

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report Proposed Amended Rule 1111 – Reduction of NO_x Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces

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Deputy Executive Officer

Planning, Rule Development, and Area Sources
Philip Fine, Ph.D.

Assistant Deputy Executive Officer

Planning, Rule Development, and Area Sources
Susan Nakamura

Planning and Rules Manager

Planning, Rule Development, and Area Sources
Michael Krause

Author: Shawn Wang – Air Quality Specialist
Yanrong Zhu – Air Quality Specialist

Contributor: Kendra Reif – Air Quality Specialist
Shah Dabirian, Ph.D. – Program Supervisor

Reviewed by: Gary Quinn, P.E. – Program Supervisor
Mary Reichert – Senior Deputy District Counsel

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EXECUTIVE OFFICER:

WAYNE NASTRI

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Rule 1111 reduces emissions of nitrogen oxides (NO_x) from residential and commercial gas-fired fan-type space heating furnaces with a rated heat input capacity of less than 175,000 BTU per hour or, for combination heating and cooling units, a cooling rate of less than 65,000 BTU per hour. The rule applies to manufacturers, distributors, sellers, and installers of such furnaces.

The furnaces are categorized into four types by Rule 1111: 1) Non-condensing (standard); 2) Condensing (high efficiency); 3) Weatherized (e.g., outdoor); and 4) Mobile home furnaces. The compliance dates to meet the emission limit are different depending on the furnace type. The furnaces for installation at the high elevation regions can be any type but are most commonly non-condensing and condensing furnaces.

Rule 1111 was adopted by the South Coast AQMD Governing Board in December 1978 and amended in 1983, 2009, 2014, 2018, and 2019. The more significant changes included:

- The 2009 amendment lowering the NO_x emissions from 40 to 14 nanograms per Joule (ng/J);
- The 2014 amendment providing an alternate compliance option that allows the original equipment manufacturers (OEMs) to pay a per unit mitigation fee, in lieu of meeting the new lower NO_x emission limit, for up to 36 months past the applicable compliance date;
- The March 2018 amendment extending the mitigation fee alternate compliance option and increasing the mitigation fee; and
- The December 2019 amendment providing a limited exemption from the 14 ng/J emission limit for condensing and non-condensing furnace installations at elevations greater than or equal to 4,200 feet above sea level until October 1, 2020.

The compliance date has passed for condensing and non-condensing furnaces for installation at elevations below 4,200 feet above sea level. The current compliance dates for meeting the 14 ng/J NO_x emission limit are: October 1, 2019 for condensing and non-condensing furnaces; October 1, 2020 for weatherized furnaces; October 1, 2021 for mobile home furnaces; and October 1, 2020 for installation of condensing and non-condensing furnaces at elevations greater than or equal to 4,200 feet above sea level (high-altitude installation).

Staff has been closely monitoring the progress of commercialization of compliant weatherized furnaces and condensing and non-condensing high-altitude furnaces, as the October 1, 2020 is approaching. Original Equipment Manufacturers (OEMs) have discussed how the COVID-19 pandemic has affected their business operation and their progress in commercializing Rule 1111 weatherized and high-altitude compliant furnaces. OEMs have also commented that the supply chains for certain parts from overseas or Mexico affected existing and future production, and travel restrictions have affected completion of high-altitude testing for some OEMs. In addition, some OEMs have expressed how the pandemic is affecting their overall business decisions on the development of compliant products.

The OEMs are continuing to release more ultra-low NO_x models to the market for condensing and non-condensing furnaces. There are no reported issues regarding excessive noise or overheating for the current models in the market.

As for weatherized units, out of the seven OEMs, five OEMs are expecting to have some models available that will meet the October 2020 deadline for residential applications (single-phase weatherized), one OEM expects they will not meet the October deadline for residential application, and one OEM has suspended any efforts to meet the deadline. For commercial units (three-phase weatherized), one OEM may meet the October 2020, five are concerned they will not meet the deadline, and one OEM has been delayed and has not provided a scheduled compliance timeline.

With regards to high altitude furnace installations, all seven furnace manufacturers are expecting to have compliant 14 ng/J NO_x condensing and non-condensing furnaces available for installation at an elevation between 4,200 feet to 7,800 feet above sea level by the October 2020 deadline. However, only two OEMs can currently provide compliant condensing and non-condensing furnaces certified for installations at around 6,800 feet and above that could service all mountain communities in the South Coast AQMD, including Big Bear City. One additional manufacturer has expressed optimism in certifying their product for elevations up to 7,000 feet above sea level by October 1, 2020. Three of the OEMs expressed concern that the recent COVID-19 pandemic will likely delay their ability to test in high elevations due to company travel restrictions and thus, delay development and commercialization of compliant furnaces to these high-altitude areas for 3 to 6 months for these manufacturers.

Based on the discussion with the manufactures and contractors, Proposed Amended Rule 1111 will:

- Extend the existing mitigation fee alternate compliance option for three-phase (commercial) weatherized units for six months until March 31, 2021;
- Extend the exemption for high altitude condensing and non-condensing furnace installations for six months until March 31, 2021; and
- Retain the existing applicable requirements for mitigation fee, recordkeeping, and reporting.

Extending the compliance deadline to March 31st will allow for a smoother transition as it will be after the heating season.

Three OEMs and the Air Conditioning, Heating and Refrigeration Institute (AHRI) has urged the South Coast AQMD staff to consider allowing a gas-electric dual fuel split system equipped with a noncompliant 40 ng/J furnace as an alternative compliance option, which is composed of a separate electric heat pump paired with a gas furnace that provides cooling and heating. These OEMs requested that Rule 1111 allow the installation of a noncompliant 40 ng/J furnace when paired with an electric heat pump. Three OEMs expressed opposition to the allowance of dual fuel split systems with noncompliant 40 ng/J furnaces as it undercuts development and commercialization of compliant 14 ng/J furnaces that can also be used in a dual fuel split system. Staff supports dual fuel split systems using compliant 14 ng/J NO_x furnace but recognizes a dual fuel system with a 40 ng/J furnace has the potential, if designed properly, to generate lower NO_x emissions than a standalone 14 ng/J furnace. Staff is continuing to work with stakeholders to explore mechanisms that can ensure if a 40 ng/J dual fuel system were allowed under PAR 1111 compliance issues could be eliminated

CHAPTER 1: BACKGROUND

INTRODUCTION

REGULATORY HISTORY

EQUIPMENT AND PROCESS

REQUIREMENTS AND TESTS FOR NEW TECHNOLOGY

AFFECTED INDUSTRIES

PUBLIC PROCESS

INTRODUCTION

The purpose of Rule 1111 – Reduction of NO_x Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces is to reduce NO_x emissions from residential and commercial gas-fired fan-type space heating furnaces with a rated heat input capacity of less than 175,000 BTU per hour or, for combination heating and cooling units, a cooling rate of less than 65,000 BTU per hour. The rule applies to manufacturers, distributors, sellers, and installers of such furnaces. It requires manufacturers to certify that each furnace model offered for sale in the South Coast AQMD complies with the emission limit using the test methods approved by the South Coast AQMD and U.S. EPA. In lieu of meeting the lower emission limit, Rule 1111 has provided manufacturers an alternate compliance option of paying a per-unit mitigation fee for up to 4 to 4.5 years past the applicable compliance date, depending on the furnace type, which includes non-condensing, condensing, weatherized, and mobile home furnaces. Most single-family homes, many multi-unit residences, and some light commercial building in the South Coast AQMD use this type of space heating equipment.

REGULATORY HISTORY

Rule 1111 was adopted by the South Coast AQMD Governing Board in December 1978. The original rule required residential and commercial space heating furnaces to meet a NO_x emission limit of 40 nanograms per Joule (ng/J) of heat output (equivalent to 61 ppm at a reference level of 3% oxygen and 80% Annual Fuel Utilization Efficiency (AFUE)) beginning January 1, 1984.

In November 2009, Rule 1111 was amended to implement the 2007 Air Quality Management Plan (AQMP) Control Measure CMB-03. The 2009 amendment established a new lower NO_x emission limit of 14 ng/J (equivalent to 22 ppm at a reference level of 3% oxygen and 80% AFUE), and required the three major categories of residential furnaces – condensing (high efficiency), non-condensing (standard), and weatherized furnaces to meet the new limit by October 1, 2014, October 1, 2015, and October 1, 2016, respectively. Furthermore, new mobile home heating units, which were unregulated prior to the 2009 amendment, were required to meet a NO_x limit of 40 ng/J by October 1, 2012 and 14 ng/J by October 1, 2018. To facilitate the depletion of existing inventories and to ensure a smooth transition to the new limits, Rule 1111 also provided a temporary 10-month exemption (a sell-through period) for units manufactured and delivered into the South Coast Air Basin prior to the compliance date.

14 ng/J Technology Development Projects

Four technology development projects were initiated in 2010 and completed in 2013, funded by the South Coast AQMD, the Gas Company, and San Joaquin Valley APCD with a total amount of \$1,447,737. Through those projects, prototype furnaces were developed demonstrating that the new lower Rule 1111 NO_x limit of 14 ng/J is achievable for forced air residential heating furnaces.

Mitigation Fee to Delay Compliance of 14 ng/J Furnaces

Rule 1111 was later amended in September 2014 to delay the compliance date for condensing furnaces and provide an alternate compliance option. The alternate compliance option allows

manufacturers subject to Rule 1111 to pay a per unit mitigation fee of \$200 for each condensing furnace and \$150 for each other type of furnace distributed or sold into the South Coast Air Basin, in lieu of meeting the new lower 14 ng/J NO_x emission limit. Depending on furnace type, the mitigation fee option had an end date and the NO_x limit of 14 ng/J was phased in, over the period from April 1, 2018, to October 1, 2021.

Extension and Increase of the Mitigation Fee

Based on the lack of 14 ng/J furnaces that were commercialized at that time, Rule 1111 was amended in March 2018 to increase the mitigation fee in two phases to a range of \$300 to \$450, depending on the furnace type and heat input capacity, and extend the mitigation fee alternate compliance option by 1.5 years for condensing furnaces, and one year for non-condensing and weatherized furnaces. Rule 1111 was also amended to provide an exemption from the mitigation fee increase for units encumbered in a contractual agreement by OEMs and distributors for new construction, if contracts were signed prior to January 1, 2018, and include provisions to address propane conversion kits for propane firing only furnaces.

Clean Air Furnace Rebate Program

In March 2018, a rebate program for consumers who purchase and install compliant 14 ng/J furnaces in the South Coast AQMD was initiated. The purpose of the rebate program was to help commercialize and incentivize consumers to purchase 14 ng/J furnaces. On May 4, 2018, the South Coast AQMD executed the contract with Electric & Gas Industries Association (EGIA) to administer the Clean Air Furnace rebate program. On June 28, 2018, the rebate website was launched (www.cleanairfurnacerebate.com). The South Coast AQMD Governing Board approved funding of \$3,000,000 to the furnace rebate program, specifying a \$500 rebate for each compliant furnace. The program was suspended in May 2020 when the funds were exhausted.

High Altitude Furnaces

Rule 1111 was last amended in December 2019 to include a limited exemption from the 14 ng/J NO_x emission limit that applies to manufacturers, distributors, sellers, and installers of condensing and non-condensing natural gas furnaces. This exemption applies to furnaces installed at elevations greater than or equal to 4,200 feet above sea level until October 1, 2020. During this interim exemption period, condensing and non-condensing furnaces installed in high altitude areas are still required to meet the 40 ng/J NO_x emission limit. This rule amendment included recordkeeping requirements for manufacturers, distributors, and installers to track the distribution, sales, and installations of these furnaces. Verification of the elevation is based on U.S. Geological Survey data, which is also used by other location sources such as Google Maps, Wikipedia, etc.

The adoption Resolution for the December 2019 amendment directed staff to update the Stationary Source Committee on the development of high-altitude furnaces and weatherized furnaces. This update was scheduled to occur no later than May 15, 2020. However, due to the impacts resulting from the COVID-19 pandemic on staff's ability to gather information on the OEM's implementation efforts, the update to the Board was delayed for one month. At the December 2019 Governing Board meeting Supervisor Janice Rutherford also requested staff to continue working with manufacturers, distributors, and installers regarding high-altitude installations, weatherized

furnaces, and the potential of allowing hybrid dual fuel split systems that use noncompliant 40 ng/J furnaces.

Since the December Board meeting, staff has been periodically meeting with all furnace manufacturers to monitor the progress of compliant furnace development and commercialization. The market availability for condensing and non-condensing compliant furnaces has increased four-fold during the past year, with 448 models released to the market as of May 2020 compared to the 112 models in February 2019. Manufacturers did not initially report complaints regarding excessive noise issues for compliant furnaces; however, recently some contractors have reached out to staff regarding noise issues. Four out of seven furnace manufacturers have informed Staff of reported noise issues. The cause of the noise issues is identified to be either installer error or defective components from third party suppliers. To resolve identified noise issues, manufacturers are taking steps to increase installer training and worked with part suppliers to revise identified parts. Prior to the October 1, 2019 compliance date, an early model had an overheating issue, but the manufacturer modified the model and resolved the issue. Staff is not aware of overheating or safety issues beyond this initial report which has been resolved.

EQUIPMENT AND PROCESS

Fan-type gas-fired furnaces heat a building by circulating air from inside the building (office, home, apartment, etc.) through the furnace. In a fan-type furnace, air is heated when it passes through a heat exchanger. Combustion gases heat up the inside of the heat exchanger, and air from the building that is moving past the outside of the heat exchanger removes heat from the outside surface. A blower (fan) pulls air through one or more intake ducts and pushes the air past the heat exchanger and through another set of ducts, which direct the heated air to different parts of the building. The heated air circulates through the building before it is again pulled into the intake ducts and re-heated. This process continues until a specific temperature is detected by a thermostat in the building, which then shuts off the furnace. When the temperature at the thermostat goes below a set point, the thermostat sends a signal for the furnace to turn on.

Heat pumps are electric heat transfer units utilizing compression and evaporation of refrigerant to release and absorb heat. Heat is absorbed when the refrigerant is evaporated at low pressure and released when the refrigerant is compressed at high pressure. Heat pumps consist of an outdoor and indoor unit, both equipped with a coil and fan. The coils located in both the outdoor and indoor unit can act as either a compressor or evaporator depending on whether the unit is in heating or cooling mode. The fans in both the indoor and outdoor unit move air across the coils to facilitate heat exchange. In heating mode, the outdoor unit absorbs heat by acting as an evaporator and the indoor unit releases heat by acting as a compressor. In cooling mode, the flow of the refrigerant and functions of the coils are reversed. By utilizing the reversible compression and evaporation cycles, a heat pump can move heat in and out of the home.

Unlike a gas-fired furnace, heat pumps do not generate heat by themselves, which impacts their ability to operate in colder climates. To make up for the limitations of electric heat pumps, dual fuel split systems are available from all seven furnace OEMs. For dual fuel split systems, the fan of the indoor unit is replaced with a gas-fired furnace. The gas-fired furnace in dual fuel split

systems serves as the auxiliary heating element for when external temperatures drop below a user-defined threshold, aka “switchover temperature,” for when the heat pump is unable to maintain indoor temperature. When the external temperature rises above the threshold, the furnace turns off and the heat pump resumes as the primary source of heat.

Rule 1111 categorizes furnaces into four types: non-condensing, condensing, weatherized, and mobile home furnaces. Condensing furnaces, also called high-efficiency furnaces, utilize a second heat exchanger to recover the latent heat in the flue gas, achieving 90 to 98 percent fuel efficiency. Non-condensing furnaces only use one heat exchanger, with a typical fuel efficiency of about 80 percent. Weatherized furnaces are designed for installation outside of a building, equipped with a protective jacket and integral venting, and labeled for outdoor installation. A weatherized furnace is often referenced as package units by the heating, ventilation, and air conditioning (HVAC) industry as the furnace is packaged with an air conditioning condensing unit. A mobile home furnace means a furnace designed specifically and solely for installation to heat a mobile home.

REQUIREMENTS AND TESTS FOR NEW TECHNOLOGY

Gas furnaces in the United States must meet the ANSI Z21.47/CSA 2.3 standard referred as CSA certification, mainly to ensure safety. To be sold and installed in the South Coast AQMD’s jurisdiction, they must also be certified by the South Coast AQMD for Rule 1111 NOx emission limit compliance by specific test methods approved by the South Coast AQMD and U.S. EPA. OEMs could also be subject to other regulations, such as ANSI/ASHRAE/IES 90.1-2013, Energy Standard for Buildings Except Low-Rise Residential building required by the U.S. Department of Energy (DOE), and AHRI certification program for verification test of output heating capacity and annual fuel utilization efficiency. For furnace installation, manufacturers provide extensive training programs and instruction material for the contractors and installers.

AFFECTED INDUSTRIES

Proposed Amended Rule 1111 affects manufacturers (NAICS 333), distributors and wholesalers (NAICS 423), and retailers and dealers (NAICS 444) of residential furnaces. Because heating units regulated by the rule are used in most residential and many commercial settings for heating small buildings, construction and building contractors and installers (NAICS 238 and 811) related to residential furnaces are also affected by PAR 1111. The Air Conditioning Heating and Refrigeration Institute (AHRI), the major manufacturer’s trade organization, indicates that there are no manufacturers of fan-type gas-fired residential furnaces in the South Coast AQMD. However, these companies do maintain regional sales offices and distribution centers in the South Coast AQMD and there are manufacturers of other types of heating furnaces in the South Coast AQMD.

PUBLIC PROCESS

Staff has held ongoing individual meetings with the seven OEMs prior to and after the December

2019 Governing Board meeting. The discussions at these meetings included rule implementation status for compliant 14 ng/J condensing and non-condensing, high elevation, and weatherized furnaces. Also discussed at these meeting was the potential of utilizing dual fuel technology to comply with the Rule 1111 NO_x emission limit. The meetings were held individually to provide each OEM the ability to speak about confidential information regarding their technology development.

The progress of compliant furnace commercialization and proposed amendment were discussed at the June 10, 2020 Rule 1111 Implementation meeting and the June 19, 2020 Stationary Source Committee (SSC) meeting. The Public Workshop and Public Hearing are tentatively scheduled for July 15, 2020 and September 4, 2020 respectively.

CHAPTER 2: SUMMARY OF PROPOSED AMENDED RULE 111

PROPOSED AMENDED RULE REQUIREMENTS

PROPOSED AMENDMENTS TO RULE REQUIREMENTS

The South Coast AQMD staff has been closely monitoring the progress of commercialization of weatherized compliant furnaces, accounting for and assessing the impacts resulting from the COVID-19 pandemic. Based on discussions with OEMs, Proposed Amended Rule 1111 will extend the compliance date from October 1, 2020 to March 31, 2021, for both the mitigation fee alternative compliance option for three-phase weatherized units and the exemption for installing condensing and non-condensing furnaces at high altitude areas. Other existing requirements, including the compliance date for single-phase weatherized units, are currently proposed to remain unchanged.

Three OEMs and AHRI urged the South Coast AQMD staff to consider allowing a dual fuel split system with a noncompliant 40 ng/J furnace as an alternative compliance option. A dual fuel split system is a separate electric heat pump paired with a natural gas furnace. The system first operates the heat pump until it reaches a set temperature (e.g., outside temperatures drop to less than 32 degrees F) at which point the gas furnace is switched on and operated. Staff supports the use of heat pumps and dual fuel split systems with compliant 14 ng/J NO_x furnaces. Staff is concerned that a dual fuel system with a 40 ng/J NO_x furnace will allow noncompliant furnaces to enter the Basin creating additional enforcement challenges.

Extending the mitigation fee alternative compliance option for three-phase weatherized units until March 31, 2021

When compared with condensing and non-condensing furnaces, weatherized furnaces utilize the same basic combustion technology for burner and heat exchanger design. The development work for weatherized furnaces is focused on integration with the air conditioning unit as a package system, as well as addressing the outdoor operation environment.

To comply with the current Rule 1111, OEMs are paying the mitigation fee for weatherized furnaces distributed to the South Coast AQMD that are not meeting the 14 ng/J NO_x emission limit. The mitigation fee alternative compliance option for this type of furnace will expire on September 30, 2020. OEMs, distributors, contractors, and installers would have to comply with the 14 ng/J NO_x limit starting on October 1, 2020.

Multiple furnace manufacturers have reported delays in the supply chain, especially from overseas or Mexico, as a result of COVID-19. Other COVID-19 pandemic impacts include required lower worker density, plant-wide downtime to sanitize and prepare for worker distancing, and funding reallocation by corporate offices due to the unstable market and financial status. In addition, the OEMs are uncertain as to whether and how the COVID-19 pandemic will evolve to further adversely impacting their business. According to these OEMs, all these factors are contributing to the delay in furnace development and commercialization.

Out of the seven OEMs, five OEMs are expecting to have some weatherized models available that will meet the September 30, 2020 deadline for residential applications (one-phase), one OEM expects they will not meet the October deadline for residential applications, and one OEM has

suspended any efforts to meet the deadline. For commercial weatherized units (three-phase), one OEM may meet the September 30, 2020 deadline, five are concerned they will not meet the deadline, and one OEM has been delayed and has not provided a scheduled compliance timeline. Some OEMs suggested a 3 to 6 months delay in commercializing compliant units after the September 30, 2020 deadline. Based on initial communications with some manufacturers, establishing different compliance dates for single phase and three phase weatherized units may be a better distinction between the two categories of weatherized furnaces than residential and commercial weatherized units.

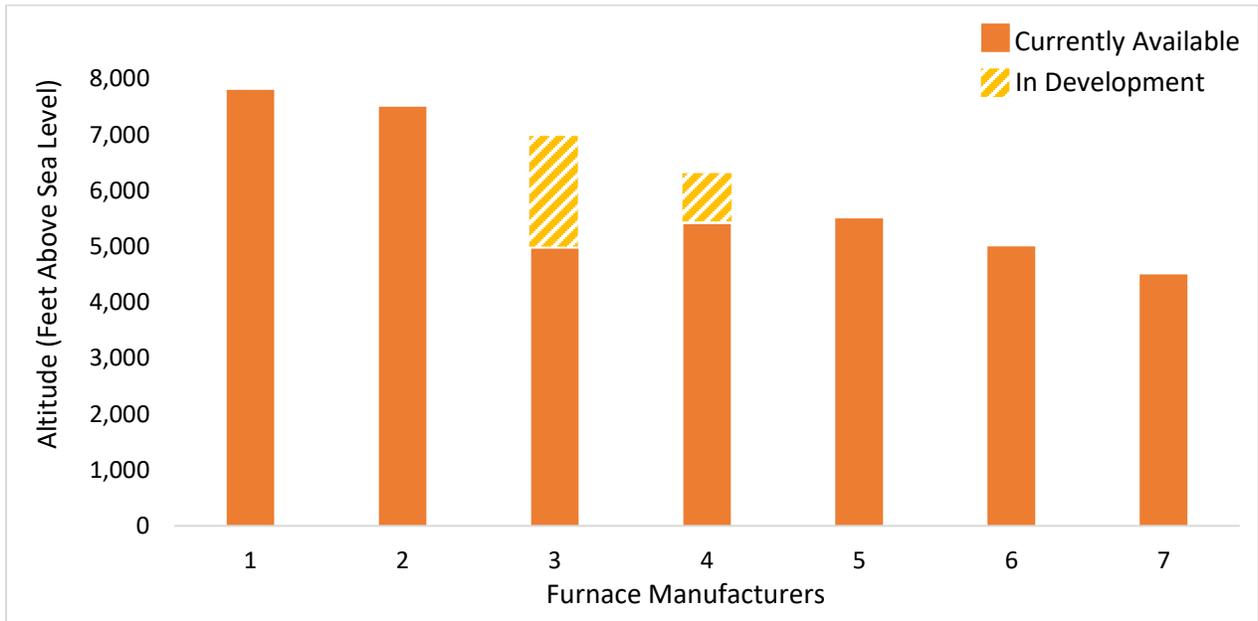
Based on these discussions with the seven OEMs, PAR 1111 will extend the mitigation fee alternative compliance option for three-phase weatherized units by six months for, but currently propose to maintain the September 30, 2020 deadline for single-phase weatherized units. The considerations are not only based on the COVID-19 impacts, but also the winter heating season which typically takes place from October to March. Implementing any new requirement in the middle of heating season would cause additional complications in the supply chain. This proposal does not change the requirements for the mitigation fee or the recordkeeping and reporting requirements. That is, the OEMS would continue to be subject to the phase two mitigation fee identified under Rule 1111 Table 2, as well as the compliance plan and report specified under Rule 1111(c)(5), except that the phase two mitigation fee option end date would be March 31, 2021 for commercial weatherized units.

Extending the exemption for installing condensing and non-condensing furnace at high altitude until March 31, 2021

The furnaces at high altitude installations are mostly non-condensing and condensing furnaces. For an installation at high altitude, minor modification to the furnace are needed to accommodate different air density and oxygen levels to ensure an optimal air/fuel ratio for burner combustion. The modification involves a high-altitude kit or a built-in manifold adjustment. OEMs conduct testing of high-altitude installation at locations that requires staff traveling. Due to the COVID-19, travel restrictions have caused some OEMs to suspend this testing.

As to the installation progress, all seven furnace manufacturers are expecting to have compliant 14 ng/J NO_x condensing and non-condensing furnaces available for installation at an elevation between 4,200 feet to 7,800 feet above sea level by the October 1, 2020 exemption end date. However, currently only two of them will be able to provide compliant condensing and non-condensing furnaces for installations at around 6,800 feet above sea level or higher for communities within the South Coast AQMD, such as Big Bear City. Progress of high-altitude condensing, and non-condensing furnace development is outlined in Figure 1.

Figure 1 – Development Status of High-Altitude Condensing and Non-Condensing Furnaces

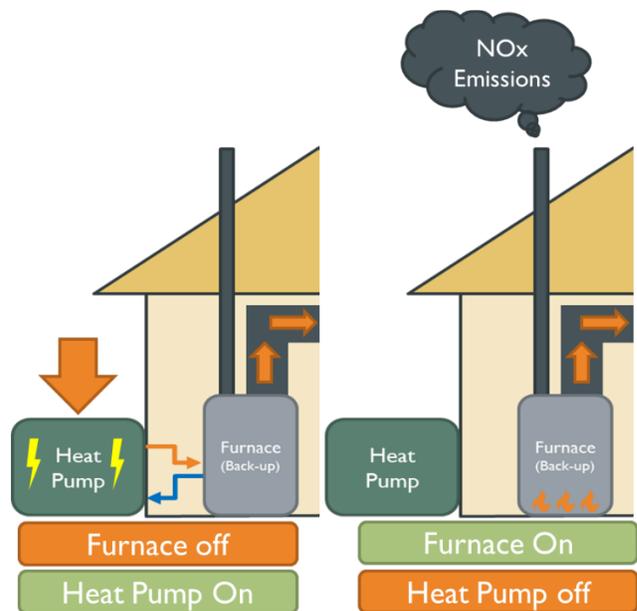


PAR 1111 will extend the exemption for high altitude installations by six months. Like the extension for weatherized units, the considerations include COVID-19 impacts and the winter heating season duration. Recordkeeping and reporting requirements specified under Rule 1111(g)(6) and (g)(7) continue to apply.

Considerations of dual fuel split systems with 40 ng/J NOx furnace

Three OEMs and AHRI urged the South Coast AQMD staff to consider the dual fuel split system with a 40 ng/J noncompliant furnace as an option to comply with the Rule 1111 NOx limit. These OEMs have commented that a dual fuel split system with a 40 ng/J furnace would provide more compliance options for the consumer than a standalone 14 ng/J furnace. A dual fuel split system, also called hybrid system, is a heat pump paired with a gas furnace that provides both cooling and heating as depicted in Figure 2. Dual fuel split systems are comprised of a separate furnace and heat pump which are paired together by the installer or dealer as compared to a packaged weatherized dual fuel system where the system is packaged in a single enclosure. The heat pump operates as the primary heating source at milder temperatures with low heating demand. As temperatures get colder the heat pump does

Figure 2 – Dual Fuel Heating System



not have the capacity to keep the home warm. At this point the furnace then takes over as the auxiliary heating source, at what is called the “switchover temperature.”

According to this OEM, the basis for installing a dual fuel split system would be significantly more NOx emissions reductions as compared to the operation of a 14 ng/J furnace. The OEM initially stated that there would be up to a 90 percent reduction in NOx emissions for installations in the South Coast AQMD using a dual fuel split system when compared to a 40 ng/J low NOx furnace on its own could be achieved. This OEM shared a study that was funded by them and conducted by University of California, Davis. The study indicated potential NOx emissions reductions of up to 95-100 percent in high population areas of California when using a heat pump with a low NOx furnace (40 ng/J) for auxiliary heat vs. a standalone ultra-low NOx (14 ng/J) furnace. Based on a switchover temperature of 32 °F, the study concluded that most of the Southern California region could rely solely on the electric heat pump, thus generating fewer NOx emissions compared to the compliant standalone 14 ng/J NOx furnace. The emissions benefits from noncompliant 40 ng/J NOx dual fuel split systems start to decline relative to the length of operation of the furnace itself. To ensure the potential emissions reduction benefits from dual fuel system equipped with a noncompliant 40 ng/J NOx furnace, enforcement of furnace operation times (hours) will be necessary.

Staff discussed this subject with all seven OEMs and some distributors in assessing the feasibility of the dual fuel system. Three OEMs oppose the allowance of dual fuel split systems with 40 ng/J furnaces because the 40 ng/J dual fuel system undercuts their development and commercialization of 14 ng/J compliant furnaces. These OEMs have expressed that they have invested significant resources to commercialize a complete portfolio of compliant furnaces. They have also expressed concerns about the enforceability of allowing noncompliant furnaces to enter the basin because the furnace is sold as a split system and separate from the heat pump. Based on these discussions, dual fuel split systems are a very small portion of overall furnace sales. The market demand for dual fuel split systems is much lower in the South Coast AQMD as compared to other parts of United States. This low demand could be due to the higher cost of electricity (for heat pump use) as compared to natural gas in the South Coast AQMD. The higher price of a heat pump installation in the form of electrical panel upgrades may also contribute to the low demand.

It is important to note that all seven furnace manufacturers have dual fuel split systems pairing a heat pump with compliant 14 ng/J NOx furnaces available. OEMs are also on schedule to certify their compliant furnaces for high altitude installations. Thus, compliant furnaces with 14 ng/J NOx emissions could be employed as part of the dual fuel split systems. Because compliant furnaces are available or actively under development, allowing noncompliant furnaces as part of dual fuel split systems would undercut the cost of existing dual fuel split systems that include compliant 14 ng/J furnaces and likely discourage new technology development, preventing or delaying further emissions reductions.

Furthermore, staff has concerns regarding the increased supply of 40 ng/J NOx furnaces in the South Coast AQMD to be used in dual fuel split systems, which could create additional enforcement challenges. With this legal pathway for stock to enter the District, noncompliant 40 ng/J NOx furnaces could be more accessible to be sold in standalone applications. In addition, the current design of the systems allows installers or consumers to be able to change the “switchover

temperature” setting through the system control panel. Thus, an installation of a dual fuel system with a 40 ng/J NO_x furnace could allow the noncompliant furnace to be run considerably more than what is assumed in the estimates that show emissions reductions and could result in significantly higher emissions than a compliant 14 ng/J furnace.

Lastly, the high reduction potential for NO_x emissions (90 percent or higher) by using the dual fuel system as stated by the OEM is from the operation of the heat pump, not from the natural gas furnace within the system. Using a compliant furnace instead of a noncompliant furnace would achieve an additional 65% emission reductions and not require staff inspection of the dual fuel system, risk user interference that would negate any emissions benefits, or open the door to noncompliant furnaces entering the District.

Staff acknowledges the emissions reduction benefits of dual fuel split systems; however, systems equipped with noncompliant 40 ng/J furnaces will undercut the cost of existing dual fuel split systems equipped with compliant 14 ng/J NO_x furnaces as well as introduce additional compliance challenges that require regulating the end user. Staff is continuing to work with stakeholders to explore mechanisms that can ensure if a 40 ng/J dual fuel system were allowed under PAR 1111 compliance issues could be eliminated. Dual fuel split systems with compliant 14 ng/J NO_x furnaces offer the highest amount of emission reductions outside of standalone electric heat pump systems. On those bases, staff supports dual fuel systems using compliant 14 ng/J NO_x furnaces but recognizes a dual fuel system with a 40 ng/J furnace has the potential, if designed properly, to generate lower NO_x emissions than a standalone 14 ng/J furnace.

CHAPTER 3: IMPACT ASSESSMENT

EMISSION REDUCTIONS

COST EFFECTIVENESS

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

SOCIOECONOMIC IMPACT ASSESSMENT

**DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY
CODE SECTION 40727**

INCREMENTAL COST-EFFECTIVENESS

COMPARATIVE ANALYSIS

CONCLUSION AND RECOMMENDATIONS

DELAY OF EMISSION REDUCTIONS

Based on the 2016 AQMP emission inventory for fuel consumption, the annual average NO_x emissions from residential heating using natural gas was 9.51 tons per day in 2012. Staff estimates that there are about four million residential type heating furnaces in the South Coast AQMD. Based on a furnace life of 25 years, a typical furnace emits 1.5 to 2.0 pounds of NO_x per year. The emission rate reduction from 40 ng/J to 14 ng/J results in more than one pound per year of NO_x emissions reductions for each furnace.

Total weatherized furnace annual sales (including both single-phase and three-phase units) are estimated at 15,000 units in the South Coast AQMD. A six-month delay in compliance would result in about 0.01 tons per day emission reduction delay for the next 25 years (calculated as: $(15,000 \times 1)/(2 \times 2,000 \times 365)$). Limiting the compliance deadline delay to just commercial (three-phase) units will reduce this adverse impact.

Staff tracked furnace sales to be approximately 50 units for high altitude installations during the two-month period of October and November 2019. Based on this information, the estimated total installations during the six-month exemption extension would be between 100 and 200 units. The six-month extension of the exemption for high altitude installations would result in a negligible (near zero tons per day) emission reduction delay.

Consequently, the emission reduction delay by this proposal is not significant. The proposed amendments do not result in any significant effect on air quality or significant changes to emissions reductions.

On the other hand, the final year (2046, based on a 25 year useful life expectancy) to achieve the overall emission reductions for this rule remains unchanged, as the proposed compliance date of March 31, 2021 for both weatherized units and high-altitude installation is still earlier than the mobile home furnace compliance date of October 1, 2021.

COST EFFECTIVENESS

A cost effectiveness analysis is not required for PAR 1111. The proposed amendment does not impose additional requirements on manufacturers of compliant residential furnaces meeting the 14 ng/J NO_x emission limit.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

Pursuant to the California Environmental Quality Act (CEQA) and South Coast AQMD Rule 110, the South Coast AQMD, as lead agency for the proposed project, has reviewed Proposed Amended Rule 1111 pursuant to CEQA Guidelines Sections 15002(k) and 15061. South Coast AQMD staff has determined that allowing the installation and operation of 40 ng/J furnaces in the high-altitude areas and three-phase weatherized furnaces for a limited period of time would result in minimal and temporary NO_x emission reductions foregone; thus, it can be seen with certainty that there is no possibility that the proposed project may have a significant adverse effect on the environment. Therefore, the proposed project is considered exempt from CEQA pursuant to CEQA Guidelines Section 15061(b)(3). Further, because PAR 1111 will not have statewide, regional or areawide

significance, no CEQA scoping meeting is required to be held pursuant to Public Resources Code Section 21083.9(a)(2). If the proposed project is approved, the Notice of Exemption will be filed with the county clerks of Los Angeles, Orange, Riverside, and San Bernardino counties.

SOCIOECONOMIC IMPACT ASSESSMENT

The proposed amendments to Rule 1111 does not impose any additional requirements and will have no socioeconomic impacts.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE SECTION 40727

California 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. In order to determine compliance with section 40727, 40727.2 requires a written analysis comparing the proposed amended rule with existing regulations, if the rule meets certain requirements.

The following provides the draft findings.

Necessity: A need exists to amend Rule 1111 to provide extension to both the mitigation fee alternative compliance option for three-phase weatherized units and the exemption for installing condensing and non-condensing furnaces at high altitude.

Authority: The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations from California Health and Safety Code Sections 39002, 40000, 40001, 40440, 40702, 40725 through 40728, 41508, and 41700.

Clarity: PAR 1111 has been written or displayed so that its meaning can be easily understood by the persons affected by the rule.

Consistency: PAR 1111 is in harmony with, and not in conflict with or contradictory to, existing federal or state statutes, court decisions, or federal regulations.

Non-Duplication: PAR 1111 does not impose the same requirement as any existing state or federal regulation and is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference: In amending this rule, the South Coast AQMD hereby implements, interprets, or makes specific reference to the following statutes: Health and Safety Code sections 39002, 40001, 40702, 40440(a), and 40725 through 40728.5.

INCREMENTAL COST-EFFECTIVENESS

Health and Safety Code section 40920.6 requires an incremental cost-effectiveness analysis for Best Available Retrofit Control Technology (BARCT) rules or emission reduction strategies when

there is more than one control option that would achieve the emission reduction objective of the proposed amendments, relative to ozone, CO, SO_x, NO_x, and their precursors. The proposed amendment does not include new BARCT requirements; therefore, this provision does not apply to the proposed amendment.

COMPARATIVE ANALYSIS

Health & Safety Code section 40727.2(g) for comparative analysis is applicable when the proposed amended rules or regulations impose, or have the potential to impose, a new emissions limit or standard, or increased monitoring, recordkeeping, or reporting requirements. In this case, a comparative analysis is not required because the amendments do not impose such requirements.

CONCLUSION AND RECOMMENDATIONS

Additional time is needed for furnace development due to the COVID-19 pandemic impacts. Staff recommend amending Rule 1111 to extend the mitigation fee period for three-phase weatherized furnaces to March 31, 2021 and extend the exemption for condensing and non-condensing installed at altitudes above 4,200 ft until March 31, 2021. This recommendation does not pose socioeconomic impacts or result in any significant effect on air quality.

REFERENCES

REFERENCES

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