Southern California's Hidden Air Pollution Problem: Gas Furnaces & Water Heaters

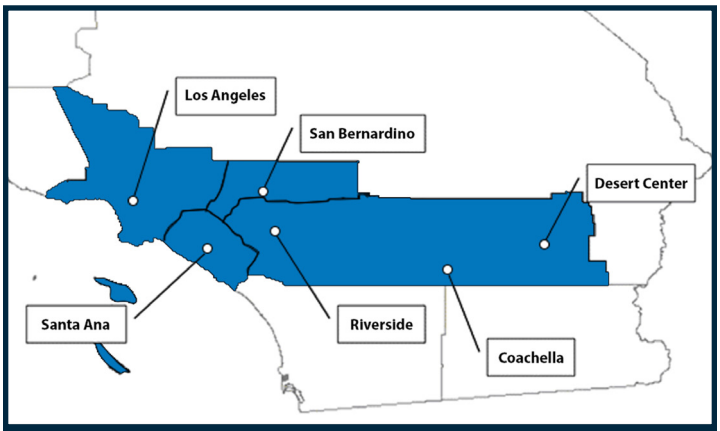
The vast Southern California region encompassed by the South Coast Air Quality Management District (AQMD) suffers from some of the most polluted air in the country and has consistently failed to meet federal and state air quality standards for more than 30 years.[1, 2, 3] Under federal law, regions that fail to meet these standards must develop comprehensive plans to cut pollution.

Gas-burning equipment in residential and commercial buildings is a significant – but often overlooked – contributor to this air quality crisis. Burning gas in household appliances like furnaces and water heaters generates a range of pollutants that harm health, including nitrogen oxides (NOx) and fine particle ($PM_{2.5}$) pollution. In addition to harming health in its own right, NOx emissions from gas-burning equipment are also a precursor to ozone pollution – a major component of smog – and "secondary" $PM_{2.5}$ pollution.[4, 5]

To address these significant health-harming emissions, the South Coast Air Quality Management District (AQMD) has proposed strengthening pollution standards for some HVAC and water heating equipment. Under these new standards, manufacturers of NOx-emitting furnaces (up to 175,000 Btu/hr) and residential water heaters (up to 75,000 Btu/hr) would need to meet increasing zero-emission sales targets over time: starting at 30% clean heating technologies in 2027-2028, rising to 50% by 2029, 75% by 2033, and reaching 90% by 2036.

Manufacturers would pay mitigation fees ($100 per gas furnace, $50 per gas water heater) when selling NOx-emitting units, with higher fees for exceeding the annual target. These fees will help fund the District's Go Zero rebate incentive program to support an affordable and equitable transition to clean technologies.

If adopted, these health-protective standards would deliver the second greatest emissions reductions of any air quality regulation the agency has issued in three decades.[6]



South Coast Air Quality Management District

The Scale of the Problem:

Methane gas-burning equipment in residential and commercial buildings in the South Coast Air Basin generates significant levels of smog and other air pollution:

- Gas-burning equipment in residential and commercial buildings produces nearly half of the health-harming nitrogen oxide (NOx) emissions that fall under the South Coast AQMD's direct authority and responsibility to control.[7, 8]
- Gas-burning equipment in residential and commercial buildings produces more NOx pollution than regional oil and gas production,

refining, cement manufacturing, and power generation combined.[9]

- Gas-burning equipment in residential and commercial buildings produces seven times more NOx pollution than the region's power plants.[10]
- Gas-burning equipment in residential and commercial buildings produces over three times more $PM_{2.5}$ than the region's power plants.[11]
- Considered alone, residential gas-burning equipment in the region emits more NOx pollution than all its cement production and power generation combined.[12]

This pollution leads to $2 billion annually in negative health impacts like lost school days, asthma attacks, and premature deaths.[13]

The Air Quality Crisis in the South Coast

Poor air quality results in serious health impacts for more than 17 million residents of Southern California:

- The Los Angeles-Long Beach metropolitan area has ranked first in the nation for high ozone days for 24 of the last 25 years.[14]
- From 2020 to 2022, the region saw an average of 175 unhealthy ozone days each year, exceeding federal pollution limits more than one-third of the time.[15, 16]

Disadvantaged communities, specifically those with larger populations of color, suffer a disproportionate burden of this harmful pollution in the Los Angeles region:

- People of color in the Los Angeles metro area are almost twice as likely as white residents to live in an area with a high risk for respiratory illness.[17]
- Black residents in Los Angeles County seek emergency care for asthma-related health issues more than twice as often as the county average and nearly five times as often as white residents.[18]

The federal Clean Air Act requires areas that are failing to meet National Ambient Air Quality Standards (NAAQS) to develop comprehensive plans for how they will attain those pollution limits.

The South Coast AQMD's most recent plan – the culmination of a multi-year public process – highlights that the "only way to achieve the required NOx reductions is through extensive use of zero emission technologies across all stationary and mobile sources."[19]

Gas-Burning Furnaces & Water Heaters Release Health-Harming Air Pollution

Burning methane gas in building equipment like furnaces and water heaters generates a range of outdoor air pollutants that harm health.
Analysis using EPA's Co-Benefits Risk Assessment (COBRA) health impacts tool demonstrates that methane gas-burning equipment in residential and commercial buildings in the South Coast Air Basin is responsible for:

- Approximately 76,000 asthma attacks per year.[20]
- About 30,000 lost school days annually.[21]
- 130 premature deaths each year.[22]
- Annual health impacts valued at $2 billion.[23]

Compounding existing environmental and social inequities, $PM_{2.5}$ pollution from residential gas combustion disproportionately harms people of color in California:

- 30% higher exposure for people of color compared to white residents.[24]
- 50% higher exposure for Black residents compared to white residents.[25]

Nitrogen oxides (NOx)	• Short-term exposure to NOx is causal of asthma attacks and long-term exposure is "likely causal" of the development of asthma.[26] • The EPA cites a causal link between short- and long-term exposure to nitrogen dioxide (NO_2, a component of NOx) and a variety of other health harms, such as heart rate variability, systemic inflammation of other organs, adverse birth outcomes, cancer, and premature death.[27, 28] • Short-term exposure to NO_2, as well as long-term exposure to low levels of NO_2, is correlated with higher overall mortality rates among older adults.[29]
Ozone	• Short-term exposure to ozone is associated with shortness of breath, wheezing, and coughing, asthma attacks, increased risk of respiratory infections, increased risk of emergency room visits and hospitalizations, and premature death. • Long-term ozone exposure is associated with increased cardiovascular mortality, respiratory illnesses, metabolic disorders, nervous system issues, reproductive problems (including reduced fertility and poor birth outcomes), and cancer.
Fine Particle Pollution ($PM_{2.5}$)	• Short- and long-term exposure to $PM_{2.5}$ contribute to premature death, infant mortality, lung cancer, heart attacks and strokes, new and worsening asthma in children and adults, slowed lung development, incidence of diabetes, reduced brain volume, and increased risk of dementia, among other negative outcomes. • No safe level of $PM_{2.5}$ exposure has been identified.[30, 31]

A Critical Step Towards Healthier Air: South Coast AQMD's Proposed Rules for Furnaces & Water Heaters

Since 1978, the South Coast AQMD has limited NOx pollution from gas furnaces and water heaters through two key regulations – Rules 1111 and 1121 – with emissions declining over time. The agency's Governing Board is now proposing a flexible approach focused on sales targets to further reduce harmful pollution from these sources and transition the region toward zero-emission technologies like highly efficient heat pumps.

Together, these rules target more than 10 million methane-burning furnaces and water heaters.[32] Along with the zero-NOx rule the agency adopted in June 2024, covering more than 1 million pool heaters, tankless water heaters, and commercial water heaters, the AQMD's adoption of these rules will address about 58% of the NOx emissions that come from gas combustion in the region's residential and commercial buildings.[33] The remaining pollution comes from other residential gas appliances like stoves, ovens, and dryers – as well as commercial furnaces and cooking equipment – which are not in the scope of the proposed rule updates.

Proposed Updates to Rule 1111 - Furnaces

- Scope: Affects 5.2 million central, wall, and floor furnaces up to 175,000 Btu/hr
- Manufacturer Sales Requirements:
  - 2027-2028: 30% zero-emission units
  - 2029-2032: 50% zero-emission units
  - 2033-2035: 75% zero-emission units
  - 2036 and after: 90% zero-emission units
- Base mitigation fee of $100 per NOx-emitting gas furnace sold
- Additional $500 fee for NOx-emitting units sold above compliance targets
- Fee discounts available when exceeding zero-emission targets

Proposed Updates to Rule 1121 - Water Heaters

- Scope: Affects 5.1 million residential water heaters up to 75,000 Btu/hr
- Follows same manufacturer sales requirements timeline as furnaces
- Base mitigation fee of $50 per NOx-emitting gas water heater sold
- Additional $500 fee for NOx-emitting units sold above compliance targets
- Fee discounts available when exceeding zero-emission targets

Clean Technology Solutions

What Is a Heat Pump?

A heat pump is like a super-efficient air conditioner that can run in reverse, so it is able to both cool and heat buildings. Instead of burning fuel like a methane gas furnace, it moves heat from one place to another using electricity. In winter, an air-source heat pump extracts heat from the outside air and moves it inside your home, even in below-freezing temperatures.[34] In summer, it works like a highly efficient air conditioner. Ground-source heat pumps use the relatively stable temperature of the ground or groundwater as a heat source in the winter and a heat sink in the summer and provide the most efficient form of heating available today. Whatever the source of heat, because heat pumps move heat rather than generate it, they are two to four times more efficient than traditional gas furnaces.[35]

What Is a Heat Pump Water Heater?

A heat pump water heater uses the same technology to heat water for your home. Rather than burning methane gas, it pulls heat from the surrounding air and transfers it into the water in the tank, saving energy by being much more efficient.

South Coast AQMD's Go Zero Rebate Program

Program Basics:

- Launching early 2025 with $21M initial funding (potential for 5x increase in future)
- Helps residents/building owners upgrade to clean heating technologies
- 75% of funds reserved for low-income households, including renters
- Covers air-source heat pumps and heat pump water heaters
- Can be combined with other federal, state, utility, and local incentives

Support Provided:

- Application assistance
- Extra help for overburdened communities
- Contractor training
- Equipment selection guidance

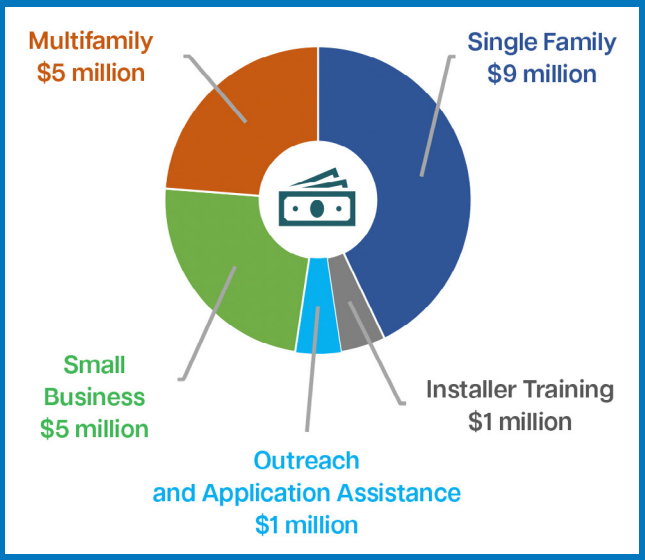


Image source: South Coast Air Quality Management District

National Context: South Coast AQMD Is Not Acting Alone

The federal Clean Air Act grants states broad authority to identify and enact regulations that limit pollution from stationary sources. Several states have already exercised this authority to limit pollution from space and water heaters. For example, Texas adopted a low-NOx standard requiring some space and water heating equipment over two decades ago – a regulation that limits but does not fully exclude NOx pollution from heating equipment.[36] Other states and the South Coast AQMD have taken similar action.

The South Coast AQMD's proposed healthy air standards for furnaces and water heaters align with a growing national trend to strengthen these standards as states and regions across the country take decisive action to further address air pollution and greenhouse gas emissions from buildings.

- The Bay Area Air Quality Management District adopted the nation's first zero-pollution standard for space and water heating in 2023.[37] This standard will prevent 15,000 asthma attacks and up to 85 premature deaths every year.[38]
- California commited to zero-pollution space and water heater standards by 2030 in its 2022 plan for meeting federal air quality standards.[39, 40] In May of 2023, the California Air Resources Board kicked off development of statewide zero-emission standards.[41]
- Maryland is developing statewide zero-pollution HVAC and water heating standards as well. Regulators may introduce the draft rules in 2025.[42]
- Eight additional states – Connecticut, Hawaii, Massachusetts, New York, Oregon, Pennsylvania, Rhode Island, and Washington – joined California and Maryland in committing in 2023 to explore the adoption of zero-emission standards for space and water heating equipment, and all are participating in an Equipment Emissions Standards Cohort co-convened by NESCAUM and the U.S. Climate Alliance.[43, 44]
- Building on this commitment, nine states – California, Colorado, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, and Rhode Island – plus DC signed an agreement in February 2024 to ensure at least 65% of collective sales of residential HVAC and water heating equipment are heat pumps by 2030 – and 90% by 2040.[45]
- NESCAUM has now published a model rule that sets zero-emission standards for furnaces and water heaters, which states may use to accelerate achievement of their heat pump goals.[46]

Conclusion: A Cleaner, Healthier Future for the South Coast

These new standards for furnaces and water heaters represent a crucial step toward cleaner air in Southern California. These healthy air standards will be the second largest single pollution reduction the agency has completed in three decades. By establishing manufacturer sales targets for zero-emission space and water heating technologies that increase over time, the South Coast region can significantly improve health outcomes for all residents, especially in our most vulnerable communities.

Endnotes

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