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

Working Group Meeting #4

October 19, 2023, 10:00 AM (PDT)

Join Zoom Meeting:

https://scaqmd.zoom.us/j/96893878030

Meeting ID: 968 9387 8030

Agenda

- Stakeholder Comments from Working Group Meeting #3
- Further Analysis on Applications
  - Restaurants
  - Hospitals
  - Other Applications
- Cost-Effectiveness
  - New Buildings
  - Baseline Emissions
  - Updates to Analysis
- Key Rule Proposal
- Next Steps and Staff Contact

PAR 1146.2 Working Group Meeting #3

In the third Working Group Meeting, Staff provided background on:

- Stakeholder comments from Working Group Meeting #2
- Manufacturer survey on zero-emission technologies
- Federal, state, and utility incentives for commercial appliances
- Best Available Retrofit Control Technology (BARCT) Assessment
- Other regulatory requirements
- Technologies
- Cost-effectiveness

Stakeholder Comments from Working Group Meeting #3

Stakeholder Comments Received

Stakeholder emailed comments:

- *There are emissions from electricity generation as the grid is about 42% powered by gas, oil, or coal*
  - California's grid includes renewable sources, which will increase over time
    - In 2021, renewable generation accounted for 33.6% of the total California Power Mix, not including solar photovoltaic systems installed on residential and commercial buildings
    - California Senate Bill 100 called for Renewables Portfolio Standard of 60% by 2030
- Emissions from energy generating facilities are regulated by South Coast AQMD (Rule 1135)
- Natural gas exploration, extraction, processing, storage, distribution, and delivery also generate emissions beyond the unit emissions
  - Staff will not conduct lifecycle analyses related to the BARCT assessment
- Further responses to this topic can be found in the Working Group Meeting #2 presentation

Comments located at http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1146-2/comment-letters

Stakeholder Comments Received *(con’t)*

Stakeholder emailed comments:

- *Waste heat type heat pumps can generate higher temperatures. I suppose these could be used in facilities with large combustion equipment. Can a facility get a permit at this time to install a gas-powered engine/turbine?*
  - Heat pumps using waste heat allow reuse of low-temperature heat (~140 degrees Fahrenheit) and can achieve temperatures up to 250 degrees Fahrenheit; heat pump extracts waste heat from a heat source (chilled water/cooling tower water/any consistent waste heat) and raises the temperature to a useful level; because the amount of heat produced is not dependent on the amount of energy consumed, efficiency can surpass 100 percent
  - Applications include sterilization; hot and chilled water for hotels, hospitals, schools and universities; boiling processes for food manufacturing; and other industry processes
  - Waste heat application is opted only when there is an existing source that provides waste heat; it is not intended for installation of a large combustion unit with purpose of serving waste heat for zero-emission unit such as heat pump
- *If there are no heat pump solutions for higher temperature applications, the operation temperature for boilers should be discussed*
  - High temperatures can be achieved via solutions such as booster heaters for dishwashers or waste heat reclaiming for heat pumps; however, for most applications requiring high temperatures, more technology advancement is needed
  - Staff is open to suggestions for defining the temperature for boilers

Further Analysis on Applications

Meetings and Site Visits

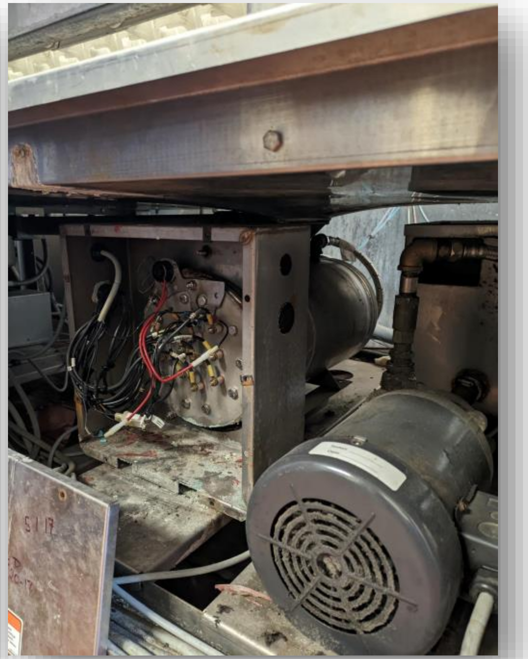
- Contacted several manufacturers for further data including costs
  - Received some cost data from manufacturers
  - Expecting further meetings on costs
- Site visit to a manufacturer facility on the day prior to Working Group Meeting #3
- Three site visits since Working Group Meeting #3:
  - Hospital
  - Office building
  - Restaurant/facility
- Staff is open to meeting individually with stakeholders or conducting further site visits

Restaurant Site Visit

- Information from site visit to restaurant/facility:
  - 500 kBtu to 2 MMBtu sized units used for restaurants
  - Electric booster heaters for dishwashing used to increase temperature from 120 to 170 degrees Fahrenheit
  - 120 degrees Fahrenheit used for restaurant sanitation
  - No hot water need above 180 degrees Fahrenheit
  - Currently undergoing boiler replacements, but not installing heat pumps at this time as additional power to electrify the whole site cannot be supplied for at least six to eight years
- Staff is reaching out to California Restaurant Association to collect further information and input
- Requirement for restaurant hot water from California Retail Food Code: minimum 120 degrees Fahrenheit supplied from faucet; minimum 100 degrees Fahrenheit for handwashing*

Dishwashing Unit

Electric Booster Heater



** California Retail Food Code, Sections 113953, 114192*

Hospital Site Visit

Sixteen natural gas-fired units below 2 MMBtu, spread between two buildings:

- Four units for domestic hot water
- Twelve units for space heating, with highest water temperature output 180 degrees Fahrenheit
- Includes redundant units
- Units are often oversized
- Hospital steam for sterilization usually generated by larger boilers permitted under Rule 1146
- Hospital considering replacement with heat pumps for domestic hot water Type 1 units
- Challenge: five to seven years for HCAI (California Department of Health Care Access and Information) project approval to replace boiler

- California Plumbing Code* hot water use temperature requirement for health facilities and clinics:

	Clinical	Dietary	Laundry	Dishwashing
Temperature (degrees Fahrenheit)	105-120	120	160	180

- Redundancy requirement for dishwashing and minimum patient services such as handwashing and bathing

* *Link*

All-Electric Hospital

- All-electric UCI Medical Center anticipated operational in 2025
  - Future plans include fuel cells and battery storage
  - Staff is planning a site visit to gather more information
- Costs and efficiency
  - Heat pump Coefficient of Performance (COP) is 3, or 300% more efficient than conventional unit
  - Lower maintenance costs for all-electric distributed steam
  - Annual operational cost savings

https://www.bdcnetwork.com/uc-irvine-takes-sustainability-new-level-all-electric-medical-center

Office Building Site Visit

Eight gas boilers, five of which were replaced with gas units around a year ago, with some downsizing

- For example, a 1.6 MMBtu unit was replaced with a 900 kBtu unit
- Hot water used for space heating/comfort air, handwashing, dishwashing, cafeteria
- Highest temperature that could be needed is estimated 185 degrees Fahrenheit (cafeteria applications such as dishwashing)
- Facility predicts considerable electric upgrades to install heat pumps
  - Staff is waiting for further details including sizing and energy assumptions and will provide more information in a future meeting

Hot Water in Dry Cleaning

Reaching out to California Cleaners Association to collect information and input

- California Cleaners Association is the trade association for dry cleaners in California
- Dry cleaners use boilers to provide steam for ironing
- Boilers are usually rated under 1 MMBtu/hr

California Cleaners Association expressed the challenge of meeting zero-emission requirement for boilers, stating that there is no feasible zero-emission technology for boilers

- Staff will continue to communicate with the Association and provide further analysis in future meetings

Emerging High Temperature Technology

Zero-emission technology for commercial and industrial applications is continuing to develop

- New Belgium Brewing in Colorado partnering with AtmosZero on a pilot study to replace gas boiler with industrial electric heat pump in 2024*
  - Facility currently operating 329 degrees Fahrenheit
  - Air source heat pump water heater to generate steam (greater than 212 degrees Fahrenheit)
    - Can operate in sub-zero temperatures
    - Potential applications include breweries, dairies, plastics, pharmaceuticals, food, paper, etc.
- Study hopes to result in off-the-shelf product at a comparable price to a combustion unit
- Current unit larger than 1146.2 units, but potential for further technology development for smaller units

International Energy Agency's Technology Collaboration Programme on Heat Pumping Technologies provides information on high temperature heat pumps**

- Overview of high-temperature heat pump technologies for temperatures greater than 212 degrees Fahrenheit
- Expecting high-temperature heat pump technologies will become more commercially available and implemented in coming years

* https://coloradosun.com/2023/09/11/new-belgium-greenhouse-gases-atmoszero-heat-pump/

** https://heatpumpingtechnologies.org/annex58/task1/

Incentives for Emerging Technology

Technology development is further incentivized by various programs

- 2022 Federal Inflation Reduction Act: $10 billion in manufacturing tax credits, which could be applied to heat pumps
- Incentives for zero-emission products could help advance the technology and reduce costs
  - Tankless units for residential purposes and multifamily units could be eligible for incentive programs, including forthcoming Clean Air Appliances Rebate Program under development at the South Coast AQMD

Takeaways from Site Visits and Meetings

Restaurant high temperature water can be achieved by zero-emission technologies:

- Heat pump water heater with booster heater
- Electric boiler

Zero-emission steam generating units are under development

- High temperature heat pump by waste heat reclaiming is available

Hospital 1146.2 units are mainly for domestic hot water or comfort air, similar to other commercial buildings

- Hospital sanitation relying on larger boilers rated over 10 MMBtu/hr, subject to Rule 1146
- Zero-emission technology is feasible for hospital applications

Challenges and Opportunities for Zero-Emission Technologies in New Buildings

California Energy Commission Building Code

State building code encourages the proliferation of zero-emissions solutions

- California Energy Commission Energy Code applies to newly constructed buildings and additions/alterations to existing buildings*
  - Contained in Title 24, Part 6 of the California Code of Regulations, and updated every three years
- 2022 Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, and more
  - Buildings whose permit applications are applied for on or after January 1, 2023, must comply with 2022 Energy Code
  - Mandatory requirements for electric ready and heat pump ready multifamily buildings
- Energy Code discourages use of electric resistance heating when an alternative method of heating is available

* Link

Zero-Emission Implementation for New Buildings

Studies investigated infrastructure cost savings associated with utilizing all-electric water heating system

- Electric water heater with storage tank, heat pump water heating, increasing electrical capacity, eliminating natural gas connections in new construction
- Hotel/motels and high-rise residential occupancies
- For new construction without gas infrastructure, cost savings associated with:
  - Connecting gas service line from the street main to the building
  - Distribution within the building
  - Monthly utility connection charges

Study Approximate Cost Savings for Medium Office:

Service Extension	$13,000
Meter	$3,000
Distribution Within Building	$600

2019 Nonresidential New Construction Reach Code Cost Effectiveness Study
2022 Cost-Effectiveness Study: Multifamily New Construction

Zero-Emission Implementation for New Buildings *(con't)*

New buildings may be more ready for zero-emission implementation

- No panel upgrades
- Potential for infrastructure cost savings
- Assuming ten percent of commercial buildings are new construction

Baseline Emissions

Previous Estimates of Baseline Emissions for Individual Units by Category

Baseline emission estimates from Working Group Meeting #3:

- Bottom-up calculations for individual units by category
  - Lifetime NOx Baseline Emission (tons) = Unit Size (MMBtu/h) × Baseline Emission Factor (lb/MMBtu) × Capacity Factor (or usage factor) × Annual Hours × Equipment Lifetime (years) ÷ 2,000 lbs/ton
  - Baseline emission factor (lbs/MMBtu): 0.024 lbs of NOx per MMBtu for 20 ppm at 3% Oxygen
  - Capacity Factor, or the proportion of time the unit is expected to operate: 21.5% from manufacturer survey in previous Rule 1146.2 rule development
    - For Type 1 pool heaters, assuming 7.16% for gas-fired units and 14.32% for heat pump pool heaters, which operate for longer time
  - Equipment useful life: 25 years for all categories except pool heaters, for which assuming 15 years

Category	Total Lifetime NOx Baseline Emission (tons) per Unit
Type 1 Water Heater (76 kBtu)	0.043
Type 2 Water Heater (500 kBtu)	0.282
Pool Heater (125 kBtu)	0.039
Type 1 Boiler (399 kBtu)	0.225
Type 2 Boiler (1 MMBtu)	0.565
Type 2 Boiler (2 MMBtu)	1.130
Tankless (150 kBtu)	0.042

Baseline Emissions for Rule 1146.2 Universe

New Analysis

Table 3 displays estimates of Rule 1146.2 universe baseline emissions utilizing bottom-up calculations for medium-sized units in each category, with the assumptions listed in Tables 1 and 2:

Table 1:

	Type 1 Units	Type 2 Units	Tankless Units
Universe*	40,000	20,000	300,000
Btu size range	Less than or equal to 400 kBtu	Greater than 400 kBtu, less than or equal to 2 MMBtu	Many units expected to be Type 1 units
Average Btu size	238 kBtu	1.2 MMBtu	238 kBtu

Table 2:

	Type 1 Pool Heater	Other Categories
Baseline emission factor**	0.067	0.024
Capacity factor	0.0716	0.215
Annual hours per year	8,760	
Unit lifetime	15	25

Table 3:

Category	Baseline Emissions (tons/day)
Type 1 Units	0.58
Type 2 Units	1.49
Tankless Units	0.28
Total	**2.34**

** Working Group Meetings #1 and #2*

*** From previous Rule 1146.2 rulemaking*

Updates to Cost-Effectiveness

Updates to Cost-Effectiveness

Cost-effectiveness presented at the last Working Group Meeting has been updated with:

- Further analysis utilizing emerging heat pump technology
  - Cost-effectiveness examples for Type 1 water heaters and boilers
- Further analysis for Type 1 pool heaters
  - Examples utilizing solar pool covers and solar pool heaters
- Updates to previous cost-effectiveness calculations with 25-year Present Value Factor

Cost Assumptions for Further Analyses

The following cost information will be used in the next slide:

Manufacturer-Provided Case Study: Retail/Office Type 1 Unit Replacement

250 kBtu gas unit replaced with two 60 kBtu heat pumps

Building owner costs:

- ~$4,000 for gas unit, $3,000 for 115-gallon tank, $600 for boiler pump
  - Total: ~$7,600
- ~$37,000 for two heat pumps, $10,000 for two 175-gallon tanks, $2,000 for two pumps
  - Total: ~49,000

Electric tankless heat pump water heater anticipated in early 2024*

- Runs on electricity and heats water from energy stored in a thermal battery
- Up to 15.4 kW electrical input
- Produces hot water up to 170°F, without water tank storage
- Model iE1 with integrated thermal battery has maximum heating output of 90,000 Btu/h (~$21,000)
- Modular iE6 unit model has heating capacity of up to 300,000 Btu/h
  - May be paired with four thermal batteries, bringing total heating capacity up to 800,000 Btu/h

* https://www.intellihot.com/electron-ie1/

New Analysis

Further Analysis – Type 1 Boiler

- Further analysis – gas-fired unit from manufacturer-provided case study replaced with heat pump water heater
  - Type 1 boiler for hot water less than 170 degrees Fahrenheit shows cost savings when replaced by heat pump
- Assumptions for heat pump water heater producing hot water up to 170°F replacing a 250 kBtu conventional unit (may be oversizing heat pump, as manufacturer example utilized two 60 kBtu heat pumps):

Category		Natural Gas Unit	Zero-Emission Unit
Type 1 Boiler (replacement with heat pump)	Estimated Cost ($)	4,000	42,000 (21,000 * 2 = 42,000)
	Unit Description	250 kBtu unit from manufacturer	Two 90 kBtu heat pump water heaters; COP 4.2; produce hot water up to 170°F; up to 15.4 kW electrical input

Category	Cost-Effectiveness in $/Ton, No Panel Upgrade, PVF 25 Years	Cost-Effectiveness in $/Ton, $4.2k Panel Upgrade, PVF 25 Years
Type 1 Boiler (heat pump replacement)	(182,000 cost savings)	(152,000 cost savings)

New Analysis

Further Analysis – Type 1 Water Heater

- Further analysis – natural gas unit from previous Working Group Meeting Type 1 water heater example
- Cost assumptions for heat pump water heater replacing a 100 kBtu conventional unit:

Category		Natural Gas Unit	Zero-Emission Unit
Type 1 Water Heater	Estimated Cost ($)	7,000	21,000
	Unit Description	Rule 1146.2 May 2006 staff report estimated cost for 100-300 kBtu unit, adjusted to present value by CPI Inflation Calculator	90 kBtu heat pump water heater; COP 4.2 (4.2 times more efficient than conventional unit, results in lower operating cost); produces hot water up to 170°F; up to 15.4 kW electrical input
	Source	http://www3.aqmd.gov/hb/2006/May/060535a.html	https://www.intellihot.com/electron-ie1/

Category	Cost-Effectiveness in $/Ton, No Panel Upgrade, PVF 25 Years	Cost-Effectiveness in $/Ton, $4.2k Panel Upgrade, PVF 25 Years
Type 1 Water Heater	(36,000) (cost savings)	46,000

Pool Heaters with Solar Pool Covers

Pool covers prevent debris from getting into the water and minimize evaporation

Solar pool covers offer added benefit of raising pool water temperatures

Using solar pool cover when pool is not in use reduces total energy loss by approximately 50 percent

- Reduce amount needed to run heat pump by 50 percent

Assume average pool surface area is around 430 square feet

- One internet example of solar pool blanket covers 512 square feet

Image Link

Further Analysis – Type 1 Pool Heater with Solar Pool Cover

New Analysis

Estimated costs from currently available data:

	Natural Gas Unit	Zero-Emission Heat Pump Plus Solar Cover
Estimated Cost	$2,000	$4,000 unit + $150 solar cover
Unit Description	125 kBtu unit from internet search	90 kBtu heat pump cost from internet search; COP 5.7
Source Link	https://intheswim.com/	https://intheswim.com/ https://www.homedepot.com/p/Robelle-Heavy-Duty-16-ft-x-32-ft-Rectangular-Blue-Solar-Pool-Cover-1632RS-8-BOX/305534141

Preliminary cost-effectiveness calculations:

	Replacement with heat pump and cover
Lifetime fuel switching cost ($)	(4,000)
Cost-Effectiveness in $/Ton, No Panel Upgrade	(40,000)
Cost-Effectiveness in $/Ton, $2.5k Panel Upgrade	24,000

Solar Pool Heaters

Solar powered pool heaters use thermal energy from the sun

- Assume people that use outdoor pools 6-8 months per year could size their systems at 60-70 percent of pool's surface area
- Sunlight varies throughout the year, affecting usage
  - This example assumed same capacity factor used for other pool heater examples, 0.0716
- Assume solar pool heaters would replace 125 kBtu gas-fired unit
  - This example did not include a pool cover
    - Using a pool cover can decrease the required collector area

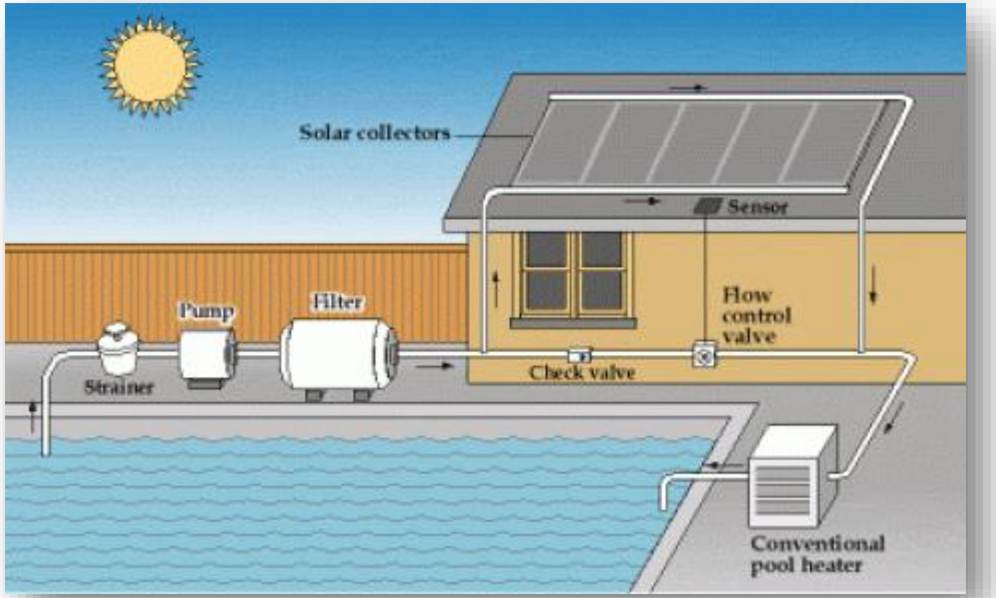


Image Link

New Analysis

Further Analysis – Type 1 Solar Pool Heater

Estimated costs from currently available data:

	Natural Gas Unit	Solar Pool Heater	Solar Pool Heater
Estimated Cost	$2,000	$170	$270
Unit Description	125 kBtu unit from internet search	Above-ground	In-ground
Source Link	https://intheswim.com/	Link	Link

Preliminary cost-effectiveness calculations for replacement with solar pool heater:

	Above-Ground	In-Ground
Lifetime fuel switching cost ($)	(11,000) (cost savings)	(11,000) (cost savings)
Cost-Effectiveness in $/Ton, No Panel Upgrade	(331,000) (cost savings)	(328,000) (cost savings)

Cost-Effectiveness Estimates

- 25-year unit lifetime for all categories except pool heating; 25-year Present Value Factor
- Costs are sourced from manufacturers, internet search, and previous 1146.2 rulemaking adjusted for inflation
- Certain categories are under cost-effectiveness screening threshold of $349,000 per ton of NOx reduced (2022 dollars)

Equipment Category	Replacement With	Cost-Effectiveness ($/Ton), No Panel	Cost-Effectiveness ($/Ton), Panel
Type 1 Water Heater	Heat pump	~~(60,000)~~ (83,000)	~~38,000~~ 15,000
	Tankless heat pump	(36,000)	46,000
Type 2 Water Heater	Heat pump	~~1,200~~ (26,000)	~~16,000~~ (11,000)
Type 1 Boiler	Electric resistance	~~1,700,000~~ 1,952,000	~~1,720,000~~ 1,971,000
	Heat pump	~~609,000~~ 593,000	~~627,000~~ 611,000
	Tankless heat pump	(182,000)	(152,000)
Type 2 Boiler (1 MMBtu)	Electric resistance	~~1,697,000~~ 1,951,000	~~1,705,000~~ 1,958,000
	Heat pump	~~358,000~~ 347,000	~~366,000~~ 354,000
Type 2 Boiler (2 MMBtu)	Heat pump	~~277,000~~ 263,000	~~279,000~~ 267,000

Cost-Effectiveness Estimates *(con't)*

- 25-year unit lifetime for all categories except pool heating; 25-year Present Value Factor
  - 15-year unit lifetime for pool heating; 15-year Present Value Factor
- Further analysis for pool heaters using pool covers and solar pool heaters

Equipment Category	Replacement With	Cost-Effectiveness ($/Ton), No Panel	Cost-Effectiveness ($/Ton), Panel
Tankless (Instantaneous)	Electric resistance tankless	~~1,705,000~~ 1,855,000	~~2,495,000~~ 2,644,000
	Electric resistance tank type	~~3,930,000~~ 4,307,000	~~4,720,000~~ 5,096,000
	Heat pump tank type	~~(3,000)~~ (44,000)	~~96,000~~ 745,000
Type 1 Pool Heater	Heat pump	148,000	211,000
	Heat pump, solar pool cover	(40,000)	24,000
	Solar pool heater (in-ground)	(328,000)	-
	Solar pool heater (above-ground)	(331,000)	-

Summary of Cost-Effectiveness

New buildings are more ready to implement zero-emission appliances

- No panel upgrade
- Gas infrastructure cost savings

Zero-emission technology is feasible and cost-effective for categories including:

- Type 1 Water Heaters (most feasible), Type 2 Water Heaters, and Type 1 Pool Heaters
- Tankless units replaced by heat pumps
  - Many tankless units are residential units
  - Energy code electric-ready requirements for new residential buildings

Zero-emission technology is currently not as feasible or cost-effective for categories including:

- Type 1 Boilers and Type 2 Boilers – high temperature applications
  - Zero-emission technology is continuing to develop for high temperature applications
  - Further implementation dates allow for technology development and market penetration

Key Rule Proposal

Summary of Key Rule Proposal

Modify definition for boiler based on temperature

Set different compliance dates based on cost-effectiveness and feasibility

Remove obsolete requirements

Technology assessment by 2027

Key Rule Proposal

Staff is proposing to modify the Definition for Boilers:

Modify definition based on output temperature, for example, 190 degrees Fahrenheit

Consider further implementation dates for boilers to allow for the technology to develop for high temperature applications

Key Rule Proposal *(con't)*

- This table summarizes the draft proposal with future implementation dates depending on category
- Future implementation dates allow for zero-emission technology market growth
- Longer timeframes for **end-of-life** replacements in existing buildings versus installations in new buildings
- **Technology assessment by 2027**

Equipment Category	NOx Emission Limit (nanograms/Joule*)	New or Existing Building	Compliance Date
Type 1 Water Heater	0	New	January 1, 2025
		Existing	January 1, 2029
Instantaneous Water Heater	0	New	January 1, 2025
		Existing	January 1, 2029
Type 1 Pool Heater	0	New	January 1, 2027
		Existing	January 1, 2031
Type 2 Water Heater	0	New	January 1, 2027
		Existing	January 1, 2031
Type 1 Boiler or Process Heater	0	New	January 1, 2029
		Existing	January 1, 2033
Type 2 Boiler or Process Heater	0	New	January 1, 2029
		Existing	January 1, 2033

Technology Assessment

Staff considering including a technology assessment as some zero-emission limits are technology forcing

- High capital cost for certain high temperature applications
- High cost-effectiveness for certain categories
- Technology development is underway for high temperature applications
- Monitor market supply and growing opportunities for contractor training

Technology assessment will evaluate status of zero-emission technology for all equipment categories and address any equity issues

How is a Technology Assessment Conducted?

A South Coast AQMD technology assessment can take different forms:

- Third-Party evaluation
- In-house evaluation

Rule 1146.2 technology assessments likely will be conducted in-house and include:

- Evaluation of available technology/products
- Consultations with manufacturers
- Working group meetings

At the conclusion of the technology assessment, staff will present the finding to the Stationary Source Committee and recommend actions if necessary:

- Actions can include a rule amendment or further studies

The technology check-in will be included as part of the Resolution included with the Governing Board Package such as:

*"**BE IT FURTHER RESOLVED**, that the South Coast AQMD Governing Board directs staff to report on the status of the zero-emission technologies for applicable categories by 2027 and conduct a technology assessment if there are potential challenges for any equipment category; and amend the requirements through the public process for applicable equipment categories if deemed appropriate"*

Technology Assessment Text in Resolution

Next Steps and Staff Contact

Next Steps

Tentative Schedule for Proposed Amended Rule 1146.2:

- Initial Draft Rule Language – Fall 2023
- Continue Public Process and Stakeholder Meetings
- Public Hearing – 1^{st} Quarter 2024

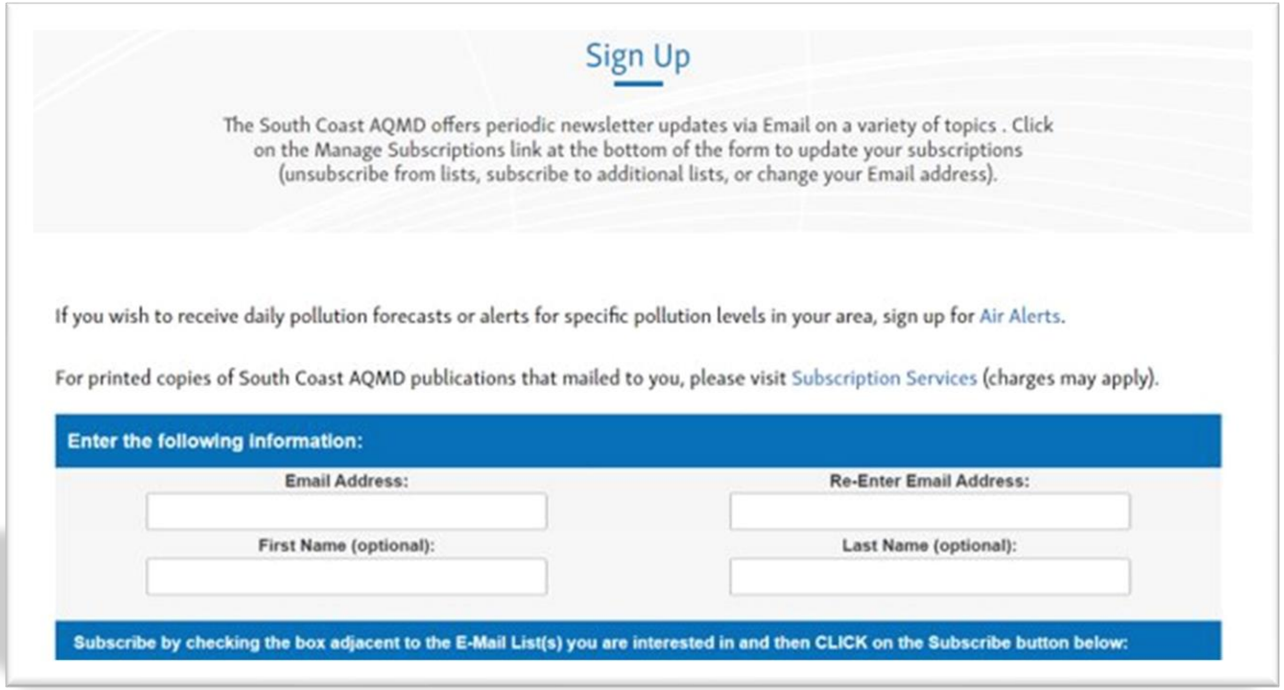
Incentives:

- Developing a new rebate program for building appliances, potentially similar to previous Clean Air Furnace Rebate Program

Webpage for more information on Building Appliances Rules:
http://www.aqmd.gov/home/rules-compliance/residential-and-commercial-building-appliances

Sign Up for Notifications

- To receive newsletter updates via email for notifications regarding the 1146.2 rule development and other forthcoming building appliances rules, please subscribe by checking the **Rule 1146.2** and **Building Appliances** check boxes located under Rule Updates: *http://www.aqmd.gov/sign-up*



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