gov/home/research/documents-reports/lead-agency-scaqmd-projects/south-coast-aqmd-projects---year-2022

December 2022 Final Program EIR for the 2022 AQMP (including Appendices)

https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-final-peir.pdf

Findings, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Plan: https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-attachment1toresolution.pdf

2022 AQMP: https://www.aqmd.gov/home/air-quality/air-quality-management-plans/air-quality-mgt-plan

INTRODUCTION

1. South Coast AQMD, December 2022, 2022 Air Quality Management Plan, https://www.aqmd.gov/home/air-quality/air-quality-management-plans/air-quality-mgt-plan.

2. South Coast AQMD, December 2022, Final Program Environmental Impact Report for the 2022 Air Quality Management Plan. https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-final-peir.pdf.

SUMMARY OF ENVIRONMENTAL IMPACTS

3. South Coast AQMD, December 2022, Attachment 1 to the Governing Board Resolution for the Final Program Environmental Impact Report for the 2022 Air Quality Management Plan -Findings, Statement of Overriding Considerations, and Mitigation, Monitoring, and Reporting Plan. https://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2022/2022-aqmp-attachment1toresolution.pdf.

ENVIRONMENTAL IMPACT AREA WITH POTENTIALLY SIGNIFICANT IMPACTS

4. CEC, 2021. Final 2021 Integrated Energy Policy Report, Volume II, Ensuring Reliability in a Changing Climate. CEC-101-2021-001-V2 February 2022. https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2021-integrated-energy-policy-report

5. Senate Bill 100, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB100.

6. California Gas and Electric Utilities, 2020. California Gas Report, Prepared by the California Gas and Electric Utilities, in Compliance with California Public Utilities Commission Decision D. 95-01-039. https://www.socalgas.com/sites/default/files/2020-10/2020_California_Gas_Report_Joint_Utility_Biennial_Comprehensive_Filing.pdf.

7. Southern California Association of Governments, May 2020, Connect SoCal (2020–2045 Regional Transportation Plan/Sustainable Communities Strategy), https://scag.ca.gov/read-plan-adopted-final-connect-socal-2020.

8. California Air Resources Board, September 2022, 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy), https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy.

ENVIRONMENTAL IMPACT AREA WITH LESS THAN SIGNIFICANT IMPACTS

9. South Coast AQMD, March 2023, South Coast AQMD Air Quality Significance Thresholds, https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf.

10. U.S. EPA, 2022, 2020 eGRID data of 453 lb/MWh for SCE. https://epa.gov/egrid/download-data.

ENVIRONMENTAL IMPACT AREA WITH NO IMPACTS

11. Office of Planning and Research 2017. General Plan Guidelines, Noise Element Guidelines (Appendix D), 2017. https://opr.ca.gov/docs/OPR_Appendix_D_final.pdf

APPENDIX B: RESPONSES TO COMMENTS

PUBLIC WORKSHOP COMMENTS

Staff held the Public Workshop on February 7, 2024, to provide a summary of PAR 1146.2. The following is a summary of the comments received on PAR 1146.2 and staff responses.

Comment #PW-1: Robert Benz (Benz Air Engineering, Co. Inc.)

Staff should evaluate lifecycle emissions from electric generation.

Response to Comment #PW-1:

Staff recognizes that there are externalities for both electric and natural gas production and distribution. Staff also recognizes the need for regulation of emissions from electricity generation. South Coast AQMD Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities, is a rule that aims to lower emissions from electricity generation. Regarding the natural gas system, natural gas leaks into the atmosphere from natural gas wells, storage tanks, pipelines, and processing plants. In 2020, methane emissions from natural gas and petroleum systems and from abandoned oil and natural gas wells were the source of approximately 33 percent of U.S. methane emissions and approximately four percent of U.S. greenhouse gas emissions. In the South Coast AQMD region, there have been examples of large leaks such as Aliso Canyon, where 109,000 metric tons of methane emissions were released between October 2015 and February 2016. For this rulemaking, staff did not conduct lifecycle analyses related to the BARCT assessment for either the electricity or natural gas systems.

Comment #PW-2: Joe Boros (Rheem Manufacturing Company)

Retrofitting gas units with heat pumps requires higher costs and more equipment space.

Response to Comment #PW-2:

Staff gathered cost data for various types of units for the cost-effectiveness analysis described in Chapter 2 of this report. Heat pumps are the primary zero-emission technology evaluated. The analysis accounted for higher equipment and installation costs, operational cost of switching from gas to electricity, and electrical upgrade cost for some cases. Although the analysis determined that it is cost-effective for most of the equipment categories to implement zero-emission, staff understands the challenge of higher upfront cost. Staff is in the process of developing a rebate program to help lower the cost for some consumers and centralizing information for incentive and financing opportunities offered by other agencies and organizations. Further, as zero-emission technologies become more mature and more widely adopted in the market in the future, there will be less cost impact.

Regarding the required space for zero-emission equipment, staff conducted numerous site visits for heat pump installations in commercial buildings such as multifamily buildings, hotels, and groceries stores, and discussed case studies with stakeholders and organizations that incentivize the installation of heat pumps. While some heat pumps may require more space for operation than natural gas-fired units, the heat pump installations that staff observed were capable of fitting in the existing room or area. Staff conducted site visits to various locations to consider the spacing challenge and found feasibility for all sites visited. Staff recognizes that some stakeholder's case studies failed to consider the high energy

efficiency of heat pumps, and thus have oversized the heat pump replacement, overestimating the number or the capacity of heat pumps and storage tanks, thus taking up more space. Nevertheless, staff has proposed to provide an extension of up to six months for an owner or operator of a unit to comply with the zero-emission standards if the installation is delayed because construction is required to expand the space designed to house the unit and associated equipment necessary for operating the unit.

Existing buildings may have more challenges than new buildings to replace gas-fired units and thus may have potentially increased costs. To address this potential increased cost, staff included a 20 percent increase to the cost of zero-emission units, which could be an underestimate for some and overestimate for others. In addition, staff included alternative compliance options to address any potential utility upgrade and emergency replacement concerns and has provided later implementation dates to give more time for units in existing buildings to be replaced.

Staff will continue to monitor all the challenges for zero-emission implementation and is committed to conduct a technology check-in and report the findings to the Stationary Source Committee by January 1, 2028.

Comment #PW-3: Kevin Pirotin (Navien, Inc.)

There should be provisions for emergency replacement.

Response to Comment #PW-3:

Staff understands the concern and added paragraph (i)(4) to provide an alternative compliance option for emergency replacement when an electrical upgrade for more power supply capacity is required to comply with zero-emission limits. This allows the use of a temporary unit that complies with Table 1 emission limits (20 ppmv NOx/400 ppmv CO) for up to six months. When the owner or operator of a unit subject to alternative compliance options in paragraph (i)(1) for utility upgrades, paragraph (i)(6) for property under lease, or paragraph (i)(7) for construction upgrade and the unit is non-operational, the owner or operator can use a temporary unit that complies with Table 1 emission limits (20 ppmv NOx/400 ppmv CO) during the approved extension.

Comment #PW-4: Kevin Pirotin (Navien, Inc.)

Suggested to align proposed compliance dates with Title 24 Building Code effective dates.

Response to Comment #PW-4:

Staff revised the compliance dates and extended both Phase I and Phase II compliance dates for new buildings by one year. The proposed Phase I compliance date for new buildings is January 1, 2026, aligning with the expected effective date for the next updated Title 24 Building Code.

Comment #PW-5: James Phillips (Rheem Manufacturing Company)

Suggested to use 180 degrees Fahrenheit instead of 190 degrees Fahrenheit for the high temperature unit definition to align with the Code of Federal Regulations definition:

Response to Comment #PW-5:

Staff revised the high temperature unit definition and changed 190 degrees Fahrenheit to 180 degrees Fahrenheit, aligning the temperature threshold with the Code of Federal Regulations definition for "residential-duty commercial water heater" for outlet water temperature.

Comment #PW-6: Kevin Pirotin (Navien, Inc.)

Suggested to align the instantaneous water heater compliance date with PAR 1121 implementation date.

Response to Comment #PW-6:

Staff is currently working on the Proposed Amended Rule 1121 (PAR 1121); however, implementation deadlines have not been established. PAR 1121 regulates most residential water heaters, but instantaneous water heaters, which are mostly installed in residential structures, are subject to Rule 1146.2. Building readiness is being evaluated for both PAR 1146.2 and PAR 1121. Staff will consider aligning compliance dates but will determine if further analysis on technologies and other factors for PAR 1121 will require different implementation schedules.

Comment #PW-7: Joe Boros (Rheem Manufacturing Company)

Expressed concern about removing the 9,000 therms per year low-use exemption.

Response to Comment #PW-7:

The existing rule exemption is intended for Type 2 units manufactured prior to January 1, 2000, with NOx emissions higher than 30 ppm NOx. The 9,000 therms per year low-use threshold is about 50 percent of typical annual fuel use for a medium size Type 2 unit, which is no longer justifiable as low-use. Staff has proposed to phase out this exemption when zero-emission implementation starts on January 1, 2031 or January 1, 2033 for Type 2 high temperature units. PAR 1146.2 establishes a new low-use exemption from Table 2 zero-emission requirements in paragraph (k)(3). Annual use of 3,000 therms is about 16 percent of normal fuel use for a 1.0 MMBtu/hr unit and annual use of 2,000 therms is about 27 percent of normal fuel use for a 400 kBtu/hr unit. The provisions of paragraphs (d)(2) and (d)(3) and subparagraph (d)(5)(B) shall not apply to the following existing units installed prior to the date of rule adoption that meet Table 1 emission limits: units with a rated heat input capacity greater than 1 MMBtu/hr, but less than or equal to 2 MMBtu/hr that are demonstrated to use less than 3,000 therms during every calendar year for; or units with a rated heat input capacity greater than 400 kBtu/hr, but less than or equal to 1 MMBtu/hr that demonstrate to use less than 2,000 therms during every calendar year.

Comment #PW-8: Adrian Martinez (Earthjustice)

Suggested not to have any delay on adopting zero-emission requirements.

Response to Comment #PW-8:

Staff recognizes the need to pursue emission reduction with an earlier timeframe to address the air quality needs of the South Coast AQMD. PAR 1146.2 is currently scheduled to be presented to the Governing Board in the second quarter of 2024 for consideration.

PUBLIC CONSULATION COMMENTS

Staff held the Public Consultation on February 23, 2024, to provide a summary of PAR 1146.2. The following is a summary of the comments received on PAR 1146.2 and staff responses.

Comment #PC-1: Steve Mertz (DB Sales & Service)

Heat pump operational cost is high.

Response to Comment #PC-1:

Staff gathered cost data for various types of units for the cost-effectiveness analysis described in Chapter 2 of this report. Heat pumps are the primary zero-emission technology. The analysis has accounted for higher equipment and installation costs, operational cost of switching from gas to electricity, and electrical upgrade cost for some cases. Staff understands the challenge of higher costs and is in the process of developing a rebate program to lower the cost for some consumers and centralizing information on incentives and financial opportunities available from other agencies and organizations. Staff also expects the costs to decrease as more zero-emission technologies become available. Please see also Response to Comment #PW-2 .

Comment #PC-2: Robert Benz (Benz Air Engineering, Co. Inc.)

Staff should consider near-zero-emission units.

Response to Comment #PC-2:

The 2022 AQMP's objective is to transition to zero-emission technologies wherever feasible and staff identified technically feasible zero-emission control options for each category of equipment subject to Rule 1146.2. The 2022 AQMP stated that near-zero-emission technology would be considered when zero-emission technologies were not technically feasible, which is not the case for PAR 1146.2.

Comment #PC-3: Robert Benz (Benz Air Engineering, Co. Inc.)

Staff should evaluate life cycle emissions from electric generation.

Response to Comment #PC-3:

Please see Response to Comment #PW-1 which provides staff response to the same comment.

Comment #PC-4: Kevin Pirotin (Navien, Inc.)

Suggested to align instantaneous water heater compliance date with PAR 1121 implementation date.

Response to Comment #PC-4:

Please see Response to Comment #PW-6 which provides staff response to the same comment.

Comment #PC-5: William Pearce (The Boeing Company)

Suggested to increase all unit ages by five years.

Response to Comment #PC-5:

In previous Rule 1146.2 rulemaking, unit age of 15 years was utilized for the analysis. Meetings and site visits with different manufacturers during the current rulemaking process indicated unit ages of under and over 25 years for gas-fired units. U.S. DOE estimates that with proper installation and maintenance, heat pump pool heaters can last 10 or more years. The BAAQMD staff report for Rules 9-4 and 9-6 indicated that water heaters were assumed to have an average lifespan of 13 years. For PAR 1146.2, staff utilized 15 years for Type 1 units that are not instantaneous water heaters or high temperature units and utilized 25 years for other categories to align more closely with other rulemakings while taking into consideration comments on longer unit ages.

Comment #PC-6: Amanda Grey (University of California, Riverside)

For the alternative compliance option for multiple unit replacement, suggested to lower the threshold from five units to a number less than five units that are required to meet zero-emissions in the same calendar year.

Response to Comment #PC-6:

The alternative compliance option for multiple unit replacement was initially proposed for cases where an owner or operator has five or more units that are required to meet zero-emission limits in the same calendar year. Similar provision have been included in other South Coast AQMD rules. However, staff has revised the proposal after the Public Workshop to have this provision applicable for cases where five or more units are required to meet zero-emission limits in two consecutive calendar years. The proposed provision allows three years extension for the implementation of five or more units, which means one or more units should be replaced each year. Staff believes the revised proposal is reasonable and have addressed the comment in an alternative way.

Comment #PC-7: Sassan Rahimzadeh (Arya Cleaners)

Concern about dry cleaners' ability to upgrade gas-fired units to zero-emission units.

Response to Comment #PC-7:

Staff has contacted the California Cleaners Association previously and is currently in contact for further discussion on any challenges. The dry cleaners' primary concern is the high upfront cost to install a new zero-emission unit. Staff is in the process developing a rebate program to help lower the cost for some consumers and centralizing information for incentive and financing opportunities offered by other agencies and organizations. As zero-emission technologies become more mature and more widely adopted in the market, there will be less cost impact. In addition, staff is projecting future utility savings based on projected natural gas and electricity prices. The cost to operate heat pumps is lower than most electric appliances because they are so energy efficient; over the lifetime of the unit, that initial cost increase could be recovered.

Staff proposed several alternative compliance options, a limited exemption for small businesses, and a longer compliance timeline, further detailed in Chapter 3, that dry cleaners would be able to utilize, including:

- Paragraph (i)(1) provides an alternative compliance option for when utility upgrades delay compliance with zero-emission limits. When the applicable utility company is unable to provide the necessary power which is beyond the owner or operator's reasonable control, the owner or operator can request an extension of up to 36 months for compliance.
- Paragraph (i)(4) provides an alternative compliance option for emergency replacement when an owner or operator requires a short-term replacement due to sudden unit failure after the applicable Table 3 compliance date if an electrical upgrade is needed to operate a unit that complies with Table 2 emission limits. In this situation, the owner or operator may elect to install and operate a temporary unit that complies with Table 1 emission limits for up to six months.
- For a dry cleaner in a property under lease, paragraph (i)(6) provides another alternative compliance option that allows an extension of up to 24 months to comply with the Table 2 emission limits, if the installation is delayed beyond the reasonable control of the owner or operator of the unit.
- There is also an exemption in paragraph (k)(5) that the provisions of paragraph (d)(3) regarding replacing existing units once they reach their defined unit age in the rule shall not apply to units installed in facilities that meet the Rule 102 definition of a small business. For small businesses, existing units can be operated until their natural replacement after the applicable Table 3 compliance date.
- Boilers operated by dry cleaners are categorized as high temperature units, for which PAR 1146.2 has proposed a later zero-emission implementation date (i.e., 2033 for existing buildings).

Staff will continue to monitor all the challenges for zero-emission implementation and will conduct a technology check-in and report the findings to the Stationary Source Committee by January 1, 2028.

Comment #PC-8: Jed Holtzman (RMI)

Staff should reconsider the 3,000 therms per year low-use threshold which is not a de minimis value for annual fuel use of smaller units.

Response to Comment #PC-8:

The existing rule allow for a low-use exemption for older Type 2 units with annual fuel use of 9,000 therms. Those units were manufactured prior to January 1, 2000, with NOx emissions higher than 30 ppmv NOx. PAR 1146.2 proposes to phase out the existing 9,000 therms exemption when zero-emission implementation starts and include a new low-use exemption as a transitional option. The new low-use exemption from Table 2 zero-emission requirements is for a Type 2-unit meeting Table 1 emission limits (i.e., 20 ppmv NOx and 400 ppmv CO) with fuel use less than 3,000 therms per year. For context, annual use of 3,000 therms is about 16 percent of normal fuel use for a 1.0 MMBtu/hr unit and 40 percent of normal fuel use for a 400 kBtu/hr unit; 3,000 therms is about two hours of use per day,

960 lbs of NOx per year, or 2.6 lbs of NOx per day. Staff has further revised the low-use threshold for smaller units. For smaller units with heat input capacity rated between 400 kBtu/hr and 1.0 MMBtu/hr, staff is proposing a lower threshold such as 2,000 therms per year which is about 27 percent of normal fuel use for a 400 kBtu/hr unit.

Comment #PC-9: Michael Corbett (Bradford White Corporation)
Opposed the labeling requirement.

Response to Comment #PC-9:

Labeling requirements were previously proposed and removed. However, concerns were raised for how the zero-emission limits will be enforced when new buildings are required to have zero-emission units installed and existing buildings can have units with 20 ppmv NOx limits installed. PAR 1146.2 is proposing a labeling requirement under the new subdivision (j) for the period between new building compliance date and existing building compliance date of an equipment category, and the extended period for tankless water heaters replacing existing tankless water heaters in mobile homes.

Labeling requirements are common for area source rules. For example, Rule 1111 has several labeling requirements. One of the requirements specified by subparagraph (e)(3)(B) of Rule 1111 requires manufacturers to display a labeling language for unit using an alternative compliance plan in lieu of meeting the 14 ng/J NOx limit: "If installed in South Coast AQMD only: This furnace does not meet the South Coast AQMD Rule 1111 NOx emission limit (14 ng/J), and thus is subject to a mitigation fee of up to $450. This furnace is not eligible for the Clean Air Furnace Rebate Program: www.CleanAirFurnaceRebate.com." Labeling requirements are important tools for enforcement, especially when some units distributed to the market can only be installed under certain conditions. Manufacturers may elect to send a sticker or label to distributors to be applied upon unit installation.

Comment #PC-10: James Phillips (Rheem Manufacturing Company)
Units for multifamily structures should be exempted from retrofit requirement.

Response to Comment #PC-10:

The retrofit requirement is intended for installations in industrial and commercial entities; therefore, units for residential structures are exempted from this requirement. Multifamily structures are grouped with other commercial buildings (e.g., hotels and motels) by the CEC manual for the 2022 Building Code.[67] Although the PAR 1146.2 analysis determined that it is cost-effective for most of the equipment categories to implement zero-emission, staff understands the higher upfront cost is a concern. Staff is in the process developing a rebate program to help lower the cost for some consumers, including owners or operators of multifamily structures, and centralizing information for incentive and financing opportunities offered by other agencies and organizations. Further, as zero-emission

[67] 2022 Nonresidential and Multifamily Compliance Manual, Page 2-5, https://www.energy.ca.gov/publications/2022/2022-nonresidential-and-multifamily-compliance-manual-2022-building-energy

technologies become more mature and more widely adopted in the market in the future, there will be less cost impact.

Comment #PC-11: Adrian Martinez (Earthjustice)
Urged no further delay of the rule adoption and recommended allocating funding to support the early adoption of zero-emission units.

Response to Comment #PC-11:

Please see Response to Comments #PW-2 and #PW-8 which provide staff responses to the same comment.

COMMENT LETTER #1

BRADFORD WHITE CORPORATION

January 19, 2024

Yanrong Zho
Program Supervisor
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Re: Rule 1146.2 Initial Preliminary Draft of Rule 1146.2

Dear Ms. Zho:

On behalf of Bradford White Corporation (BWC), we would like to thank you for the opportunity to comment on South Coast Air Quality Management District's (SCAQMD) Initial Preliminary Draft of Rule 1146.2.

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 Southern California, a significant number of individuals, families, and job providers rely on our products for their hot water and space heating needs. We have compiled our comments and questions to the Initial Preliminary Draft of Rule 1146.2 below:

General comments

BWC has participated in the District's five working groups related to Rule 1146.2 and has reviewed the preliminary rule language. We observe that the preliminary rule language and implementation timelines have deviated significantly from SCAQMD's 2022 Air Quality Management Plan (AQMP), where there was discussion of "infeasibility" and use of Low NOx alternatives. Specifically, C-CMB-01 stated "allow low NOx technologies as a transitional alternative when installing a zero-emission unit is determined to be infeasible." However, the Initial Preliminary Draft of Rule 1146.2 does not contain any provisions to address infeasibility of equipment, or use of Low NOx alternatives. Further, it proposes to push up the implementation timelines, as compared to the 2022 AQMP, for equipment phase out beginning in 2025, less than a year after the rule is scheduled to be adopted in April 2024. 1-1

BWC has also reviewed the staff analysis from the working group presentations, and we believe the conclusions drawn from these studies have been applied too broadly. We strongly recommend additional site evaluations are necessary to determine the market's readiness to transition to zero NOx. Water heating and boiler equipment is not limited in application to multifamily and hospitals as much of the staff analysis shows. A single commercial water heater or boiler model could be used in a wide variety of applications

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ranging from hotels/motels, restaurants, office buildings, and gymnasiums. Keeping this in mind, each application has its own unique challenges that must be accounted for. While zero NOx replacements could be feasible, it comes with increased cost and installation challenges, many of which are significant. We have outlined a common example below:

Cont'd 1-1

Replacing a Commercial (100 Gallon, 199,999 Btu/hr) Gas-fired Storage Water Heater
This example shows how current commercially available electric water heater product(s) could be used in lieu of a commercial gas-fired storage water heater that matches the specifications in the above subject line. These products are commonly sold for use in smaller hotels/motels, restaurants, gymnasiums, and office buildings.

	Commercial gas-fired storage water heater	**Commercial ASME Tank Electric Water Heater**	**(2) Heavy Duty Commercial Tank Electric Water Heater**	**Medium Duty Commercial Tank Electric Water Heater plus 200-gallon storage tank**
Input	199,999 Btu/hr or 58.59 kW	81 kW	30 kW per unit	18 kW
Amperage Requirement	5.5A	98A	36A each	22A
Recovery (100°F Rise)	235 GPH	334 GPH	124 GPH each	74 GPH
Footprint (in)	77.63"H x 28.25" W	60.88"H x 32.5" W	50.44" H x 30.5" W per unit	63" H x 30.88"W plus 78"H x 32" W storage tank
Piping	Uses existing	Uses existing	Multiple units piped in reverse return	Commercial electric paired with storage tank
Installation Challenges compared to Gas		Equipment cost premium, potential cost to upgrade service,	Equipment cost premium, Increased footprint,	Equipment cost premium, Increased footprint,

Cont'd 1-1

	Commercial gas-fired storage water heater	Commercial ASME Tank Electric Water Heater	(2) Heavy Duty Commercial Tank Electric Water Heater	Medium Duty Commercial Tank Electric Water Heater plus 200-gallon storage tank
		panel, Increased footprint, requires ASME product, increased operation cost	Potential cost to upgrade service panel, additional labor and materials for piping, increased operation cost	ASME Product, Increased cost of piping, Recirculation pump (cost), Increased operation cost
Product Link	EF120T199	CEA80-81kW	CEHD50-30kW	E32-120R-18kW plus 200 gallon storage tank

While the example above highlights that commercially available electric products can be used to replace gas products or installed in new construction, this tradeoff comes at a premium cost for the equipment and will require additional cost and installation considerations to function properly.

In these common situations, using a heat pump water heater (HPWH) solution *may* benefit the operator by reducing the utility cost and possibly avoiding a costly upgrade to the electrical panel. However, the downside of using a HPWH is that it will require a much larger footprint, as more storage tank capacity is needed to compensate for slower recovery rates, and significant air volume is needed to transfer heat effectively. In many existing buildings, this expanded footprint can require widening doorways or closets; partially removing walls and/or ceilings; and running electrical wiring to the install area if needed. Additionally, commercial HPWHs[1] will be considerably more expensive than their gas-fired counterparts and will likely have availability concerns as these products often have longer lead times to manufacture, and may not be readily available at supply houses. These issues are especially concerning in emergency replacement situations.

Given the unique challenges water heating applications of this kind can present, BWC suggests District staff consider including rule provisions for project "infeasibility" as was originally presented in the 2022

[1] Microsoft Word - 2021 WA Code Change - Heat Pump Water Heating

AQMP. BWC submitted comments on the 2022 AQMP with a suggested definition for determining whether or not a zero NOx project was feasible and reiterate this recommendation below: Cont'd 1-1

> "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."

Product Labeling 1-2

The Initial Preliminary Draft of Rule 1146.2 proposes to require manufacturers to affix labels to equipment identifying the Unit as "not to be installed or sold for New Buildings." BWC believes the proposed labeling requirement is unnecessary to enforce the rule and will add significant cost and compliance complexity to regulated products.

SCAQMD currently maintains a qualified products list[2] for all manufacturer water heating and boiler models certified under Rule 1146.2. To enforce the proposed Zero NOx implementation dates, SCAQMD could simply modify their table to show models that are allowed in new construction and models that are only allowed in existing buildings. Secondly, new construction requires plans to be submitted to building jurisdictions to review, as well as Title 24 energy modeling. SCAQMD can work with building jurisdictions within their territory that review and approve project plans to enforce the use of Zero NOx water heating and boiler equipment. Lastly, new construction projects are permitted and require building inspectors to approve the construction. If a non-compliant product were to be installed, it could ultimately be flagged for removal by the building inspector.

For the reasons outlined above, BWC strongly urges staff to remove the labeling requirement as it will not aid in enforcement and will simply add cost and complexity to the manufacturing process.

Useful Life and Repairs 1-3

The Initial Preliminary Draft of Rule 1146.2 proposes to establish effective useful lives for equipment. While BWC questions how the District arrived at the stated useful lives for each product, we also have questions regarding the enforcement of useful lives. We respectfully request feedback to the following questions:

- How will SCAQMD enforce equipment operating beyond its deemed useful life?
- If affected products are still in proper working order, will the owner be required to remove and replace the product with a zero NOx product?
  - If so, will there be a timeline given? Will there be an exception process?
- What analysis did SCAQMD conduct to determine the established useful lives are appropriate?
  - Will that analysis be made available, in full, for stakeholders to review and comment on?

[2] Rule 1146.2 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters (aqmd.gov)

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- How will repairs be enforced?

Cont'd 1-3

As Rule 1146.2 is currently written, our understanding is an owner would be responsible for ensuring that any repair completed on a regulated water heater or boiler product burner after the zero NOx compliance date would be required to meet the new zero NOx standard.

For instance, consider a situation where a Type 1 water heater was installed on December 1, 2028, and suffered a burner failure in April 2029. Unless there was a zero NOx retrofit kit available, the owner would be compelled to replace the entire unit. Apart from potential safety concerns, attempting to retrofit an existing water heater or boiler to meet zero NOx emissions would often require significant modifications to the appliance's venting system. These modifications, such as the addition of a catalytic converter, may not be feasible in all existing buildings if the necessary zero NOx burner is incompatible with the unit. If modifications are possible, they will often represent a significant cost to the building owner if they are.

This poses an undue and significant cost to the building owner as well as other concerns. BWC recommends that unless a water heater or boiler failure results in a leaking tank, repairs to burner and other components be allowed if the equipment is within its deemed useful life, as defined in Table 2 of the rule.

1-4

Implementation Timelines

BWC recommends that SCAQMD align all new construction timelines with California Energy Commission (CEC) Title 24 Energy Code cycles. For Instance, the 2025 Energy Code is currently under development and is expected to be adopted by January 1, 2025. The code does not take effect until January 1, 2026. Similarly, the following code cycle for the 2028 Energy Code, will not take effect until January 1, 2029. This change would help align SCAQMD compliance dates with changes occurring at the statewide level for designers, architects, and builders. We also recommend keeping the proposed four-year gap between new construction and existing construction compliance dates. For future rule development proceedings, we recommend SCAQMD align with state energy code cycles and Department of Energy (DOE) rulemakings.

In addition to aligning with the CEC, we recommend four additional compliance date changes.

- **Type 1 Pool Heater equipment category** align with the 2029 date for new construction and subsequently 2033 for existing construction. On May 30, 2023, the DOE published a Final Rule, which amended energy conservation standards for these products[3] containing a new Integrated Thermal Efficiency (TE_I) metric to measure efficiency and sets the TE_I for gas-fired pool heaters at 84%. Additionally in this rule, the DOE is raising the efficiency requirements for electric pool heaters to effectively require the use of heat pump technology. These new requirements go into effect May 30, 2028. More closely aligning SCAQMD's proposed zero NOx compliance date with this DOE Final Rule, will help ease the burden for manufacturers, who can then be mindful of these changes, as well as those potentially adopted by SCAQMD as they work to redesign their products.
- **Type 2 (Non-High Temperature) equipment category** align with the 2029 date for new construction and subsequently 2033 for existing construction. The 2025 Energy Code is already addressing all-electric construction in smaller multifamily, hotel/motel and school building applications. Further, larger applications requiring over 1 million Btu rated input must use the highest efficiency gas equipment to achieve a combined rated efficiency of 90% Thermal Efficiency or better. In addition to Title 24, manufacturers will already have a significant challenge meeting the already finalized DOE Commercial Water Heater Energy Conservation Standards

[3] Federal Register :: Energy Conservation Program: Energy Conservation Standards for Consumer Pool Heaters

requirements[4]. These changes go into effect on October 6, 2026, and effectively will require all commercial storage water heaters to meet a 95% Thermal Efficiency.

- **The Instantaneous Water Heater category** be split into two categories with different compliance dates:
  - *Gas-fired instantaneous water heater* (as further defined below) with a nameplate input rating less than 200,000 Btu/hr equipment category align with the 2026 date for new construction and subsequently 2030 for existing construction. This category is predominantly used in residential new construction and the 2025 Energy Code is already proposing a HPWH baseline for residential new construction. Adopting a January 1, 2026, compliance date for this category and subsequently a 2030 date for existing construction would better align with statewide efforts to reduce emissions in new construction and make for an easier transition.
  - *Instantaneous Water Heater* (as further defined below) with a nameplate input rating greater than 200,000 Btu/hr equipment category align with the 2029 date for new construction and subsequently 2033 for existing construction. These products also fall under the DOE efficiency changes on October 6, 2026, discussed above and will require all instantaneous water heaters to meet a 96% Thermal Efficiency.

Cont'd 1-4

Our summary of proposed changes to compliance dates and equipment categories is contained in the following table:

Equipment Category	NOx and CO Emission Limits (ppmv)	Building Type	Compliance Date	Useful Life (years)
Type 1 Unit	0	New/Existing	Jan. 1, 2026/Jan 1, 2030	15
Gas-fired instantaneous water heater (≤200,000 BTU)	0	New/Existing	Jan. 1, 2026/Jan 1, 2030	25
Instantaneous Water Heater (>200,000 BTU)	0	New/Existing	Jan. 1, 2029/Jan 1, 2033	25
Type 1 Pool Heater	0	New/Existing	Jan. 1, 2029/Jan 1, 2033	15
Type 2 Unit	0	New/Existing	Jan. 1, 2029/Jan 1, 2033	25
Type 1 High Temperature Unit	0	New/Existing	Jan. 1, 2029/Jan 1, 2033	25
Type 2 High Temperature Unit	0	New/Existing	Jan. 1, 2029/Jan 1, 2033	25

Lastly, we ask the District to clarify in the rule, that the proposed compliance dates for existing buildings are based on date of equipment manufacture, and not an effective date.

[4] 2023-20392.pdf (govinfo.gov)

1-5

Definitions

BWC recommends that SCAQMD align their equipment category definitions with the Code of Federal Regulations. The Code of Federal Regulations governs certain regulated products, including those covered by this rulemaking. By adopting these definitions in Rule 1146.2, SCAQMD can harmonize their rule with how products are built in the United States and avoid creating product classes specific to one region of southern California. Additionally, by adopting these definitions, compliance with NOx emission standards is made simpler as manufacturers are not sorting each product class by Btu/hr to determine which model units comply. The specific equipment category changes we propose are as follows:

- **Type 1 and Type 2 (Non-High Temperature Units):** This category includes all *Storage water heaters* and *Residential-duty commercial water heaters* as defined in 10 CFR 431.102[5]
  - "*Storage Water Heater* means a water heater that uses gas, oil, or electricity to heat and store water within the appliance at a thermostatically-controlled temperature for delivery on demand, including:
    1. Gas-fired storage water heaters with a rated input both greater than 75,000 Btu/hr and less than 4,000 Btu/hr per gallon of stored water
    2. Oil-fired storage water heaters with a rated input both greater than 105,000 Btu/hr and less than 4,000 Btu/hr per gallon of stored water; and
    3. Electric storage water heaters with a rated input both greater than 12 kW and less than 4,000 Btu/hr per gallon of stored water."
  - "*Residential-duty commercial water heater* means any gas-fired storage, oil-fired storage, or electric instantaneous commercial water heater that meets the following conditions:
    1. For models requiring electricity, uses single-phase external power supply;
    2. Is not designed to provide outlet hot water at temperatures greater than 180 °F; and
    3. Does not meet any of the following criteria:

Water heater type	Indicator of non-residential application
Gas-fired storage	Rated input >105 kBtu/hr; Rated storage volume >120 gallons.
Oil-fired storage	Rated input >140 kBtu/hr; Rated storage volume >120 gallons.
Electric instantaneous	Rated input >58.6 kW; Rated storage volume >2 gallons.

- **Type 1 and Type 2 High Temperature Units:** This category includes *Hot water supply boilers*[6] and *Commercial package boiler* as defined in 10 CFR 431.102
  - *"Hot water supply boiler* means a packaged boiler (defined in § 431.82 of this part) that is industrial equipment and that:
    1. Has a rated input from 300,000 Btu/hr to 12,500,000 Btu/hr and of at least 4,000 Btu/hr per gallon of stored water;
    2. Is suitable for heating potable water; and
    3. Meets either or both of the following conditions:

[5] eCFR :: 10 CFR 431.102 -- Definitions concerning commercial water heaters, hot water supply boilers, unfired hot water storage tanks, and commercial heat pump water heaters.

[6] eCFR :: 10 CFR 431.102 -- Definitions concerning commercial water heaters, hot water supply boilers, unfired hot water storage tanks, and commercial heat pump water heaters.

i. It has the temperature and pressure controls necessary for heating potable water for purposes other than space heating; or
ii. The manufacturer's product literature, product markings, product marketing, or product installation and operation instructions indicate that the boiler's intended uses include heating potable water for purposes other than space heating.

- *"Commercial package boiler* means a packaged boiler that meets all of the following criteria:
  1. Has rated input of 300,000 Btu/hr or greater;

- **Instantaneous Water Heater Units:** This category includes *Instantaneous water heaters*[7] as defined in 10 CFR 431.102 and *Gas-fired instantaneous water heaters*[8] as defined in section 10 CFR 430.2
  - "*Instantaneous water heater* means a water heater that uses gas, oil, or electricity, including:
    1. Gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/hr and not less than 4,000 Btu/hr per gallon of stored water;
    2. Oil-fired instantaneous water heaters with a rated input both greater than 210,000 Btu/hr and not less than 4,000 Btu/hr per gallon of stored water; and
    3. Electric instantaneous water heaters with a rated input both greater than 12 kW and not less than 4,000 Btu/hr per gallon of stored water."
  - "*Gas-fired instantaneous water heater* means a water heater that uses gas as the main energy source, has a nameplate input rating less than 200,000 Btu/hr, and contains no more than one gallon of water per 4,000 Btu per hour of input."

Cont'd 1-5

While the definitions above contained in the Code of Federal Regulations do not exactly align with SCAQMD's Btu/hr limits for Type 1 and Type 2, these definitions have little to no bearing on the proposed compliance dates. Specifically for Type 1 and Type 2 High Temperature units, SCAQMD proposes the same compliance dates, covering the entire Btu/hr range. We strongly believe these definition changes need to be adopted into Rule 1146.2 to align with federal equipment categories and provide additional clarity.

In closing, we would like to reiterate the need for SCAQMD to align compliance dates with Title 24 Energy Code cycles and update equipment category definitions to align with the Code of Federal Regulations. We fully understand the District's goals to reduce emissions and want to play a part in ensuring it is successful in responsibly doing so. We welcome continued dialogue on this matter and would be pleased to have further, direct, conversations with District staff.

BWC is grateful to SCAQMD for the opportunity to provide feedback on the Initial Preliminary Draft of Rule 1146.2. 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

[7] eCFR :: 10 CFR 431.102 -- Definitions concerning commercial water heaters, hot water supply boilers, unfired hot water storage tanks, and commercial heat pump water heaters.
[8] eCFR :: 10 CFR 430.2 -- Definitions.

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Tom Gervais
Senior Director, Regulatory Affairs

Cc: R. Carnevale; E. Truskoski; R. Simons; B. Hill; L. Prader; C. VanderRoest; T. Gervais; M. Corbett; B. Wolfer

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RESPONSE TO COMMENT LETTER #1

Response to Comment 1-1:

Staff appreciates Bradford White Corporation's comments on PAR 1146.2. The 2022 AQMP's objective is to transition to zero-emission technologies wherever feasible. Staff identified technically feasible zero-emission control options for each category of equipment subject to Rule 1146.2 as discussed in Chapter 2 of this report. Allowing alternative control options (e.g., near-zero-emission technology) would not meet the air quality objectives.

The 2022 AQMP Control Measure C-CMB-01 set a goal for zero-emission standard by 2031 for all equipment categories, wherever feasible. PAR 1146.2 is consistent with this goal and has proposed a more specific schedule for each equipment category, with three implementation phases depending on building and technology readiness. Units for Phase I are more ready for zero-emission implementation and thus has an earlier implementation date. Units for Phase III require additional time for technology development and thus have a later implementation. Nevertheless, staff extended the Phase I compliance date for new buildings by one year, from 2025 to 2026, to better align with the CEC Building Code effective date.

Staff held meetings and conducted site visits for various applications including food service, grocery, hotel, hospital, multifamily, office building, and dry cleaning Staff recognizes there are many applications with unique situations and proposed alternative compliance options to address these specific concerns.

Staff appreciates the example of replacing a gas-fired unit with an electric resistance water heater. Staff recognizes that heat pumps can be over three times more efficient than electric resistance technologies, which can lower fuel switching and operational costs. Further discussion on cost-effectiveness, including capital and installation costs, are included in Chapter 2 of this staff report. There are some commercial incentives available including the Willdan Commercial Energy Efficiency Program, which provides incentives to commercial customers who have monthly maximum energy demands of greater than 20 kW across Southern California Edison's service territory.

For further discussion on spacing, please refer to Response to Comment PW-2.

Response to Comment 1-2:

PAR 1146.2 proposes a labeling requirement under the new subdivision (j) for the period between the new building compliance dates and existing building compliance dates of each equipment category. Paragraph (j)(1) requires labeling for units to be installed in existing buildings, and paragraph (j)(2) requires labeling for instantaneous water heaters rated less than or equal to 200 kBtu/hr installed in mobile homes. Labeling requirements are being proposed to address concerns for how the limits will be enforced when new buildings are required to have zero-emission units limits installed while existing buildings are allowed to have units that meet 20 ppmv NOx limits installed. Staff recognizes the need for a compliance tool to differentiate the units allowed to be installed in new and existing buildings. Please also see Response to Comment #PC-9 for more details.

Response to Comment 1-3:

South Coast AQMD has a Compliance and Enforcement team that conducts inspections. If a unit is deemed to be operating past its unit age after PAR 1146.2 Table 3 compliance dates are in effect, the owner or operator would be required to replace the unit with a zero-emission unit. Units installed in residential structures are exempt from this retrofit requirement. Further discussion on unit age for different categories can be found in Chapter 2 of this staff report. In previous Rule 1146.2 rulemaking, unit age of 15 years was utilized for the analysis. Meetings and site visits with different manufacturers during the current rulemaking process indicated unit ages of under and over 25 years for gas-fired units. U.S. DOE estimates that with proper installation and maintenance, heat pump pool heaters can last 10 or more years. The BAAQMD staff report for Rules 9-4 and 9-6 indicated that water heaters were assumed to have an average lifespan of 13 years. For PAR 1146.2, staff utilized 15 years for Type 1 units that are not instantaneous water heaters or high temperature units and utilized 25 years for other categories. Staff believes the proposed unit age for each category of this proposed amended rule is appropriate and aligns closely with other rulemakings, while taking into consideration manufacturer comments.

PAR 1146.2 subdivision (i), as explained in Chapter 3 of this staff report, provides alternative compliance options to address specific concerns including emergency replacement, utility upgrades, replacement of five or more units within consecutive two compliance years, and other cases.

Paragraph (d)(5) of PAR 1146.2 specifies the applicable emission limit when an owner or operator modifies or replaces a burner. A unit requiring burner replacement will be subject to zero-emission if the burner replacement occurs after PAR 1146.2 Table 3 zero-emission compliance dates and the unit has reached its unit age. Otherwise, Table 2 emission limits for 20 ppmv NOx, and 400 ppmv CO for type 2 unit, will apply.

Response to Comment 1-4:

Where appropriate, staff aligned the compliance dates with the effective dates of other agencies. Staff extended the Phase I compliance date for new buildings by one year, from 2025 to 2026, to align with the CEC Building Code effective date. However, staff does not see a compelling reason to align with the 2029 effective date for the future Building Code for which the requirements are yet unknown, or to extend other compliance dates to keep the four-year gap between new building and existing building compliance dates in the initial proposal. Staff set compliance dates to take into account the upcoming 2026 effective year for the CEC Building Code, the BARCT assessment, and feedback from stakeholders.

Staff acknowledges the 84 percent efficiency set by U.S. DOE for gas-fired pool heaters and did reflect this efficiency in the revised calculations. Staff recognizes that the DOE final rule will apply to efficiency standards for electric pool heaters, which is not directly applicable to PAR 1146.2, which is focused on reducing NOx emissions. Staff extended the Phase II compliance date for new buildings by one year, from 2027 to 2028, to allow more time for technology to mature. Staff strives to align with other agencies on timelines, but mainly relies on the South Coast AQMD's independent BARCT assessment to establish the appropriate compliance schedule. PAR 1146.2 provides shorter timelines for

units where the BARCT assessment indicated that zero-emission technology is available now, and longer timelines where the BARCT assessment indicates more time is needed.

Staff recognizes that the 2025 Energy Code is already addressing all-electric construction in smaller multifamily, hotel/motel and school building applications. Staff extended the Phase II compliance date for new buildings by one year, from 2027 to 2028, which will include the Type 2 (non-high temperature unit) category.

Staff divided instantaneous water heaters into two categories by rated heat input capacities as suggested so that larger units will have more time to comply. Further, staff extended the Phase I compliance date for new buildings by one year, from 2025 to 2026, to align with the CEC Building Code effective date.

For clarification regarding the zero-emission compliance dates for existing buildings, they are effective dates for new installations applicable to the supply chain including manufacturers, distributors, sellers, and installers. They are also the effective dates for the retrofit requirement applicable to owners and operators, after which units are required to be phased into the zero-emission technologies once their unit age as listed in Table 2 is reached.

Response to Comment 1-5:

Staff revised the high temperature unit definition by changing the temperature threshold from 190 degrees Fahrenheit to 180 degrees Fahrenheit, as was recommended by stakeholders to align with the Code of Federal Regulations definition for "residential-duty commercial water heater" for outlet water temperature. Staff divided instantaneous water heaters into two categories by rated heat input capacities as suggested. Staff notes that PAR 1146.2 applies to natural gas-fired units, and the definitions detailed by the commenter include fuel types other than natural gas.

COMMENT LETTER #2

February 6, 2024

VIA E-MAIL
Michael Krause, Assistant DEO
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

RE: 1146.2 Public Workshop Comments

Dear Mr. Krause,

Thank you and your staff for the ongoing opportunity to discuss Proposed Rule 1146.2. Navien will be making comments in the Public Workshop tomorrow and wanted to provide those in writing as well.

As we have previously noted, Navien's tankless water heaters fall between 1121's residential rules and 1146.2 commercial rules. However, Navien tankless water heaters are mostly used in residences and are for use by consumers. Therefore, we believe that the compliance date for tankless water heaters should align with other residential products covered under 1121. 2-1

Further, we encourage staff and the Board to give careful consideration to the detailed definitions and revised implementation timelines spelled out in the Bradford White letter of January 19, 2024. Navien agrees with Bradford White that implementation timelines should match the **California Energy Commission Title 24 Energy Code** of January 1, 2026, compliance dates for new buildings. Furthermore, SCAQMD should maintain a four-year gap between new and existing construction where it is anticipated for Department of Energy (DOE) to implement new efficiency targets in 2030, to align and be consistent with DOE. 2-2

Moreover, we believe the staff report's number of 300,000 tankless water heaters in the South Coast Basin is low, perhaps by as much as two to three times. Navien alone has sold more than 200,000 tankless units in the Basin. Since our units are more efficient than non-condensing units, we believe the NOx reductions achieved by replacing these units are over-estimated and the costs to consumers will be greater than estimated, and we request the final staff report to consider these factors. 2-3

20 Goodyear, Irvine, CA 92618 T 949.420.0420 F 949.420.0430 W Navieninc.com

Finally, we request staff clarify its intentions about the useful life/repairs section of the Proposed Rule. Under "burner replacement" scenarios, when it is **after** the compliance date and the unit has **not** reached useful life, must we then comply with Table 1 Emission Limit? If any part other than a burner needs to be replaced, then are we correct that Table 2 compliance shall not be applicable since the parts are not related to emissions? We note that the lack of clarity of this section points to additional future enforcement challenges. 2-4

Again, thank you for the opportunity to share our concerns with the AQMD. We look forward to your responses and to working together to improve air quality in our region.

Sincerely,

KEVIN PIROTIN
Vice President
Engineering & Service
Navien, Inc.

20 Goodyear, Irvine, CA 92618 T 949.420.0420 F 949.420.0430 W Navieninc.com

RESPONSE TO COMMENT LETTER #2

Response to Comment 2-1:

Staff appreciates Navien's comments on PAR 1146.2 and input on the rule language. For clarification, PAR 1121 rulemaking is in progress with an anticipated public hearing date in the fourth quarter of 2024. Instantaneous water heaters are not subject to PAR 1121, even though they are mostly installed in residential structures similar to PAR 1121 units. Building readiness is being evaluated for both PAR 1146.2 and PAR 1121. Staff will consider aligning compliance dates and determining if further analysis of technologies and other factors for PAR 1121 will require any different implementation timelines.

Response to Comment 2-2:

Staff extended Phase I compliance date for new buildings by one year, from 2025 to 2026, to better align with the CEC Building Code effective date. Please refer to Response to Comment 1-4 for more detail.

Response to Comment 2-3:

Staff estimated the instantaneous water heater universe to be approximately 300,000 units in the South Coast AQMD region using the 2019 California RASS from the CEC and the RECS from the U.S. Energy Information Administration. Staff appreciates any detailed estimate and data source on the number of instantaneous water heaters in the region. Staff understands instantaneous water heaters can be more efficient than non-condensing units, the 95% energy efficiency used in the cost-effectiveness calculations for instantaneous water heaters aligns with their energy efficiency level.

Response to Comment 2-4:

Paragraph (d)(5) specifies the applicable emission limit when an owner or operator modifies or replaces a burner. Zero-emission limits in Table 2 will only apply when the modification or replacement occurs on and after the Table 3 compliance date and the unit has reached its unit age; otherwise, Table 1 limits apply. Paragraph (d)(5) specifies that this is for a burner modification or replacement. If any part other than a burner needs to be replaced, Paragraph (d)(5) is not applicable. This provision was added to address a stakeholder's concern that a burner replacement might occur before the end of a unit's unit age resulting in stranded assets.

COMMENT LETTER #3

ACTIVE SGV
COALITION FOR CLEAN AIR
EARTHJUSTICE
INDUSTRIOUS LABS
SIERRA CLUB

VIA: ELECTRONIC MAIL

February 5, 2024

Michael Krause, Assistant DEO
Heather Farr, Planning and Rules Manager
South Coast Air Quality Management District (South Coast AQMD)
21865 Copley Dr.
Diamond Bar, CA 91765
mkrause@aqmd.gov
hfarr@aqmd.gov

Re: Proposed Rule 1146.2

Dear Mr. Krause and Ms. Farr:

The undersigned organizations are grateful for the opportunity to comment on Proposed Amended Rule 1146.2. The current proposal – the second major regulation targeting Nitrogen Oxide (NOx) emissions after adoption of the 2022 Air Quality Management Plan (AQMP) - marks an important milestone, in that the Air District including zero-emission standards for all equipment covered under the rule. We support moving swiftly to adoption of a true zero-emission regulation. The points below provide feedback on the most recent iteration of the rule and the presentation at Working Group Meeting 5 in December of 2023.

I. Great Urgency Exists to Pass This Regulation. 3-1

There is great urgency to move forward with these rule amendments no later than the April Governing Board meeting, the proposed date presented at the last Working Group Meeting. The region has failed to attain even the 1997 8-hour ozone standard, much less any of the subsequent ozone standards. The region has also failed to attain the annual PM2.5 standard. The NOx emission reductions achieved by these rule amendments will help the Air District make progress on attainment for both pollutants, resulting in significant health benefits for residents. In addition to banking critical emission reductions, timely adoption of this regulation will maximize lead time for market and complementary policy development and allow staff to move onto other life-saving rules that are dearly needed. It is concerning that Slide 42 of the presentation for Working Group Meeting #5 noted that the April adoption hearing timeline could be "subject to change." We highly encourage staff not to delay this rulemaking.

The South Coast AQMD has already delayed these amendments to Rule 1146.2. During Working Group Meeting #1 in April of 2023, the AQMD staff projected that these rule amendments were going to be adopted in September of that year. That timeline was later moved

down to November 2023, then over to the first quarter of 2024, before landing on the current proposed date in April 2024. Cont'd 3-1

While we generally understand the motivation behind these timeline changes and have not opposed moving the adoption date, the April 2024 proposal is already a delay of seven months from the proposal originally presented to the public, and we would be unlikely to support additional delays.

As the Air District is aware, these delays have real and serious consequences for public health. The 2022 Air Quality Management Plan (AQMP) makes clear that passing zero-emission regulations for stationary sources must be a top priority. The AQMP aptly states:

> Previous AQMPs have relied on increasingly stringent regulations targeting tailpipe and exhaust stack emissions, new engine technologies, or fuel mix improvements. However, these approaches rely on additional reductions from already strictly regulated sources and cannot achieve an additional 67 percent reduction beyond the 2037 baseline. Therefore, there is no viable pathway to achieve the needed reductions without widespread adoption of zero emissions (ZE) technologies across all mobile sectors and stationary sources, large and small.[1]

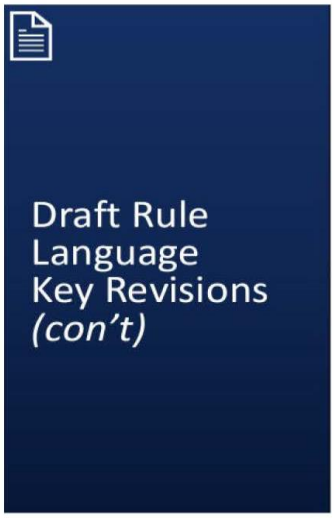
With so many control measures needing to be accomplished in the near term, the Air District must quickly pass zero-emission regulations on these sources and others. Moreover, given that some facilities covered under these rules will be changing equipment due to the REgional CLean Air Incentives Market (RECLAIM) transition, setting these standards sooner will provide a stronger signal to focus on advancing zero-emission solutions instead of continued combustion technologies.

We support the April adoption date for these amendments and urge that the AQMD stick to this timeline for passing this important life-saving regulation.

II. Zero--Emission Standards Are Critical, and Faster Compliance is Feasible. 3-2

Moving to zero-emission equipment where feasible remains critical to attaining federal and state ozone and PM2.5 standards, and our organizations are pleased that this regulation includes zero-emission standards for all categories of equipment:

[1] *See* 2022 Final AQMP, at ES-4, *available at* http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/final-2022-aqmp.pdf?sfvrsn=16.



Modify Requirements:

- Present future effective limits in table format

(2) No person shall manufacture, supply, sell, offer for sale, or install, for use in the South Coast AQMD, any Unit subject to this rule, unless such Unit does not exceed the applicable NOx and CO emission limit and compliance date set forth in Table 2.

Table 2 – NOx and CO Emission Limits, Compliance Schedule, and Unit Useful Life

Equipment Category	NOx and CO Emission Limits (ppmv)	Building Type	Compliance Date	Useful Life (years)
Type 1 Unit*	0	New	January 1, 2025	15
		Existing	January 1, 2029	
Instantaneous Water Heater	0	New	January 1, 2025	25
		Existing	January 1, 2029	
Type 1 Pool Heater	0	New	January 1, 2027	15
		Existing	January 1, 2031	
Type 2 Unit**	0	New	January 1, 2027	25
		Existing	January 1, 2031	
Type 1 High Temperature Unit	0	New	January 1, 2029	25
		Existing	January 1, 2033	
Type 2 High Temperature Unit	0	New	January 1, 2029	25
		Existing	January 1, 2033	

* Referring to a Type 1 Unit that is not a High Temperature Unit, Type 1 Pool Heater, or Instantaneous Water Heater.

** Referring to a Type 2 Unit that is not a High Temperature Unit.

34

Cont'd 3-2

Some compliance dates can and should be moved up, however. Importantly, given the need for additional NOx reductions by 2031 to attain the 2008 8-hour ozone standard after more than 20 years of excess impacts to health and air quality, all equipment categories currently listed with 2033 compliance dates should be shifted to 2031. Maximizing emissions reductions in the District by 2031 will be necessary to avoid further years of nonattainment and its concomitant harms to residents of the region.

In a similar vein, equipment categories currently listed with 2029 compliance dates should be bumped up to 2028 in order to allow for a greater penetration of equipment before the 2031 attainment deadline arrives.

III. The Current Approach of Assuming Natural Gas Will Be Abundant and Cheap for Decades Does Not Comport with Reality.

3-3

On December 1, 2022, the California Public Utilities Commission (CPUC) "adopted a new framework to comprehensively review utility natural gas infrastructure investments in order to help the state transition away from natural gas-fueled technologies and avoid stranded assets in the gas system."[2] There is a cognitive dissonance between air quality planning and these proceedings happening at the state level. The current BARCT assessments assume electricity prices will go up over the next two decades, but natural gas prices are predicted to go down.

These assumptions arise from South Coast AQMD's use of the gas and electricity rate projections included in the California Energy Commission's (CEC) California Energy Demand

[2] CPUC Creates New Framework to Advance California's Transition Away from Natural Gas, Press Release, (December 1, 2022), *available at* https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-creates-new-framework-to-advance-california-transition-away-from-natural-gas.

Update 2022-2035[3] – which assumes gas demand will remain steady through time despite California's many policies to reduce fossil fuel use and corresponding greenhouse gas emissions.[4]

Cont'd 3-3

The economic assumptions underpinning the analysis that fossil methane will be cheap and abundant ignore many factors. For example, as more and more people and entities leave the gas system, fewer and fewer users will remain to pay for the fixed infrastructure costs of the increasingly expensive gas system. It is not clear why gas prices in the South Coast Air Basin would defy the tenets of economics and remain cheap for decades to come.

The same year CEC published the document staff is using, the agency published another report, "The Challenge of Retail Gas in California's Low-Carbon Future," which takes future demand and future customer base into account and that work finds that gas rates will increase steadily over time especially as California implements its programs to curb air and climate pollution.[5] For example, the chart below shows that building electrification at a high level will result in increased rates for industrial facilities.

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[3] California Energy Demand Update *available at* https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2022-integrated-energy-policy-report-update-2.

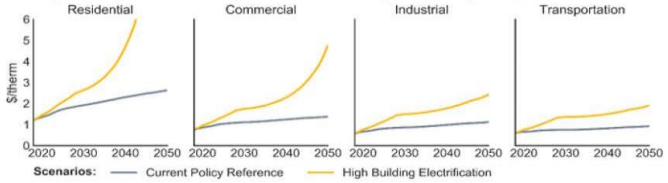
[4] The Environmental Defense Fund (EDF) filed significant comments on the gas assumptions portion of the Integrated Energy Policy Report (IEPR). In particular, EDF pointed out "Currently, the IEPR preliminary model projects stable future gas demand…

> EDF highlights two concerns around these projections. First, stable gas demand is at odds with California's climate policies aimed at reducing fossil fuel use—including natural gas demand. These state policies include the Senate Bill 32 targets of reducing California's greenhouse gas emissions by 40% below 1990 levels by 2030, the Assembly Bill 1279 target of reaching net zero by 2045, the California Air Resources Board (CARB) 2022 Scoping Plan targets of reducing total fossil fuel consumption by 86% below 2022 levels by 2045, the California Public Utilities Commission (CPUC) decision to eliminate gas extension subsidies, and various local ordinances on gas appliances…
>
> Second, EDF contends that it is unreasonable to assume constant demand beyond a future point in time simply because no existing projections are available. It is true that no future projection can be made with 100% confidence and accuracy; and that confidence will decline further out into the future the projection is made. However, the entire IEPR process has uncertainty of projections baked in, and holding this one element constant is not worthy of the IEPR process. To project *no change* and assume constant future gas demand beyond a certain point, however, would be to overlook existing market trends of electrification and various state policies."

EDF Comments on Gas Demand Forecasts in IEPR, (May 2, 2023).

[5] CEC, *The Challenge of Retail Gas in California's Low Carbon Future, available at* https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-055-F.pdf.

Figure 25: Gas Rates by Sector in the High Building Electrification Scenario



Cont'd 3-3

The CEC is currently working on its 2023 Integrated Energy Policy Report (IEPR), which is examining load modifier scenarios, including additional achievable fuel substitution through policies like zero-emission appliance standards. These scenarios are still overly conservative – for example, most assume that SCAQMD will take no action in this area, and CARB's own statewide zero-emission standards to come are not examined at all – however the agency should monitor the 2023 IEPR process and integrate its updated gas rate projections into BARCT analyses when available.

The context for the assumptions staff use in the BARCT analysis is important as well. While the South Coast AQMD's primary regulatory concern is reducing traditional criteria pollutants, there is overwhelming consensus that we must dramatically drive down the use of methane to stave off the worst consequences of climate change. The sector being discussed today is a large user of gas, and this rule provides great opportunity for reductions in climate pollution.

As such, equipment covered by this rule will be a priority target for addressing greenhouse gas emissions moving forward. Moreover, we are disappointed in the approach of some working group participants seeking to drop anchors in the process for achieving zero-emissions. We do not have time for delays and half measures to clean up this equipment.

IV. Our Organizations Support the Definition of "High Temperature Unit."

3-4

At the workshop, staff requested feedback on the definition of "high temperature unit." The current temperature is set at 190 degrees Fahrenheit. Commenters question the premise here that arbitrary temperature levels should dictate the speed of clean up of equipment. We also question any presumption – whether express or implied – of the infeasibility of zero-emissions technologies for equipment above 190 degrees. Not only are there zero-emission alternatives like electric boilers available now that can provide zero-emission heat, it is safe to assume that technology will only improve in the coming years as technology forcing regulations such as 1146.2 are implemented. Given technology development is not static, we suggest staff build into its technology review an assessment of this "high temperature unit" definition as technology continues to advance.

V. Technology Investments.

3-5

Record amounts of funding exists for addressing emissions. The South Coast AQMD Technology Advancement team should work to secure funding for incentive programs to advance zero-emissions equipment in this sector. Given the proposed rule's zero-emission market signal, it will be important to develop an incentive program in the next couple of years before

compliance dates for existing buildings arrive. As such, the AQMD should establish a $25 million program, including technical assistance to support entities that want to advance zero-emission technologies quicker than proposed deadlines for equipment covered by this rule. These monies could come from state or federal funds, such as the Food Production Investment Program and the Industrial Decarbonization and Improvement of Grid Operations program, which are administered by the California Energy Commission.

Cont'd 3-5

VI. Technology Summit.

3-6

The technological changes in this sector are rapidly evolving. To play its proper leading role in this area, SCAQMD should participate in and/or host a technology workshop focused on equipment covered by this rule and other related sectors (e.g., residential space and water heating, or industrial heat). This workshop should be conducted in coordination with our energy agencies (CEC and CPUC), in addition to our electric utilities, and it could be held regularly to capture a variety of sectors and technologies.

As an interim step, we recommend that the South Coast AQMD staff invite the Industrial Heat Pump Alliance to present to the Stationary Source Committee about new clean industrial heat solutions and what the agency can do to start eliminating more sources of health-harming and climate-disrupting fossil fuel combustion.

We appreciate your consideration of these comments, and we look forward to the adoption of these rule amendments to get one step closer to the emissions reductions the region desperately needs.

Sincerely,

Adrian Martinez
Earthjustice

David Diaz, MPH
ActiveSGV

Chris Chavez
Coalition for Clean Air

Evan Gillespie
Industrious Labs

Kim Orbe
Sierra Club, Angeles Chapter

RESPONSE TO COMMENT LETTER #3

Response to Comment 3-1:

Staff thanks the Coalition for their participation and comments on PAR 1146.2. Staff recognizes the need to pursue emission reduction with an earlier timeframe to address the air quality needs of the South Coast Air Basin. At this time, the public hearing has been further delayed; however, staff is seeking a June 2024 Public Hearing.

Response to Comment 3-2:

Staff recognizes the need for earlier compliance timelines to encourage greater adoption of zero-emission equipment before attainment deadlines. The proposed compliance dates in PAR 1146.2 Table 3 will allow for greater technology and market development to occur. In addition, staff is proposing to conduct a status check-in/technology review before January 1, 2028, to assess the technology development and market availability of zero-emission units. The compliance dates also align with the goal set by the 2022 AQMP Control Measure C-CMB-01.

Response to Comment 3-3:

For cost-effectiveness calculations, staff utilized the CEC's Integrated Energy Policy Report (IEPR), which is released every two years and reports projected future rates of gas and electricity. Previously, staff utilized the 2021 IEPR for the PAR 1146.2 cost-effectiveness assessment, which impacts the cost to switch from natural gas-fired units to heat pumps. Staff has updated the cost-effectiveness assessment according to the new IEPR released on January 1, 2024, which projected natural gas rates increased by 40 percent and projected electricity cost showed a more moderate increase of 28 percent. Utilizing these new projected rates improved cost-effectiveness estimates. Staff recognizes that this is an estimate, and that future projections and actual prices may differ. A technology assessment scheduled for before January 1, 2028, will consider changes in rate forecasts and integrate updated gas rate projections into BARCT analyses when available. Staff also acknowledges that California's many policies to reduce fossil fuel use and corresponding greenhouse gas emissions will lower gas demand over time, leading to increased gas costs. Staff also recognizes that there are co-benefits to reducing NOx emissions from this universe.

Response to Comment 3-4:

Staff included a high temperature unit definition with threshold of 180 degrees Fahrenheit, aligning with the Code of Federal Regulations definition for "residential-duty commercial water heater" for outlet water temperature, to provide a later implementation date for zero-emission units in this category. As discussed in Chapter 2 of this report, staff has identified some technologies that can provide hot water beyond the 180 degrees Fahrenheit threshold; however, high efficiency technology (e.g., heat pump) for this equipment category may not be mature in the market yet. While electric resistant boiler for high temperature is a mature technology, it is not viable to heavily rely on this technology due to its high-power demand that could overburden the grid. PAR 1146.2 provides a separate equipment category for high temperature units which will allow for further technology development and market

advancement prior to compliance dates. A technology assessment scheduled for before January 1, 2028, will consider the technology development and market availability of high temperature units, including whether the "high temperature unit" category should remain at the later implementation date as technology continues to advance.

Response to Comment 3-5:

Staff understands the challenge of higher upfront cost and is in the process developing a rebate program to help lower the cost for some consumers. The initial phase of the program will include incentives to water heating zero-emission technologies for small businesses that are subject to this rule. In addition, staff is requesting the third-party contractor that implements the program help direct applicants to other state, federal, and local funding opportunities that can be stacked with the South Coast AQMD rebate program. There are many funding opportunities currently available or targeted for the near future that staff will work toward securing to help defer the upfront costs to transition to zero-emission technologies.

Response to Comment 3-6:

Staff appreciates the recommendation to hold a technology workshop or summit and the suggestion to invite the Industrial Heat Pump Alliance to present to the Stationary Source Committee about new clean industrial heat solutions. Staff will consider these ideas for future meetings.

COMMENT LETTER #4

Benz Air Engineering, Co. Inc.
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info@benzair.com

CLEAN AND INTELLIGENT ENERGY SOLUTIONS

LAS VEGAS, NV - LOS ANGELES, CA - MODESTO, CA - PORTLAND, OR

February 7, 2024
Public comment PAR1146.2

Benz Air Engineering Co, INC, ("BAE") files these comments in response South Coast Air Quality Management District's (SCAQMD) Initial Preliminary Draft of Rule 1146.2

About BAE

Having expertise in electrical generation and all aspects of steam, its generation and use, and driven by its vision of the affordable, reliable, net-zero carbon grid of the future, BAE has developed and commercialized a new steam generation technology – the hybrid Boiler Accessory – decarbonizing existing hard to electrify boilers and fluid heaters with renewable electrical power when available while providing local power at less than half the current grid heat rate. BAE's boiler accessory offers a unique capacity and energy solution that simultaneously addresses the critical AND immediate need to reduce greenhouse gas and criteria pollutant emissions, while also providing a near-term use of excess renewable electric production.

Modular and scalable, BAE's boiler accessory leverages existing hard-to-electrify emission sources as a heat and electrical energy sink, amplifying the carbon reduction of excess renewable electrical generation and firming California's grid at half the carbon rate of the highest known efficient electric generation. Depending on the grid supply, BAE's Boiler Accessory can utilize up to the limit of the existing facility's electrical supply to directly reduce greenhouse gas emissions from generating hot water or steam in a wide range of commercial and industrial applications. As the electrical grid transitions from periods of high renewable generation to generation supplied by traditional greenhouse gas emitting combined cycle generation and higher carbon single cycle sources such as fuel cells and linear generators, BAE's flameless Boiler Accessory complements fluid heaters and boilers to provide the most efficient incremental use of fuel, resulting in a net heat rate of just 4000btu/kw/hr HHV – less than half the carbon intensity of any local generation technology such as linear generators. BAE's inverter-based technology offers the widest range of valuable grid and environmental benefits including the fastest transition from consuming renewable electricity to generating ultra-low NOx and carbon emission electricity, the only known way to decarbonize hard-to-electrify emissions sources such as boilers while firming the grid at less than half the carbon footprint of microturbines, linear generators or fuel cells.

BAE's commitment to developing cost-effective and maximal efficiency heat and power generation technologies that support our nearly overloaded electrical grid infrastructure and prioritize ultra-low greenhouse gas emissions implores our public response to the AQMD's proposed regulation PAR 1146.2.

BAE provides the following comments on this preliminary draft of Rule PAR1146.2Through these comments, we strongly recommend…

1. AQMD **EMISSION INVENTORY** analysis must include greater consideration for electrical service availability. 4-1
    a. The are many areas within Southern California where there is insufficient electrical grid capacity to accommodate the added electrical load needed to electrify existing 1146.2 emission sources, precluding these sources from increasing their grid demand to accommodate the electrification of their 1146.2 equipment. This critical oversight must be accounted for in any EMMISSION INVENTORY analysis either through the inclusion of individually reported demand from inventoried facilities and/or grid demand capacity for substation localities via the U.S Energy Information Administration[1].
    b. of the **EMISSION INVENTORY,** there requires a determination of Technology Readiness Level of the proposed zero NOx heat pump technology. While generating sub 180F hot water via heat pump technology is available, heat pump generation of higher temperature water does not exist. Indeed, the staff report acknowledges that the zero-emission technology is "continuing to develop"[2] citing a public relations article about AtmosZero doing a "pilot study" at New Belgium Brewing[3]. A pilot study is anything but a product that is available or deployable on the scale of PAR 1146.2.

2. The **EMISSION REDUCTIONS** must include the analysis of electrical grid heat rate – the average BTU/kw-hr of the electricity supplied via the electrical grid in order accurately to determine NOx reductions. 4-2
    a. Whereas electrical generation in the spring, winter and fall afternoon hours is largely zero carbon and zero NOx, the afternoon and early night electrical generation supplying the electrical grid is anything but zero NOx. Until the electrical grid in Southern California is supplied solely by solar or other zero carbon means, zero emission water heating or steam production is a fallacy exactly counterintuitive to the proposed goals of the AQMD outlined in PAR 1146.2.

3. The PAR1146.2 staff report on **COST-EFFECTIVENESS** should include analysis of specific 1146.2 installations instead of fictional scenarios presented. 4-3
    a. The **INCREMENTAL COST-EFFECTIVENESS of Electrical Panel Upgrade Cost on** Page 2-14 of the Staff Report "panel upgrade cost estimate of $5,000"[4] should be

[1] U.S.E.I.A https://www.eia.gov/about/copyrights_reuse.php

[2] Preliminary Draft Staff Report PAR 1146.2 Presentation https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-preliminary-draft-staff-report-january-2024.pdf?sfvrsn=19

[3] Atmos Zero, New Belgium Brewing https://www.craftbrewingbusiness.com/featured/new-belgium-brewing-continues-to-embrace-clean-tech-works-with-atmoszero-on-first-of-its-kind-electrified-boiler/

[4] Preliminary Draft Staff Report PAR 1146.2 (Pg. 2-14)

reviewed and confirmed by a third party as it is far more likely to be the cost of getting an estimate for an electrical panel upgrade than the actual panel upgrade itself. A 600amp panel for the electrification of a 2mmbtu/hour steam boiler will be between $50,000 to as much as $200,000, depending on if there's utility service available AND the costs of the utility line/transformer upgrade. This possible deviation from 2022 AQMP estimates must be concretely falsified before any implementation of PAR 1146.2.

b. The AQMD 2022 Air Quality Management Plan (Dec 2, 2022) states the following – page 8-17:
    i. "…many buildings will likely need additional electrical panel upgrades and other infrastructure to support the increased electrical load needed to power the replacement appliances. These infrastructure upgrades can be far more costly than the cost of replacing gas appliances."[5]

c. PAR 1146.2 staff report fails to include the cost associated with utility charges for upgraded service. Assuming the local utility grid has capacity, the upgrade from the line transformer to the newly upgraded panel could be more than the newly powered equipment and the electrical panel upgrade combined.

Cont'd 4-3

4. Any **Incremental Cost Effectiveness Equation, Energy Input Method** must include theoretical Coefficient of Performance (COP).
    a. The theoretical COP of a heat pump serves as a check of heat pump manufacturers advertised COP – as any advertised COP cannot exceed that of theoretical as dictated by the temperature of the cold and hot heat sinks. (The pilot study of AtmosZero COP of 329F steam given sub-zero heat supply cannot exceed 2.39)[6]
    b. **Incremental Cost Effectiveness** calculation as presented in PAR 1146.2 is incomplete in that the stated COP relies solely on that provided by vendors rather than actual temperature and mass flow of all hot water and boiler demand scenarios.

4-4

Discussion:

California needs three times more power capacity to reach 100% clean energy by 2045. An initial analysis suggests the goal is technically feasible but only with a sustained high pace of construction: 6 GW annually for the next 25 years[7]. PAR 1146.2 imposes significant complications toward that goal as the electrification of 1146.2 sources adds to a significantly overloaded Southern California electric grid. Concurrently, the electrification of the transportation sector has exposed the severe shortage of electrical transmission.

4-5

https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-preliminary-draft-staff-report-january-2024.pdf?sfvrsn=19

[5] The AQMD 2022 Air Quality Management Plan. Dec 2, 2022 (pg. 8-17)
https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/final-2022-aqmp.pdf?sfvrsn=16

[6] Ibid: AtmosZero, New Belgium Brewing

[7] CalMatters Race to Zero (pt. 1)
https://calmatters.org/environment/2023/01/california-electric-cars-grid/#:~:text=California's%20target%20to%20build%20at,gigawatt%20of%20wind%20per%20year.

The requirement of electrifying 1146.2 sources is conceived in ignorance of the State's clean energy plan, in that the additional load on the grid falls within the same time frame where Southern California utilities grid demand approaches that of available supply[8]. The electrification of the heavy truck transportation sector alone doubles the existing grid demand of 60 gigawatts. Cont'd 4-5

I recognize that the AQMD has no interest in facilitating the State's clean energy goals, however efforts to reduce NOx emissions via electrification of 1146.2 sources irrefutably depends on electricity being available and cheap, both of which are unreasonable assumptions.

Where does Electricity come from: As stated earlier, PAR1146.2 incorrectly assumes that the electrification of 1146.2 sources is zero carbon. Assuming the latest SCE electrical heat rate of 8000btu/kw-hr alongside the location of these incremental fossil fueled peaker plants within AQMD jurisdiction AND that such peaker plants have an emission rate of 2.5ppm corrected to 15% O2, *the electrification mandated by **PAR** 1146.2 may actually increase basin NOx emissions.*

Conclusion:

Should the AQMD fail to consider these critical oversights and implement PAR1164.2 without significantly greater adherence to: 1) the reality of rapidly approaching grid overload in the State of California, 2) in-depth facility-level costs for Types 1 & 2 Boiler and Pool Heater electrification *beyond abstraction*, and 3) emissions sourcing and generation coincident to boiler and pool heater electrification on the scale of PAR 1146.2; electrical infrastructure, industrial function, carbon emissions and, most counterintuitively, *even the NOx emissions targeted by the proposed regulation* may be irreversibly worsened.

In support for the well-being of residents and businesses in southern and greater California AND our necessary commitment to reducing toxic and greenhouse gas emissions BAE implores that these comments be taken into consideration before implementation of the potentially harmful and dangerous PAR 1146.2.

Thanks
Robert Benz PE

Benz Air Engineering Co.
Phone: 209-602-1019
Email: robert@benzair.com

Robert Benz PE

[8] California ISO
https://www.caiso.com/TodaysOutlook/Pages/demand.html

RESPONSE TO COMMENT LETTER #4

Response to Comment 4-1:

Staff appreciates BAE's comments on PAR 1146.2. Staff recognizes the importance of electric grid reliability for electric units, but also for natural gas units, which often require electricity to operate. The CEC, CPUC, and CARB are working to coordinate efforts, identify issues not covered by ongoing efforts, and assess needed actions to better align the energy system with the state's climate targets. The CEC adopts an IEPR every two years and an update every other year, and the 2022 IEPR has recognized the proposed zero-emission requirements for residential and commercial buildings in California and included recommendations and updates to the energy demand forecast. Furthermore, CAISO is planning billions of dollars in transmission capacity projects over the next 20 years, and the 20-Year Transmission Outlook document from May 2022 considers transmission needs to meet load and renewable energy growth aligned with state policy. In 2021, the CPUC created new programs and modified existing programs to reduce energy demand and increase energy supply during critical hours of the day. Per Senate Bill 350 (De León, 2015), the CPUC developed an integrated resource planning process to ensure California's electric sector meets its greenhouse gas reduction goals while maintaining reliability at the lowest possible costs. On the utility level, according to SCE's 2021 Sustainability Report, SCE is expected to invest significantly in the electric grid, including energy storage. SCE also expected increases in Distributed Energy Resources such as solar.

There are products existing and emerging in the market that can meet the high-water temperature demand. For example, an internet search of examples of units sold or installed in U.S. or Southern California with focus on high water temperatures found products providing water temperature between 160- and 248-degrees Fahrenheit, with waste heat recycling systems capable of achieving up to 248 degrees Fahrenheit. Staff recognizes that for steam, heat pump technology may not be viable in the market yet, and for certain industrial processes, heat pump technology is not as mature. As part of the BARCT assessment, including discussions with manufacturers, staff determined that a temperature threshold was necessary to provide more time for the zero-emission technology market to mature for high temperature applications. As discussed above, zero-emission technologies for providing water temperatures up to 180 degrees Fahrenheit are available. Further discussion in a later section indicates that California Plumbing Code hot water temperature requirements are also up to 180 degrees Fahrenheit. Staff is proposing a temperature threshold of 180 degrees Fahrenheit for special consideration on high temperature applications with further implementation dates. Staff intends to conduct a status update /technology check-in prior to the proposed implementation dates for high temperature units to gather information on changes in technology development and availability.

Response to Comment 4-2:

Rule 1146.2 regulates the emission levels of the water heater, boiler, or process heaters themselves and does not include a lifecycle analysis of the emissions generated when producing the fuel needed to power the units. That is how BARCT assessments are conducted, and it is the same regardless of if the units are powered by natural gas, hydrogen, electricity, etc. Emissions generated during the production of natural gas,

hydrogen, or electricity are controlled by other South Coast AQMD regulations. The goal of the proposed amended rule is zero NOx emissions at the unit level. Staff does not claim the generation of electricity produces zero NOx emissions.

Please see Response to Comment #PW-1 for more details on emissions from the electric and natural gas systems.

Response to Comment 4-3:

The cost-effectiveness analysis for PAR 1146.2 includes case studies recommended by manufacturers and installers. The capital costs were sourced from internet searches and manufacturer information, and more discussion on the data sources can be found in Chapter 2 of this staff report. The cost-effectiveness analysis relied on the panel upgrade cost estimate of $5,000 from the 2022 AQMP and considered a unit age of 30 years for the panel. However, the cost of an electrical panel upgrade was adjusted to account for this longer unit age of the electrical panel versus the unit. For some categories involving residential units, the panel cost was split between residential appliances. Electrical panel upgrades will not be required for all instances where conventional units are replaced with zero-emission units, so staff assessed the cost-effectiveness with and without the estimated cost of the upgrades.

Staff consulted contractors for utility line/transformer upgrade and understands this type of upgrade may be required but is not commonly required. Upgrades on the utility side of the meter is utility company's responsibility, but consumers do bear most of the cost. PAR 1146.2 was updated to include alternative compliance options to address utility upgrade and emergency replacement concerns that allow additional time if needed. Staff will monitor the cost impact and include it in the status update/technology check-in by 2028.

In addition to options under Rule 1146.2, the South Coast AQMD has several NOx rules for boilers and heaters, based on their rated heat input. Over the years, many facilities opted to install many small water heaters or boilers subject to Rule 1146.2 for a variety of reasons including costs, flexibility, no permit requirements, etc. Facilities will maintain this flexibility and if the estimated cost of installing a zero-emission unit less than 2.0 MMBtu/hour is too high, the facility can opt to install a larger unit regulated by Rule 1146 or Rule 1146.1 that allows for low-NOx units that would not require a utility upgrade. Those rules have lower NOx limits than Rule 1146.2 so emission reductions would still be achieved if facilities opted for that approach, though it would be speculative to estimate the emissions impact on such business decisions.

Response to Comment 4-4:

Staff acknowledges that the heat pump product energy efficiency measure, COP, is an industry standard, and that the COP of heat pump products varies between 3.0 and 6.0 or more depending on the product. There will be case-by-case differences between different installations. For the analysis, staff made assumptions, disclosed those assumptions, discussed them in public meetings, and sought and considered stakeholder input.

Response to Comment 4-5:

Regarding electric grid capacity and supply, please see Response to Comment 4-1 which provides staff response to a similar comment and Chapter 2 in this staff report for further discussion.

Regarding the lifecycle emissions from electric generation, please see Response to Comment #PW-1. Nevertheless, staff has reviewed the calculations provided by the commenter through email communication and recognizes that several inaccurate assumptions were made by the commenter: a lower NOx emission by gas-fired units (10 ppm) than the current Rule 1146.2 limit (20 ppm); that 100 percent of electricity comes from natural gas power plants using the highest emission limit, when 24.7 percent of electricity in SCE comes from natural gas; that an electric boiler would replace the gas-fired unit, rather than a heat pump which is at least three times more efficient. The lifecycle emission should be much lower than the commenter's estimate.

COMMENT LETTER #5

From: Brian <brian@calhot.com>
Sent: Monday, February 19, 2024 12:51 PM
To: Heather Farr <hfarr@aqmd.gov>
Subject: [EXTERNAL] Rule 1146.2 proposed changes

I understand the want for new buildings to be equipped with heat pumps. Retrofitting an existing building is going to be a bigger endeavor than you may think. In Rule 1146.2 when changing out the standard atmospheric equipment for Low NOx equipment you were changing a gas box that used the same power requirements for another box that was about a foot longer and the storage tank stayed the same size. In changing a gas water heater to heat pump that box is being replaced by a number of slightly smaller boxes. That is not the problem, the amount of storage required for the heat pumps is the problem. 5-1

The roof or the building was designed for 500 gallons of water now has to be upgraded to handle 2,000 to 4,000 gallons of water. The structural for the roof in most apartment buildings will need to be reinforced to handle the additional weight of the storage tanks and the water they hold. 5-2

The power to the building will need to be upgraded to handle the current that the heat pumps require. Again you are not changing out one or two boxes for the gas box that uses 120V you are going to need to supply 240V to 10 or more units. The line entering the building is about a thick as your thumb for the gas, the power wires needed to enter the building will need to about as thick as your wrist. This upgrade in power will be expensive, some of it will have to wait as the power grid is in the area is upgraded to supply the needed power. Until the power company has the infrastructure to power the heat pumps, your rule can not be enacted. 5-3

For buildings that have the equipment rooms inside the building, the boilers use one square inch for every 4,000 BTUs of fresh air for combustion and for ventilation. A million BTU boiler will need two screened opening to the room two (2) feet by two (2) feet. Each heat pump will need an opening about five (5) feet by eight (8) feet and to replace the million BTU heater you will need about eight (8) of the units. 5-4

Most installations are going to close the business for a time, my guess is 3 to 9 months to do the upgrades and set up the equipment. In the case of a Hotel, Motel, Restaurant, coin laundry, and apartment complex they will need to close. Many of the companies will not be able to afford the millions of dollars required in your change out to handle the added weights and power requirements of the equipment. 5-5

For apartment dwellers, they will need to move out and find another place to live, the good news is that in LA that landlord has to pay each lease $12,000 to move. Rents will increase, to pay for the moving costs, the lost rents while the building is retrofitted, and the cost of the equipment and labor to do the work. Condo owners will have to move out, pay mortgage, pay rent, and pay their part in the cost of the equipment and upgrades to make the equipment work.

With the replacement of Gas BTU to Electric KW we are going to need to add about 293 KW for each Million BTUs you eliminate. We don't have the power production capacity to meet the needs. Before you say renewable sources, they turned off all fossil fueled sources and we had less than 7 minutes of renewable power. It was actually around 5 seconds but I am guessing that after a year it may have increased up to 40% new sources. There was talk about building a power plant in Arizona to power Los Angeles. But what would stop that local Air Quality Board from passing a rule that forbids plants that export power or taxes / fines them excessively? Is the SCAQMD going to allow new gas powered power plants in the SCAQMD area? Other wise we are going to have to ration power. Only charge your electric car on even or odd days according to your address? 5-6

We sell Heat Pumps. But as I said the problem is three fold, not sufficient power or infrastructure, the amount of water and the weight needed for a heat pump to work, and the closing of businesses and residents to make the switch from BTU to KW that will result in an increase in the costs of Housing, lodging, food, laundry, and as those go up associated business will raise their prices.

Brian McDonald
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o 310.725.5144
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www.calhot.com

RESPONSE TO COMMENT LETTER #5

Response to Comment 5-1:

Staff appreciates the comments on PAR 1146.2. Regarding the required space for zero-emission equipment, please refer to Response to Comment PW-2.

Response to Comment 5-2:

Staff recognizes that there may be some roof installations, and that there may be options for installations in other locations for those cases. Staff also acknowledges that some stakeholder's case studies have oversized the heat pump replacement, overestimating the number or the capacity of heat pumps and storage tanks, thus taking up more space. For oversized units and the need for multiple units, facilities have the ability to install a larger unit that complies with Rules 1146 and 1146.1. For a further discussion, please see Response to Comment 4-3.

Response to Comment 5-3:

Regarding electrical upgrade and associated cost impact, please see Response to Comment 4-3. Existing buildings may have more challenges than new buildings to replace gas-fired units, so staff included alternative compliance options to address utility upgrade and emergency replacement concerns and later implementation dates to give more time for units in existing buildings to be replaced. In addition, staff included an additional 20 percent to the cost of each unit to address installation and other potential additional costs. As stated in Chapter 2 of this Staff Report, for some units this may be an overestimate, for some it may be an underestimate so applying the additional costs to all units, estimated to be approximately 1.07 million units, is a conservative assumption. Further, as heat pump installations become more commercially available and common, the installation costs are anticipated to be comparable to installation costs for conventional units. In addition, staff included costs for electrical panel upgrades. Staff will evaluate the electrical upgrade and associated cost impact include it in the status update/technology check-in by 2028.

Response to Comment 5-4:

Please see Response to Comment 5-1.

Response to Comment 5-5:

Staff understands the concern and added paragraph (i)(4) to provide an alternative compliance option for emergency replacement when an electrical upgrade for more power supply capacity is required to comply with zero-emission limits. This allows the use of a temporary unit that complies with Table 1 emission limits (20 ppmv NOx/400 ppmv CO) for up to six months. Staff visited several commercial locations, and more details are included in Response to Comment 1-1. Staff discussed the installation efforts with the commercial businesses and stakeholders and have not heard of any facility shutdowns required.

Staff gathered cost data for various types of units for the cost-effectiveness analysis described in Chapter 2 of this report. Heat pumps are the primary zero-emission technology. The analysis accounted for higher equipment and installation cost, operational cost of switching from gas to electricity, and electrical upgrade cost for some cases. Although the analysis determined that it is cost-effective for most of the equipment categories to implement zero-emission, staff understands the challenge of higher upfront costs. Staff also recognizes that many residents live in tenant-occupied multifamily homes, and that increases in rent may be attributed to factors other than zero-emission water heater replacements. Staff also recognizes that PAR 1146.2 would require unit replacement at end of unit age, which means that the analysis should consider incremental cost. Staff is developing a rebate program to help lower the cost for some consumers and centralizing information for incentive and financing opportunities offered by other agencies and organizations. Further, as zero-emission technologies become more mature and more widely adopted in the market in the future, there will be less cost impact.

Response to Comment 5-6:

Staff recognizes the importance of electric grid reliability for electric units, but also for natural gas units, which often require electricity to operate. The CEC, CPUC, and CARB are working to coordinate across efforts, identify issues not covered by ongoing efforts, and assess needed actions to better align the energy system with the state's climate targets. The CEC adopts an IEPR every two years and an update every other year, and the 2022 IEPR has recognized the proposed zero-emission requirements for residential and commercial buildings in California and included recommendations and updates to the energy demand forecast. Furthermore, CAISO is planning billions in dollars in transmission capacity projects over the next 20 years, and the 20-Year Transmission Outlook document from May 2022 considers transmission needs to meet load and renewable energy growth aligned with state policy. In 2021, the CPUC created new programs and modified existing programs to reduce energy demand and increase energy supply during critical hours of the day. Per Senate Bill 350 (De León, 2015), the CPUC developed an integrated resource planning process to ensure that California's electric sector meets its greenhouse gas reduction goals while maintaining reliability at the lowest possible costs. On the utility level, according to SCE's 2021 Sustainability Report, SCE is expected to invest significantly in the electric grid, including energy storage. SCE also expected increases in Distributed Energy Resources such as solar. In 2021, according to the CEC, renewable generation accounted for 33.6 percent of the total California Power Mix, not including solar photovoltaic systems installed on residential and commercial buildings that are less than one MW as they are typically considered distributed generation and not required to report to CEC. The California Power Mix is the percentage of specified fuel types derived from the California Energy Mix, and the California Energy Mix is the total in-state electric generation plus energy imports. There is expected to be more renewables adoption by states in the future, and California Senate Bill 100 called for a Renewables Portfolio Standard of 60 percent by 2030. Electricity imports account for approximately 30 percent of total system electric generation, with other states pursuing Renewable Portfolio Standards and state energy goals.

COMMENT LETTER #6

From: Anna Haney <acecleanerssantaclarita@gmail.com>
Sent: Tuesday, February 20, 2024 2:12 PM
To: Emily Yen <eyen@aqmd.gov>
Subject: [EXTERNAL] Proposed Amended Rule 1146.2 comments

Hi!

Hope you're doing well. I just wanted to send a comment in regards to the proposal amended rule for 11 46.2. This rule would have a detrimental impact to our business as the cost of replacing our current equipment would be financially unsustainable, and would possibly cause us to close our doors. Please take into consideration the smaller businesses when proposing such a widespread change . 6-1

A major concern of mine is not only the price of the equipment, but the cost of operations. As well as the impact this will have on the electrical grid. We are already facing power, shut, offs, and possible rolling blackouts in during the summer and winter months. Such shut off, would be catastrophic to our business if we become reliant entirely on electricity.

Thank you ,
Anna
Sent from my iPhone

RESPONSE TO COMMENT LETTER #6

Response to Comment 6-1:

Staff appreciates the comment on PAR 1146.2 and recognizes the concerns of small businesses. Staff gathered cost data for various types of units for the cost-effectiveness analysis described in Chapter 2 of this report. Heat pumps are the primary zero-emission technology. The analysis has accounted for higher equipment and installation costs, operational cost of switching from gas to electricity, and electrical upgrade cost for some cases. Although the analysis determined that it is cost-effective for most of the equipment categories to implement zero-emission, staff understands the challenge of higher upfront costs. Staff is in the process of developing a rebate program to help lower the cost for some consumers and centralizing information for incentive and financing opportunities offered by other agencies and organizations. There are some federal and state incentives for zero-emission commercial appliances including Section 179D of the Internal Revenue Code, which allows deductions for energy-efficient commercial buildings, including new or existing buildings.[68] The Inflation Reduction Act extended and expanded these tax deductions.[69] TECH Clean California launched more state-wide incentives for multifamily and commercial water heating in 2023.[70] There are also utility incentives for appliances in commercial buildings, including SCE's Willdan Commercial Energy Efficiency Program, which incentivizes replacement of an existing electric resistance or gas-fired water heater with a packaged heat pump water heater.[71] GoGreen Financing also provides loan financing options.[72] Further, as zero-emission technologies become more mature and more widely adopted in the market in the future, there will be less cost impact. To address further concerns, PAR 1146.2 provides alternative compliance options to address specific concerns including emergency replacement, utility upgrades, replacement of more than four units with the same compliance year, and other cases. There is also an exemption for small businesses from the unit age requirement, so that small businesses are not subject to the zero-emission requirements at the end of unit age. They can operate their equipment beyond the unit age, replace them at natural turn-over or break down, and subject to zero-emission requirements if the replacement is on and after Table 3 zero-emission compliance dates.

Regarding electric grid reliability, please refer to Response to Comment 4-1.

[68] U.S. Department of Energy, 179D Commercial Buildings Energy-Efficiency Tax Deduction, https://www.energy.gov/eere/buildings/179d-commercial-buildings-energy-efficiency-tax-deduction
[69] IRS, Inflation Reduction Act of 2022, https://www.irs.gov/inflation-reduction-act-of-2022
[70] TECH Clean California, Incentives, https://techcleanca.com/incentives/multifamily-information/
[71] Willdan Commercial Energy Efficiency Program, https://willdanefficiency.com/commercial/
[72] GoGreen Financing, https://www.gogreenfinancing.com/

COMMENT LETTER #7

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March 1, 2024

Emily Yen
Planning, Rule Development, and Implementation
South Coast Air Quality Management District (SCAQMD)
21865 Copley Drive, Diamond Bar, CA 91765
(Submitted via email to: eyen@aqmd.gov)

Re: Proposed Amended Rule 1146.2. Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters

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Dear Ms. Yen:

AHRI appreciates the opportunity to submit comments on SCAQMD's updated Proposed Amended Rule 1146.2 (PAR 1146.2) regarding "Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters" posted to AQMD's docket on February 20, 2024[1].

Background on AHRI

AHRI represents more than 330 manufacturers of heating, ventilation, air conditioning, commercial refrigeration (HVACR) and water heating equipment. It is an internationally recognized advocate for the HVACR and water heating industry and certifies the performance of many of the products manufactured by its members. In North America, the annual economic activity resulting from the HVACR industry is more than $211 billion. In the United States alone, AHRI member companies, along with distributors, contractors, and technicians employ more than 704,000 people.

Introduction

AHRI and its members have reviewed the updated PAR 1146.2 and understand that its purpose is to obtain further NOx emission reductions and to implement the 2022 Air Quality Management Plan (AQMP) Control Measure C-CMB-01-Emission Reductions from Replacement with Zero

[1] Proposed Amended Rule 1146.2 (aqmd.gov); https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-draft-rule-language-february-2024.pdf?sfvrsn=6.

Emission or Low NOx Appliances – Commercial Water Heating (Control Measure C-CMB-01).

AHRI and its members support many of the changes in the updated PAR 1146.2. However, AHRI and its members have additional concerns and request that SCAQMD consider our comments herein.

General Comments

1. BARCT Assessment 7-1

AHRI and its members understand that the purpose of a BARCT assessment is to establish emission limits for specific equipment categories consistent with state law and is defined as: "an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source."[2] AHRI and its members have the following comments with regards to several steps in this approach.

a. Equipment Categories

In the Preliminary Draft Staff Report PAR 1146. 2[3] (Staff Report), Table 2-1, the "Type 1 High Temperature Unit" refers to "Type 1 units that are high temperature units, which are units used to produce steam or to heat water above 190 degrees Fahrenheit." AHRI and its members are pleased to see that in the updated PAR 1146.2, SCAQMD has now set the limit at 180 degrees Fahrenheit for water heaters.

While AHRI and its members would prefer the clarity given in the Working Group 4 proposal, which highlighted boilers and process heaters instead of "High Temperature Units," we support the compromise decision to adopt a limit of 180 degrees rather than 190 degrees. This decision will align the PAR with the American Society of Mechanical Engineers (ASME) thresholds that impact storage water heaters, which is 180°F.[4] Therefore, while aligning to DOE classifications for boilers and process heaters is preferred, it is more reasonable to define the limit at 180 degrees instead of 190 degrees as it will harmonize with existing standards.

AHRI and its members appreciate that SCAQMD staff "intends to conduct a technology assessment prior to the proposed implementation dates for high temperature units to gather information on changes in technology development

[2] CA Health and Safety Code Section 40406.
[3] https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-preliminary-draft-staff-report-january-2024.pdf?sfvrsn=19; https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-preliminary-draft-staff-report-january-2024.pdf?sfvrsn=19.
[4] https://www.asme.org/codes-standards.

and availability"[5] as this endeavor will be instrumental in ensuring that key technologies required to carry out this rule are both commercially available and economically justified. AHRI looks forward to participating in those discussions. Additionally, AHRI and its members support the proposal to bifurcate the instantaneous water heater category. The bifurcation of this product class brings this PAR into alignment with the U.S. Department of Energy (DOE) classification of the residential and commercial sizes of these products. Alignment of state regulations with federal product classifications is paramount to reducing regulatory burden as manufacturers design and build their products based off the DOE classification. Cont'd 7-1

b. Economic Impacts

The BARCT assessment must also look at economic impacts and the Staff Report states that "major components of the cost-effectiveness analysis are capital costs, emission reductions, discount rate, and equipment useful age" and provides equations to explain its reasoning. However, AHRI members have questions and concerns about this approach.
Although AHRI and its members recognize and appreciate that SCAQMD staff make extensive changes in this area in the updated PAR 1146.2, we still have concerns about whether the Cost Effectiveness Analysis provides a proper threshold and whether it provides sufficient transparency in its data sources or cost justifications.
Furthermore, SCAQMD has created a "cost-effectiveness screening threshold" that essentially has no enforcement mechanism (please also see our comments in the "Screening Threshold" section below).

2. Support for Exemptions 7-2

AHRI and its members are pleased to see that SCAQMD restored the Low Use Exemption in the updated PAR 1146.2. We believe this is important because the underlying issue allows for the use of emergency backup. For example, during a power outage, gas equipment could run on a generator backup, but it is unlikely any heat pump or electric resistance equipment could. We have not yet, however, had an opportunity to evaluate other updates in this section, such as the change from 9000 therms to 3000 therms. Therefore, AHRI and its members support this but acknowledge that certain aspects of the new proposals may need further consideration or refinement.
Additionally, AHRI is supportive of SCAQMD creating an exemption acknowledging the difficulties surrounding mobile homes. We acknowledge that this conversation stemmed out of the working group meetings for PAR 1111/1121[6] for furnaces and water heaters and hope that this exemption is carried through in that PAR as well.

[5] https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-preliminary-draft-staff-report-january-2024.pdf?sfvrsn=19; https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-preliminary-draft-staff-report-january-2024.pdf?sfvrsn=19.
[6] Control of Nitrogen Oxides from Residential Type, Natural Gas-Fired Water Heaters.

3. Support for Harmonization with Other Agencies 7-3

To avoid adding unnecessary extra burden on manufacturers, AHRI and its members applaud SCAQMD's efforts to align compliance dates with other agencies such as the California Energy Commission (CEC) and the Department of Energy (DOE) in its updated PAR 1146.2 and ask that the agency continue this effort wherever feasible. For example, AHRI appreciates that SCAQMD aligns its phase 1 new construction timelines with CEC Title 24 Energy Code cycles. The 2025 CEC Energy Code is currently under development and is expected to be adopted by January 1, 2025. The code is not expected to take effect until January 1, 2026. The 2025 version of Title 24 will have a large emphasis on heat pump so alignment with the code provides a cohesive effective date for the market to transition over.

SCAQMD should align with state energy code cycles and Department of Energy (DOE) rulemakings. AHRI and its members also recommend keeping the proposed four-year gap between new construction and existing construction compliance dates.

4. **Screening Threshold** 7-4

SCAQMD has created a "cost-effectiveness screening threshold" that essentially has no enforcement mechanism. The staff report states that,

> The 2022 AQMP established a cost-effectiveness screening threshold of $325,000 per ton of NOx reduced based on 2021 dollars. The 2022 AQMP stated that this screening threshold will be adjusted based on the annual California Consumer Price Index (CPI). PAR 1146.2 currently considers a $349,000 per ton of NOx reduced cost-effectiveness screening threshold using 2022 dollar-figures. The 2022 AQMP threshold is neither considered a starting point for control costs, nor an absolute cap.[7]

AHRI and its members also recommend that SCAQMD enforce this limit as a cap. We also recommend that the cost-effectiveness calculations be done without any TECH Clean California incentives.[8]

5. Labeling Requirement 7-5

The updated PAR 1146.2 SCAQMD is proposing a labeling requirement under the new Subdivision (j) for the period between the new building compliance date and the existing building compliance date of an equipment category. AHRI and its members do not support this proposal.

[7] https://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/rule-1146-1146.1-and-1146.2/par-1146-2-preliminary-draft-staff-report-january-2024.pdf?sfvrsn=19.
[8] https://techcleanca.com/.

This information is already available to building inspectors and managers in several forms. SCAQMD currently operates a compliance database with product listings for all compliant products, the acceptable installation cases can be added to that database with limited impact to manufacturers production lines.[9]

Cont'd 7-5

Furthermore, given that a 0 NOx limit would effectively ban gas installation, inspectors can easily verify compliance simply by confirming the fuel source of the appliance without the need for labels.

Lastly, in reference to PAR 1146.2, Subdivision (j)(1) "Labeling and Reporting Requirement," Table 4, (below) AHRI and its members do not understand the rationale for requiring units shipped prior to all Table 3 compliance dates to be marked "For Installation and Use in Existing Buildings Only." We would expect this marking to be applicable to units supplied or offered for sale on or after the start date and before the end dates in Table 4.

PAR 1146.2, Subdivision (j)(1) Labeling and Reporting Requirement, Table 4 – Labeling Schedule

Unit's Compliance Schedule	Labeling Requirements	
	Start Date	End Date
Phase I	January 1, 2026	January 1, 2029
Phase II	January 1, 2028	January 1, 2031
Phase III	January 1, 2029	January 1, 2033

For these reasons, we ask SCAQMD to remove this labeling requirement proposal, as it is unnecessary and would be expensive and burdensome for manufacturers.

6. Alternate Compliance Pathways

7-6

AHRI supports SCAQMD's addition of the Section (i) for Alternative Compliance Options. The addition of a section to account for delays caused by utilities will be instrumental in ensuring a smooth transition to 0 NOx without affecting services to a building. However, given that this rule will be phasing out the ability to sell these products into the district, AHRI would recommend that SCAQMD staff review and understand what the availability of ultra-low NOx gas fired products will be in the state that can be used as a temporary unit while a building is awaiting a service upgrade. While there could be options available at the onset of this rule, in 15-25 years, the available stock may be limited when the last of these products are being transitioned.

7. Need for Broader Stakeholder Engagement

7-7

While we appreciate SCAQMD's stakeholder engagement efforts, we urge the agency to

[9] https://www.aqmd.gov/home/rules-compliance/rules/support-documents/rule-1146-2-details

continue to work with key affected sectors of the regulated community including engagement with installers and end users such as building owners to ensure any unknown issues or consequences are identified.

Cont'd 7-7

Conclusion

AHRI and its members appreciate SCAQMD's stakeholder engagement efforts towards this goal and have been attending meetings and workshops. AHRI and its members additionally look forward to collaborating with SCAQMD to achieve policy solutions that are practical, economical, and technologically feasible.

Thank you for allowing us to provide comments to SCAQMD on the updated Proposed Amended Rule 1146.2 regarding "Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters."

Please feel free to contact us directly if you have questions or need additional information.

Sincerely,

Stacy Tatman, MS, JD
AHRI Senior Director, Regulatory Affairs
Email: statman@ahrinet.org

RESPONSE TO COMMENT LETTER #7

Response to Comment 7-1:

Staff appreciates AHRI's comment on PAR 1146.2. Staff is proposing a temperature threshold of 180 degrees Fahrenheit for special consideration on high temperature applications with further implementation dates. Staff intends to conduct a technology assessment prior to the proposed implementation dates for high temperature units to gather information on changes in technology development and availability. Staff has also separated instantaneous water heaters into two categories by rated heat input capacities and appreciates the comment on this subject.

Staff gathered cost data for various types of units for the cost-effectiveness analysis described in Chapter 2 of this report, which were discussed with the Working Group throughout the rule development process. The analysis accounted for higher equipment and installation costs, operational cost of switching from gas to electricity, and electrical upgrade cost. Although the analysis determined that it is cost-effective for most of the equipment categories to implement zero-emission, staff understands the challenge of higher upfront costs. During the rule development process, staff strives to maximize emission reductions while considering cost-effectiveness. The cost-effectiveness threshold is neither considered a starting point or absolute cap for control costs, nor an enforcement tool. Instead, it provides a guide during rule development to identify cost-effective control options to present to the Governing Board for consideration during the Public Hearing. Staff is committed to identifying and proposing the cost-effective control options, but this cannot be done at the expense of foregoing emission reductions necessary for regional air quality attainment, especially given the magnitude of the emission reductions needed to meet the ozone standards.

Response to Comment 7-2:

Staff recognizes the importance of electric grid reliability for electric units, but also for natural gas units, which often require electricity to operate. The proposed new low-use exemption could be a transitional option for the implementation of zero-emission. Since the Public Consultation Meeting, staff has refined the proposal and divided the low-use threshold to two tiers based on unit size. Regarding zero-emission implementation in existing mobile homes, the proposed alternative compliance option is to provide more time for mobile home with instantaneous water heaters, during which time a natural gas fired instantaneous water heaters meeting the Table 2 emission limits can be installed.

Response to Comment 7-3:

Staff agreed with the commenter and extended the Phase I compliance date for new buildings by one year, from 2025 to 2026, to better align with the CEC Building Code effective date. Staff does not see a compelling reason to extend existing building compliance dates to keep the initially proposed four-year gap between new and existing building compliance dates.

Response to Comment 7-4:

Health and Safety Code 40920.6 requires the South Coast AQMD to consider cost-effectiveness as a factor in the rule process to adopt a control option as BARCT. The 2022 AQMP cost-effectiveness threshold provides a guide or reference for the cost-effectiveness analysis, which staff and the Governing Board consider when proposing and adopting BARCT emission limits. The cost-effectiveness threshold is not a hard cap and is not intended as an enforcement mechanism. Staff is committed to identifying and proposing cost-effective control/compliance options, while striving to achieve the emission reductions necessary for regional air quality attainment, especially given the magnitude of the emission reductions needed to meet the ozone standards. Cost-effectiveness is an important basis for the proposed implementation schedule. PAR 1146 proposes a later implementation for equipment categories that are less cost-effective.

Staff presented various incentive and financing opportunities (e.g., TECH Clean California incentives) that could lower the costs. However, for the cost-effectiveness calculations, staff did not include the incentives to mitigate the costs.

Response to Comment 7-5:

PAR 1146.2 is proposing a labeling requirement under the new subdivision (j) for the period when a gas unit can be installed in some applications and not in others. Table 4 start dates are the zero-emission implementation dates for installations in new buildings, and Table 4 end dates are the zero-emission implementation dates for installations in existing buildings. The period between start and end dates is when gas units can be installed in existing buildings but not in new buildings, which is the message the required label pursuant to paragraph (j)(1) would convey. Paragraph (j)(2) requires labeling for instantaneous water heaters rated less than or equal to 200 kBtu/hr installed in mobile homes during the period when natural gas fired instantaneous water heaters can replace the existing instantaneous water heaters in mobile homes but cannot be installed in other applications. Labeling requirements were previously proposed during the rulemaking process and then removed after stakeholder meetings. However, concerns were raised over enforcement during these in-between periods in the absence of labeling. Staff recognizes the need for labeling requirements to differentiate the units allowed to be installed in new and existing buildings. Please also see Response to Comment #PC-9 for more details.

Response to Comment 7-6:

Staff recognizes the need to provide additional time for emergency replacements prior to future effective dates or when utility upgrades are needed outside of the facility's reasonable control. The proposed alternative compliance options and exemption provisions will allow limited use of gas units. The demand for these temporary units could be met by a robust rental marketplace; a rental unit market exists today and could expand to meet future demand, and scaled back as the transition to zero-emission units nears completion.

Response to Comment 7-7:

PAR 1146.2 was developed through a public process that began with the development of the 2022 AQMP and was re-initiated during the second quarter of 2023. The public process

included a series of working group meetings, a public workshop, and a public consultation meeting. In addition, staff held numerous individual meetings with stakeholders who may be impacted by this rulemaking and conducted multiple site visits to various stakeholders. Staff continues to be open to stakeholder feedback and input during the rulemaking process.

COMMENT LETTER #8

March 4, 2024

Via Email: eyen@aqmd.gov

Ms. Emily Yen
Planning, Rule Development, and Implementation
South Coast Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765

RE: Proposed Amended Rule 1146.2 – Control of Oxides of Nitrogen from Large Water Heaters, Small Boilers, and Process Heaters

Dear Ms. Yen:

Rheem Manufacturing Company (Rheem) appreciates the opportunity to submit the following comments in response to the South Coast Air Quality Management District's (SCAQMD) Proposed Amended Rule 1146.2 – Control of Oxides of Nitrogen from Large Water Heaters, Small Boilers, and Process Heaters (Proposed Rule).

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 (HPWH), 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 Alabama, Arkansas, California, Connecticut, and North Carolina. The company also operates distribution facilities throughout the US, Canada, and many other countries around the world. Rheem manufactures commercial boilers and pool heating equipment at the Raypak facility in Oxnard, CA, both equipment types are affected by this Proposed Rule.

Rheem appreciates SCAQMD staff's efforts to update Rule 1146.2, and specifically to include and consider stakeholder input. To that end, we are pleased to see improvements in the latest Proposed Rule language that address many concerns raised during the last working group meeting. Rheem would like to affirm the latest changes and reiterate our concerns around the compliance dates and the newly added labeling and reporting requirements.

Definitions

8-1

Rheem supports the updated definitions of high temperature unit, instantaneous water heater, mobile home, and new building.

INTEGRATED HOME COMFORT
RHEEM MANUFACTURING COMPANY • 1100 ABERNATHY STE. 1400 • ATLANTA, GA 30328 • RHE

Building Type

Rheem recommends aligning the residential and multifamily structure definitions with California's Building Code (Title 24).[1] Title 24 exhaustively lists the building types in their "Residential Building" and "Multifamily Building" definitions, while also excluding certain types of dwellings that are for commercial purposes, such as hotels. Rheem notes that under the proposed definitions a hotel could be considered a dwelling for more than four families and fall under the multifamily structure definition.

Cont'd 8-1

High Temperature

Rheem appreciates SCAQMD amending the definitions of "high temperature unit" to include "designed" instead of "used" and 180°F instead of 190°F. These changes align with the historic understanding of high temperature applications and ease certification and compliance burden as the requirements will be around the unit and not the specific installed application.

It is becoming more well understood that electrification is only viable when there are heat pump solutions to an application.[2] Rheem notes that most heat pump water heaters can provide temperatures up to 140°F, with some capable of up to 160°F. Select heat pumps with higher temperature capability, have been identified, yet their market availability and suitability to replace existing equipment has not been reviewed. Also, it is not clear how much of the higher temperature rise is achieved with built-in electric resistance heating.

The US DOE definition of a "Residential-Duty Commercial Water Heater" includes, "Is not designed to provide outlet hot water at temperatures greater than 180 °F." Therefore, the US DOE has set >180°F as the starting point for commercial high temperature operation (where there is no longer a residential application) for water heaters. Above 180°F is also referenced throughout the ASHRAE Handbook as the recommended temperature for many applications such as sanitation, commercial kitchen, and laundry. Greater than 190°F is more typical of boiler applications. Many gas-fired water heaters and boilers operate within the 180-190°F range and, if the 190°F threshold was maintained, some of this equipment will likely be replaced with gas-fired equipment that can operate above 190°F, while other applications may not have viable solutions.

Finally, Rheem recommends added language to the rule to clarify how the high temperature qualification will be determined. More specifically, we recommend that a manufacturers declaration be used, with supporting certification standards documents to demonstrate high temperature operations.

[1] See Section 100.1 of TITLE 24, PART 6, BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS.

[2] Electric resistance equipment uses much more electricity than heat pump equipment, which significantly increases emissions at the source. Even as more renewables come online, if significantly more capacity is needed due to electric resistance equipment the non-renewable electrical generation will continue to be needed.

Compliance dates

8-2

Rheem appreciates SCAQMD amending the January 1, 2025 compliance date; however, Rheem recommends SCAQMD either include an exemption for buildings constructed under permits obtained under the 2022 code or set a January 1, 2027, date as new construction permitted under the 2022 code can be initiated up to 12 months after the permit issue date (with 180-day extensions allowed).[3] In addition, a later date would align more closely with the Bay Area AQMD zero emission date for this range of equipment.

Rheem also recommends that SCAQMD divide Type 2 units into above and below 1 MMBtu/h and set the greater than 1 MMBtu/h category as Phase III. Heating capacities greater than 1 MMBtu/h are significantly more difficult to produce with heat pump technology.

Labeling and Reporting

8-3

Rheem does not support the labeling and annual reporting requirements in section (j). Region-specific labeling adds significant complexity to the supply chain. Further, Rheem typically only has visibility to the first step in the distribution channel and has no clear way of determining where a unit is installed. This reporting requirement should be limited to distributors, retailers, and resellers operating within the South Coast region.

Exemptions

8-4

Rheem supports the exemption for "low usage" as described in sections (k)(2-3). However, Rheem recommends that the therms per year in section (k)(3) (*i.e.*, 3,000 therms) be scaled to the equipment input rate. For example, SCAQMD could determine a representative value of annual operating hours[4] at full firing rate.

Thank you for the opportunity to provide these comments. If there are questions, please contact me directly.

Sincerely,

James Phillips
Senior Regulatory Affairs Manager
Rheem Manufacturing Company

cc: Karen Meyers, Joe Boros

[3] See section 105.5.1 of the California Building Code: https://codes.iccsafe.org/content/CABC2022P3/chapter-1-scope-and-administration.
[4] The operating hours could be based on 1) the expected downtime to replace or repair the primary zero NOx equipment that has failed or 2) the heating degree days for the region above which the zero NOx equipment has trouble meeting the load.

RESPONSE TO COMMENT LETTER #8

Response to Comment 8-1:

Staff appreciates Rheem's comment on PAR 1146.2. The proposed amended rule defines a Residential Structure as, "any structure which is designed exclusively as a dwelling for not more than four families, and where such equipment is used by the owner or occupant of such a dwelling. Residential Structures includes any structures on the property such as sheds and detached garages and appurtenances such as pools and spas."

Staff does not consider a hotel to be a multifamily building. Although the proposed amended rule language does not define hotels or multifamily structures, units subject to Rule 1146.2, e.g., water heaters, boilers, and process heaters fired with, or is designed to be fired with, natural gas that have a rated heat input capacity less than or equal to 2 MMBtu/hr, that are operated at a hotel or multifamily structure are subject to the rule. Moreover, there is no requirement proposed for units operated at hotel or multifamily buildings that differentiates them from units operated at other commercial buildings; therefore, there is no need for a multifamily or hotel definition in PAR 1146.2.

There are products existing and emerging in the market that can meet the high-water temperature demand. For example, an internet search of examples of units sold or installed in U.S. or Southern California with focus on high water temperatures found products providing water temperature between 160- and 248-degrees Fahrenheit, with waste heat recycling systems capable of achieving up to 248 degrees Fahrenheit. Chapter 2 of this report provides further detail on high temperature applications. Response to Comment PW-5 provides further detail on the temperature threshold. Staff intends to conduct a technology assessment prior to the proposed implementation dates for high temperature units to gather information on changes in technology development and availability.

High Temperature Unit is defined in the proposed amended rule language and described in the staff report. The rule's intent is to ensure high temperature units are installed for high temperature use. Only specifying units designed for high temperature can create rule circumvention. For example, a boiler is designed for high temperatures, but it could be used for comfort air or hot water with output water temperature less than 180 degrees Fahrenheit. For clarity, staff suggests the definition of "high temperature unit" shall specify that the unit is designed and used to produce steam or to heat water above 180 degrees Fahrenheit.

Response to Comment 8-2:

As the South Coast Air Basin has been classified as "extreme" nonattainment for the 2015 ozone standard, staff is required to consider emission reduction for all categories and set future effective dates to reduce emissions as early as feasible. Staff does consider other agencies' plans and rulemakings for alignment where appropriate but does not use a later implementation date set by another air district as the justification for pushing back proposed compliance dates for the South Coast Air Basin. PAR 1146.2 proposes earlier implementation dates for some equipment categories and later implementation dates for others based on the BARCT assessment.

Staff also considers that South Coast AQMD standards cannot be less stringent than the state-wide standard which will be set by CARB during its ongoing rulemaking process for zero-emission standards for space and water heaters sold in California with potential implementation in 2030. Staff believes that alignment with the Title 24 implementation date of January 1, 2026, for new buildings is feasible for the categories of units in Phase I of the compliance schedule.

Staff understands that Type 2 units that are not high temperature units or instantaneous water heaters may require more time for the technology to be feasible, and the compliance dates in Phase II of the compliance schedule provide time for greater technology and market development to occur, with a technology assessment scheduled for before January 1, 2028. Staff agrees more time is needed for high temperature units, and thus divided Type 2 high temperature units out from the Type 2-unit category. Type 2 high temperature units are subject to Phase III implementation schedule. Staff recognizes that the technology is feasible for heat pumps above 1 MMBtu/hr and that the future implementation dates will allow for greater market growth. The technology assessment scheduled for before January 1, 2028, will consider the market readiness for Type 2 units.

Response to Comment 8-3:

Staff recognizes the need for a compliance tool to differentiate the units allowed to be installed in new and existing buildings. Please see Response to Comment #PC-9 or Response to Comment 7-5 for more details.

Response to Comment 8-4:

Staff recognizes that referring to an annual fuel use in therms for low-use is consistent with other boiler and water heater rules and can be a more accurate way to demonstrate low-use than operation hours. Please refer to Response to Comment 7-2 for more detail on low use.

COMMENT LETTER #9

March 5, 2024

Mr. Michael Krause, Assistant DEO
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Dear Mr. Krause:

Subject: Los Angeles Department of Water and Power's (LADWP) Comments on Proposed Amended Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters

LADWP appreciates the opportunity to provide comments on the Proposed Amended Rule (PAR) Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters. LADWP remains committed to working with the South Coast Air Quality Management District (SCAQMD) during this rulemaking process and looks forward to refining the proposed language in ensuring a successful implementation of the proposed rule.

I. Key Concerns for SCAQMD's Consideration: Recognizing that the proposed transition from gas-powered water heaters, boilers, and process heaters to all-electric alternatives has raised some concerns among the stakeholders, LADWP requests that SCAQMD take into account the following considerations: 9-1

a. Energy Demand and Grid Capacity:
The widespread adoption of electric heating systems across the South Coast Air Basin would result in an increased demand for electricity that could potentially strain local electrical grids. Upgrades to the grid infrastructure may be necessary to accommodate the additional load. Similarly, upgrades to building infrastructure (such as electrical panels and wiring) which would involve detailed design/engineering, permitting, installation, and testing may be necessary to support the increased electrical demand. LADWP appreciates SCAQMD's proposed phased implementation schedule as this could reduce the impact on energy demand but encourages SCAQMD to work with utilities and stakeholders to ensure that the intended electrification of these equipment and the resulting increase in energy demand would not significantly impact grid reliability.

b. Reliability and Resilience:
Interruptions in power supply may disrupt heating systems, impacting the functionality of commercial buildings. In particular, LADWP's water facilities which supply water for the City of Los Angeles are dependent on water heater and boiler operations. Interruptions to power, especially during emergencies, may negativity impact water facility operations. Also, compared their gas-powered counterparts, electric water heaters and boilers have a short track record, making it challenging to assess their long-term reliability and durability.

111 N. Hope Street, Los Angeles, California 90012-2607 Mailing Address: PO Box 51111, Los Angeles, CA 90051-5700
Telephone (213) 367-4211 ladwp.com

c. Technology Maturity and Availability:
There are concerns with the availability of large electric water heaters, small boilers, and process heaters since the market for electric alternatives is currently not as mature and established as their gas counterparts. Though the market is expected to expand in the future, there is no assurance that the electric alternatives available in the market would be reliable and suitable replacements for existing gas-fired water heaters, boilers, and process heaters. Concerns also remain as to whether these electric alternatives would be compatible with current equipment and building specifications. For instance, sizing constraints for existing equipment (e.g. water heaters and boilers that are located in tightly enclosed areas), could pose challenges in finding appropriate replacements.

Cont'd 9-1

II. Proposed Updates to the Rule Language: LADWP would also like to propose some updates to the second preliminary draft Rule 1146.2 language for addedclarification:

9-2

a. Condition (d)(1) states "Prior to the applicable Table 3 compliance dates, no person shall manufacture, supply, sell, offer for sale, or install, for use within the South Coast AQMD, any Unit unless the Unit is certified pursuant to subdivision (f) not to exceed the applicable Table 1 emission limits." However, the intention is to allow water heaters and boilers to operate at the NOx and CO emission limits until the compliance date, or the end of useful life, whichever is later. LADWP's proposed language is as follows:
"Prior to the applicable Table 3 compliance dates or the end of unit useful life, whichever is later, no person shall manufacture, supply, sell, offer for sale, or install, for use within the South Coast AQMD, any Unit unless the Unit is certified pursuant to subdivision (f) not to exceed the applicable Table 1 emission limits."

b. Similarly, for clarity, LADWP proposes a change to Condition (d)(3): "On and after the Table 3 compliance dates, an owner or operator of a Unit shall not operate a Unit which exceeds Table 2 emission limits once the Unit age determined pursuant to subdivision (e) is greater than or equal to the applicable Table 2 Unit age" to the following:
"On and after the Table 3 compliance dates or the end of unit useful life, whichever is later, an owner or operator of a Unit shall not operate a Unit which exceeds Table 2 emission limits once the Unit age determined pursuant to subdivision (e) is greater ~~than or equal to the applicable Table 2 Unit age.~~"

c. LADWP also suggests that SCAQMD include clarification about the Labeling and Reporting Requirements in Condition (j)(1). Since labeling has not previously been required by Rule 1146.2, LADWP requests clarification as to whether these requirements apply to already installed water heater and boilers.

LADWP requests SCAQMD's consideration of these comments and other stakeholders' comments and looks forward to working further with SCAQMD during this rulemaking process.

If you have any questions or would like additional information, please contact Ms. Andrea Villarin of my staff at (213) 367-0409 or Ms. Tejasree Ganapa at (213) 367-6332.

Sincerely,

Katherine Rubin Digitally signed by Katherine Rubin
Date: 2024.03.05 15:39:25 -08'00'

Katherine Rubin
Director of Corporate Environmental Affairs
Division

TG:cy
c: Ms. Andrea Villarin (LADWP)
Ms. Tejasree Ganapa (LADWP)

RESPONSE TO COMMENT LETTER #9

Response to Comment 9-1:

Staff appreciates LADWP's comment on PAR 1146.2. The state and local agencies in California are aligned working towards similar policy direction for zero-emission building appliances and are planning for the corresponding future demand for grid capacity, reliability, and resilience. BAAQMD adopted the zero-emission standards effective in 2027 for small water heaters and in 2031 for other space and water heaters in residential and commercial buildings in March 2023. CARB has commenced its rulemaking process for potential state-wide standards to "develop and propose zero-emission standards for space and water heaters sold in California" with potential implementation in 2030 as committed in the 2022 State Strategy for the State Implementation Plan. Many cities and counties have adopted ordinances for zero-emission appliances. The CEC, CPUC, and CARB are working to coordinate across efforts, identify issues not covered by ongoing efforts, and assess needed actions such as infrastructure upgrades to better align the energy system with the state's climate targets and electrical demand. The CEC adopts an IEPR every two years and an update every other year, and the 2022 IEPR has recognized the proposed zero-emission requirements for residential and commercial buildings in California and included recommendations and updates to the energy demand forecast. Furthermore, CAISO is planning billions in transmission capacity projects over the next 20 years, and the 20-Year Transmission Outlook document from May 2022 considers transmission needs to meet load and renewable energy growth aligned with state policy. In 2021, the CPUC created new programs and modified existing programs to reduce energy demand and increase energy supply during critical hours of the day. Per Senate Bill 350 (De León, 2015), the CPUC developed an integrated resource planning process to ensure that California's electric sector meets its greenhouse gas reduction goals while maintaining reliability at the lowest possible costs. On the utility level, according to SCE's 2021 Sustainability Report, SCE is expected to invest significantly in the electric grid, including energy storage. SCE also expected increases in Distributed Energy Resources such as solar. In 2021, according to the CEC, renewable generation accounted for 33.6 percent of the total California Power Mix, not including solar photovoltaic systems installed on residential and commercial buildings that are less than one MW as they are typically considered distributed generation and not required to report to CEC. There is expected to be more renewables adoption by states in the future, and California Senate Bill 100 called for a Renewables Portfolio Standard of 60 percent by 2030. Electricity imports account for approximately 30 percent of total system electric generation, with other states pursuing Renewable Portfolio Standards and state energy goals.

Staff has accounted for potential infrastructure upgrades in the cost-effectiveness analysis and included alternative compliance options related to potential utility upgrades and emergency replacement situations. The future effective dates will allow for reduced impact on energy demand, and many exiting units will be replaced when they reach their unit age which may be after the compliance dates which will result in a slower, phased transition to zero-emission technologies.

Zero-emission technologies such as heat pump water heaters and electric resistance water heaters and boilers have been in operation for years and continue to be installed in various

applications. Staff expects the capital costs for heat pumps to decrease over time in the lead up to future effective dates and beyond as the market matures and availability increases.

Regarding spacing, please refer to Response to Comment PW-2 for more details.

Response to Comment 9-2:

Staff appreciates the suggestion for rule language. Prior to the Table 3 compliance dates, whether the unit is at the end of unit age or not, Table 2 emission limits apply. Units reaching their unit age after the zero-emission compliance dates of their applicable categories are required to phase into the zero-emission requirement. Staff believes the mentioned rule language clearly expresses the intent without revising the rule language.

Regarding the labeling and reporting requirement, the labeling requirements do not apply to already installed water heaters and boilers.

COMMENT LETTER #10

COMPACT, HIGHLY EFFICIENT, QUICK STARTING
STEAM GENERATOR SYSTEMS

Clayton INNOVATIVE STEAM SOLUTIONS

March 8th, 2024

Subject: SCAQMD Rule 1146.2 potential rule change

Attention: Michael Krause -Assistant DEO, 909-396-2706, Emily Yen – Assistant Air Quality Specialist, 909-396-3206, Heather Farr – Planning & Rules Mgr., 909-396-3672

To whom this may concern:

Clayton Industries opposes the proposed rule change which in effect would require all small steam boilers to be electric only. Opposition is based on the following:

10-1

It would present an economic hardship to our customers:

a) These customers have already paid a premium for SCAQMD pre-certified equipment.

b) Infrastructure does not exist to bring newly required electrical power into most facilities effected. Targeted small commercial boilers typically used by small businesses/manufacturers that would now be forced to make very expensive upgrades that may not even be possible in some cases due to permitting/zoning, economic requirements. (example: 49 BHP boiler, even if they had three phase/ high voltage power available, would need 600 amps to run at 460volts. The amperage would be even higher if they used lower voltage or single- phase power!)

c) Cost of running an electrical boiler is substantially more expensive than running on gas due to high cost of electricity.

d) Increased dependence on a less reliable power source will make it more difficult to run a business. Without electrical power, the boiler and work/services will be off- line.

10-2

It will further perpetuate California's hostile business environment to the detriment of Californians:

a) Many small manufacturers and services (dry cleaners for example) may be forced to relocate or go out of business.

b) This will discourage many new companies from manufacturing/processing or providing services in California.

c) With less good paying jobs, the middle class will continue to be pushed out of California.

d) The above means less tax revenue that adds to California's financial problems.

Clayton Industries
17477 Hurley Street, City of Industry, CA 91744
www.claytonindustries.com

COMPACT, HIGHLY EFFICIENT, QUICK STARTING
STEAM GENERATOR SYSTEMS

Clayton
INNOVATIVE STEAM SOLUTIONS

10-3

It is not practical at this time:

a) Aside from the electrical current capacity limitation of local users, the power grid throughout California is already having trouble keeping up with current statewide electrical requirements, evidenced by rolling blackouts and the high cost of electricity.
b) even the push for electric car mandates has had to deal with the realities of the current electric grid.
c) The latest low NOx gas fired burners provide extremely low levels of air pollution.
d) Majority of air pollution caused by vehicle emissions.
e) The impact to small businesses would be too large in relation to the actual impact to the overall air pollution problem.

10-4

Recommendation:

Rather than go to the extreme of all electric boilers, reduce the NOx limit from 20ppm to 15ppm, CO under 50ppm, and requirement for full premix burners.

We hope that the SCAQMD will re-consider this radical change.

Sincerely,

Brian T. Dominici
CLAYTON INDUSTRIES
17477 Hurley Street
City of Industry, CA 91744
www.claytonindustries.com
661-263-0923 (office)
661-904-2111 (Mobile)

RESPONSE TO COMMENT LETTER #10

Response to Comment 10-1:

Staff appreciates Clayton Industries' comment on PAR 1146.2. The proposed zero-emission limits will not take effect until future compliance dates for new installations, and at the end of the presumed unit age of the equipment currently being used; therefore, the majority of the cost impacts are at the natural turnover of the equipment. The facilities will incur some cost to upgrade the equipment, but some of the cost will already be incurred due to end-of-unit-age replacement. The boiler example described by the commenter appears to be a large unit for industrial use with a heat input capacity beyond PAR 1146.2's applicability. Units with a rated heat input capacity greater than 2 MMBtu/hour are subject to either Rule 1146 or 1146.1, depending on the rated heat input capacity, which have lower emissions limits than Rule 1146.2 but are not transitioning to zero-emission limits at this time. In addition, staff included alternative compliance options to address utility upgrade and emergency replacement concerns and later implementation dates to give more time for units in existing buildings to be replaced and for high temperature unit installations. Boilers for output water temperature higher than 180 Degree Fahrenheit will not be subject to zero-emission limit until 2033. Staff also committed to a technology assessment by January 1, 2028, to review technology development and market availability and address any further concerns.

Common zero-emission water heating technology includes heat pumps, which can be over three times more efficient than conventional appliances. The CEC adopts an Integrated Energy Policy Report (IEPR) every two years and an update every other year. The IEPR update released on January 1, 2024, provided forecasts for future natural gas and electricity rates, which staff utilized in the cost-effectiveness analysis. As the newest IEPR projected the natural gas rate to increase 40% and electricity rate to have a more moderate increase of 28%, this resulted in increased cost savings from fuel switching in the cost-effectiveness analysis for transitioning to heat pumps. Most categories for heat pump replacements were below the cost-effectiveness screening threshold, ranging from cost-effectiveness savings of $190,000 to cost-effectiveness of $264,000 per ton of NOx reduced. The Type 1 high temperature category was above the screening threshold at around $580,000 per ton of NOx reduced, and staff is proposing a longer compliance schedule for high temperature units to comply with zero-emission limits. Costs are expected to decrease as technology matures, and a future technology check-in will provide further cost analysis prior to compliance dates for high temperature units.

Staff recognizes the importance of electric grid reliability for electric units, but also for natural gas units, which often require electricity to operate. The CEC, CPUC, and CARB are working to coordinate across efforts, identify issues not covered by ongoing efforts, and assess needed actions to better align the energy system with the state's climate targets. Please see Response to Comments #4-1 and #9-1 for more on electric grid reliability.

Response to Comment 10-2:

Staff recognizes the concerns of small businesses and added an exemption for small businesses from the unit age requirement, so that small businesses can operate their equipment beyond the rule defined unit age. Staff gathered cost data for various types of units for the cost-effectiveness analysis described in Chapter 2 of this report. Heat pumps are the primary zero-emission technology. The analysis accounted for higher equipment and installation cost, operational cost of switching from gas to electricity, and electrical upgrade cost for some cases. Although the analysis determined that it is cost-effective for most of the equipment categories to implement zero-emission, staff understands the challenge of higher upfront costs. Staff is in the process of developing a rebate program to help lower the cost for some consumers and centralizing information for incentive and financing opportunities offered by other agencies and organizations. Please refer to Response to Comment 6-1 for more detail. Further, as zero-emission technologies become more mature and more widely adopted in the market in the future, there will be less cost impact.

To address further concerns, PAR 1146.2 provides alternative compliance options to address specific concerns including emergency replacement, utility upgrades, replacement of five or more units with the same compliance year, and other cases. PAR 1146.2 is accompanied by a socioeconomic impact assessment which considers potential impacts to job growth forecast, among other metrics.

We should also recognize the health benefit to the communities. BAAQMD evaluated ambient air quality and health impacts from natural gas-fired furnaces and water heaters in commercial and residential buildings in support of the zero emission standards BAAQMD adopted in March 2023. According to the BAAQMD staff report, the proposed zero emission space and water heaters in residential and commercial buildings will result in reductions in NOx emissions and reductions in secondary PM2.5 across the Bay Area. [73] These reductions in secondary PM2.5 avoid an estimated 23 to 52 deaths per year and about 71 new cases of asthma per year. Reductions in total PM2.5 attributable to the targeted appliances, including reductions in primary PM2.5 from adoption of electric appliances, would avoid an estimated 37 to 85 premature deaths per year and about 110 new cases of asthma each year. The valuations of the health impacts from total PM2.5 were estimated to be between 400 to 890 million U.S. dollars annually. Similar benefits would accrue to communities in the South Coast AQMD.

Response to Comment 10-3:

Regarding electric grid supply and reliability, please refer to Response to Comment 4-1.

As the South Coast Air Basin has been classified as “extreme” nonattainment for the 2015 ozone standard, staff is required to consider emission reduction for all categories and set future effective dates to reduce emissions as early as feasible. The estimated baseline emissions for PAR 1146.2 is around nine percent of the total stationary source inventory. Staff also considers that South Coast AQMD standards cannot be less stringent than state-wide standards. CARB has commenced its rulemaking process for potential state-wide standards to “develop and propose zero-emission standards for space and water heaters

sold in California" with potential implementation in 2030 as committed in the 2022 State Strategy for the State Implementation Plan.

Staff gathered cost data for various types of units for the cost-effectiveness analysis described in Chapter 2 of this report, which was discussed with the Working Group throughout the rule development process. The analysis accounted for higher equipment and installation costs, operational cost of switching from gas to electricity, and electrical upgrade costs. Although the analysis determined that it is cost-effective for most of the equipment categories to implement zero-emission, staff understands the challenge of higher upfront cost. During the rule development process, staff strives to maximize emission reductions while considering cost-effectiveness. The cost-effectiveness threshold is neither considered a starting point or absolute cap for control costs, nor an enforcement tool. Instead, it provides a guide during rule development to identify cost-effective control options. Staff is committed to identifying and proposing cost-effective control options, while striving to achieve the emission reductions necessary for regional air quality attainment, especially given the magnitude of the emission reductions needed to meet the ozone standards.

Response to Comment 10-4:

PAR 1146.2 only applies to a subset of large water heaters and small boilers and process heaters. At this time, South Coast AQMD is not proposing all boilers transition to zero-emission limits - only the units less than 2 MMBtu/hour. Staff conducted a thorough technology assessment for PAR 1146.2 to evaluate the NOx control technologies that will achieve the BARCT level equipment subject to PAR 1146.2. The final proposed zero-emission limit for each class and category is the emission limit that achieves the maximum degree of emission reductions and is determined to be cost-effective and feasible with future year implementation. With regards to the commenter calling zero-emission standards for building appliances "extreme," other agencies are considering or have already adopted similar rules, and a South Coast AQMD rule cannot be less stringent than a state-wide rule. CARB has commenced its rulemaking process for potential state-wide standards to "develop and propose zero-emission standards for space and water heaters sold in California" with potential implementation in 2030 as committed in the 2022 State Strategy for the State Implementation Plan. The CEC 2022 Building Energy Efficiency Standards (Energy Code) apply to newly constructed buildings and additions and alterations to existing buildings. The 2022 Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, and more. BAAQMD adopted Rule 9-6 – Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters in March 2023 with zero-emission limits for 2031 implementation. Some manufacturers are opposed to interim lower NOx emission limits when zero-emission limits are deemed feasible for future implementation and will be the ultimate policy direction. Those manufacturers would be focused on expanding zero-emission products, instead of spending resources on developing lower NOx emission technologies for an interim time period.

COMMENT LETTER #11

The Boeing Company
4000 Lakewood Blvd.
Long Beach CA 90808-1700

March 04, 2024

S C A Q M D
21865 E. Copley Drive
Diamond Bar, CA 91765

ATTN: Heather Farr
Planning and Rules Manager

Re: SCAQMD Rule 1146.2 Proposed Amendments

Thank you for the opportunity to provide comments relating to the proposed amendments to SCAQMD Rule 1146.2 (Emissions of Oxides of Nitrogen From Large Water Heaters and Small Boilers and Process Heaters). Boeing requests that the following changes be incorporated into the proposed amendments to the rule:

- Proposed Amended Rule 1146.2 (Table 2) assigns a life expectancy (unit age) of 15 Years for Type 1 units and 25 years for Type 2 units. The Boeing Company (Boeing) typically sees longer life expectancy for these types of units due to the maintenance programs employed by the company. Even the draft staff reports states that 25 years is used for Type 1 and Type 2 boilers (Page 2-15) with respect to the cost-effectiveness analyses. Boeing requests that the unit age for Type 1 boilers be increased to 25 years and Type 2 boilers increased to 30 years. 11-1
- PAR 1146.2 (d)(9) provides that Type 1 and Type 2 units that do not meet specified NOx limits must be removed from service within one year after rule adoption. Boeing anticipates having to replace a number of units currently in the RECLAIM program and the specified time frame is insufficient to allow replacement. Boeing has replaced several of these units over the past few years. The projects typically takes anywhere from 12-18 months for planning, permitting and installation, assuming there are no issues with delivery of equipment. In addition, this relatively short time frame does not allow adequate time to perform the necessary engineering evaluations to determine if a switch to heat pumps might be a suitable approach. Boeing requests that the compliance dates contained in Table 3 for existing equipment be utilized for these units. 11-2
- PAR 1146.2 (g)(1) requires that copies of source tests be retained onsite. These reports are usually maintained at a central office and Boeing requests that the language in recently adopted SCAQMD Rule 1147 (h)(8) be utilized in lieu of the proposed language. 11-3
- PAR 1146.2 (h)(3) specifies that the owner/operator maintain documentation identifying the rated Heat input capacity of the unit. The manufacturer's label on the unit specifying the required information should be sufficient to meet this requirement. 11-4
- PAR 1146.2 (i)(1) specifies requirements for obtaining relief with respect to the lack of power availability at a facility. Utility upgrades, especially for larger facilities, may be a multi-year project. Is the intent that a company will have to request a new extension every year from SCAQMD until the facility has completed the work, since the company will have spelled out the 11-5

The Boeing Company
4000 Lakewood Blvd.
Long Beach CA 90808-1700

specific requirements in (i)(1)(D)? With respect to (i)(1)(C)), notification period should be changed to 72 hours to allow adequate time for internal review, especially if completion occurs over weekends or holidays. Boeing also seeks clarification on what information is required under (i)(1)(D)(i)(E). Companies are dependent upon the utility to provide the necessary infrastructure upgrades and the associated time table for when the upgrades will be completed. Boeing is unsure what information SCAQMD is requesting in this section that demonstrate delays are beyond the control of the owner/operator.

Boeing looks forward to continuing to work with District staff in the development of the proposed amendments to SCAQMD Rule 1146.2. Note that we are continuing to assemble cost and emission information for the Boeing facilities and are working to providing the additional information this week. If you should have any questions or require additional information, please do not hesitate to contact me.

William Pearce
Senior Environmental Engineer
Environmental Services
Environment, Health & Safety

RESPONSE TO COMMENT LETTER #11

Response to Comment 11-1:

Staff appreciates Boeing's comment on PAR 1146.2. Please refer to Response to Comment 1-3 for discussion on unit age.

Response to Comment 11-2:

Staff agrees that RECLAIM and former RECLAIM need more time to replace the existing units that are not meeting the NOx standards of 30 ppmv for Type 2 units and 55 ppmv for Type 1 units. Staff removed the lower NOx requirements previously proposed in paragraph (d)(9). This proposal revision means RECLAIM and former RECLAIM facilities will be subject to paragraph (d)(3) of PAR 1146.2 for zero-emission requirements once the existing units reach their unit age on and after the applicable Table 3 compliance dates. This change allows facilities to keep operating older units and will potentially achieve higher emission reductions as facilities will not be required to replace older units with newer combustion units that can operate for an additional 25 years; facilities will have the option to continue to operate the older units until the future effective zero-emission limits go into effect.

Response to Comment 11-3:

Staff agrees with the comment and revised the proposed amended rule. The owner or operator will be required to make the copies of source tests available to the Executive Officer upon request, instead of retaining the copies onsite.

Response to Comment 11-4:

The provision regarding rated heat input capacity documentation is PAR 1146.2 paragraph (j)(5) is an existing requirement. This provision streamlined recordkeeping requirements in existing Rule 1146.2 paragraph (c)(10) for rated heat input capacity documentation. The definition for rated heat input capacity in both the existing rule and proposed amended rule specifies that the gross heat input shall be supported by required documentation, and which shall be specified on a permanent rating plate. Requiring documentation is especially important when the burner of a unit is modified. The documentation must be signed by the licensed person modifying the unit and the rating plate must be updated accordingly as required by the rule. Staff does not agree with the suggestion to change the proposal to only require the rating plate or label on the unit for the demonstration of rated heat input capacity.

Response to Comment 11-5:

Staff revised paragraph (i)(1). The owner or operator of the unit is provided 18 months additional time to comply if a utility upgrade is required and the applicable utility company is unable to provide the necessary power to operate the unit, which is causing a delay beyond the facility's reasonable control. In addition, the owner or operator can request an extension of an additional 18 months. The total allowed delay in this situation is up to 36 months. When there are also multiple units subject to the situation, the owner or operator can submit an alternative compliance plan for the scheduled extended implementation as

specified in paragraph (i)(2). The owner or operator may seek variance or other alternatives beyond PAR 1146.2 if further relief is needed.

Regarding the comment on notification period, staff agrees and changed the notification period from 24 hours to 72 hours to provide adequate time for internal review. Regarding documentation which demonstrates that the delays are beyond the reasonable control of the owner or operator, this could be documentation showing timely communication, utility companies' statements, contract for the work with projected work plan, etc. A good example would be a letter from the utility that says the issue is on the utility side of the meter.

COMMENT LETTER #12

California Council for Environmental and Economic Balance
369 Pine Street, Suite 720, San Francisco, CA 94104
(415) 512-7890 | cceeb.org

March 13, 2024

Mr. Michael Krause, Assistant DEO
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Dear Mr. Krause:

Subject: Comments on Proposed Amended Rule 1146.2 – Emissions of Oxides from Large Water Heaters and Small Boilers and Process Heaters

The California Council for Environmental and Economic Balance (CCEEB) is a coalition of business, labor and public policy leaders that work together in pursuit of balanced and effective policy solutions. Many CCEEB member organizations operate large facilities in the South Coast Air Quality Management District (SCAQMD or "District") and, as such, we are closely following the development of PAR 1146.2.

While CCEEB recognizes the need to transition to zero emission (ZE) and low-NOx technologies where feasible, we also recognize these strategies are far more complex and costly to implement than other strategies developed by the District. Additionally, CCEEB recognizes that some of these concerns have been previously communicated to the District, and in reiterating these concerns, CCEEB intends to highlight the importance and potential impacts of these rulemaking decisions. CCEEB wishes to focus its comments on three areas of the proposal:

12-1

1. Concern with the Availability of Sufficient Energy to Implement this Proposal

   While CCEEB supported the adoption of the 2022 AQMP, we raised the concern to staff and the Board that initiatives to electrify large sectors could strain the grid. The 1146.2 rule, as proposed, is a prime example of the concern we raised in our comments to the SCAQMD where we stated:

   > "Mandates to deploy ZE technologies must be closely aligned and coordinated with development of energy infrastructure and maintaining system reliability. This is particularly important for the state's electrical grid, which must respond to several

> equally important but overlapping mandates, such as the shift to 100% renewable and carbon-free electricity generating resources and a "hardening" of the system to prevent and protect against catastrophic wildfires."

CCEEB encourages the District to work with state agencies, the utilities and all stakeholders to ensure that the proposal takes into consideration, and adjusts where necessary, its potential impact on the grid. Facilities that need to upgrade power have to take into account demands from switching all types of equipment to electric at relatively the same time. Thus, some publicly-owned utility providers may have even greater difficulty providing facilities with enough electricity in time to meet the demands of 1146.2 and other proposed zero-emission rules.

12-2

2. Cost-Effectiveness Does Not Take Into Account the Degree of Work Necessary to Make these Transitions

SoCalGas, a CCEEB member, articulated this point to the District quite well in its March 8 comment letter.

> "The South Coast AQMD's cost-effectiveness analysis has focused on single pieces of equipment at a single facility. It has not evaluated the cost associated with retrofits at larger commercial and/or industrial facilities that have multiple affected pieces of equipment, many of which are located in multiple buildings/structures on the site. The South Coast AQMD has also not included cost for cutting concrete and/or asphalt and trenching to distribute new on-site electrical power distribution to these pieces of equipment and/or buildings, which will be the costliest aspect of conversion."

This concern has been echoed by many CCEEB members. Again, in our comments to the 2022 AQMP, CCEEB stated:

> "Given the range of costs associated with ZE technology and the significant degree of uncertainty, the District will need to work closely with stakeholders and other partners in developing a reliable way to assess a fair scope of costs. An added challenge is the robustness of low-NOx controls, which lowers the marginal benefit of ZE strategies. How the District will apply its cost-effectiveness thresholds will be important. Similarly, staff assessments of technological feasibility will be more complicated than ever before. In its work, the District can serve as an important model for other jurisdictions."

12-3

3. Implementation Periods Need to be Extended

Many CCEEB members are in the RECLAIM program and, as such, CCEEB has a particular concern with PAR 1146.2 (d)(9). As we understand the proposal, the current language requires Type 1 and Type 2 boilers that do not meet specific NOx limits to be removed from service within one year of rule adoption. Many of our organizations have multiple units that would fall into this category and CCEEB does not believe it is feasible to make this

changeover in such a tight window. Further, the proposal is not clear as to why RECLAIM facilities are called out with this short compliance deadline. CCEEB requests compliance dates contained in Table 3 for existing equipment to be utilized for these units.

For facilities with multiple units, we appreciate staff's addition of the Alternate Compliance Option. Even with this option, the time to plan, obtain additional power, and install for these larger facilities will likely result in some facilities being unable to achieve compliance within the 3-year phased option as described in section (i)(2)(B). CCEEB requests the District to consider a 5-year phased-in approach (20% of units per year) for facilities with more than 20 units.

12-4

Given the significance of our comments above and the fact that several of our members are working closely to provide more accurate information on cost-effectiveness, we sincerely request a one-month delay in moving this proposal forward to the Board for an April Set Hearing and a May Public Hearing.

CCEEB recognizes the importance of this proposal and, along with our members, commits to work with you to find solutions to these concerns. Thank you for considering our comments.

Sincerely,

William J. Quinn
CCEEB Consultant

cc: Tim Carmichael, CCEEB President
Allegra Curiel, CCEEB
Members, CCEEB's South Coast Air Project

RESPONSE TO COMMENT LETTER #12

Response to Comment 12-1:

Staff appreciates CCEEB's comment on PAR 1146.2. Please see Response to Comment 4-1.

Response to Comment 12-2:

The cost-effectiveness analysis for BARCT is to evaluate the incremental cost per ton of emission reductions by retrofitting or replacing a type of equipment with newer technologies. This analysis is equipment based, and it considers incremental installation and electrical upgrade costs as explained in Chapter 2 of this staff report. Although the cost-effectiveness does not evaluate the total cost for a facility with multiple units, the socioeconomic impact analysis for this project, a draft of which will be released 30 days prior to the public hearing for PAR 1146.2, assesses the total cost impact for the region.

Regarding the installation cost, staff recognizes that there may be some cases where a utility upgrade is required and could include trenching, which can add additional cost. While trenching is costly, the end user would not bear the full cost when the trenching is required before the facility's meter. Furthermore, not every unit replacement will require trenching. Staff acknowledges that alternative compliance options could be useful in cases where a utility upgrade is needed, or multiple units need to be replaced. Regarding alternative compliance options for utility upgrades and multiple units, please see Response to Comment 5-3. Please refer to Response to Comment 7-1 for further details on the cost-effectiveness threshold.

Response to Comment 12-3:

Please see Response to Comment 11-2 regarding RECLAIM units. Please see Response to Comment 11-5 regarding multiple units.

Response to Comment 12-4:

Staff has been available throughout the public process to meet with stakeholders and appreciates any further input or data that may be provided.

COMMENT LETTER #13

UNIVERSITY OF CALIFORNIA

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ASSOCIATE VICE PRESIDENT & CHIEF RISK OFFICER

OFFICE OF THE PRESIDENT
1111 Franklin Avenue. 10th Floor
Oakland, California 94607-5200

BY E-MAIL ONLY

March 15, 2024

Yanrong Zhu
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765
yzhu1@aqmd.gov

Re: Second Preliminary Draft Rule: Proposed Amended Rule 1146.2(d)(7)

Dear Ms. Zhu:

13-1

The Regents of the University of California ("University"), on behalf of its campuses in Los Angeles, Irvine, and Riverside, has discovered what it believes to be an error in the Second Preliminary Draft of Proposed Amended Rule 1146.2, and would like to bring this error to the Air District's attention before the Draft Rule is officially released for public review on April 2, 2024.

Specifically, the University believes an error exists in PAR 1146.2(d)(7). Subsection (d)(7) proposes: "An owner or operator shall not operate any Type 1 Unit manufactured prior to January 1, 2012, in the South Coast AQMD which does not meet the NOx emission limit of 55 ppmv." As written, this amendment would immediately prohibit the use of Type 1 Units manufactured and in operation prior to January 1, 2001, with emissions exceeding 55 pm NOx. We do not believe this reflects the Air District's intent for two reasons:

1. *Existing* Rule 1146.2 does not expressly prohibit the use of Type 1 Units manufactured and in operation before January 1, 2001, even if emissions exceed 55 ppm NOx.

2. Tables 2 and 3 in PAR 1146.2 include a phase-out schedule for Type 1 Units manufactured and in operation before January 1, 2001.

If subsection (d)(7) is adopted as proposed, the compliance schedule in Tables 2 and 3 would be rendered meaningless because Type 1 Units manufactured before January 1, 2001 that exceed 55 ppm would need to immediately cease operation upon the Rule's effective date. In other words, our campuses and any other facilities with pre-2001 Type 1 Units would be forced to leave buildings unheated without any opportunity to phase out these Units in accordance with proposed Tables 2 and 3.

For the above reasons, the University requests that PAR 1146.2(d)(7) be modified to correct this error. The University proposes the following edit for the Air District's consideration: "An owner or

13-1

operator shall not operate any Type 1 Unit manufactured **after January 1, 2001, and** prior to January 1, 2012, in the South Coast AQMD which does not meet the NOx emission limit of 55 ppmv."

The University recognizes that the Air District has yet to open a formal comment period on the Draft Rule, but we believe this error is significant enough that subsection (d)(7) should be changed before the formal comment period begins.

Thank you for your consideration of this concern and related request.

Sincerely,

Ken Smith, CHP CIH RRPT
Executive Director of Environment Health & Safety

cc: Sarah Quiter, UC Legal Principal Counsel

RESPONSE TO COMMENT LETTER #13

Response to Comment 13-1:

Staff appreciates the University of California's comment on PAR 1146.2.

Staff understands Preliminary Draft PAR 1146.2 paragraph (d)(7) for Type 1 units is not in existing Rule 1146.2; however, previous rule language was for 15 years of unit age (useful life) and current PAR 1146.2 language includes 15 years of unit age for Type 1 units that are not high temperature units or instantaneous water heaters. Thus, staff expected Type 1 units would have been phased out by now through natural turnover and did not anticipate the provision would result in stranded assets. That said, staff agrees that it is more meaningful to replace those old Type 1 units with zero-emission units on and after Table 3 compliance dates and that approach is estimated to result in more lifetime emission reductions. Therefore, staff is proposing to remove paragraph (d)(7). Type 1 units manufactured prior to January 1, 2001, with emissions exceeding 55 ppmv NOx limit will be required to transition to zero-emission technologies based on the future effective dates in Table 3.

COMMENT LETTER #14

BRADFORD WHITE CORPORATION

March 27, 2024

Emily Yen
Planning, Rule Development, and Implementation
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Re: Rule 1146.2 Second Preliminary Draft of Rule 1146.2

Dear Ms. Yen:

On behalf of Bradford White Corporation (BWC), we would like to thank you for the opportunity to comment on South Coast Air Quality Management District's (SCAQMD) Second Preliminary Draft of Rule 1146.2, dated February 20, 2024.

We have compiled our comments and questions to the Second Preliminary Draft of Rule 1146.2 below.

14-1

General

BWC has reviewed the Second Preliminary Draft of Rule 1146.2, and we appreciate staff's consideration of our comments and other stakeholders, as reflected in the current draft. In particular, alignment of the new construction compliance dates for Type 1 Water Heaters and Instantaneous Water Heaters rated 200,000 Btu/hr and under with the California Energy Code cycle, the inclusion of an exception process for utility delays and extending compliance dates for mobile homeowners. However, BWC has concerns regarding the reintroduction of labeling requirements, along with the newly introduced annual reporting requirements for equipment.

14-2

Product Labeling

The Second Preliminary Draft of Rule 1146.2 proposes to require manufacturers to affix labels to equipment identifying the Unit as "For installation and use in existing buildings only." In addition, the draft proposes a second labeling requirement for instantaneous water heaters that would take effect in 2029 labeling these products as "For Installation and Use in Mobile Homes Only." As stated in our previous letter dated January 19, 2024, and repeated below, we strongly believe the proposed labeling requirement, as written, is unnecessary to enforce the rule and will add significant burdens to compliance for manufacturers of regulated products:

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"SCAQMD currently maintains a qualified products list[1] for all manufacturer water heating and boiler models certified under Rule 1146.2. To enforce the proposed Zero NOx implementation dates, SCAQMD could simply modify their table to show models that are allowed in new construction and models that are only allowed in existing buildings. Secondly, new construction requires plans to be submitted to building jurisdictions to review, as well as Title 24 energy modeling. SCAQMD can work with building jurisdictions within their territory that review and approve project plans to enforce the use of Zero NOx water heating and boiler equipment. Lastly, new construction projects are permitted and require building inspectors to approve the construction. If a non-compliant product were to be installed, it could ultimately be flagged for removal by the building inspector."[2]

We understand that the intent of the labels is to aid the District's inspectors in verifying equipment in the field. However, as currently proposed, the labeling nomenclature will create market confusion outside of the SCAQMD territory. If the District maintains that a labeling requirement is necessary instead of utilizing its qualified products list, we strongly encourage the District to provide manufacturers and our wholesalers autonomy as to how we label our products. We request the District remove the specific language requirement and replace it with a more generic statement, such as "affected products must include a mechanism to verify local emissions limits." We would like to discuss this alternative in more detail with the District prior to implementation of the rule. 14-3

Product Reporting

BWC does not agree with the newly proposed annual reporting requirements for manufacturers. As a manufacturer, we have limited influence or knowledge on where a product will ultimately be installed after it is manufactured. Manufacturers have limited capability to control a product's final installation location. We are unclear as to why the District believes annual reporting of product sales will be necessary.

The phased, compliance schedule, as outlined in the proposed rule, clearly shows which product categories cannot be sold within the District after a specified date. We would like to request further discussion with the District regarding the reporting requirements and the purpose they will serve to enforce the proposed rule. Furthermore, if reporting is to be required, we ask that the District use the manufacture date of equipment, consistent how other regulatory bodies implement requirements, including the Bay Area Air Quality Management District[3], and not the date of sale or installation.

In closing, we encourage SCAQMD to reconsider the labeling requirements altogether. However, if the District maintains labeling requirements, we strongly encourage revising the language, revising the reporting requirements to reduce compliance burdens on product manufacturers and adopt the manufacture date as the date of compliance. We welcome continued dialogue on these matters and would be pleased to have further, direct, conversations with District staff.

Please let me know if you have any questions or would like to schedule a meeting to discuss our comments further.

Respectfully Submitted,

[1] Rule 1146.2 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters (aqmd.gov)
[2] bradford-white-corporation-comment-letter---01-19-2024.pdf (aqmd.gov)
[3] 20230315_rg0906-pdf.pdf (baaqmd.gov)

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Bradford White Corporation

Tom Gervais
Senior Director, Regulatory Affairs

Cc: R.B. Carnevale; E. Truskoski; R. Simons; B. Hill; L. Prader; C. VanderRoest; M. Corbett; B. Wolfer

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RESPONSE TO COMMENT LETTER #14

Response to Comment 14-1:

Staff appreciates Bradford White Corporation's comment on PAR 1146.2 and participation in the rulemaking process.

Response to Comment 14-2:

The labeling requirement by paragraph (j)(2) for mobile homes is similar to the labeling requirement by paragraph (j)(1) for existing buildings, where the unit can be installed in some buildings but not others. Instantaneous water heaters with the labeling requirement for the specified period are only allowed for installations in mobile homes, not in other buildings. The labeling requirement is important to educate and remind the buyer of an unpermitted unit. Please refer to Response to Comment PC-9 for a further discussion on labeling.

Response to Comment 14-3:

The reporting requirement is intended to better understand how many natural gas units would be installed following the provisions of the exemption and alternative compliance sections. Since those are unpermitted units without sufficient installation records, the reporting requirement will provide emission inventory data that can be utilized for future evaluation of the benefit achieved by the rule. Manufacturers have reported units distributed to the region through previous Rule 1121 and Rule 1111 mitigation fee compliance options. The reporting for PAR 1146.2 could be similar, except there would be no associated fee.

COMMENT LETTER #15

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

March 8, 2024

Yanrong Zhu
Program Supervisor
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Subject: Comments on the Initial Preliminary Draft of Proposed Amended Rule 1146.2

Dear Ms. Zhu:

15-1

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide public comments on the South Coast Air Quality Management District (South Coast AQMD) Initial Preliminary Draft of Proposed Amended Rule (PAR) 1146.2. SoCalGas has multiple facilities which will be affected by this rule and has been an active participant in the South Coast AQMD rulemaking. SoCalGas recommends South Coast AQMD provide an adequate compliance schedule for entities with multiple facilities in order to accommodate the heavy workload necessary to design, engineer, contract, equipment/materials procurement and construction of these new equipment.

15-2

SoCalGas supports policies incentivizing the adoption of zero-emissions appliances and equipment as part of a broader strategy to achieve NOx reductions, provided such policies are feasible, permitted by federal law, cost-effective, and commercially available. However, SoCalGas has concerns that the proposed rule effectively bans certain appliances covered by the federal Energy Policy and Conservation Act (EPCA).

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

1

preemption provisions "by doing *indirectly* what Congress says they can't do *directly*." *Id.* at 1107 (emphasis in original).

15-3

Putting EPCA aside, the South Coast AQMD's cost-effectiveness analysis has focused on single pieces of equipment at a single facility. It has not evaluated the costs associated with retrofits at larger commercial and/or industrial facilities that have multiple affected pieces of equipment, many of which are located in multiple buildings/structures on the site. The South Coast AQMD has also not included costs for cutting concrete and/or asphalt and trenching to distribute new on-site electrical power distribution to these pieces of equipment and/or buildings, which will be the costliest aspects of conversion.

The South Coast AQMD should perform an analysis that incorporates this type of cost and its impact on cost-effectiveness. This type of cost, as well as other costs, have not typically been accounted for in the South Coast AQMD's previous Best Available Retrofit Control Technology (BARCT) rule analyses, as historically, BARCT rules only required retrofits (burners or add-on emission controls) or replacement of existing natural gas fueled equipment with similar natural gas fueled equipment which had a much smaller reconstruction cost and footprint. Replacement with electric driven equipment is a much different project with new construction beyond the equipment location and new power supply requirements. These new costs must be included when evaluating a project's cost-effectiveness. Due to these and other factors, the cost-effectiveness of transitioning existing buildings to zero emissions space and water heating equipment can vary significantly.

15-4

Accordingly, based on the information provided at the PAR 1146.2 workgroup meetings and SoCalGas' meeting with South Coast AQMD staff in January, we asked Ramboll to apply the South Coast AQMDs cost-effectiveness analysis technique of the proposed zero emission standard for Large Water Heaters, Small Boilers and Process Heaters (Appendix) to get a better understanding of the actual installation costs associated with the transition to electric water heaters and boilers at our facilities. SoCalGas recently presented this information to South Coast AQMD staff and will follow up with additional information requested in that meeting. The analysis shows that:

- With design and engineering costs and electrical infrastructure upgrade costs (including the concrete cutting and trenching mentioned above) included in the cost effectiveness (CE) calculations for new zero-emission units, replacing 5 NG units with electric resistance heaters and boilers incurred an incremental installation cost of approximately $1.81 million, while heat pumps resulted in even higher costs at $1.89 million. This is significantly higher than the incremental installation cost assumptions in Staff's CE calculations.
- Zero-emission units are not cost effective when all components of the installation costs are considered in the CE analysis. The CE values are between $2.6 million and $5.4 million dollars per ton of NOx emission reductions for the SoCalGas facilities we examined.

There will be cases where it will not be practical or financially viable to retrofit existing buildings with zero-emissions space and water heating equipment. Therefore, PAR 1146.2 should incorporate measures to handle situations where such equipment isn't feasible or where power supply to a facility is unavailable. In cases where installing zero-emissions units isn't feasible, transitional alternatives such as low-NOx technologies should be allowed.

Conclusion

SoCalGas appreciates the chance to provide feedback on PAR 1146.2. Prioritizing control measures that enhance reliability and resiliency will yield reductions in NOx and other criteria pollutants, including reductions in GHG. Exploring a diversified energy supply will ensure enduring and cost-effective emission reductions. SoCalGas eagerly anticipates working together to mutually pursue California's shared objectives of advancing air quality objectives.

Respectfully,

/s/ Kevin Barker

Kevin Barker
Senior Manager
Energy and Environmental Policy

RESPONSE TO COMMENT LETTER #15

Response to Comment 15-1:

Staff appreciates SoCalGas' comments on PAR 1146.2. Please refer to Response to Comment PC-6 for the discussion on multiple units.

Response to Comment 15-2:

Staff disagrees that the *Berkeley* decision stands for the proposition that *all* regulations that relate to the natural gas use of certain consumer appliances are preempted by the EPCA. The court in the *Berkeley* case made it very clear and repeatedly emphasized that its holding is "very narrow" and is "limited" only to building codes that regulate the gas usage of certain consumer appliances. (*California Restaurant Ass'n v. City of Berkeley*, 89 F.4th 1094, 1101, 1103, 1106.) The court also expressly acknowledged that the EPCA's preemptive scope is "not unlimited." (*Id*. at 1103.) As Judge Baker explained in his concurrence, "EPCA preemption is unlikely to reach a host of state and local regulations that incidentally impact 'the quantity of natural gas' directly consumed by a [covered] product at point of use." (*Id*. at 1117.)

The EPCA expressly preempts "regulations concerning the energy efficiency, energy use or water use" of certain appliances. (42 U.S.C. section 6297(c).) In *Berkeley*, the court held that the EPCA preempted a local building code that prohibited new buildings from connecting to the natural gas meter, effectively preventing the use of natural gas appliances covered by the EPCA in those buildings and thus reducing the natural gas use of those appliances to zero. Unlike Berkeley's regulation, PAR 1146.2 does not ban natural gas or otherwise regulate the amount of natural gas used by the equipment subject to PAR 1146.2. This rulemaking is not any different from previous rulemakings lowering NOx emission limits of various equipment. PAR 1146.2 is technology and fuel-neutral and is focused on achieving the maximum NOx emission reductions possible. Equipment that meets the NOx emission limits, regardless of the energy source, is not prohibited by PAR 1146.2. While PAR 1146.2 may have some impact on natural gas use depending on a number of factors, including how they are designed to meet the zero-NOx emission standard and when zero-NOx natural gas technology becomes available, any such impact is incidental to the emission reduction purpose of PAR 1146.2. BAAQMD reached a similar conclusion in its response to a similar comment regarding the *Berkeley* case and EPCA preemption when it finalized its determination to submit its new zero-NOx emission rules for building appliances for inclusion in the State Implementation Plan. (Response to Comments: Submittal of Rules 9-4 and 9-6 to SIP, *available at* https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances.)

Response to Comment 15-3:

Please refer to Response to Comment 12-2 and Response to Comment PW-2 for the discussions on trenching and additional construction cost.

Response to Comment 15-4:

Staff appreciated the meeting with SoCalGas to go through the SoCalGas cost estimation details, provide staff clarification and suggestions to adjust the estimation, and request further information. SoCalGas agreed to reevaluate the cost details and estimation, and staff will continue working with SoCalGas to identify any challenges.

COMMENT LETTER #16

남가주 한인 세탁 협회 (KDLA)
Korean Dry Cleaners & Laundry Association of Southern California
555 W Redondo Beach Blvd #247 Gardena, CA 90248
Tel: (310) 679-1300 Fax: (310) 324-3293 (Fax)

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April 15, 2024

Hon. Vanessa Delgado, Chair
South Coast Air Quality Management District Governing Board
21865 Copley Dr.
Diamond Bar, CA 91765

Subject: Urgent Request for Deferral of Consideration for Proposed Amended Rule 1146.2: Mitigating Economic Impact on Korean Drycleaners Laundry Association

Dear Chair Delgado and Esteemed Governing Board Members,

We write to you on behalf of the Korean Drycleaners Laundry Association (KDLA), representing FKDA members nationwide and KDLA members in Southern California. Urgently, we request the deferral of consideration of Proposed Amended Rule 1146.2.KDLA members embody the dynamic essence of an underrepresented community, along with the resilience of small businesses that form the cornerstone of Southern California's economy.

16-1

Our primary concern revolves around the lack of outreach and awareness regarding PAR 1146.2. Many members only recently became aware of this rulemaking have significant concerns regarding its potential economic impacts and feasibility. We fear the potential consequences this rule could have on the economic viability of the minority community, KDLA and related businesses.

16-2

The implementation of PAR 1146.2 poses an existential threat to numerous KDLA members, potentially driving them out of business. The financial burden imposed by mandatory upgrades and retrofits could prove insurmountable for these small businesses, which are already grappling with the devastating economic impacts of the COVID-19 pandemic. Approximately 30% of Korean American cleaners in Southern California have already closed their doors due to the pandemic's repercussions. The additional costs associated with compliance could make this situation even worse, leading to further closures, job losses, and economic instability within our community and the state of California.

Moreover, PAR 1146.2 risks triggering a ripple effect throughout the local economy by imposing substantial financial burdens on property owners and managers. Increased utility expenses and the need for rent hikes to offset compliance costs would place additional strain on tenants, further dampening consumer spending and exacerbating economic challenges in our region. Furthermore, the potential closure of KDLA would not only eliminate vital employment opportunities but also erode the cultural fabric and social cohesion of our communities.

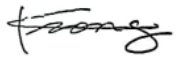
16-3

In light of these pressing concerns, we urgently request the SCAQMD Governing Board to postpone consideration of PAR 1146.2. Additionally, we implore the Board to instruct District staff to actively engage with our organization and other stakeholders to foster a comprehensive dialogue on the feasibility and economic implications of this proposed rule.

Thank you for your attention to this matter. We stand ready to collaborate with you in finding equitable and sustainable solutions that prioritize both environmental and economic resilience in our region.

Sincerely,

Yoon Dong Kim
President
Korean Drycleaners Laundry Association Southern California



RESPONSE TO COMMENT LETTER #16

Response to Comment 16-1:

Staff appreciates the comments by the Korean Dry Cleaners & Laundry Association of Southern California on PAR 1146.2. Staff contacted the California Cleaners Association in October 2023 and has been in communication with representatives of the dry cleaning industry, including a member of the Korean Dry Cleaners & Laundry Association, since February 2024. Through meetings and site visits, staff has been working with the dry cleaners to identify challenges and propose potential solutions. As detailed in Chapter 2, the following changes were made to the rule to address the dry cleaners' concerns:

- Alternative compliance option that allows up to two consecutive 18-month extensions when utility upgrades delay compliance with zero-emission limits;
- Alternative compliance option that allows for a 6-month rental unit for emergency replacement when an owner or operator requires a short-term replacement due to sudden unit failure;
- Alternative compliance option that allows an extension of up to 24 months for a property under lease;
- Exemption for small businesses where existing units can be operated until their natural replacement after the applicable Table 3 compliance date; and
- Extended compliance date (i.e., 2033 for existing buildings) for boilers operated by dry cleaners, which are categorized as high temperature units.

Response to Comment 16-2:

Staff acknowledges some zero-emission technologies have higher upfront costs, but as zero-emission technologies become more mature and widely adopted in the market, there will be less upfront cost impact. In addition, staff is projecting lifetime utility savings based on future projected natural gas and electricity prices. The cost to operate heat pumps is lower than most electric appliances because they are so energy efficient; over the lifetime of the unit, that initial cost increase could be recovered. In addition, there are federal, state, and local incentive funding specifically to incentivize the switch to zero-emission technologies such as heat pumps. South Coast AQMD is developing a rebate program to help lower the cost for some consumers and small businesses and will be centralizing information for incentive and financing opportunities offered by other agencies and organizations.

Staff proposed several alternative compliance options as explained above and detailed in Chapter 3 that dry cleaners would be able to utilize. Staff will continue to monitor all the challenges for zero-emission implementation and will conduct a technology check-in and report the findings to the Stationary Source Committee by January 1, 2028, before the compliance dates for the high temperature units go into effect.

Response to Comment 16-3:

Staff recognizes the need to pursue emission reduction to address the air quality needs of the South Coast AQMD and also to send a market signal to manufacturers ahead of future

implementation dates. Staff continues to communicate with representatives of the dry cleaning industry to discuss challenges PAR 1146.2 may pose to their operations.

COMMENT LETTER #17

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LATHAM & WATKINS LLP

May 3, 2024

Michael Krause, Assistant Deputy Executive Officer
Heather Farr, Planning and Rules Manager
Planning, Rule Development and Implementation
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Re: Regulatory Flexibility Group Comments on Proposed Amended Rule 1146.2

Dear Mr. Krause and Ms. Farr:

We write on behalf of our client the Regulatory Flexibility Group ("RFG") regarding Proposed Amended Rule 1146.2 ("PAR 1146.2"). The RFG is an industry coalition that includes companies in the refining, utility and aerospace sectors that operate facilities within the jurisdiction of the South Coast Air Quality Management District ("SCAQMD" or the "District") that will be affected by PAR 1146.2.

We appreciate the work that Staff has done so far to incorporate stakeholder feedback into PAR 1146.2, and we are thankful for the opportunity to comment on the proposed amendments and rulemaking process. We write to raise concerns with the legality of a ban on natural gas-fired water heaters, the sufficiency of the current cost-effectiveness analysis, the lack of environmental analysis under the California Environmental Quality Act ("CEQA"), and the ability of the electrical grid to handle PAR 1146.2's wide-scale electrification. We also propose extending the timeline for PAR 1146.2 implementation in order to accommodate needed infrastructure upgrades, and for RECLAIM and former RECLAIM facilities to replace existing units. Each issue is discussed below.

17-1

PAR 1146.2 Effectively Bans Energy Policy and Conservation Act Covered Products

The Energy Policy and Conservation Act ("EPCA") preempts any "State regulation concerning the... energy use... of [a] covered product."[1] EPCA defines "energy use" as "the quantity of energy directly consumed by a consumer product at point of use."[2] The Ninth Circuit recently interpreted EPCA preemption in the context of a City of Berkeley building code ordinance

[1] 42 U.S.C. § 6297(c).

[2] *Id.* § 6291(4).

17-1

that banned installation of natural gas piping in new construction, invalidating the ordinance as preempted by EPCA.[3] While the case concerned the legality of Berkeley's ordinance and the application of EPCA preemption to building codes,[4] the court's reasoning indicates that EPCA preemption likely also applies to a ban on natural gas appliances, such as water heaters and pool heaters, that are "covered products" under EPCA.[5]

In reaching the conclusion that EPCA preempted Berkeley's ordinance, the Ninth Circuit reasoned:

> "EPCA preempts regulations... that relate to 'the quantity of [natural gas] directly consumed by' certain consumer appliances at the place where those products are used.... EPCA is concerned with the end-user's ability to *use* installed covered products at their intended final destinations, like restaurants. After all, a building code that prohibits consumers from using natural gas-powered appliances in newly constructed buildings necessarily regulates the "quantity of energy directly consumed by [the appliances] at point of use.... ***In other words, a regulation on 'energy use' fairly encompasses an ordinance that effectively eliminates the 'use' of an energy source***."[6]

PAR 1146.2, by mandating the installation of zero-emission equipment after the applicable effective date, effectively eliminates the use of an energy source (natural gas) for these EPCA-covered appliances. Accordingly, PAR 1146.2 falls squarely within the scope of the Ninth Circuit's EPCA preemption analysis. "Put simply, by enacting EPCA, Congress ensured that the States and localities could not prevent consumers from using covered products in their homes, kitchens, and businesses."[7] EPCA therefore preempts PAR 1146.2.

The Cost-Effectiveness Analysis Excludes Substantial Costs

17-2

We appreciate that Staff has updated its cost-effectiveness analysis throughout the rulemaking process. We note, however, that the most recent analysis does not include the substantial costs associated with the on-site electrical infrastructure upgrades necessary to transition to zero-emissions technology at many facilities, particularly at facilities with multiple units subject to PAR 1146.2, spread across many buildings.

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[3] *California Restaurant Association v. City of Berkeley* (9th Cir. 2024) 89 F.4th 1094, 1098.

[4] *Id.* at 1101.

[5] See 42 U.S.C. §§ 6292(a) (covered products include water heaters and pool heaters). EPCA preemption also extends to certain industrial equipment. 42 U.S.C. § 6316(a). See also 88 Fed. Reg. 69686 (Oct. 6, 2023) (establishing standards for commercial water heating equipment).

[6] *California Restaurant Association*, 89 F.4th at 1101–02.

[7] *Id.* at 1103

17-2

Other than the potential need for an electrical panel upgrade, Staff's analysis regarded the difference in installation costs between natural gas-fired and zero-emission units to be negligible.[8] This is a vast underestimation. Staff's assumption fails to appropriately consider the cost of the electrical infrastructure design, engineering, and installation that is necessary to support the installation and operation of zero-emissions units at a facility. Such infrastructure upgrades depend on the specifics of each facility and may include replacement of air handlers, installation of new switch gears, seismic building upgrades, and ***even new electrical substations to handle increased electricity demand***. For larger facilities, these infrastructure upgrades could result in facilities expending tens of millions of dollars (if not more) to comply with PAR 1146.2 requirements. As detailed fully in a comment letter submitted by RFG member SoCalGas,[9] this is a substantial cost that is unique to the deployment of zero-emissions units, making the cost of installing zero-emission units significantly higher than the costs associated with replacing natural gas-fired units with like units. Specifically, SoCalGas calculated a multi-unit installation scenario and concluded that replacing five natural gas-fired units with zero-emission units would be over $1.8 million more expensive than replacing the natural gas-fired units with like units. This incremental cost increase will quickly compound to substantial capital outlays for facilities that must replace many units and for entities with multiple facilities. These costs must be considered in order to conduct an accurate cost-effectiveness analysis.

The Cost-Effectiveness Exceeds Screening Thresholds

17-3

The 2022 Air Quality Management Plan ("AQMP") adopted a cost-effectiveness threshold of $325,000 per ton of NOx reduced, which was updated to $349,000 to reflect 2022 dollars for the PAR 1146.2 rulemaking.[10] Pursuant to the AQMP, when the cost-effectiveness threshold is exceeded, District Staff must hold a public meeting to discuss "emission standards with a cost-effectiveness at or below the proposed screening threshold and/or compliance or implementation options to address an emission standard that is above the proposed screening threshold."[11] Further, at the public hearing for the proposed amendments, Staff must present the various emission standard options and the emission reductions associated with each.[12]

The most recent cost-effectiveness figures calculated by Staff exceed the screening threshold for Type 1 High Temperature Units.[13] When including the costs associated with electrical infrastructure design, engineering, and installation, SoCalGas' analysis confirms that the cost-effectiveness for replacement of all unit categories will greatly exceed the screening threshold.[14] For example, when considering all installation costs, the cost-effectiveness of replacing a Type 1 water heater with a heat pump water heater is over $3 million per ton of NOx

[8] SCAQMD, PAR 1146.2 Preliminary Draft Staff Report (Jan. 2024) p. 2-14 (*hereafter*, "Staff Report").

[9] See March 8, 2024 letter from Kevin Barker, SoCalGas, to Yangrong Zhu, SCAQMD, regarding Comments on the Initial Preliminary Draft of Proposed Amended Rule 1146.2, appendix (*hereafter*, "SoCalGas Comment").

[10] Staff Report, pp. 2-16 to 2-17.

[11] SCAQMD, 2022 Air Quality Management Plan (Dec. 2, 2022) p. 4-83.

[12] *Id*.

[13] SCAQMD, PAR 1146.2 Public Consultation Presentation (Feb. 23, 2024), p. 10.

[14] See SoCalGas Comment.

17-3

reduced, and the cost-effectiveness of replacing a Type 2 boiler with a heat pump water heater is over $2.5 million.[15] Staff must adhere to the public process outlined in the 2022 AQMP before bringing PAR 1146.2 to the Board for a public hearing.

17-4

PAR 1146.2 Requires Additional CEQA Analysis

We are concerned that the District's decision not to prepare additional environmental analysis for PAR 1146.2 may run afoul of CEQA. The scope of the proposed amendments in PAR 1146.2 is greater than the project descriptions of the relevant control measures analyzed in the Final Program Environmental Impact Report for the 2022 AQMP ("2022 AQMP PEIR"). While the analysis of control measure C-CMB-01 in the 2022 AQMP PEIR appears to encompass the replacement of Type 1 and Type 2 water heaters subject to PAR 1146.2, the scope of the project has changed substantially in regard to replacement of instantaneous water heaters and Type 1 pool/spa heaters.

Specifically, control measure C-CMB-01 was analyzed to include the replacement of 64,000 Type 1 and 32,000 Type 2 water heaters,[16] but there appears to be no analysis for the 300,000 instantaneous water heaters that Staff estimates will be subject to replacement under PAR 1146.2.[17] Additionally, control measure R-CMB-04, which includes replacement of pool heaters with zero-emission technology, analyzed replacement of only 200,000 pool heaters[18] while Staff estimates that PAR 1146.2 will apply to 708,000 units.[19]

Beyond the substantial increase in the number of affected sources, the District continues to vastly underestimate the on-site infrastructure upgrades that will be required to install PAR 1146.2-required units. Replacing natural gas-fired boilers with zero-emission units requires replacing the associated infrastructure as well, particularly at larger facilities. Most notably, some facilities will need to construct new substations to support the electrical needs of PAR 1146.2-required units. Existing electrical supplies are already strained to accommodate planned facility growth and other in-process electrification efforts such as installing electric vehicle charging infrastructure. Other infrastructure upgrades may also be necessary, for example:

- Replacing a boiler can also require replacing associated air handlers, and facilities with many boilers may have scores of air handlers to replace.
- At facilities with boilers spread across multiple buildings, new switch gears will need to be installed in each building.
- Seismic upgrades may be necessary when equipment is installed on the roofs of buildings because heat pumps and associated equipment can be considerably heavier than natural-gas fired equipment.

[15] See *id*., appendix, p. 4.

[16] SCAQMD, 2022 AQMP Final Program Environmental Impact Report (Nov. 2022), p. 4.2-32.

[17] SCAQMD, PAR 1146.2 Public Consultation Presentation (Feb. 23, 2024), p. 6.

[18] SCAQMD, 2022 AQMP Final Program Environmental Impact Report (Nov. 2022) p. 4.2-32.

[19] SCAQMD, PAR 1146.2 Public Consultation Presentation (Feb. 23, 2024) pp. 5, 6.

17-4

Staff has concluded that the 2022 AQMP PEIR "adequately describes the activities associated with implementing PAR 1146.2 for the purposes of CEQA" and that PAR 1146.2 is a "later activity" within the scope of the 2022 AQMP PEIR.[20] However, the project changes described above may lead to different effects or more severe effects than those analyzed in the 2022 AQMP PEIR. Further, the on-site infrastructure upgrades needed to install zero-emissions units at larger facilities greatly exceed what the District has acknowledged to date, and the impacts from that construction were not considered in the 2022 AQMP PEIR. Accordingly, further environmental analysis is required to comply with CEQA.[21] Prior to considering the rule for adoption, the District should conduct a subsequent environmental analysis of PAR 1146.2 and release the resulting document for public comment.

17-5

The Compliance Dates Should be Extended to Allow Time for Infrastructure Upgrades and Development of a Robust Supply Chain

As discussed above, replacement of natural gas water heaters with electric units will require significant infrastructure upgrades at many facilities. This will take both significant time and require significant capital outlay. Implementation of PAR 1146.2 on the currently proposed timeline may therefore cause facilities to forgo growth opportunities and have the effect of slowing the progress of other important electrification initiatives in order to meet PAR 1146.2 compliance deadlines. Additionally, we are concerned that the proposed compliance timelines do not adequately account for the needed ramp up in manufacturing and supply chains sufficient to provide the electric units that facilities will need in order to comply with the rule. Facilities will be unable to maintain compliance if supply is not sufficient and may be forced to incur inflated costs in order to obtain units that are in short supply. ***For all of these reasons, we propose that the compliance dates in PAR 1146.2, Table 3 each be extended ten years***.

17-6

We Are Concerned with the Grid's Ability to Handle the Transition

Implementation of PAR 1146.2 will significantly increase the load on the power grid. As RFG raised in letters commenting on the 2022 AQMP, the electrification measures proposed in the 2022 AQMP will require increased electrical generation and development of associated infrastructure. The increased load on the grid could adversely impact the affordability, availability, and reliability of the regional energy market. Further, there are significant cost and timing challenges associated with the deployment of needed infrastructure, including likely delays driven by strategic litigation brought under CEQA. Increased litigation risk may discourage investments from public utilities and private parties that are necessary to realize a resilient and reliable grid that can handle the wide-scale deployment of zero-emission technologies. These challenges are yet to be solved and may threaten the ability for facilities to implement wide-scale electrification measures like those contemplated by PAR 1146.2.

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[20] SCAQMD, PAR 1146.2 Stationary Source Committee Presentation (March 15, 2024), p. 13.

[21] See Cal. Code Regs. tit. 14, § 15168(c)(1) ("If a later activity would have effects that were not examined in the program EIR, a new initial study would need to be prepared leading to either an EIR or a negative declaration."); see also Cal. Code Regs. tit. 14, § 15162(a)(1) (subsequent EIR required when "[s]ubstantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects.")

17-6

As discussed above, proposed amendments in PAR 1146.2 will prompt electrification on a scale even more expansive than contemplated in the relevant 2022 AQMP control measure. The resulting environmental effects of the expanded scope of electrification driven by PAR 1146.2 must be carefully considered and fully understood prior to the adoption of the rule to avoid unintended consequences.

17-7

It is not Feasible for RECLAIM and Former RECLAIM Facilities to Replace Certain Existing Boilers Within One Year of Rule Adoption

Another area of concern is the requirement that RECLAIM and former RECLAIM facilities replace existing units that do not meet specific NOx limits within one year of rule adoption. Specifically, effective one year after rule adoption, PAR 1146.2 paragraph (d)(9) prohibits current and former RECLAIM facilities from operating Type 2 units manufactured prior to January 1, 2010 that do not meet NOx emission limits of 30 ppmv and Type 1 units manufactured prior to January 1, 2012 that do not meet NOx emission limits of 55 ppmv. One year is not sufficient time for the required design, planning, engineering, permitting, and infrastructure upgrades necessary to replace these units with zero-emissions units. To facilitate a successful transition, we propose that current and former RECLAIM facilities be given three years to phase these units out.

Conclusion

We greatly appreciate the opportunity to provide these comments on PAR 1146.2. We would also appreciate a meeting to discuss the concerns expressed in this letter. Please contact me at (213) 891-7395, or by email at john.heintz@lw.com with your availability to schedule a discussion.

Best regards,

John C. Heintz

John C. Heintz
of LATHAM & WATKINS LLP

Cc: Yanrong Zhu, SCAQMD
Jennifer Vinh, SCAQMD
Peter Campbell, SCAQMD
Emily Yen, SCAQMD
RFG Members
Nick Cox, Latham & Watkins LLP

RESPONSE TO COMMENT LETTER #17

Response to Comment 17-1:

Staff appreciates the comments by the Regulatory Flexibility Group. Please see Response to Comment 15-1 regarding EPCA preemption.

Response to Comment 17-2:

The cost-effectiveness analysis for BARCT is to evaluate the incremental cost per ton of emission reductions by retrofitting or replacing a type of equipment with newer technologies. This analysis is equipment based, and it considers incremental installation and electrical upgrade costs as explained in Chapter 2 of this staff report. Although the cost-effectiveness does not evaluate the total cost for a facility with multiple units, the socioeconomic impact analysis for this project assesses the total cost impact for the region.

Please see Response to Comment 5-3 regarding incremental installation cost and Response to Comment 12-2 regarding the cost of multiple unit replacement and potentially required electrical infrastructure construction (e.g., trenching).

Staff met with SoCalGas to go through the SoCalGas cost estimation details, provided staff clarification and suggestions to adjust the estimations, and requested further information. As noted in Response to Comment 15-4, SoCalGas agreed to reevaluate the cost details and estimation. Staff will follow up with SoCalGas for their updated cost estimation.

Response to Comment 17-3:

For PAR 1146.2, staff did not identify multiple control options that would meet the air quality objectives. The 2022 AQMP's objective is to transition to zero-emission technologies, wherever feasible, and staff identified technically feasible zero-emission control options for each category of equipment subject to Rule 1146.2.

Staff understands the cost-effectiveness for Type 1 high temperature units is over the 2022 AQMP cost-effectiveness threshold, and thus proposed later implementation dates for high temperature units, which are 2029 for installations in new buildings and 2033 for installations in existing buildings. In addition, staff has committed to conducting a technology check-in by January 2028, prior to the implementation dates for high temperature units. The technology check-in will reassess the costs and cost-effectiveness to transition high temperature units to zero-emissions and may recommend changes to the emission limits or compliance schedule at that time. Establishing the zero-emission limits at this time is important to set the market signal that will drive technology development and reduce costs overtime. A public process will be included as part of the technology check-in.

Staff did not apply the installation costs suggested by SoCalGas to the installation of all units subject to PAR 1146.2. All installations will have unique challenges, as some costs might be higher than the staff's estimates and some might be lower. Overall, our cost-effectiveness approach is balanced and resulted in one category, Type I high temperature units, being over the cost screening threshold. Staff discussed the cost effectiveness of that category in several public Working Group Meetings and at Stationary Source Committee meetings. Page 4-83 of the 2022 AQMP requires discussing at public meetings, "other

emission standards with a cost-effectiveness at or below the proposed screening threshold **and/or** compliance **or** implementation options to address an emission standard that is above the proposed screening threshold." (Emphasis added.) The approach staff has discussed in public meetings, presented to the Stationary Source Committee, and will present at the Public Hearing, is the implementation approach to allow for an extended compliance schedule for high temperature units, coupled with the technology check-in to reassess costs. In addition, the rule includes a number of alternative compliance options designed to address potential challenges and costs for the transition to zero-emission technologies. Finally, the average cost-effectiveness of PAR 1146.2 when considering the entire rule universe is about $137,000 per ton of NOx reduction, which is well below the 2022 AQMP cost-effectiveness screening threshold.

Response to Comment 17-4:

The Final Program EIR for the 2022 AQMP extensively analyzes a full suite of control measures that were adopted in the 2022 AQMP, including Control Measure C-CMB-01 upon which PAR 1146.2 relies. Appendix A of this Staff Report provides the evidence which explains how implementation of PAR 1146.2 comports with the analysis in the Final Program EIR for the 2022 AQMP relative to implementing Control Measure C-CMB-01. In particular, Table A-1 contains a summary of the conclusions for the environmental topic areas with potentially significant impacts in the Final Program EIR for the 2022 AQMP which are specific to implementing Control Measure C-CMB-01 (see Appendix A of this Staff Report, p. A-6). Further, Table A-2 (see Appendix A of this Staff Report, p. A-7) summarizes the physical changes expected, environmental topic areas affected, and the applicable mitigation measures associated with implementation of PAR 1146.2 and compares the similarities to those analyzed for Control Measure C-CMB-01 in the Final Program EIR for the 2022 AQMP. The replacement of existing water heating equipment is expected to occur at the end of unit age. Regarding instantaneous water heaters, they are predominantly installed in residential settings which will undergo natural replacement, such that operators will remove the existing equipment and install a new water heating system, including the estimated 300,000 potential new instantaneous water heaters, regardless of implementation of PAR 1146.2. Thus, the replacement of water heaters is not considered a new impact.

Further, the replacement of existing water heating equipment is, in some cases, expected to require upgrades to electrical panels and other building components to enable the increased use of zero-emission equipment. Therefore, of the physical changes contemplated from Control Measure C-CMB-01, implementation of PAR 1146.2 is primarily expected to result in the increased use of electricity and natural gas to produce electricity.

It is important to note that PAR 1146.2 includes long implementation timeframes; therefore, when examining the peak daily impacts of the rule during construction and operation, whether replacing water heaters, pool heaters, or boilers and modifying the infrastructure accordingly the conclusions in the Final Program EIR for the 2022 AQMP are not anticipated to change.

Specific to the remark regarding the potential increase from 200,000 pool heaters to 708,000 pool and spa heaters, the energy estimates were updated accordingly and the

potential increase in energy usage was less than one percent, which is the criteria relied upon to determine whether the change is significant for energy use. For this reason, the change in the overall number of potential pool heater replacements over time was not considered significant new information. The details of the reasoning behind this conclusion can be found in Appendix A of this Staff Report (see pp. A-10 through A-11).

Finally, there is no other new additional detailed information currently available to further refine the analysis beyond what was conducted in the Final Program EIR for the 2022 AQMP for industrial facilities and CEQA does not require speculation [CEQA Guidelines Section 15145]. Of course, at the time when large industrial facilities are ready to modify their equipment to replace their units with zero-emission technology, modifications to the facility's air permits will be required and the application(s) seeking the necessary modifications will be required to undergo a project-level CEQA review at that time.

Response to Comment 17-5:

Staff has worked with stakeholders on the proposed implementation dates throughout the rulemaking process and made adjustments accordingly. Response to Comment 1-4 is an example of the adjustment of implementation dates for several categories. Staff understands an infrastructure upgrade may be needed for some existing buildings, and thus proposed more time for implementation in existing buildings versus in new buildings. For installations in existing buildings, the earliest implementation is phase one by January 1, 2029, for smaller units that have mature zero-emission technology market adoption, and a later implementation is phase three by January 1, 2033, for high temperature units. This implementation schedule provides time for owners or operators to prepare for any future installation and sends a market signal to manufacturers for more product development. Zero-emission units are available now and have been available for a long time. Staff met with appliance manufacturers who are increasing production. Further, the South Coast AQMD needs these emission reductions to achieve the NAAQS ozone and PM standards and cannot extend the compliance dates 10 years beyond what is being proposed and still achieve the NAAQS standards.

Staff will continue to monitor all the challenges for zero-emission implementation and will conduct a technology check-in and report the findings to the Stationary Source Committee by January 1, 2028, prior to the compliance dates for installations in existing buildings.

Response to Comment 17-6:

Regarding electric grid capacity and supply, please see Response to Comment 4-1 which provides staff response to a similar comment and Chapter 2 in this staff report for further discussion.

Response to Comment 17-7:

Staff removed the lower NOx requirements previously proposed in paragraph (d)(9) and added an exception for units at RECLAIM and former RECLAIM facilities to paragraph (d)(6). This proposal revision means RECLAIM and former RECLAIM facilities will be subject to paragraph (d)(3) of PAR 1146.2 for zero-emission requirements once the existing

units reach their unit age on and after the applicable Table 3 compliance dates. Please see Response to Comment 11-2 regarding the proposal revision for units in RECLAIM and former RECLAIM facilities.