



# Chapter 4

## Control Strategy and Implementation

- To attain the 2015 ozone standard, NO<sub>x</sub> emissions need to be reduced to ~~62,860~~ tons per day by 2037. This represents a ~~71-67~~ percent reduction in NO<sub>x</sub> emissions over baseline levels.
- NO<sub>x</sub> emissions from federally regulated sources alone will exceed the amount of NO<sub>x</sub> needed to attain by ~~50-42~~ percent. Without substantial action by the federal government the region will be unable to attain the standard.
- The only viable pathway to achieve the required NO<sub>x</sub> reductions is through widespread adoption of zero emission technologies across all stationary and mobile sources.
- The needed transformation to zero emission technologies will require significant public and private investments and continued innovation and advancement on technologies.
- The control strategy includes innovative measures, such as residential and commercial building electrification, Facility-Based Mobile Source Measures, co-benefits from existing climate and energy efficiency programs, and incentives.
- Meeting the standard will require that the U.S. EPA acts to address sources within their authority such as ships, trains, and trucks.
- Implementation of the control strategy relies on additional regulations, accelerated deployment of available cleaner technologies, best management practices, and Clean Air Act section 182(e)(5) “black box” measures.

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## Introduction

The control strategy in the Draft Final 2022 Air Quality Management Plan (AQMP) provides the path to achieving emission reductions needed to meet the 2015 8-hour ozone NAAQS. Implementation of the 2022 AQMP will be based on a series of control measures and strategies that vary by source type (i.e., stationary or mobile) as well as by pollutant (i.e., NOx or VOC). This chapter outlines the proposed control strategy and the adoption and implementation schedule for the 2022 AQMP to achieve the 2015 8-hour ~~Ozone~~ozone standard in the Basin and the Coachella Valley.

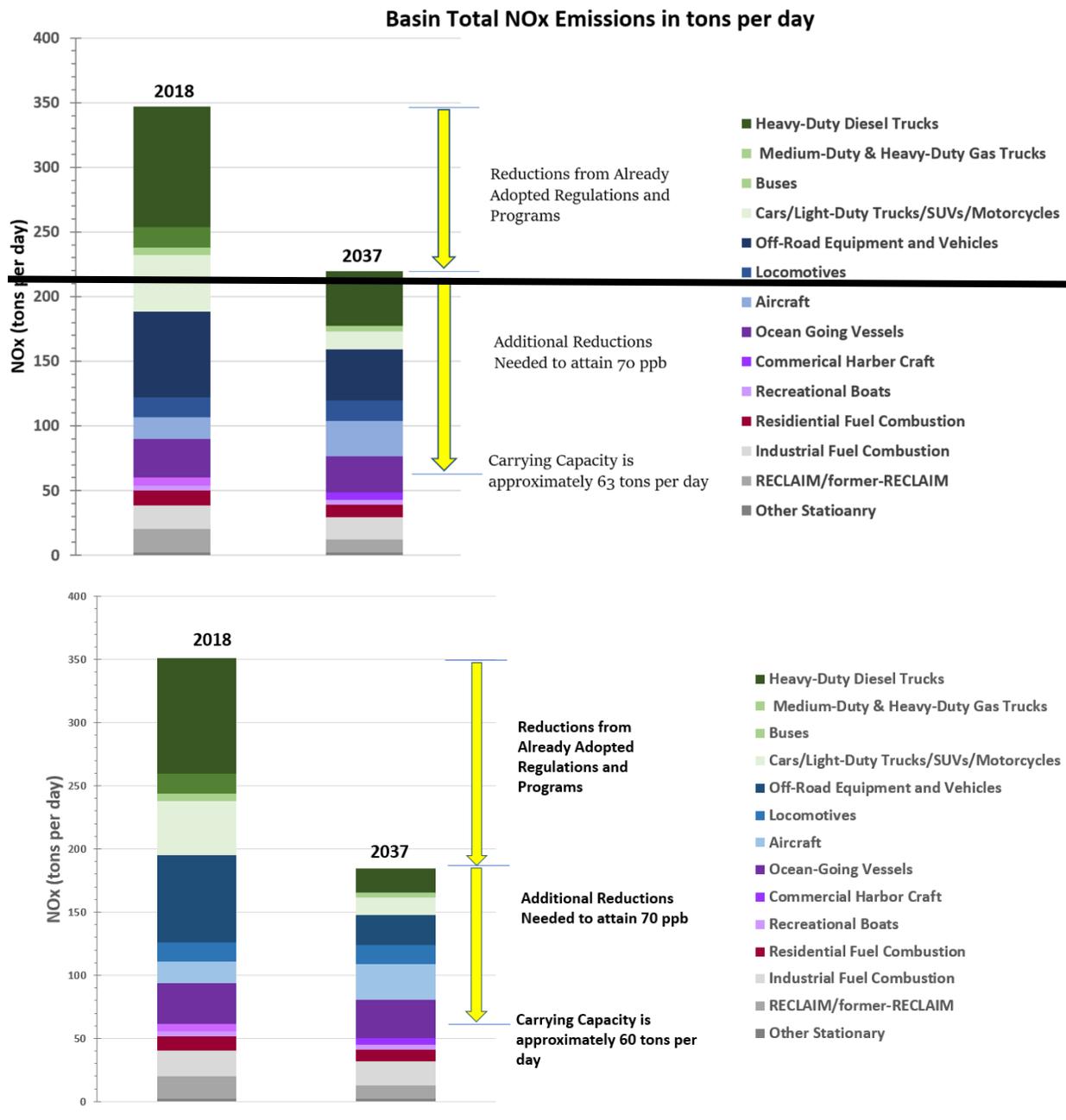
To meet the 2015 ozone standard, NOx emissions must be reduced by ~~157~~124 tons per day, or about ~~71~~67 percent over baseline levels by 2037, and about ~~82~~83 percent below current levels. The preliminary baseline NOx emissions inventory is ~~220~~184 tons per day in 2037. This baseline reflects already adopted regulations and other controls currently in place. Meanwhile, the carrying capacity – the maximum amount of NOx in the atmosphere that results in attaining the standard – is approximately ~~63~~60 tons per day. The vast amount of NOx emission reductions needed to attain the standard poses a significant challenge. Traditional combustion controls and after controls will not be sufficient to achieve the level of NOx emission reduction needed for attainment. Instead, meeting the standard requires widespread adoption of zero emissions technologies where feasible, and the lowest emitting technologies where zero emission technologies are not feasible, across all emission sectors. Close collaboration with federal, State, and regional governments, businesses, and the public will be critical to tackling this challenge. Meeting the standard will also require that the federal government ~~act~~act to address sources that are subject to federal regulation and beyond the regulatory authority of the South Coast AQMD and California Air Resources Board (CARB).

The Draft Final 2022 AQMP control strategy includes a variety of implementation approaches such as regulation, accelerated deployment of available cleaner technologies, best management practices, co-benefits from existing programs (e.g., climate, energy efficiency), incentives, and CAA section 182(e)(5) “black box” measures. Additional demonstration and commercialization projects will be crucial to help deploy and reduce costs for zero emission and low NOx technologies. A key element of AQMP implementation will be private and public funding from several sources to help further the development and deployment of these advanced technologies. Many of the same technologies will address both air quality and climate goals, such as increased energy efficiency and a transition to cleaner fuels. The total required emission reductions, technology readiness, cost-effectiveness, and economic impacts are critical considerations in developing a comprehensive and integrated control strategy.

## Overall Strategy

The most significant air quality challenge in the Basin, and the primary driver for the control strategy, is the significant amount of NOx emission reductions required to meet the standard by the required attainment date ~~in~~, August 3 2038 – which requires the needed emission reductions to be in effect in 2037.

The challenge associated with the amount of emission reductions to reach attainment is depicted in Figure 4-1. The figure demonstrates the baseline reductions and strategy reductions required to reach attainment. The former is due to ongoing implementation of already adopted regulations and the latter represents reductions anticipated from the proposed control measures included in this chapter.



**FIGURE 4-1**  
**BASELINE NOx EMISSIONS INVENTORIES AND ADDITIONAL REDUCTIONS REQUIRED TO ATTAIN THE 70 PPB STANDARD**

## Control Strategy

South Coast AQMD staff have developed a comprehensive emission control strategy to achieve the necessary NO<sub>x</sub> emission reductions. The 2022 AQMP integrates a variety of control measures and implementation approaches in a cost-effective, feasible, and strategic fashion. Co-benefits from climate change programs and multi-pollutant management will likely produce concurrent benefits for ozone. Regional air quality modeling analysis indicates that significant NO<sub>x</sub> reductions with additional strategic, limited VOC reductions will result in the region attaining the 2015 ozone standard. The only viable pathway to achieve the standard requires a transformation to zero emissions technology where feasible across all sectors. This includes relying on the development of new, zero emission and ultra low NO<sub>x</sub> technologies where advanced control technologies are not yet available or feasible. Air quality regulatory agencies have traditionally set policies and requirements that are performance-based. Such standards do not prescribe specific technologies or fuel usage provided the required level of emission control is achieved. This is a policy that the South Coast AQMD intends to continue.

The 2022 AQMP relies on the development of new, zero emission and on ultra low NO<sub>x</sub> technologies where advanced zero emission control technologies are not yet available or feasible. CAA section 182(e)(5) provides for reliance on the emission reductions from developing advanced technologies. These emission reductions are known as “black box” measures because the specific technologies or controls to achieve the emission reductions are not yet known. The rationale for allowing “black box” measures is that “extreme” ozone nonattainment areas have 20 years to attain the standard and, in that time, advanced technologies to achieve further emission reductions are presumed to become available. Control measures that rely on the development of new zero emission or low NO<sub>x</sub> technologies would utilize the flexibility provided by the Clean Air Act section 182(e)(5).

South Coast AQMD staff developed control measure concepts from a number of sources, including the AQMP Advisory Group, AQMP Working Groups, AQMP Control Measures Workshop, Reasonably Available Control Technology (RACT)/Reasonable Available Control Measures (RACM) Analysis (see Appendix VI), input from members of public and South Coast AQMD staff, and proposals from previous AQMPs. Six specialized working groups also supported the development of the 2022 AQMP:

1. Residential and Commercial Buildings Working Group;
2. Aircraft Working Group;
3. Ocean-Going Vessels Working Group;
4. Construction and Industrial Equipment Working Group;
5. Heavy-Duty Trucks Working Group; and
6. Zero Emissions Infrastructure Working Group.

Agendas and presentations for each working group meeting are available at the South Coast AQMD’s website.<sup>1,2</sup> As part of the 2022 AQMP control measure development, the South Coast AQMD and CARB

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<sup>1</sup> Residential and Commercial Buildings Working Group, <http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/2022-aqmp-residential-and-commercial-buildings-working-group>.

<sup>2</sup> Mobile Source Working Groups, <http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/2022-aqmp-mobile-source-working-groups>.

staff conducted a joint AQMP Control Measures Workshop on November 10, 2021 to solicit new control concepts and innovative ideas from industry experts, professional consultants, government specialists, environmental and community representatives, and other stakeholders.

The South Coast AQMD, CARB, and Southern California Association of Governments (SCAG) play a role in developing and implementing measures to meet ozone standards. The overall control strategy in the Draft Final 2022 AQMP therefore consists of control measures developed by South Coast AQMD staff, measures developed by CARB as part of their ~~Draft-2022 State SIP strategy~~ Strategy, and measures provided by SCAG as part of their Regional Transportation Strategy and Transportation Control Measures.

For each control measure, the estimated emission reductions and the cost-effectiveness are provided in the respective sections of the measures. These are initial estimates that will be refined during the implementation of the control measure. The control measures were developed accounting for technical and economic feasibility, as well as other factors, including ensuring that sources subject to different regulatory authorities achieved their fair share of emission reductions. Technological feasibility includes those technologies that may not be commercially available today, however, will be available upon implementation of the specific requirement that implements the control measure. Table 4-1 provides an overview of the criteria used in evaluating and selecting feasible control measures. The criteria are presented in alphabetical order.

**TABLE 4-1**  
**CRITERIA FOR EVALUATING 2022 AQMP CONTROL MEASURES**

<b>Criteria</b>	<b>Description</b>
<b>Cost-Effectiveness</b>	The cost of a control measure per reduction of emissions of a particular pollutant. The cost includes purchasing, installing, operating, and maintaining the control technology.
<b>Emission Reduction Potential</b>	The total amount of emissions that a control measure can reduce.
<b>Enforceability</b>	The ability to ensure compliance with a control measure.
<b>Legal Authority</b>	Ability of the South Coast AQMD or other adopting agency to legally implement the measure.
<b>Public Acceptability</b>	The likelihood that the public will approve or cooperate in the implementation of a control measure.
<b>Rate of Emission Reduction</b>	The time it will take for a control measure to reduce a certain amount of air pollution.
<b>Technological Feasibility</b>	The likelihood that the technology for a control measure is or will be available.

## Incentives and Funding

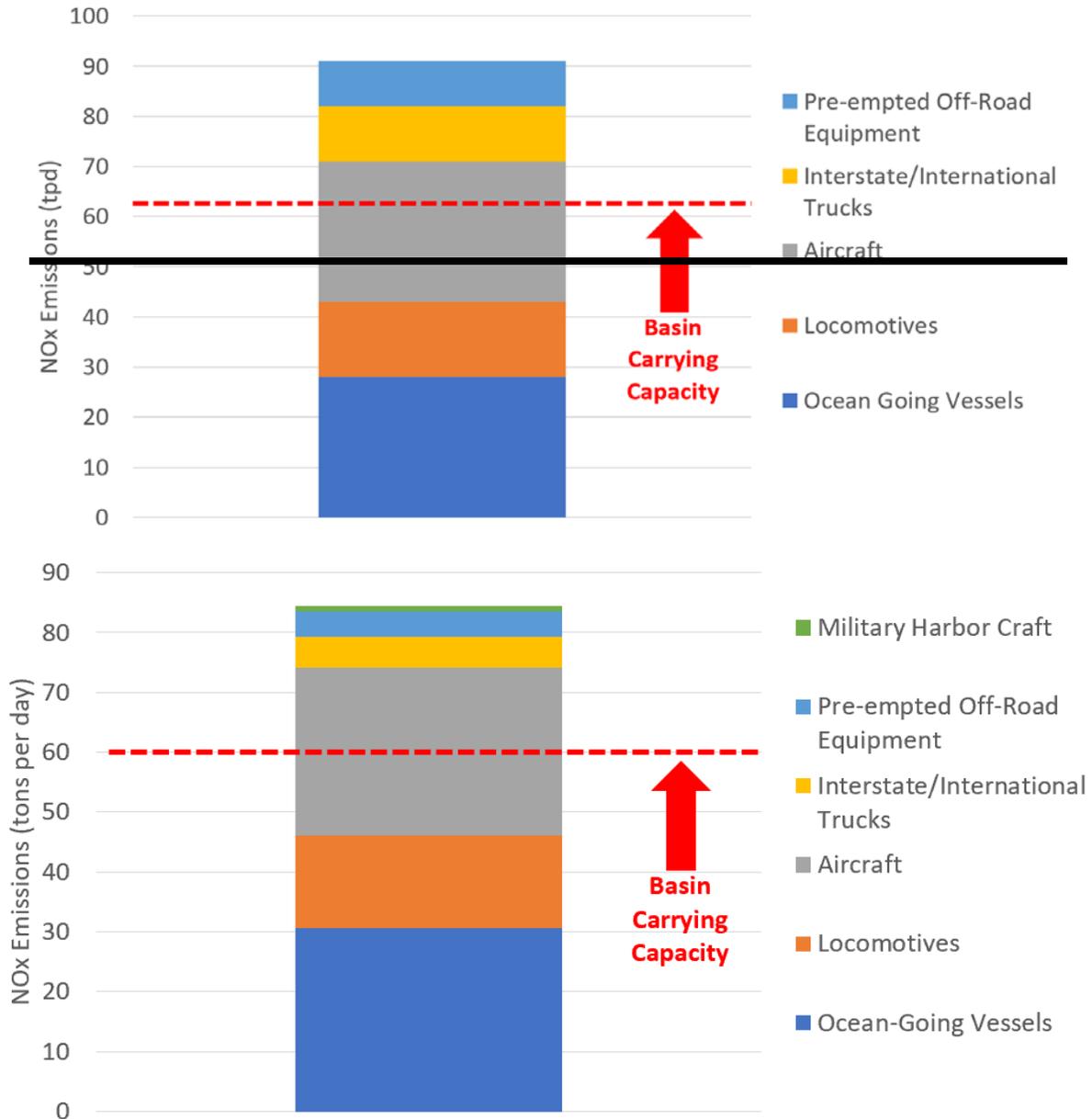
Incentives and funding will continue to be a critical component in implementing the control strategies. Substantial funding will be needed for research, technology demonstration, infrastructure, and early deployment of the new technologies. In addition, regulations alone will not be sufficient to achieve the magnitude of emission reduction needed. Incentive funds will be required to accelerate the deployment of advanced zero emission and cleaner technologies and associated fueling infrastructure. Incentive funding can be used to help promote deployment of technologies for both stationary and mobile sources. For stationary sources, incentive funds can help promote the transformation to zero emission technologies for small commercial and residential combustion sources such as water heaters and furnaces. For mobile sources, incentive funds can facilitate the replacement of older, high-emitting vehicles and equipment with the cleanest vehicles and equipment commercially available. A key consideration in deployment of incentives will be to ensure that environmental justice (EJ) areas are able to access advanced technologies and also benefit from the transition to zero emission technologies. The South Coast AQMD will therefore seek to prioritize incentive funding in EJ areas and seek opportunities to expand funding to benefit the most disadvantaged communities.

Close coordination with other agencies at federal, State and local levels will be necessary to achieve widespread adoption of clean technologies. It will be important to partner with entities beyond those typically involved with air quality planning. For example, fueling infrastructure must be significantly expanded to accelerate widespread adoption of zero emission vehicles and equipment and ultra-low

emission technology where zero emission is not feasible. Getting to the needed deployment of infrastructure will require cooperation and coordination at the State (e.g., California Energy Commission and Public Utilities Commission) and local level with assistance from federal agencies, where available.

## Federal Partnership

Federal partnerships will also be critical to meet the standard considering the significant additional emission reductions that will be necessary from sources for which the South Coast AQMD has limited regulatory authority. For example, aircraft and ocean-going vessels (OGVs) that are primarily regulated at the federal and international level, are ~~each~~ projected to emit ~~approximately 2728 and 31~~ tons per day, respectively, in 2037. Other such emission categories include locomotives, international and out-of-state trucks and pre-empted off-road equipment. The total emissions subject to federal and international authority are estimated to be ~~9284~~ tons per day in 2037 – about ~~2924~~ tons per day greater than the maximum amount of NO<sub>x</sub> that can still result in meeting the standard (see Figure 4-2). Given this, even if emissions from all sources subject to CARB and South Coast AQMD control were zero emissions, the region would fail to meet the 2015 ozone standard. The 2015 8-hour ozone standard will not be met absent significant action by the federal government to reduce emissions from sources subject to federal regulatory authority.



**FIGURE 4-2**  
**NOx EMISSIONS IN 2037 FROM SOURCES UNDER FEDERAL AND INTERNATIONAL AUTHORITIES IN**  
**RELATION TO THE CARRYING CAPACITY FOR THE 2015 8-HOUR OZONE NAAQS**

The South Coast AQMD’s primary regulatory authority to control emissions is for stationary sources with only limited authority to control mobile sources. This presents a challenge since mobile sources – namely heavy-duty trucks, ships, airplanes, locomotives and construction equipment – account for over about 80 percent of NOx emissions. Meanwhile, stationary sources – such as power plants, refineries, and factories – are responsible for the remaining 19 21 percent in 2037. It is impossible to discuss the challenge of mobile sources without examining the contribution of federal emission sources. More concerning is the

contribution of mobile sources under federal regulatory authority is growing. In 2018, these sources only accounted for 2528 percent of the NOx emissions, yet their contribution is expected to increase to 4246 percent by 2037. The growing contribution of federal emission sources reflects aggressive action by CARB and the South Coast AQMD, while only modest actions have been taken by the U.S. EPA.

Without clear action to address federal emission sources, the emission reduction burden is unfairly being shifted to stationary sources, most of which are already subject to the most stringent controls in the nation. Regardless, the control strategy includes additional reductions for stationary sources with greater emphasis on small commercial and residential sources as well as additional reductions on industrial sources. The South Coast AQMD will continue to use its available regulatory authority to further control mobile source emissions where federal or State actions do not meet regional needs and to ensure the effectiveness of State and federal measures.

## Chapter Overview

The following sections discuss the control measures, SIP commitments, overall emission reductions, and implementation as outlined below:

- The South Coast AQMD’s Proposed Strategy to attain the 2015 8-hour ozone standard. Appendix IV-A provides detailed descriptions of South Coast AQMD stationary source and mobile source control measures;
- State and Federal Control Measures. Appendix IV-B provides detailed descriptions of the CARB Strategy;
- SCAG’s Regional Transportation Strategy and Transportation Control Measures. Appendix IV-C provides detailed descriptions of the regional transportation strategy and control measures;
- Contingency Measures;
- SIP Emission ~~Reduction~~Reductions Commitment;
- Overall Emission Reductions; and
- Implementation of Proposed Control Strategy.

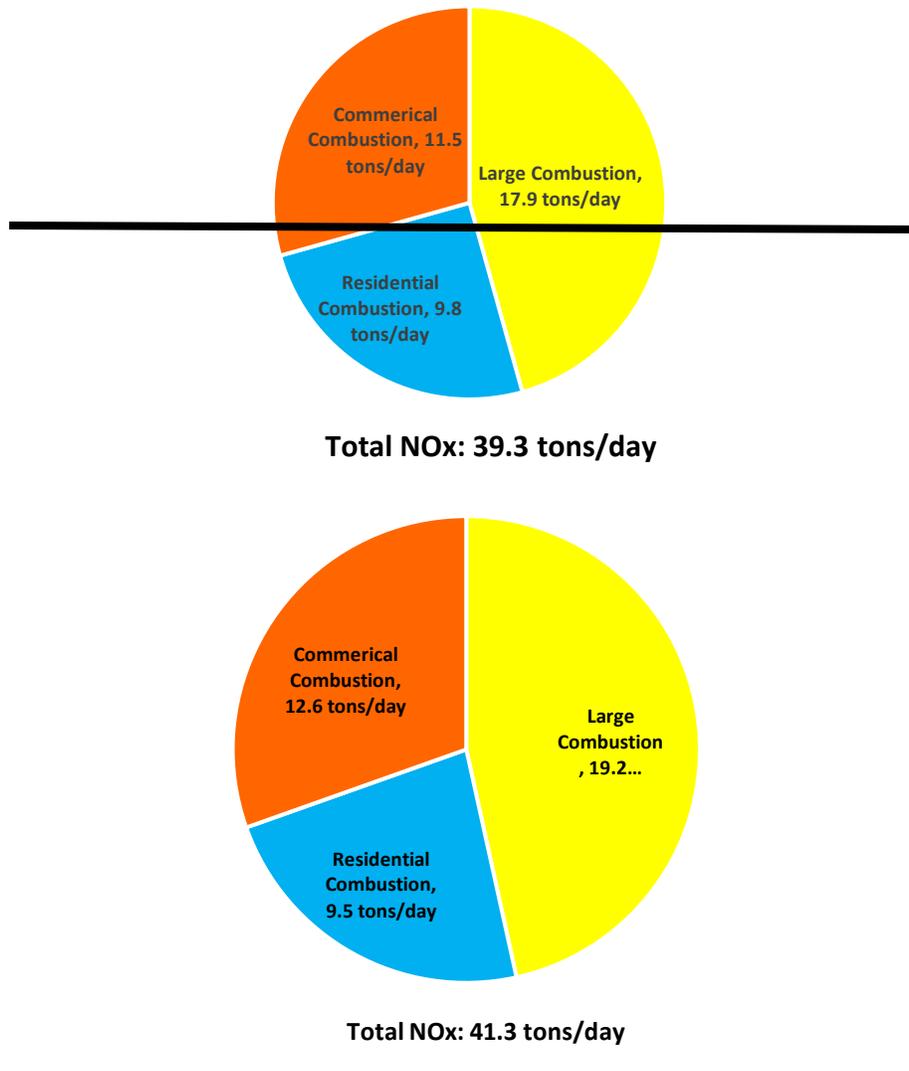
## South Coast AQMD Proposed 8-Hour Ozone Strategy

Meeting the 2015 8-hour ozone standard by its statutory deadline in 2037 will require both continuation and acceleration of existing ozone reduction strategies, as well as deployment of new strategies. Proposed measures to reduce ozone include stationary and mobile source NOx reduction strategies, supplemented by limited, strategic VOC emission reductions.

As discussed in a greater detail in Chapter 5, the carrying capacity – the maximum amount of NOx in the atmosphere that still allows for attainment of the standard – is approximately 6360 tons per day of NOx emissions. Relative to a 2037 baseline inventory of 220184 tons per day, NOx emissions must be reduced by approximately 7467 percent to attain the standard. Baseline NOx emissions for stationary point and area sources in the Basin are projected to be 3941 tons per day in 2037, which is approximately two-thirds

of the carrying capacity. While stationary sources within the South Coast AQMD are already subject to some of the most stringent regulations in the country, additional reductions will still be needed in this sector to get down to the ~~6360~~ tons per day NO<sub>x</sub> carrying capacity.

The South Coast AQMD's proposed ozone control measures are comprised of stationary and mobile source measures. Stationary source categories include: residential, commercial and large equipment. Each ~~of these groups~~group accounts for approximately one third of the entire stationary source inventory (see Figure 4-3). The control measures that cover stationary sources include traditional NO<sub>x</sub> controls, recognizing co-benefits from climate programs, incentives, limited, strategic VOC measures, and others. Stationary combustion sources can be replaced with new, lower or zero emission technologies, including low NO<sub>x</sub> or ultra-low NO<sub>x</sub> equipment and fuel cells for, but not limited to, combined heat and power (CHP). Electrification of equipment is another way to achieve substantial NO<sub>x</sub> emission reductions, especially when combined with renewable, non-combustion power generation. For residential and commercial water and space heating equipment, zero emission technologies are currently available as discussed in control measures R-CMB-01, R-CMB-02, C-CMB-01, and C-CMB-02.



**FIGURE 4-3**  
**STATIONARY SOURCE NOX EMISSIONS IN 2037**

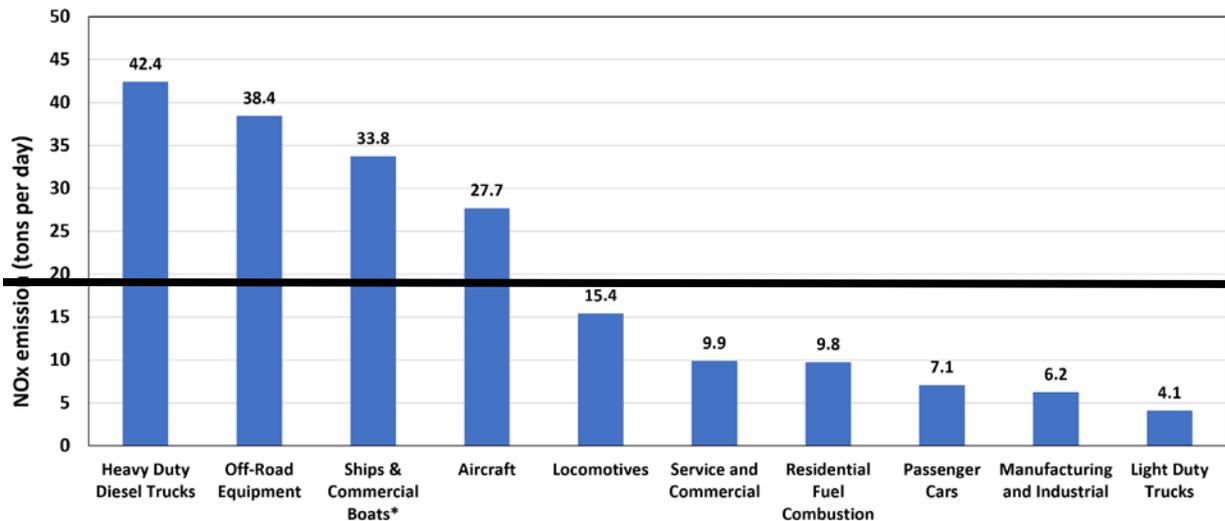
Substantial emission reductions will also be required from mobile sources to meet the standard. Mobile sources will account for ~~over~~about 80 percent of regional NOx emissions in 2037, or around ~~300~~240 percent of the carrying capacity. Therefore, mobile source controls must be a significant part of the control strategy.

South Coast AQMD's mobile source measures are categorized into ~~five~~four broad categories:

- **Emission Growth Management** addresses emission reductions from new or redevelopment projects by working with developers and local land use agencies on actions that mitigate emissions from affected projects;

- **Facility Based** mobile sources generate emissions from mobile source activity at locations such as the ports, railyards, or intermodal facilities;
- **On-road and Off-road Mobile Sources** focuses on, respectively, light, medium, and heavy-duty vehicles operating in the region, and equipment use in both construction and operational activities at industrial sites;
- **Incentives** fund a variety of sources to encourage early deployment of cleaner technologies; and
- ~~**Other** consider wildfire prevention and enhanced public outreach and education.~~

As shown in Figure 4-4, ~~the on-road heavy-duty truck category is~~ ships and commercial boats are projected to be the single largest contributor to regional NOx emissions in 2037. ~~Off,~~ which comprise 20 percent of the total baseline emission in 2037. ~~Aircraft, off-road equipment, marine vessels, aircraft,~~ heavy-duty diesel trucks, and locomotives are also substantial sources of NOx emissions in the Basin. There are both currently available and emerging advanced technologies for trucks, locomotives, and cargo handling equipment with the potential to achieve zero emission and low NOx emission levels. These technologies include ultra-low NOx engines, hybrid-electric, battery-electric, fuel cell-electric, and hydrogen fuel cell on-road vehicle technologies. Next generation hybrids can also serve long-term needs while providing additional fuel diversity. These could include, for example, natural gas-electric hybrid technologies for on-road and other applications, particularly if coupled with improved after-treatment technologies. Alternative fuels such as natural gas have historically helped the region make progress toward attaining air quality standards and are generally cleaner than conventional fuels such as gasoline and diesel. Given the region's need to attain air quality standards in a time frame much shorter than 2037, alternative fuels will continue to play a major role in emission reductions especially for the near future to meet air quality standards with earlier attainment deadlines.



\* Include Ocean-Going Vessels and Commercial Harbor Crafts

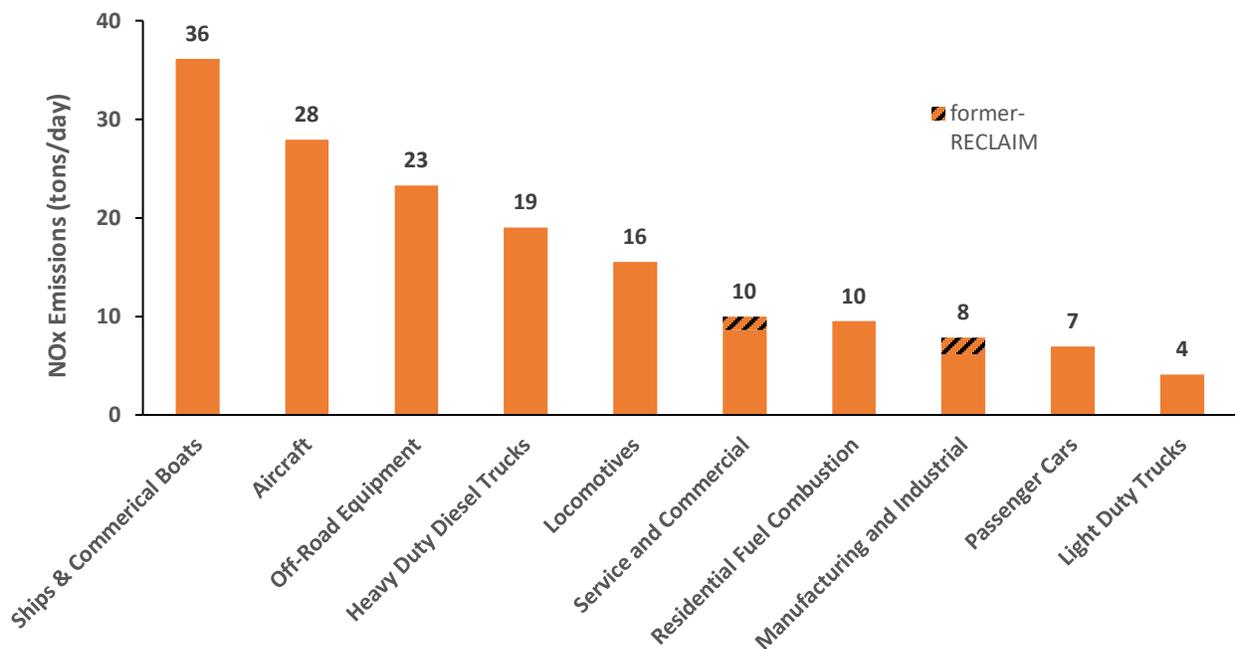


FIGURE 4-4

TOP 10 NOX EMISSIONS CATEGORIES AND CORRESPONDING NOX EMISSIONS (TONS PER DAY) IN 2037 IN THE SOUTH COAST AIR BASIN

(SOURCE: 2022 AQMP SUMMER PLANNING INVENTORY); FORMER-RECLAIM PORTION OF EACH SOURCE CATEGORY IS SHOWN WITH HATCHED AREAS)

Given the substantial contribution of NO<sub>x</sub> emissions from heavy-duty trucks, more stringent federal engine standards will be crucial for attainment. While California has established State-based emission standards for heavy-duty trucks, these standards have limited reach over trucks that are registered out-of-state. The South Coast AQMD along with other air agencies petitioned the U.S. EPA to revise the federal heavy-duty truck standard in 2016.<sup>3</sup> The U.S. EPA estimates finalizing the proposed standards by the end of calendar year 2022, which would make the revised standards effective for model year 2027 and later vehicles. While the level of the final standard is currently unknown, preliminary analysis indicates that even the most stringent option proposed by the U.S. EPA will not provide the same level of emission reductions that would be achieved if the U.S. EPA adopted standards equivalent to the NO<sub>x</sub> standard (0.02 g/bhp-hr) in California's Omnibus rule. We therefore anticipate that additional action will be necessary to reduce emissions from heavy-duty trucks.

In addition to the defined control measures, emission reductions associated with further deployment of cleaner technologies will be necessary to meet the standard. As previously discussed, section 182(e)(5) of the CAA provides additional flexibilities for areas classified as "extreme" nonattainment for ozone, allowing reliance on the future deployment of advanced technologies that have not yet been developed or commercialized.

The 2016 AQMP relied heavily on these "black box" commitments in the attainment strategy for the 1997 and 2008 8-hour ozone standards. In the 2016 AQMP, the 2031 baseline NO<sub>x</sub> emissions were 214 tons per day and the carrying capacity was 96 tons per day, indicating that the "black box" accounted for over 80 percent of the required reductions. Compared to the magnitude of black box relied upon in the previous AQMP, only 3 tons per day of NO<sub>x</sub> reductions is assumed in the stationary source category in the 2022 AQMP. Additionally, the zero and low NO<sub>x</sub> emission technologies for stationary sources and some heavy-duty mobile sources needed for attaining the 2015 ozone standard are not fully evolved, ~~so~~. As a result, reliance on section 182(e)(5) measures needs be maintained to provide flexibility and time for the development of new technology and improvement of existing technologies.

South Coast AQMD staff believes that a combination of strong regulatory actions and voluntary approaches using incentive funds for cleaner vehicles is the most effective means of achieving the needed emission reductions. In some cases, the incentive approach is the only way to address those sources currently without legal mandates to reduce emissions or beyond the reach of the South Coast AQMD authority. Other voluntary incentive programs, such as the Carl Moyer Program, provide a means to accelerate fleet turnover of outdated equipment to the cleanest commercially available equipment in a way that complements regulations. Incentive funds also play a key role in developing, demonstrating, and deploying new technologies, and significant additional investment will be needed to develop and deploy the advanced technologies needed to attain the standard at scale.

Voluntary agreements can also provide an avenue for emission reductions. For example, the South Coast AQMD reached agreements with the five major commercial airports in the Basin to reduce emissions from their operations. Each airport signed a Memorandum of Understanding (MOU) with the South Coast

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<sup>3</sup> South Coast AQMD filed a petition asking U.S. EPA consider adoption of a standard at 0.02 g/bhp-hr, 90 percent lower than the current standard. In March 2022 the U.S. EPA proposed a suite of potential revised heavy-duty emission standards, ranging from 0.02 g/bhp-hr to 0.05 g/bhp-hr.

AQMD with enforceable commitments to implement a variety of measures to reduce emissions from ground support equipment, shuttle buses, and heavy-duty trucks.<sup>4</sup> This type of agreement is another way to achieve emission reductions outside of traditional regulatory approaches. Adopting a plan with sufficient measures to attain the ozone air quality standard is required under federal law. While the transition to cleaner technologies will be expensive, the public health benefits associated with meeting the standard will be substantial. There will also be significant co-benefits from related reductions in greenhouse gas (GHG) emissions, resulting in significant climate change benefits. By transitioning to cleaner transportation technologies, NOx emissions from transportation sources will be reduced, subsequently resulting in improved air quality, lower health risk across the region, and reductions in toxic risk and GHGs along goods-movement corridors. Failure to meet air quality standards would not only have negative public health consequences, but could also risk imposing adverse economic impacts on the region due to potential federal sanctions.

## South Coast AQMD Proposed Stationary Source 8-Hour Ozone Measures

A control measure is a set of specific technologies and methods identified for potential implementation to reduce emissions to attain an air quality standard. The proposed stationary source ozone measures are designed to assist to attain the 2015 8-hour ozone standard primarily through NOx emission reductions with limited strategic VOC reductions. Co-benefits from GHG emissions reduction policies and other measures are included as well.

The NOx measures are further divided to three groups based on the scale of combustion equipment, which are Residential Combustion Sources (R-CMB), Commercial Combustion Sources (C-CMB), and Large Combustion Sources (L-CMB). Measures pursuing co-benefits from Energy and Climate Change Programs are grouped as ECC. VOC measures include Petroleum Operations and Fugitive VOC Emissions (FUG), Coatings and Solvents (CTS), Compliance Flexibility Programs (FLX), and Biogenic Sources (BIO). There are other measures such as Multiple Component Sources (MCS) and Public Outreach (FLX).

In the 2022 AQMP, the South Coast AQMD is proposing a total of ~~4849~~ 4849 control measures. Out of the ~~4849~~ 4849 proposed control measures, ~~3031~~ target reductions from stationary sources. South Coast AQMD's control measures focus on stationary sources as that is the area where South Coast has the strongest regulatory authority. The majority of these measures are anticipated to be developed in the next several years and implemented prior to 2037.

Table 4-2 provides a list of the South Coast AQMD proposed ozone measures for stationary sources along with anticipated emission reductions in 2032 and 2037. The following sections provide a brief description

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<sup>4</sup> Due to the different emissions inventory versions used in the ~~draft~~ AQMP and the ~~draft~~ SIP strategy, the reductions indicated in this section do not match with the mobile source reductions reflected in the attainment demonstration. ~~In addition, HD I/M and SORE which were adopted in December 2021 were treated as baseline reductions in the draft SIP strategy, while they were considered as strategy reductions in the draft AQMP. The discrepancy will be resolved in the final version AQMP and SIP strategy.~~

of the proposed stationary source ozone measures. Detailed descriptions of the measures are provided in Appendix IV-A.

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TABLE 4-2

## SOUTH COAST AQMD PROPOSED STATIONARY SOURCE 8-HOUR OZONE MEASURES

Number	Title [Pollutant]	Emission Reductions ( <del>tpd</del> ) (tons per day) (2032/2037)
<b>South Coast AQMD Stationary Source NOx Measures:</b>		
<b><i>Residential Combustion Source Measures:</i></b>		
R-CMB- <del>0101</del> <sup>a</sup>	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Water Heating [NOx]	<del>0.48</del> <u>0.46</u> / <del>1.29</del> <u>1.25</u>
R-CMB- <del>0202</del> <sup>a</sup>	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Space Heating [NOx]	<del>0.45</del> <u>0.44</u> / <del>1.20</del> <u>1.17</u>
R-CMB-03	Emissions Reductions from Residential Cooking Devices [NOx]	<del>0.300</del> <u>0.29</u> / <del>0.81</del> <u>0.79</u>
R-CMB-04	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Other Combustion Sources [NOx]	<del>1.171</del> <u>1.15</u> / <del>3.13</del> <u>3.09</u>
<b>Total Residential Combustion Source Reductions</b>		<b><del>2.42</del><u>2.34</u> / <del>6.43</del><u>6.30</u></b>
<b><i>Commercial Combustion Source Measures:</i></b>		
C-CMB- <del>0101</del> <sup>a</sup>	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Water Heating [NOx]	0.04 / 0.25
C-CMB- <del>0202</del> <sup>a</sup>	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Space Heating [NOx]	0.04 / 0.21
C-CMB-03	Emission Reductions from Commercial Cooking Devices [NOx]	0.21 / <del>0.62</del> <u>0.64</u>
C-CMB-04	Emission Reductions from Small Internal Combustion Engines [NOx]	0 / <del>2.12</del> <u>2.25</u>
C-CMB-05	NOx Reductions from Small Miscellaneous Commercial Combustion Equipment (Non-Permitted) [NOx]	0 / <del>4.24</del> <u>5.14</u>
<b>Total Commercial Combustion Source Reductions</b>		<b>0.29 / <del>7.42</del><u>8.49</u></b>
<b><i>Large Combustion Source Measures:</i></b>		
L-CMB-01	NOx Reductions from RECLAIM Facilities [NOx]	0 / <del>0.28</del> <u>0.31</u>
L-CMB-02	Reductions from Boilers and Process Heaters (Permitted) [NOx]	0 / <del>0.50</del> <u>0.45</u>
L-CMB-03	NOx Emission Reductions from Permitted Non-Emergency Internal Combustion Engines [NOx]	0 / <del>0.31</del> <u>0.34</u>
L-CMB-04	Emission Reductions from Emergency Standby Engines (Permitted) [NOx, VOCs]	0.0 / <del>2.02</del> <u>0.04</u>
L-CMB-05	NOx Emission Reductions from Large Turbines [NOx]	0 / <del>0.06</del> <u>0.07</u>
L-CMB-06	NOx Emission Reductions from Electricity Generating Facilities [NOx]	0.09 / <del>0.62</del> <u>0.91</u>
L-CMB-07	Emission Reductions from Petroleum Refineries [NOx]	0 / <del>0.77</del> <u>0.89</u>
L-CMB-08	NOx Emission Reductions from Combustion Equipment at Landfills and Publicly Owned Treatment Works [NOx]	0 / 0.33
L-CMB-09	NOx Reductions from Incinerators [NOx]	0 / <del>0.89</del> <u>0.90</u>
L-CMB-10	NOx Reductions from Miscellaneous Permitted Equipment [NOx]	0 / <del>1.16</del> <u>1.01</u>
<b>Total Large Combustion Source Reductions</b>		<b>0.09 / <del>6.92</del><u>7.28</u></b>

TABLE 4-2 (CONTINUED)

## SOUTH COAST AQMD PROPOSED STATIONARY SOURCE 8-HOUR OZONE MEASURES

Number	Title [Pollutant]	Emission Reductions <del>(tpd)</del> (tons per day) (2032/2037)
<b>South Coast AQMD Co-Benefits from Energy and Climate Change Programs Measures:</b>		
ECC-01	Co-Benefits from Existing and Future Greenhouse Gas Programs, Policies, and Incentives [NO <sub>x</sub> ]	TBD / TBD <sup>b</sup>
ECC-02	Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures [NO <sub>x</sub> , VOCs]	TBD / TBD
ECC-03	Additional Enhancements in Reducing Existing Residential Building Energy Use [NO <sub>x</sub> , VOCs]	TBD / TBD
<b>South Coast AQMD Stationary Source VOC Measures:</b>		
FUG-01	Improved Leak Detection and Repair [VOCs]	0.6 / 0.6
FUG-02	Emission Reductions from Industrial Cooling Towers [VOCs]	TBD / TBD
CTS-01	Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants [VOCs]	0.5 / 0.5
FLX-02	Stationary Source VOC Incentives [VOCs]	TBD / TBD
BIO-01	Assessing Emissions from Urban Vegetation [VOCs]	TBD / TBD
L-CMB-04 <sup>c</sup>	Emission Reductions from Emergency Standby Engines (Permitted) [NO <sub>x</sub> , VOCs]	0.0 / 0.1
<b>Total Stationary Source VOC Reductions</b>		<b>1.1 / 1.2</b>
<b>South Coast AQMD Stationary Source Other Measures:</b>		
MCS-01	Application of All Feasible Measures [All Pollutants]	TBD / TBD
MCS-02	Wildfire Prevention [NO <sub>x</sub> , PM]	N/A / N/AA <sup>d</sup>
FLX-01	Improved Education and Public Outreach [All Pollutants]	N/A / N/A

<sup>a</sup> will be used to assist CARB's control measure, Zero-Emission Standard for Space and Water Heaters included in the 2022 State SIP

<sup>b</sup> TBD are reductions to be determined once the measure is further evaluated, the technical assessment is complete, and inventories and cost-effective control approaches are identified, and are not relied upon for attainment demonstration purposes.

<sup>c</sup> This is a NO<sub>x</sub> control measure with co-benefits of VOC reductions.<sup>a</sup>

<sup>d</sup> N/A are reductions that cannot be quantified due to the nature of the measure (e.g., outreach) or if the measure is designed to ensure reductions that have been assumed to occur will in fact occur.

<sup>e</sup> TBD are reductions to be determined once the measure is further evaluated, the technical assessment is complete, and inventories and cost-effective control approaches are identified, and are not relied upon for attainment demonstration purposes.

<sup>f</sup> This is a NO<sub>x</sub> control measure with co-benefits of VOC reductions.

## South Coast AQMD Stationary Source NO<sub>x</sub> Measures

### Residential Combustion Source Measures

There are four stationary source measures aiming to reduce NO<sub>x</sub> emissions from residential combustion equipment:

- R-CMB-01: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Water Heating
- R-CMB-02: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Space Heating
- R-CMB-03: Emissions Reductions from Residential Cooking Devices
- R-CMB-04: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Other Combustion Sources

**R-CMB-01: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – RESIDENTIAL WATER HEATING:** This control measure seeks to reduce NOx emissions from residential building water heating sources that are subject to Rule 1121 – Control of Oxides of Nitrogen (NOx) from Residential Type, Natural Gas-Fired Water Heaters. The measure proposes to: (1) develop a rule to require zero emission water heating units for installations in both new and existing residences; and (2) allow low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible (e.g., colder climate zones, or architecture design obstacles). This control measure would include incentive funds to facilitate the transition to zero emission technologies and promote further emission reductions earlier than required. A primary zero emission residential water heating technology is currently available with the all-electric heat pump water heater.

**R-CMB-02: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – RESIDENTIAL SPACE HEATING:** This control measure seeks to reduce NOx emissions from residential space heating sources regulated by Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces. The measure proposes to: (1) develop a rule to require zero emission space heating units for installations in both new and existing residences; and (2) allowing low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible. This control measure would also provide incentive funds to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required.

**R-CMB-03: EMISSIONS REDUCTIONS FROM RESIDENTIAL COOKING DEVICES:** This control measure seeks to reduce NOx emissions from residential cooking devices including stoves, ovens, griddles, broilers, and others in new and existing buildings. Replacing gas burners with electric cooking devices, induction cooktops, or low NOx gas burner technologies will reduce NOx emissions. NOx reductions will be pursued through a combination of regulatory approaches and incentive programs. Proposed method of control consists of two steps: step one includes a technology assessment of emissions testing of various cooking devices to establish emissions rates. Once emissions rates are defined, step two supports future rule development and incentive programs. The rule would apply to manufacturers, distributors, and installers establishing emission limits. The incentive programs would provide funds to encourage and promote adoption of zero and low NOx emission technologies.

**R-CMB-04: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – RESIDENTIAL OTHER COMBUSTION SOURCES:** This control measure seeks to reduce NOx emissions from residential combustion sources that are not water heating (See R-CMB-01), space heating (See R-CMB-02) and cooking equipment (See R-CMB-03). R-CMB-04 sources are miscellaneous, but primarily comprised of natural gas and liquified petroleum gas (LPG) fired swimming pool heaters, laundry dryers, and barbecue grills. The measure proposes to: (1) develop a rule to require zero emission technologies for some emission sources in both new and existing residences; and (2) allow low NOx

technologies as an alternative for the rest of emission sources. Mitigation fees may be required for certain lower NOx technology applications which will be evaluated during the future rulemaking process. During the rulemaking, staff will assess the universe of equipment. Incentive funds will be considered to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required. Commercial Combustion Source Measures

There are five stationary source measures aiming to reduce NOx emissions from commercial combustion equipment:

- C-CMB-01: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Commercial Water Heating;
- C-CMB-02: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Commercial Space Heating;
- C-CMB-03: Emission Reductions from Commercial Cooking Devices;
- C-CMB-04: Emission Reductions from Small Internal Combustion Engines; and
- C-CMB-05: NOx Reductions from Small Miscellaneous Commercial Combustion Equipment (Non-Permitted).

**C-CMB-01: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – COMMERCIAL WATER HEATING:** This control measure seeks to reduce NOx emissions from commercial building water heating sources that are subject to Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters. The measure proposes to: (1) develop a rule to require zero emission commercial water heating units for installations in both new and existing buildings; and (2) allow low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible. This control measure would also provide incentive funds to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required.

**C-CMB-02: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – COMMERCIAL SPACE HEATING:** This control measure seeks to reduce NOx emissions from commercial building space heating sources. (i.e., forced air furnaces) with a rated heat input capacity between 175,000 and 2,000,000 BTU per hour. Those sources are currently not subject to the South Coast AQMD NOx rules. The measure proposes to: (1) develop rules to require zero emission commercial space heating units for installations in both new and existing buildings; and (2) allow low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible. This control measure would also provide incentive funds to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required. Heat pumps have been broadly applied in commercial applications as the primary zero emission technology.

**C-CMB-03: EMISSION REDUCTIONS FROM COMMERCIAL COOKING DEVICES:** This control measure seeks to reduce NOx emissions from commercial cooking devices including stoves, ovens, griddles, broilers, and others in new and existing buildings. Replacing gas burners with electric cooking devices, induction cooktops, or low NOx gas burner technologies will reduce NOx emissions. NOx reductions will be pursued through a combination of regulatory approaches and incentive programs. Proposed method of control consists of two steps: step one includes a technology assessment of emissions testing of various cooking devices to establish emissions rates. Once emissions rates are defined, step two supports future rule

development and incentive programs. The rule will apply to manufacturers, distributors, and installers establishing emission limits. The incentive programs would provide funds to encourage and promote adoption of zero and low NOx emission technologies.

**C-CMB-04: EMISSION REDUCTIONS FROM SMALL INTERNAL COMBUSTION ENGINES:** This control measure seeks to reduce NOx emissions from non-permitted engines rated 50 brake horsepower or below. Such engines may be used in generators, pumps, or air compressors. Operators of these engines can include private residences or business and governmental entities. Because these small engines are not subject to South Coast AQMD regulations, approaches to reducing emissions will focus on education and outreach and incentive programs to encourage consumers to purchase zero emission technologies. Improved technologies and resulting cost reductions are anticipated to ease the transition towards zero emission alternative technologies.

**C-CMB-05: NOX REDUCTIONS FROM SMALL MISCELLANEOUS COMMERCIAL COMBUSTION EQUIPMENT (NON-PERMITTED):** This control measure seeks to reduce NOx emissions by replacing combustion with zero and low NOx emission technologies on miscellaneous unpermitted combustion equipment. Such equipment includes ovens, furnaces, dryers, and other fuel combustion equipment too small to require a permit. Zero emission technologies, ~~including electrification~~ will be used where and when technically feasible and cost-effective. This control measure will develop rules to require zero and low NOx emission technologies at point-of-sale, establish incentive programs to facilitate adoption of cleaner technologies, and reassess permit and source specific exemption thresholds.

#### Large Combustion Source Measures

In the large combustion sources category, there are 10 proposed NOx control measures:

- L-CMB-01: NOx Reductions for RECLAIM Facilities
- L-CMB-02: Reductions from Boilers and Process Heaters (Permitted)
- L-CMB-03: NOx Emission Reductions from Permitted Non-Emergency Internal Combustion Engines
- L-CMB-04: Emission Reductions from Emergency Standby Engines (Permitted)
- L-CMB-05: NOx Emission Reductions from Large Turbines
- L-CMB-06: NOx Emission Reductions from Electricity Generating Facilities
- L-CMB-07: Emission Reductions from Petroleum Refineries
- L-CMB-08: NOx Emission Reductions from Combustion Equipment at Landfills and Publicly Owned Treatment Works
- L-CMB-09: NOx Reductions from Incinerators
- L-CMB-10: NOx Reductions from Miscellaneous Permitted Equipment

**L-CMB-01: NOX REDUCTIONS FOR RECLAIM FACILITIES:** This control measure reduces NOx emissions by transitioning NOx RECLAIM facilities to a command-and-control regulatory structure requiring BARCT level controls. Source categories covered by this control measure include metal melting and heating furnaces, food ovens, and nitric acid tanks. The following rules would implement this control measure: Proposed Rule 1147.2 – NOx Reductions from Metal Melting and Heating Furnaces (PR 1147.2); Proposed Amended Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens (PAR 1153.1); and Proposed

Rule 1159.1 – Control of NOx Emissions from Nitric Acid Tanks (PR 1159.1). Staff is proposing to evaluate a variety of different NOx control technologies depending on the type of NOx source.

**L-CMB-02: REDUCTIONS FROM BOILERS AND PROCESS HEATERS (PERMITTED):** This control measure reduces NOx emissions by replacing or retrofitting boilers and process heaters used in industrial, institutional, and commercial operations with zero and low NOx emission technologies. It would apply to units with a rated heat input greater than or equal to 2 million BTU per hour. Boilers and process heaters used in industrial, institutional, and commercial operations with a rated heat input greater than or equal to 2 million BTU per hour are currently regulated under Rules 1146 and 1146.1. This control measure will establish rules to set standards for new equipment, replacements, or retrofits of boilers and process heaters.

**L-CMB-03: NOX EMISSION REDUCTIONS FROM PERMITTED NON-EMERGENCY INTERNAL COMBUSTION ENGINES:** This control measure targets emission reductions from permitted non-emergency internal combustion engines rated over 50 bhp regulated by Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines. It proposes to transition, older, higher-emitting engines in the RECLAIM program to newer technology that can meet the NOx emission limits set forth in Rule 1110.2. Low NOx and zero emission technologies may be available in the future and will be evaluated to determine feasibility of implementation.

**L-CMB-04: EMISSION REDUCTIONS FROM EMERGENCY STANDBY ENGINES (PERMITTED):** This control measure seeks reductions of NOx emissions from emergency standby engines rated over 50 brake horsepower. Over 12,000 internal combustion engines are permitted for emergency standby power in the South Coast AQMD, however due to the essential nature, limited operations of these engines, and high replacement costs, multiple approaches are proposed to reduce emissions from this source category. The approaches involve an education and outreach program to encourage the transition to zero-emission technologies. Regulatory strategies include replacing older, higher emitting engines with cleaner engines or with alternative technologies, requiring the use of lower emission fuels, and a future prohibition of the use of Internal Combustion Engines for emergency backup power. As alternative technologies mature and new technologies emerge, the South Coast AQMD will undertake rulemaking to maximize emission reductions utilizing zero emission equipment where cost-effective and feasible and low NOx emission equipment in all other applications.

**L-CMB-05: NOX EMISSION REDUCTIONS FROM LARGE TURBINES:** This control measure aims to reduce NOx from turbines in the South Coast AQMD subject to Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines (Rule 1134). Fuel cells and electrification are ways to shift away from combustion sources generating NOx emissions wherever feasible. As older higher emitting turbines reach the end of their equipment life it is expected that some facilities will opt to replace turbines with fuel cells or electrify facility operations.

**L-CMB-06: NOX EMISSION REDUCTIONS FROM ELECTRICITY GENERATING FACILITIES:** This control measure reduces NOx emissions from electric generating units regulated by Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities (Rule 1135). This measure proposes to develop a rule to implement low NOx and zero emission technologies at electricity generating facilities. The target of this approach is to replace boiler units with lower-emitting turbines, implement zero emission technologies such as fuel cells or electrification for 10 percent of gas-fired sources and other lower NOx

emission technologies for the rest of gas-fired sources, and require stricter emission requirements from diesel internal combustion engines.

**L-CMB-07: EMISSION REDUCTIONS FROM PETROLEUM REFINERIES:** The goal of this measure is to assess and identify potential actions to further reduce NOx emissions by 20 percent for large refinery heaters and boilers with a maximum rated heat input of 40 MMBtu/hour. This would be accomplished by developing a rule requiring a lower NOx concentration limit of 2 ppm. South Coast AQMD staff identified three potential technological approaches to further reduce emissions for the large heaters and boilers category. The three approaches include next-generation ultra-low NOx burners, advanced SCR, and transition to zero emission technology.

**L-CMB-08: NOX EMISSION REDUCTIONS FROM COMBUSTION EQUIPMENT AT LANDFILLS AND PUBLICLY OWNED TREATMENT WORKS:** This control measure aims to reduce NOx emissions through a regulatory approach. The source categories for this control measure are biogas fueled combustion equipment – specifically boilers, turbines, and engines – regulated by Rule 1150.3 – Emissions of Oxides of Nitrogen from Combustion Equipment at Landfills (Rule 1150.3) and Rule 1179.1 – Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities (Rule 1179.1).

**L-CMB-09: NOX REDUCTIONS FROM INCINERATORS:** This control measure seeks emission reductions of NOx by replacing or retrofitting incinerators and other combustion equipment associated with incinerators with zero and low NOx emission technologies. Incinerators are used to burn waste material at high temperatures until reduced to ash. This control measure will achieve reductions by developing a rule, and implementation of low NOx burner systems or ultra-low NOx burner systems.

**L-CMB-10: NOX REDUCTIONS FROM MISCELLANEOUS PERMITTED EQUIPMENT:** The goal of this measure is to assess and identify potential actions to further reduce NOx emissions associated with miscellaneous permitted equipment located in the South Coast AQMD jurisdiction. South Coast AQMD staff will convene a stakeholder working group to discuss and identify actions or approaches to further reduce NOx emissions from these sources. Miscellaneous permitted equipment is regulated under Rule 1147 – NOx Reductions from Miscellaneous Sources with NOx emission limits depending on equipment category.

### *South Coast AQMD Co-Benefits from Energy and Climate Change Programs Measures*

There are three energy and climate change programs co-benefit measures as listed below:

- ECC-01: Co-Benefits from Existing and Future Greenhouse Gas Programs, Policies, and Incentives;
- ECC-02: Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures; and
- ECC-03: Additional Enhancements in Reducing Existing Residential Building Energy Use.

**ECC-01: CO-BENEFITS FROM EXISTING AND FUTURE GREENHOUSE GAS PROGRAMS, POLICIES, AND INCENTIVES:** This control measure seeks to quantify and take credit for the criteria pollutant co-benefits associated with programs to reduce GHG emissions. The processes that emit criteria pollutants and their precursors also typically emit GHGs. Mandates and programs that reduce GHG emissions will therefore also reduce criteria pollutant emissions. Significant efforts are currently being planned and implemented to reduce GHG emissions under State programs such as California Governor Executive Order B-55-18 and

SB 100 (California Renewables Portfolio Standard Program: Emissions of Greenhouse Gases), which established reduction goals for 2030, 2045, and 2050.

**ECC-02: CO-BENEFITS FROM EXISTING AND FUTURE RESIDENTIAL AND COMMERCIAL BUILDING ENERGY**

**EFFICIENCY MEASURES:** This control measure seeks to quantify and take credit for criteria pollutant co-benefits resulting from the implementation of energy efficiency mandates such as California’s Title 24 program. In addition, there are multiple programs that provide incentives, rebates, and loans for residential and commercial building efficiency projects. Improvements in weatherization and other efficiency measures provide emission reductions through reduced energy use for heating, cooling, lighting, cooking, and other needs. South Coast AQMD staff will work with agencies, utilities, and other stakeholders to implement innovative measures that provide energy savings along with emission reductions.

**ECC-03: ADDITIONAL ENHANCEMENTS IN REDUCING EXISTING RESIDENTIAL BUILDING ENERGY USE:**

This control measure seeks to provide incentive funding to enhance the objectives of ECC-02. Incentives will be used to further promote programs reducing energy use associated with space heating, water heating, and other large residential energy sources, achieving emission reductions beyond the levels expected from program mandates. Residential incentive programs would be developed to facilitate weatherization, replace older appliances with highly efficient technologies and encourage renewable energy adoption. Incorporating efficient appliance technologies, improving weatherization, and encouraging renewables such as solar thermal and photovoltaics will reduce energy demand and provide additional emission reductions within the residential sector. The South Coast AQMD will collaborate with utilities, agencies, and organizations to help leverage funding and coordinate incentives with existing programs.

*South Coast AQMD Stationary Source VOC Measures*

This category seeks limited, strategic VOC controls that further contribute to controlling ozone levels in the Basin. There are five proposed VOC measures as listed below:

- FUG-01: Improved Leak Detection and Repair;
- FUG-02: Emission Reductions from Industrial Cooling Towers;
- CTS-01: Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants;
- FLX-02: Stationary Source VOC Incentives; and
- BIO-01: Assessing Emissions from Urban Vegetation.

**FUG-01: IMPROVED LEAK DETECTION AND REPAIR:**

This proposed control measure seeks to reduce emissions of VOCs from fugitive leaks from process and storage equipment located at a variety of sources including, but not limited to, oil and gas production, petroleum refining, chemical products processing, storage and transfer, marine terminals, and other. Some of these facilities are subject to leak detection and repair (LDAR) requirements established by the South Coast AQMD and the U.S. EPA that include periodic VOC concentration measurements using an approved portable organic vapor analyzer (OVA) to identify leaks. This measure would implement the use of advanced leak detection technologies including optical gas imaging devices (OGI), open path detection devices, and gas sensors for earlier detection of VOC emissions from leaks.

**FUG-02: EMISSION REDUCTIONS FROM INDUSTRIAL COOLING TOWERS:** This proposed control measure seeks to reduce VOC emissions from industrial cooling towers through enhanced leak identification and repair requirements. Industrial cooling towers remove heat absorbed in the circulating cooling water systems at power plants, petroleum refineries, petrochemical plants, natural gas processing plants, and a wide variety of industrial operations. This control measure proposes to first assess the need for additional monitoring and practices to reduce industrial cooling tower VOC emissions. The assessment will include a review of the emissions inventory, costs for monitoring equipment, and the control requirements established by other governmental agencies. Findings from this assessment will be the basis of potential future rulemaking activities.

**CTS-01: FURTHER EMISSION REDUCTIONS FROM COATINGS, SOLVENTS, ADHESIVES, AND LUBRICANTS:** This proposed control measure seeks VOC emission reductions by focusing on select coating, adhesive, solvent and sealant categories by further limiting the allowable VOC content in formulations or incentivizing the use of super-compliant technologies. Categories to be considered include but are not limited to, metal part and product coatings, automotive refinishing coatings, adhesives, and sealants. Use of super-compliant zero and low VOC materials, such as powder coating, aqueous coatings, and some ultraviolet light, electron beam, and light emitting diode cured coatings, eliminate or substantially reduce emissions compared to similar products that are not zero or low VOC products. There are several product categories where these materials perform as well as traditional products and are widely available in the market. The proposal is anticipated to be accomplished with a multi-phase adoption and implementation schedule. Tightening regulatory exemptions that may be used as loopholes and enhanced enforcement can also lead to reduced emissions.

**FLX-02: STATIONARY SOURCE VOC INCENTIVES:** This control measure seeks to provide incentive funding to facilitate the adoption of clean, low VOC emission technologies from stationary sources. Facilities would be able to qualify for incentive funding if they use equipment or accept permit conditions which result in cost-effective emission reductions that are beyond existing requirements. The program would establish procedures for quantifying emission benefits from clean technology implementation and develop cost-effectiveness thresholds for funding eligibility. Mechanisms will be explored to incentivize businesses to choose the cleanest technologies as they replace equipment and upgrade facilities, and to provide incentives to encourage businesses to move into these technologies sooner. Potential incentive concepts include incentive funding, permitting and fee incentives and enhancements, New Source Review (NSR) incentives and enhancements, branding incentives, and recordkeeping and reporting incentives.

**BIO-01: ASSESSING EMISSIONS FROM URBAN VEGETATION:** This control measure seeks to improve the understanding of VOCs emitted by trees and vegetation (biogenic sources) and their contribution to PM and ozone formation. Certain VOCs emitted by biogenic sources are highly reactive and potent ozone precursors. A recent analysis of municipal tree inventories across the Basin demonstrated that many recently planted species are either high emitters (e.g., *Quercus ilex*, *Quercus agrifolia*, *Platanus* species) or are trees for which emission factors are unknown or highly uncertain (e.g., *Koelreuteria bipinnata*, *Cercis canadensis*, *Pistacia chinensis*, *Podocarpus gracilior*, *Hymenosporum flavum*). High resolution data combined with accurate emissions factor measurements of common tree species will be used to improve the biogenic VOC emissions inventory. Based on these findings, the South Coast AQMD will explore the need for tree planting programs that promote the planting of low VOC emitting tree species.

## South Coast AQMD Stationary Source Other Measures

There are three proposed measures in this category as listed below:

- MCS-01: Application of All Feasible Measures;
- MCS-02: Wildfire Prevention; and
- FLX-01: Improved Education and Public Outreach.

**MCS-01: APPLICATION OF ALL FEASIBLE MEASURES:** This control measure is to address the State’s requirement to take all feasible measures to reduce ozone. Existing rules and regulations for pollutants including VOC and NOx reflect current Best Available Retrofit Control Technology (BARCT). However, BARCT continually evolves as new technology becomes available that is feasible and cost-effective. South Coast AQMD staff will continue to review new emission limits or controls introduced through federal, State or local regulations to determine if South Coast AQMD regulations remain equivalent or more stringent than rules in other regions. If not, a rulemaking process will be initiated to perform a BARCT analysis and potential rule amendments if deemed feasible. In addition, the South Coast AQMD will consider adopting and implementing new retrofit technology control standards, based on research and development and other information, that are feasible and cost-effective.

**MCS-02: WILDFIRE PREVENTION:** This proposed control measure will seek to reduce the impacts of wildfires on PM and ozone levels from efforts to reduce wildfire fuel. Fuel reduction efforts include hand-thinning, mechanical thinning, and the use of chipping equipment (chipping) to mitigate excess fuels at properties located in the residential urban-wild-interface (UWI) areas of the San Bernardino National Forest (SBNF). To support efforts of wildfire prevention and aid compliance with Zone 0 defensible space requirements of California Assembly Bill 3074, incentive funding will be provided for a pilot project of approximately 1,400 acres. The South Coast AQMD will identify and coordinate implementation of the pilot project with established organizations and their contractors such as the Inland Empire Fire Safe Alliance, Mountain Rim Fire Safe Council, and Big Bear Fire Authority to provide fuel load reducing curbside chipping services to residents of these UWI areas.

**FLX-01: IMPROVED EDUCATION AND PUBLIC OUTREACH:** This control measure seeks to provide education, outreach, and incentives for consumers, business owners, and residences to contribute to clean air efforts. Examples include informing consumer choices such as the use of energy efficient products and appliances, new lighting technology, “super-compliant” coatings, and planting low VOC emitting trees. In addition, this measure intends to increase the effectiveness of energy conservation programs through public education and awareness as to the environmental and economic benefits of conservation. Educational and incentive tools to be used include social comparison applications such as comparing your personal environmental impacts with other individuals, social media, and public/private partnerships. These efforts will be complemented with currently available incentive programs.

## South Coast AQMD Proposed Mobile Source 8-Hour Ozone Measures

While the bulk of the authority to regulate mobile sources rests with CARB and the federal government, the South Coast AQMD also has a role in achieving emission reductions from these sources. The proposed South Coast AQMD mobile source measures are based on a variety of control technologies that are commercially available and/or technologically feasible to implement prior to the attainment year of 2037.

The focus of these measures includes accelerated retrofits or replacement of existing vehicles or equipment, acceleration of vehicle turnover through voluntary vehicle retirement programs, and greater use of cleaner fuels in the near-term. The measures will encourage greater deployment of low NOx and zero emission vehicle and equipment technologies such as plug-in hybrids, battery-electric, and fuel cells to the maximum extent feasible as such technologies are commercialized and available everywhere else. In the longer-term, there is a need to significantly increase the penetration and deployment of low NOx and zero emission vehicles, greater use of cleaner fuels, and substantial emission reductions from federal and international sources such as locomotives, ocean-going vessels, and aircraft. While shifting to zero emission is necessary where feasible and available, low NOx and ultra-low NOx technology are inevitable for sectors where zero emission technologies are not available or mature commercially.

The South Coast AQMD proposes a total of 18 mobile source measures which are categorized in to five groups – emission growth management, facility-based mobile sources, on-road and off-road, incentives, and other (see Table 4-3). Three emission growth management measures (EGM-01 to EGM-03) are proposed to identify actions to help mitigate and potentially provide emission reductions due to new development and redevelopment projects, projects subject to general conformity requirements, and clean construction policy. Four facility-based mobile source measures (FBMSMs) (MOB-01 to MOB-04) seek to identify actions that will result in additional emission reductions at commercial marine ports, rail yards and intermodal facilities, warehouse distribution centers, and commercial airports. FBMSMs for marine ports and intermodal rail yards are currently undergoing an Indirect Source Rule development process. Six on-road and off-road mobile measures focus on on-road light/medium/heavy-duty vehicles, international shipping vessels, passenger locomotives and small off-road engines. Additionally, incentive-based measures such as MOB-11 will use established protocols such as Carl Moyer Program guideline and report to the Governing Board periodically. MOB-12, Pacific Rim Initiative for Maritime Emission Reductions seeks NOx emission reductions from partnership with local, State, federal and international entities. Three other measures (MOB-13 to MOB-15) focus on fugitive VOC emissions from tanker vessels, fleet vehicles mitigation options, and the development of a work plan to support and accelerate the deployment of zero emission infrastructure needed for the widespread adoption of zero emission vehicles and equipment that is described in more detail in Appendix IV-A.

TABLE 4-3

## SOUTH COAST AQMD PROPOSED MOBILE SOURCE 8-HOUR OZONE MEASURES

Number	Title [Pollutant]	Emission Reductions ( <del>tpd</del> (tons per day) (2032/2037)
<b>Emission Growth Management Measures:</b>		
EGM-01	Emission Reductions from New Development and Redevelopment [All Pollutants]	TBD / TBD
EGM-02	Emission Reductions from Projects Subject to General Conformity Requirements [All Pollutants]	TBD / TBD
EGM-03	Emission Reductions from Clean Construction Policy [All Pollutants]	TBD / TBD
<b>Facility-Based Mobile Source Measures:</b>		
MOB-01	Emission Reductions at Commercial Marine Ports [NOx, SOx, PM]	
MOB-02A	Emission Reductions at New Rail Yards and Intermodal Facilities [NOx, PM]	TBD / TBD
MOB-02B	Emission Reductions at Existing Rail Yards and Intermodal Facilities [NOx, PM]	TBD / TBD
MOB-03	Emission Reductions at Warehouse Distribution Centers [NOx]	TBD / TBD
MOB-04	Emission Reductions at Commercial Airports [All Pollutants]	TBD / TBD
<b>On-Road and Off-Road Mobile Source Measures:</b>		
MOB-05	Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles [VOCs, NOx, CO, PM]	<del>0.210.20</del> / <del>0.140.11</del> [NOx]
MOB-06	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]	TBD / TBD
MOB-07	On-Road Mobile Source Emission Reduction Credit Generating Program [NOx, PM]	TBD / TBD
MOB-08	Small Off-Road Engine Equipment Exchange Program [VOCs, NOx, PM, CO]	TBD / TBD
MOB-09	Further Emission Reductions from Passenger Locomotives [NOx, PM]	TBD / TBD
MOB-10	Off-Road Mobile Source Emission Reduction Credit Generation Program [NOx, PM]	TBD / TBD
<b>Incentive-Based Measures</b>		
MOB-11	Emission Reductions from Incentive Programs [NOx, PM] <sup>5</sup>	<del>10.72</del> / <del>9.88</del> / <del>7.11</del> / <del>6.69</del> [NOx]
MOB-12	Pacific Rim Initiative for Maritime Emission Reductions [NOx]	TBD / TBD
<b>Other Measures</b>		
MOB-13	Fugitive VOC Emissions from Tanker Vessels [VOCs]	TBD / TBD
MOB-14	Rule 2202 – On-Road Motor Vehicle Mitigation Options [VOCs, NOx, CO]	TBD / TBD
MOB-15	Zero Emission Infrastructure for Mobile Sources [All Pollutants]	TBD / TBD

<sup>5</sup> MOB-11 has concurrent PM<sub>2.5</sub> reductions of 0.2423 and 0.1721 tons per day in 2032 and 2037, respectively.

## *Emission Growth Management Measures*

There are three proposed control measures within this category:

- EGM-01: Emission Reductions from New Development and Redevelopment;
- EGM-02: Emission Reductions from Projects Subject to General Conformity Requirements; and
- EGM-03: Emission Reductions from Clean Construction Policy.

**EGM-01: EMISSION REDUCTIONS FROM NEW DEVELOPMENT AND REDEVELOPMENT:** The goal of this measure is to identify emission reduction opportunities and to mitigate and, where appropriate, reduce emissions from new development or redevelopment projects such as residential, commercial, and industrial projects that are otherwise not included in other FBMSMs identified in the 2022 AQMP. Based on Governing Board direction, South Coast AQMD staff has held three Working Group meetings for the development of EGM-01 and released an RFP in 2019 to profile the universe of off-road construction equipment available in the South Coast Air Basin and identify the incremental cost to upgrade existing off-road construction equipment to Tier 4 standards; no proposals were received on the RFP. South Coast AQMD staff will re-convene the Working Group to continue the information gathering process and work towards the development of a method of control for EGM-01. The amount emission reductions that can be achieved and their SIP creditability will be determined dependent on the final method of control to be implemented.

**EGM-02: EMISSION REDUCTIONS FROM PROJECTS SUBJECT TO GENERAL CONFORMITY REQUIREMENTS:** General conformity is a process intended to prevent the air quality impacts of a proposed federal project from causing or contributing to new violations of the air quality standards, exacerbating existing violations, or interfering with the purpose of the applicable implementation plan. The 2016 AQMP established a SIP set-aside account, with an initial balance of 2.0 tons per day of NO<sub>x</sub> and 0.5 tons per day of VOC each year from 2017 to 2030, and 0.5 tons per day of NO<sub>x</sub> and 0.2 tons per day of VOC in 2031, to accommodate projects with a positive conformity determination (i.e., emissions that exceed the de minimis threshold). This measure seeks to undertake a rulemaking process in order to accommodate general conformity determination using mechanisms other than the current set-aside account. Mitigation or offset mechanisms including those adopted by other air districts in California will be explored during the rulemaking process. Such mechanisms may include the imposition of fees to fund air quality improvement programs or a requirement to purchase surplus emission reduction credits.

**EGM-03: EMISSION REDUCTIONS FROM CLEAN CONSTRUCTION POLICY:** The purpose of this control measure is to identify potential approaches to mitigate and control emissions from construction activities in the South Coast Air Basin. This control measure will seek to develop a Clean Construction Policy (CCP) which can be utilized for reference and voluntary implementation by local municipalities and public agencies. The South Coast AQMD will work in collaboration with local municipalities and agencies, construction industry, and other affected stakeholders to develop such a policy and will consider existing control measures and best management practices that are currently being implemented by entities throughout California.

### *Facility-Based Mobile Source Measures*

Facility-based mobile source measures are measures aimed at reducing the emissions from indirect sources – facilities that do not emit much air pollution directly, but instead attract mobile sources which contribute significant emissions. There are four proposed control measures within this category:

- MOB-01: Emission Reductions at Commercial Marine Ports;
- MOB-02A: Emission Reductions at New Rail Yards and Intermodal Facilities;
- MOB-02B: Emission Reductions at Existing Rail Yards and Intermodal Facilities;
- MOB-03: Emission Reductions at Warehouse Distribution Centers; and
- MOB-04: Emission Reductions at Commercial Airports.

**MOB-01: EMISSION REDUCTIONS AT COMMERCIAL MARINE PORTS:** This measure seeks to reduce NO<sub>x</sub>, VOC, and PM emissions related to on-road heavy-duty vehicles, ocean going vessels, cargo handling equipment, locomotives, and harbor craft that go to and from the Ports of Los Angeles and Long Beach (Ports). As a follow up to implementation of MOB-01 from the 2016 AQMP, the South Coast AQMD is working on an indirect source rule (Proposed Rule 2304) to address emissions from marine ports. Through a public rulemaking process, rule concepts will be proposed to address emissions from these sources. Rule development will continue to focus on deploying the cleanest technologies possible and supporting zero emissions fueling charging infrastructure as quickly as feasible. Incentive funding that supports the transition to cleaner technologies will also continue to be pursued to assist in implementing this measure.

**MOB-02A: EMISSION REDUCTIONS AT NEW RAIL YARDS AND INTERMODAL FACILITIES:** This measure seeks to reduce NO<sub>x</sub> and PM emissions related to on-road heavy-duty vehicles, off-road equipment, and locomotives at new rail yards and intermodal facilities. Through the public process, the South Coast AQMD will assess and identify potential actions that limit additional emissions created by the new operations. To implement this measure, staff will continue rule development for Proposed Rule 2306 for new railyards. Rule development will continue to focus on implementation of cleanest locomotives, switchers, on-road heavy-duty trucks, cargo-handling equipment, transportation refrigeration units available and requiring necessary infrastructure to support zero and low NO<sub>x</sub> emission technologies.

**MOB-02B: EMISSION REDUCTIONS AT EXISTING RAIL YARDS AND INTERMODAL FACILITIES:** The goal of this measure is to reduce NO<sub>x</sub> and PM emissions related to on-road heavy-duty vehicles, off-road equipment, and locomotives located at existing rail yards and intermodal facilities. Through a public rulemaking process, rule concepts will be proposed to address emissions from these sources. Rule development will focus on transitioning locomotives, switchers, on-road heavy-duty trucks, cargo-handling equipment, transportation refrigeration units to zero and low NO<sub>x</sub> emission technologies. The rule development will include necessary infrastructure measures to support the transition.

**MOB-03: EMISSION REDUCTIONS AT WAREHOUSE DISTRIBUTION CENTERS:** The goal of this measure to reduce NO<sub>x</sub> and PM emissions related to mobile sources and other equipment associated with warehouses. The strategy utilizes a menu-based point system in Rule 2305 (adopted in May 2021 to implement MOB-03 from the 2016 AQMP) where warehouses subject to the rule must annually earn points based on the amount of truck traffic at their facility. The menu includes actions that warehouse operators can take to reduce emissions, or to facilitate emission reductions from their operations. Required actions result in emission reductions when compared to conventional diesel technology, assist

in implementation of other related measures, promote the demand for zero emission and low NOx technology, foster early action of compliance, and infrastructure installation to support new or emerging zero emission technologies. Implementation of this measure will include ensuring that applicable warehouses comply with Rule 2305, quantifying the air quality benefits of Rule 2305 as they occur and seeking to incorporate those benefits as SIP-creditable emission reductions, and evaluating the state of technology every three years to identify if Rule 2305 should potentially be amended to increase the air quality benefits.

**MOB-04: EMISSION REDUCTIONS AT COMMERCIAL AIRPORTS:** The Facility-Based Mobile Source Measure for Commercial Airports, which controls non-aircraft mobile sources at commercial airports, was adopted by the South Coast AQMD on December 6, 2019. The measure consists of MOUs between the South Coast AQMD and five commercial airports in the Basin to develop and implement air quality improvement plans. The MOUs were executed with Los Angeles International Airport, John Wayne Orange County Airport, Hollywood Burbank Airport, Ontario International Airport, and Long Beach Airport. Each MOU contains performance targets for cleaner ground support equipment, airport shuttle buses, and heavy-duty trucks. Based on the measures in the MOUs, the South Coast AQMD committed to achieve 0.52 and 0.37 ton per day NOx reductions in 2023 and 2031, respectively. This measure seeks to estimate emission reductions through 2037, beyond the term of the MOUs, based on continued implementation of the airports' Air Quality Improvement Plans/Measures. Opportunities for additional feasible emission reductions will be explored through the Airport MOU Working Group.

### *On-Road and Off-Road Mobile Source Measures*

A total of six on-road and off-road mobile source measures are proposed within this category as listed below.

- MOB-05: Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles;
- MOB-06: Accelerated Retirement of Older On-Road Heavy-Duty Vehicles;
- MOB-07: On-Road Mobile Source Emission Reduction Credit Generating Program;
- MOB-08: Small Off-Road Engine Equipment Exchange Program;
- MOB-09: Further Emission Reductions from Passenger Locomotives; and
- MOB-10: Off-Road Mobile Source Emission Reduction Credit Generation Program.

**MOB-05: ACCELERATED RETIREMENT OF OLDER LIGHT-DUTY AND MEDIUM-DUTY VEHICLES:** The purpose of this control measure is to achieve emission reductions by accelerating retirement of older gasoline- and diesel-powered vehicles with up to 8,500 lbs. gross vehicle weight rating (GVWR). These vehicles include passenger cars, sports utility vehicles, vans, and light-duty pick-up trucks. The South Coast AQMD has been implementing the Replace Your Ride Program (RYP) since 2015 which provides a rebate to low- and moderate-income applicants for replacing their existing cars with newer, cleaner conventionally powered vehicles, plug-in hybrid electric vehicles or dedicated zero emission vehicles. This measure seeks to retire up to 2,000 light- and medium-duty vehicles annually through continued implementation of the Replace Your Ride Program with incentives up to \$9,500 provided which includes \$5,000 for residents in a Disadvantaged Community (DAC) zip code. For plug-in hybrid and battery electric vehicles, an additional incentive of up to \$2,000 is also provided for the installation of electric vehicle charging equipment. As an alternative, the RYP program also offers a voucher of up to \$7,500 for other

clean modes of transportation, such as car-sharing, public transportation or e-bikes, in exchange for the retirement of an old vehicle.

**MOB-06: ACCELERATED RETIREMENT OF OLDER ON-ROAD HEAVY-DUTY VEHICLES:** This proposed control measure seeks additional emission reductions from existing heavy-duty vehicles with GVWR greater than 8,500 lbs through an accelerated vehicle replacement program with zero or low NOx emission vehicles. A new pilot program, the Trade Up Program for On-Road Heavy-Duty Vehicles, is proposed to achieve enforceable emission reductions by replacing old, high-polluting vehicles with a new, low-NOx CNG powered vehicles through a three-way exchange approach. Under this pilot program, qualified participants can trade in their MY 2014 or newer heavy-duty diesel truck to a South Coast AQMD-approved dealership and receive an incentive toward the purchase of a new low NOx emission (0.02 g NOx) natural gas-powered truck. The dealer then sells the trade-in diesel truck to an owner or fleet with a MY 2009 or older truck that will be scrapped by an approved dismantler to ensure permanent and enforceable reductions. The objective of this pilot program is to accelerate the turnover of 2009 and older heavy-duty diesel trucks while also increasing the deployment of low NOx natural gas-powered heavy-duty trucks and maximizing emission reductions. If proven successful, this program can be further expanded to include other alternative-fuel vehicles including battery electric and fuel cell trucks.

**MOB-07: ON-ROAD MOBILE SOURCE EMISSION REDUCTION CREDIT GENERATING PROGRAM:** This proposed measure seeks to accelerate the early deployment of low NOx and zero emission on-road heavy-duty trucks through the generation of mobile source emission reduction credits (MSERCs) which can be used as an alternative means of compliance with certain South Coast AQMD regulations. These MSERCs will be used only by entities affected by the 2022 AQMP control measures MOB-01 through MOB-04, EGM-01, and EGM-03. The need for MOB-07 will be evaluated as these other control measures are implemented. South Coast AQMD staff will develop amendments to South Coast AQMD Rules 1612 and 1612.1 to reflect the latest advanced low NOx and zero emission technologies and quantification methodologies. MSERCs generated will be discounted to provide additional benefits to the environment and to help meet air quality standards.

**MOB-08: SMALL OFF-ROAD ENGINE EQUIPMENT EXCHANGE PROGRAM:** This measure seeks to reduce NOx emissions by promoting and expanding the accelerated turn-over of in-use small off-road engines and other engines, through expanded voluntary exchange programs. Examples of these types of engines include those used in larger diesel-powered lawn and garden equipment. Since 2003, the South Coast AQMD has sponsored lawn mower buyback programs for residential users of old lawn mowers. This program has resulted in over 57,000 high polluting gasoline-powered lawn mowers taken out of service from 2003 to the present. The South Coast AQMD also launched the Commercial Electric Lawn and Garden Equipment Incentive and Exchange Program (Commercial L&G Equipment Program) in 2018 to accelerate the replacement of old gasoline- or diesel-powered commercial lawn and garden equipment with zero emission, battery electric technology. This program provides a point-of-sale discount of up to 75 percent off the purchase price of a variety of new electric equipment. More recently, the South Coast AQMD has also started a new battery rebate program for commercial lawn and garden equipment that funds up to 75 percent of the rechargeable battery cost with a maximum limit of three batteries per equipment. Moving forward, the South Coast AQMD will increase the number of outreach and exchange events as well as continue to seek additional funding opportunities and resources to expand the scope and types of equipment and engines that can be funded by these programs.

**MOB-09: FURTHER EMISSION REDUCTIONS FROM PASSENGER LOCOMOTIVES:** This measure seeks to promote voluntary replacement or upgrade of existing passenger locomotives with Tier 4 or cleaner locomotives including zero emission locomotives. The South Coast AQMD continues to work collaboratively with technology providers and other stakeholders to explore the feasibility of zero and low NOx emission locomotive technologies such as battery electric or fuel cell engine-driven systems. For example, since 2018, the South Coast AQMD has been actively participating in the development and demonstration of zero emission battery-operated switcher locomotives in CARB-funded projects in the San Pedro Bay Ports. Through this measure, the South Coast AQMD will continue to promote accelerated replacement or upgrade of existing passenger trains with Tier 4 locomotives and support the development and adoption of zero or low NOx emission technologies.

**MOB-10: OFF-ROAD MOBILE SOURCE EMISSION REDUCTION CREDIT GENERATION PROGRAM:** This measure seeks to develop mechanisms to incentivize the early deployment of Tier 4, low NOx, and zero off-road equipment, where applicable, through the generation of mobile source emission reduction credits (MSERCs). These MSERCs will be used only by entities affected by the 2022 AQMP control measures MOB-01 through MOB-04, EGM-01, and EGM-03; and cannot be used to offset emissions from stationary sources. These MSERCs will be discounted to provide additional emission reductions to help meet air quality standards. South Coast AQMD staff will develop amendments to Rule 1620 to reflect the latest advanced low NOx and zero emission technologies and revise the quantification methodologies in Rule 1620.

### *Incentive-Based Measures*

We are proposing two incentive-based mobile source measures:

- MOB-11: Emission Reductions from Incentive Programs; and
- MOB-12: Pacific Rim Initiative for Maritime Emission Reductions.

**MOB-11: EMISSION REDUCTIONS FROM INCENTIVE PROGRAMS:** This control measure seeks to quantify and take credit for the emission reductions achieved through the implementation of South Coast AQMD-administered incentive programs for SIP purposes. The South Coast AQMD has been implementing a variety of incentive programs including, but not limited to, Carl Moyer Memorial Air Quality Standards Attainment Program, Proposition 1B, Lower Emission School Bus, Community Air Protection Program, and Volkswagen Environmental Mitigation Trust. Examples of projects funded by these programs include heavy-duty vehicle/equipment replacements, installation of retrofit units, and engine repowers. The emission reductions from these incentive programs are calculated in two parts. First, the actual emission reductions associated with existing projects that will have remaining useful life in 2031, 2032 and 2037 are quantified. Second, potential reductions that are projected from the implementation of future projects are quantified. These reductions are estimated based on the projected level of funding for these incentive programs and average emission reductions from existing projects, discounted by control factors for future years. These incentive programs result in substantial emission reductions that are typically not eligible for credit in plans to attain ozone standards because they are not required by regulation. However, actual emission reductions that are realized and quantified may qualify for credit.

**MOB-12: PACIFIC RIM INITIATIVE FOR MARITIME EMISSION REDUCTIONS:** This measure seeks to reduce emissions from OGV through an incentive-based program to encourage the deployment of cleaner OGV

to the Ports. This approach includes collaborating with international port authorities and shipping lines to establish common goals to reduce criteria pollutants from OGV. Incentives could be monetary (e.g., a per-visit payment for cleaner ships) or non-monetary (e.g., preferred berthing for cleaner ships). The cleanest commercially available OGV currently meet Tier III emission standards, however this class of vessels is not expected to be widely deployed for many years, in part due to the high cost of constructing new vessels and the difficulty in retrofitting existing vessels to Tier III standards. This measure would quicken the return on investment for these cleaner vessels by ensuring that shipping lines receive a benefit for every clean ship visit to a port with an incentive program. Clean ships could include Tier III vessels, retrofitted vessels that surpass Tier II standards, and eventually zero emissions shipping when it becomes available.

### *Other Measures*

There are three proposed other mobile measures in this category:

- MOB-13: Fugitive VOC Emissions from Tanker Vessels;
- MOB-14: Rule 2202 – On-Road Motor Vehicle Mitigation Options; and
- MOB-15: Zero Emission Infrastructure for Mobile Sources.

**MOB-13: FUGITIVE VOC EMISSIONS FROM TANKER VESSELS:** The goal of this measure is to quantify fugitive VOC emissions from petroleum tanker vessels during venting events and from other leaks and to better control these VOC emissions through enhanced monitoring and reporting, and inspections as well as changes to vessel operating procedures. Ocean-going petroleum tankers and barges transport approximately 400 million barrels per year of crude oil, refined petroleum products and unfinished petroleum products through the Ports. While these tanker vessels are in transit and at anchorage, temperature variations from day to night and other operational factors can cause pressure fluctuations in the vessels' cargo storage tanks. Vessels that transport volatile products such as crude oil and gasoline are most susceptible to pressure increases and these vessels must vent to the atmosphere to control cargo tank pressure that may result in the release of several tons of VOCs in a 15-to-30-minute period. The South Coast AQMD will collaborate with industry representatives, P/V valve manufacturers, environmental/community organizations and other stakeholders to develop control strategies and best management practices to control these VOC emissions.

**MOB-14: RULE 2202 – ON-ROAD MOTOR VEHICLE MITIGATION OPTIONS:** This control measure proposes to reduce emissions by evaluating potential amendments to Rule 2202. Rule 2202 has been developed to reduce emissions associated with work commute trips. Specifically, larger employers in the region with more than 250 employees are required to mitigate employee commute trips into the worksite. Rule 2202 provides employers with a menu of options to select from to implement a combination of emission reduction strategies in order to meet the emission reduction target (ERT) for their worksite. During the Coronavirus Disease 2019 (COVID-19) pandemic in 2020 and 2021, many Rule 2202 regulated employers (where applicable) incorporated widespread telecommuting practices which can further reduce emissions by reducing commute trips into the worksite. While Rule 2202 currently provide credit for telecommuting, future rule amendments may include a larger focus on telecommuting strategies and provide additional incentives for regulated employers to adopt telecommuting policies. Other future rule amendments may include enhancements on current basic support and direct strategies, as well as streamlined compliance and reporting options. Options for gaining credit for emission reductions associated with Rule 2202 for the purposes of plans to meet ozone standards will also be explored.

**MOB-15: ZERO EMISSION INFRASTRUCTURE FOR MOBILE SOURCES:** This control measure proposes to develop a work plan to support and accelerate the deployment of zero emission infrastructure needed for the widespread adoption of zero emission vehicles and equipment. The work plan will, in conjunction with the California Energy Commission, the California Public Utilities Commission, and other partner agencies, assess the present and future zero emission infrastructure needs of the air basin and use information gathered to support market acceptance of zero emission vehicles and equipment. The work plan will further investigate the basin-wide costs of the infrastructure needed to support a widespread adoption of zero emission vehicles and equipment, including on-road, off-road and stationary applications. The work plan is anticipated to require coordination with all stakeholders and identify informational gaps and challenges in the planning and development of zero emission infrastructure. This plan will also aim to support the State's goals and requirements for zero emission vehicles and equipment. Information gathered can then be used to create or support policies and incentives that will ease this transition. AB 2127 estimated that the State will need 157,000 electric vehicle charging stations for medium and heavy-duty vehicles by 2030. AB 8 assessed the fueling needs for hydrogen fuel cell vehicles and found that 1,700 hydrogen stations will be needed to support 1.8 million FCEVs statewide by 2035. The proposed measure seeks to address these concerns and identify the unique challenges and opportunities for zero emission infrastructure development in the South Coast Air Basin, particularly as it relates to zero emission medium and heavy vehicle deployments.

## State and Federal Control Measures

### CARB Commitment for the South Coast

#### *Overview of Commitment*

CARB shares responsibility with South Coast and other local air districts to develop and implement measures to attain meet federal air quality standards statewide. The measures that CARB will implement are contained in CARB's Draft measures to meet NAAQS are in the State Implementation Plan (SIP). SIPs contain enforceable commitments to achieve the level of emissions necessary to meet federal air quality standards. The 2022 State SIP Strategy<sup>6</sup> The Draft 2022 State SIP Strategy lists potential, adopted by CARB on September 22, 2022, contains new SIP measures and quantifies proposed potential emissions reduction SIP commitments for the South Coast based on the measures identified and quantified to date. Adoption of the The 2022 State SIP Strategy by and the accompanying measure schedule form the CARB Board would create a commitment basis of the commitments for new emission reductions by the attainment deadlines for each region that will be proposed for CARB Board consideration alongside the respective nonattainment area's SIP. The commitment consists commitments will consist of two components:

1. A commitment to bring an item to the CARB Board for defined new measures or take other specified actions within CARB's authority; and

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<sup>6</sup> [https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft\\_2022\\_State\\_SIP\\_Strategy.pdf](https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft_2022_State_SIP_Strategy.pdf)

2. A commitment to achieve aggregate emission reductions by specific dates.

As part of each SIP needing emission reductions from the State, the total aggregate emission reductions, and the obligation to make certain proposals to the CARB Board or take other actions within CARB's authority specified in the 2022 State SIP Strategy, would become enforceable upon approval by the U.S. EPA. While the Draft 2022 State SIP Strategy will discuss a range of proposed measures and actions, those proposed measures and actions would still be subject to CARB's formal approval process and would not be final until the CARB Board formally takes action on this item.

#### **Commitment to Act on Proposed Measures**

CARB staff proposes to commit to engage in a public process and bring an item to the Board, or take other specified actions within CARB's authority, to address each of the proposed SIP measures shown in Tables 4-4 and 4-5. The detailed actions that CARB staff will ultimately propose to commit to in the Proposed 2022 State SIP Strategy are still being developed at this time. For each measure, CARB staff will initiate an investigation into the measure or take other specified actions designed to achieve the emission reduction estimates identified for each measure. This public process and CARB hearing will For each of the SIP measures shown in Tables 4-4 and 4-5, CARB commits to address each measure as described in this document. For each measure committed to, CARB staff would undertake the actions detailed for each measure. In the instance of measures that involve the development of a rule under CARB's regulatory authority, CARB would commit to bring a publicly noticed item before the CARB Board that is either a proposed rule, or is a recommendation that the CARB Board direct staff to not pursue a rule covering that subject matter at that time. This recommendation would be based on an explanation of why such a rule is unlikely to achieve the relevant emission reductions in the relevant timeframe, and would include a demonstration that the overall aggregate commitment will be achieved despite that rule not being pursued. This public process and CARB hearing would provide additional opportunity for public and stakeholder input, as well as ongoing technology review, and assessments of costs and environmental impacts.

The measures, as proposed by staff to the CARB Board or adopted by the CARB Board, may provide more or less than the initial emission reduction estimates. In addition, action by the CARB Board may include any action within its discretion.

#### **Commitment to Achieve Emission Reductions**

The following section describes the estimated emission reduction and potential commitment from the SIP measures identified and quantified to date for the South Coast. The aggregate commitment of emissions reductions from State sources to be proposed for CARB Board consideration will be found in CARB's staff report for the South Coast 2022 AQMP when it is brought to the CARB Board.

While the 2022 State SIP Strategy includes estimates of the emission reductions from each of the individual new measures, CARB's overall commitment is to achieve the total emission reductions necessary from State-regulated sources to attain the federal air quality standards, reflecting the combined reductions from the existing control strategy and new measures. Therefore, if a particular measure does not get its expected emission reductions, the State's overall commitment to achieving the total aggregate emission reductions still exists. If actual emission decreases occur that exceed the projections reflected in the current emission inventory and the 2022 State SIP Strategy, CARB will submit an updated emissions inventory to the U.S. EPA as part of a SIP revision. The SIP revision would outline the changes that have

occurred and provide appropriate tracking to demonstrate that aggregate emission reductions sufficient for attainment are being achieved through enforceable emission reduction measures. CARB's emission reduction commitments may be achieved through a combination of actions including but not limited to the implementation of control measures; the expenditure of local, State or federal incentive funds; or through other enforceable measures. In some cases, actions by federal and international agencies will be needed. In others, programmatic approaches must be developed, and funding secured to achieve reductions through additional transition to cleaner technologies and systems in the relevant sectors. ~~For such measures are utilized~~ situations, the Clean Air Act includes a provision for approval under section 182(e)(5) advanced technology provisions to allow this future flexibility for "extreme" areas such as the South Coast needing additional reductions to meet the ozone standard.

**TABLE 4-4**  
**PROPOSED CARB MEASURES AND SCHEDULE**

<b>Proposed Measure</b>	<b>Agency</b>	<b>Action</b>	<b>Implementation Begins</b>
<b>On-Road Heavy-Duty</b>			
Advanced Clean Fleets Regulation	CARB_	2023	<del>2024</del> <del>2023</del> 2045
Zero Emissions Trucks Measure	CARB	<del>2028</del> TBD	<del>2030</del> TBD
<b>On-Road Light-Duty</b>			
On-Road Motorcycle New Emissions Standards	CARB	2022	<del>2025</del> <del>2024</del> 2035
Clean Miles Standard	CARB	2021	2023-2030
<b>Off-Road Equipment</b>			
Tier 5 Off-Road Vehicles and Equipment	CARB	<del>2024/2025</del>	<del>2028/2029</del>
Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation	CARB	2022	<del>2024</del> <del>2023</del> 2033
Transport Refrigeration Unit Regulation <u>Part 2</u>	CARB	<del>2026</del> TBD	<del>2028</del> TBD
Commercial Harbor Craft Amendments	CARB	2022	2023-2032
Cargo Handling Equipment Amendments	CARB	<del>2025</del> TBD	<del>2026</del> TBD
Off-Road Zero Emission Targeted Manufacturer Rule	CARB	<del>2027</del> <del>2025</del>	<del>2031</del> TBD
Clean Off-Road Fleet Recognition Program	CARB	2025	<del>2027</del> <del>2026</del>
Spark-Ignition Marine Engine Standards	CARB	<del>2029</del> <del>2026/27</del>	<del>2031</del> <del>2029</del> 2035
<b>Other</b>			
Consumer Products Standards	CARB	<del>2027</del> <del>2025-</del> 2028	<del>2028</del> <del>2031</del> 2037
Zero Emission Standard for Space and Water Heaters	CARB	2025	<del>2025</del> -2030
Enhanced Regional Emission Analysis in State Implementation Plans <sup>7</sup>	CARB	<del>2025</del> TBD	<del>2023</del> TBD
Pesticides: <u>1,3-Dichloropropene Health Risk Mitigation</u>	DPR <sup>8</sup>	2022	2024

<sup>7</sup> Proposed CARB finalization.

<sup>8</sup> California Department of Pesticide Regulation (DPR).

**TABLE 4-4 (CONTINUED)**  
**PROPOSED CARB MEASURES AND SCHEDULE**

<b>Proposed Measure</b>	<b>Agency</b>	<b>Action</b>	<b>Implementation Begins</b>
<b>Primarily-Federally and Internationally Regulated Sources – CARB Measures</b>			
In-Use Locomotive Regulation	CARB	2023	<del>TBD</del> 2024
Future Measures for Aviation EmissionEmissions Reductions	CARB	<del>TBD</del> 2027	<del>TBD</del> 2029
Future Measures for Ocean-Going Vessel EmissionEmissions Reductions	CARB	<del>TBD</del> 2027	2025+ <del>TBD</del>
<b>Primarily-Federally and Internationally Regulated Sources – Federal Action Needed<sup>9</sup></b>			
On-Road Heavy-Duty Vehicle Low NOx Engine Standards	U.S. EPA	<del>2022</del> TBD	<del>TBD</del> 2027
On-Road Heavy-Duty Vehicle Zero Emission Requirements	U.S. EPA	TBD	TBD
Off-Road Equipment Tier 5 Standard for Preempted Engines	U.S. EPA	TBD	TBD
Off-Road Equipment Zero Emission Standards Where Feasible	U.S. EPA	TBD	TBD
More Stringent Aviation Engine Standards	U.S. EPA/ICAO <sup>10</sup>	TBD	TBD
Cleaner Fuel and Visit Requirements for Aviation	U.S. EPA	TBD	TBD
Zero Emission On-Ground Operation Requirements at Airports	U.S. EPA	TBD	TBD
Airport Aviation Emissions Cap	U.S. EPA	<del>TBD</del>	<del>TBD</del>
More Stringent National Locomotive Emission Standards	U.S. EPA	TBD	TBD
Zero Emission Standards for <del>Switch</del> -Locomotives	U.S. EPA	TBD	TBD
Address <u>Unlimited</u> Locomotives Remanufacturing <del>Loophole</del>	U.S. EPA	TBD	TBD
More Stringent NOx and PM Standards for Ocean-Going Vessels	U.S. EPA/IMO <sup>11</sup>	TBD	TBD
Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels	U.S. EPA	TBD	TBD

<sup>9</sup> Request U.S. EPA approved under the provisions of section 182(e)(5) of the Clean Air Act.

<sup>10</sup> International Civil Aviation Organization (ICAO).

<sup>11</sup> International Maritime Organization (IMO).

**TABLE 4-5  
PROPOSED CARB MEASURES AND SCHEDULE\***

Measures	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Advanced Clean Fleets			★	■													
Zero-Emissions Trucks Measure					★			★		■							
On-Road Motorcycle New Emissions Standards		★			■												
Clean Miles Standard	★		■														
Tier 5 Off-Road Vehicles and Equipment					★	★			■								
Amendments to the In-Use Off-Road Diesel Fueled Fleets-Regulation		★		■													
Transport Refrigeration Unit Regulation (TBD)Part 2						★		■									
Commercial Harbor Craft Amendments		★	■														
Cargo Handling Equipment Amendments (TBD)					★	■											
Off-Road Zero-Emission Targeted Manufacturer Rule					★		★				■						
Clean Off-Road Fleet Recognition Program					★		■										
Spark-Ignition Marine Engine Standards							★		★		■						
Consumer Products Standards							★	★		■							
Zero-Emission Standard for Space and Water Heaters					★					■							
			★														
<small>P</small>	★	■															
<small>a</small>																	
In-Use Locomotive Regulation			★	■													
Future Measures for Aviation Emission Reductions (TBD)							★		■								
Future Measures for OGV Emission Reductions (TBD)							★										

\*————Yellow star represents the year for which action is proposed; dark blue represents the years of year implementation begins.

### Statewide Emissions Reductions

The proposed measures in the 2022 State SIP Strategy will provide emission reduction benefits throughout the State. Some of these benefits will come from current programs while the remainder of the benefits will come from new measures. Although the existing control program will provide mobile source emission reductions necessary to meet the attainment needs of many areas of the State, the new measures in the 2022 State SIP Strategy will provide further reductions to enhance air quality progress and achieve the 2015 8-hour ozone standard.

### Emission Reductions from Current Programs

Table 4-6 provides the remaining mobile source emissions under CARB and district current programs for the State as a whole, and the South Coast. Ongoing implementation of current control programs is projected to reduce mobile source NOx emissions statewide from today's levels by 407521 tons per day statewide, and 156 tons per day in the South Coast, in 2037. Achieving the benefits projected from the current control program will continue to require significant efforts for implementation and enforcement and thus represents an important element of the overall strategy.

**TABLE 4-6  
MOBILE SOURCE EMISSIONS UNDER CARB AND SOUTH COAST AQMD CURRENT CONTROL PROGRAMS<sup>12</sup>**

Mobile Sources	NOx (tpd tons per day)			VOC (tpd tons per day)		
	2018	2037	Change	2018	2037	Change
Statewide <sup>13</sup>	1152.21156.7	745.7635.3	-3545%	661.5638.3	448.1319.5	-3250%
South Coast–AQMD <sup>14</sup>	292.9299.0	154.8142.9	-4752%	197.1188.3	14090.0	-2952%

Although most of the 2016 State SIP Strategy measure commitments have been adopted, there are three (Advanced Clean Cars II, Transport Refrigeration Unit, is one (Zero Emission Forklift)) that the CARB Board

<sup>12</sup> The Draft SIP strategy and the Draft AQMP rely on different versions of emissions inventory and different base year, from which future emissions were projected from. Due the discrepancies in the emissions inventory, reductions anticipated from the proposed measures are not identical, but the final version SIP Strategy and AQMD will use a consistent emissions inventory and the discrepancies will be resolved. The Draft 2022 SIP Strategy reflects reductions from the HD I/M and SORE regulatory actions in December 2021 as baseline emissions, while the draft AQMP treat them as strategy reductions.

<sup>13</sup> Source: 2022 CEPAM v1.01; represents the current baseline emissions out to 100 nautical miles with adopted CARB and South Coast AQMD measures.

<sup>14</sup> Source: 2022 CEPAM v1.01; represents the current baseline emissions out to 100 nautical miles with adopted CARB and South Coast AQMD measures.

will be acting upon over the next year, and two that were recently adopted but are not yet accounted for in 2022-the baseline emissions inventory (Advanced Clean Cars II, Transport Refrigeration Unit Part 1). Table 4-7 below shows the timeline and anticipated emission reductions for these three measures.

TABLE 4-7

2016 STATE SIP STRATEGY MEASURES STILL TO BE ADOPTED<sup>15</sup>

Measure	Action	Implementation Begins	State-wide 2037 NOx (tpd*)	State-wide 2037 VOC (tpd*)	South Coast 2037 NOx (tpd*)	South Coast 2037 VOC (tpd*)
	2022	2026	<del>12.1</del> <u>13.5</u>	<del>10.0</del> <u>10.8</u>	<del>4.4</del> <u>5.0</u>	<del>3.5</del> <u>3.8</u>
	2022	2023-2024	1.3	1.0	0.5	0.4
	2023	2026	1.7	<del>1.3</del> <u>0.3</u>	0.9	<del>0.7</del> <u>0.1</u>
<b>Total</b>			<b><del>15.1</del><u>16.5</u></b>	<b><del>12.3</del><u>12.0</u></b>	<b><del>5.8</del><u>6.4</u></b>	<b><del>4.6</del><u>4.4</u></b>

\*tons per day (tpd)

**Emission Reductions from ~~Proposed~~ New Measures**

The new measures contained in the 2022 State SIP Strategy commitment reflect a combination of State actions, and petitions and advocacy for federal and/or international action, ~~as well as actions that outline an additional transition to cleaner technologies and systems.~~

Statewide ~~emission~~emissions reductions from the new measures identified and quantified to date in the ~~Draft-2022-~~ State SIP Strategy are estimated to be ~~174.2~~205.6 tons per day of NOx and ~~38.7~~40.9 tons per day of VOC in 2037. ~~Even when coupled with the emission reductions associated with ongoing implementation of the existing control program, additional reductions are needed to meet the standard, as described further in the following sections.~~

**South Coast ~~Commitment~~**

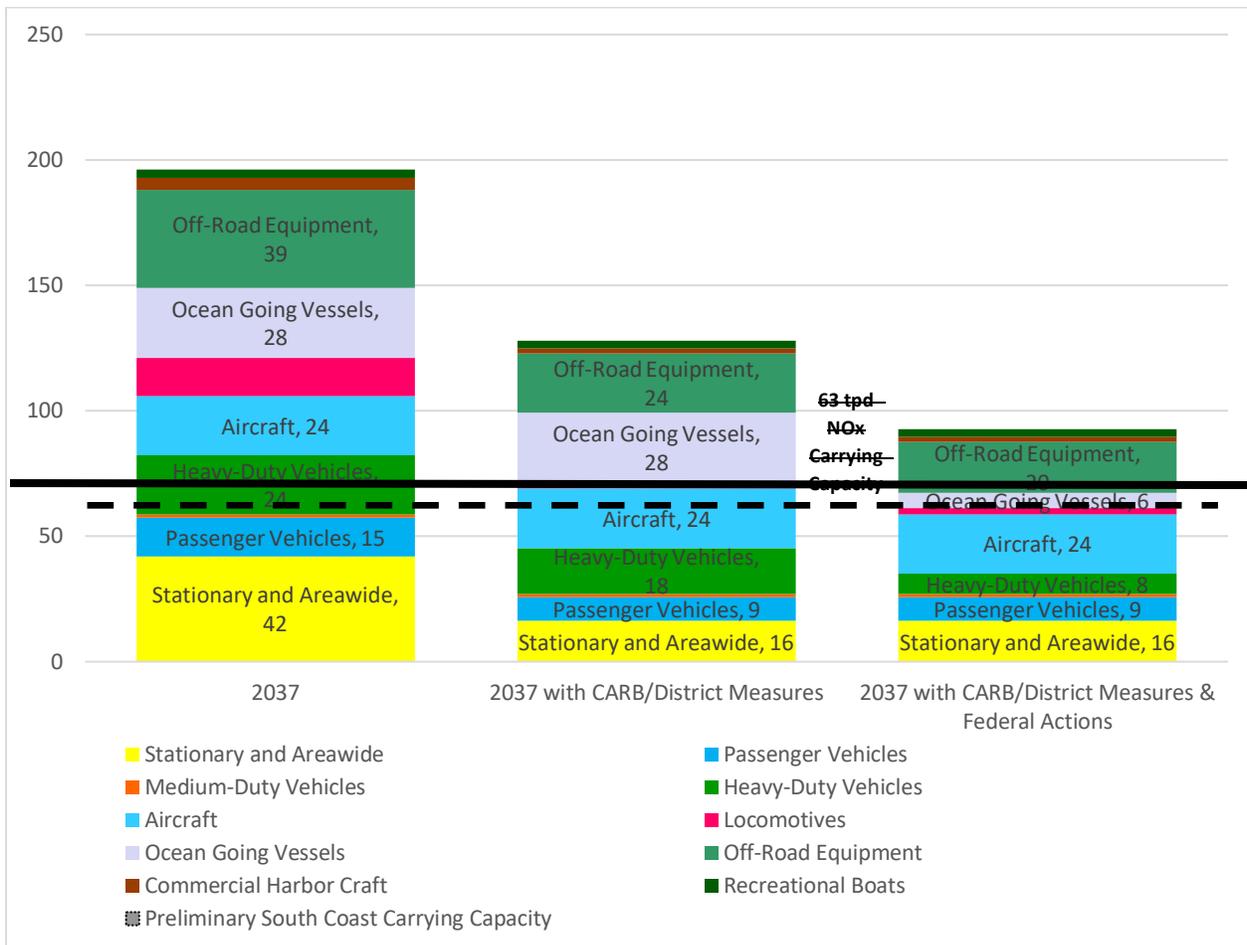
~~Preliminary air~~Air quality modeling indicates that total NOx emissions from all sources in the South Coast will need to decrease to approximately ~~636~~0 tons per day in 2037, representing ~~82~~an approximate 80 percent reduction from current levels. A significant fraction of the needed reductions will come from the existing control program, ~~which is projected to reduce NOx emissions from all sources by approximately 55 percent by 2037, providing a significant down payment on the emission reductions needed.~~

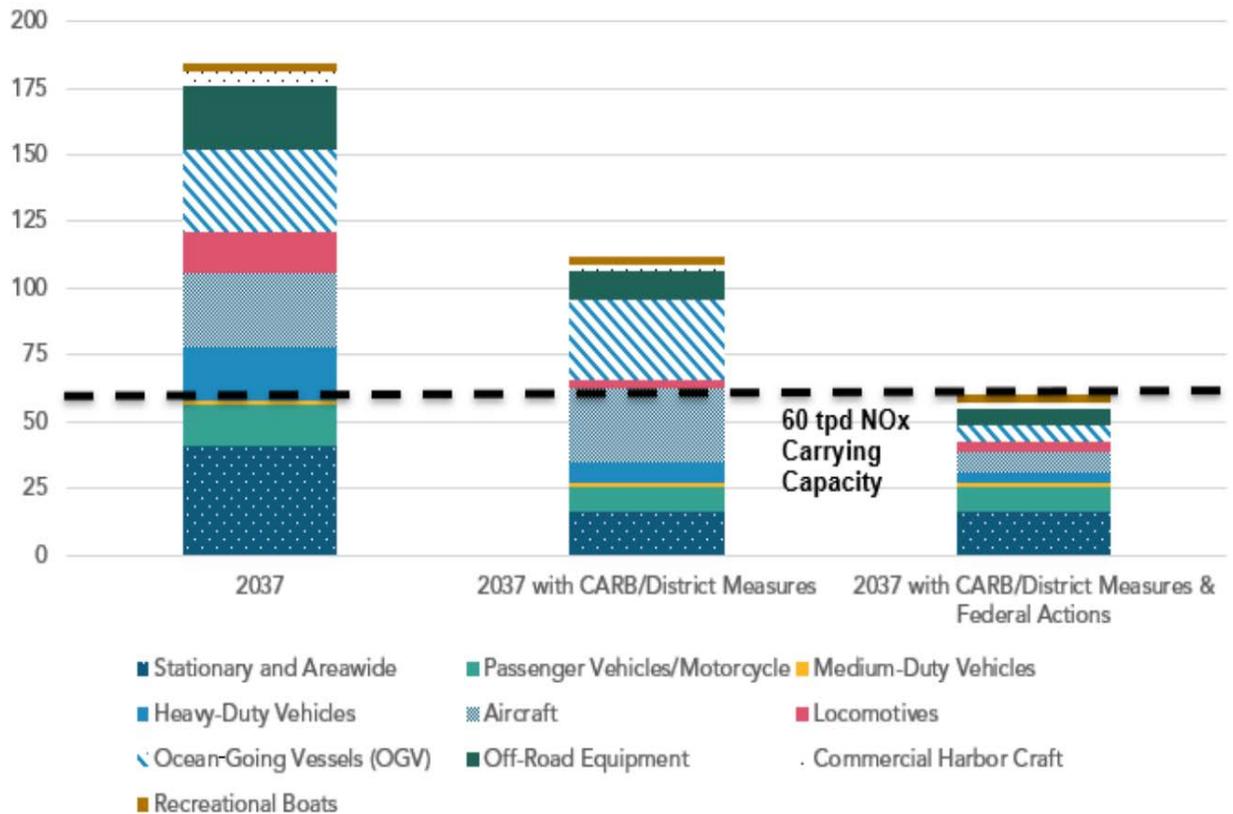
In addition, ~~while CARB action on the 2016 State SIP Strategy measure commitments has progressed through various implementation schedules over the last five years as described above, a few measure commitments included in the 2016 State SIP Strategy have not yet been acted upon or were very recently adopted and are thus not yet in the baseline emissions inventory, as outlined in Table 4-7 above. Action will be taken on these~~the remaining measures in the coming year.

Collectively, ~~emission~~emissions reductions from CARB's current control program, reductions from the remaining 2016 State SIP Strategy measures ~~still to be adopted~~, and reductions estimated from the measures identified and quantified ~~to date for proposal in~~ at the time of release of the 2022 State SIP

<sup>15</sup> Numbers may not add up due to rounding.

Strategy were not enough to meet show attainment of the 2015 8-hour ozone standard in the South Coast (Figure 4-5). Since the release of the Draft 2022 State SIP Strategy, the CARB and South Coast AQMD has been able to successfully model attainment of the 2015 8-hour ozone standard in 2037 when including have identified the additional measures and reductions needed, such that this proposal now includes all measures and commitments needed from additional State sources to support attainment in the South Coast AQMD measures. Tables 4-8 and estimated 4-9 summarize the reductions from the aviation sector. CARB identified and the South Coast AQMD are continuing to work to identify and refine the additional quantified measures and. The aggregate commitment of emissions reductions to from State sources to be proposed for CARB Board consideration can be pursued, and found in CARB's staff report for the forthcoming Proposed 2022 State SIP Strategy will include the additional measures and commitments needed from mobile sources to support the attainment demonstration in the South Coast. Table 4-8 summarizes the reductions from currently identified and quantified State measures AQMP.





**FIGURE 4-5**  
**2037 SOUTH COAST NOx EMISSIONS WITH MEASURES AND FEDERAL ACTIONS<sup>16</sup>**  
**(EMISSIONS OUT TO 100 NAUTICAL MILES)**

<sup>16</sup> Source: ~~CARB draft emissions inventory and reduction estimates~~ 2022 CEPAM v1.01 out to 100 nautical miles; left column represents the current baseline emissions with adopted CARB and district measures; ~~middle~~ center column includes 2022 State SIP Strategy CARB measures quantified to date and preliminary draft South Coast AQMD Draft Final 2022 AQMP quantified control measures; right column further includes federal actions quantified to date. Emissions inventories are still under development and will be finalized prior to release of the Proposed 2022 State SIP Strategy.

Due to the discrepancy in the emissions inventory version and treatment of HD I/M and SORE regulations adopted in December 2021, the emissions in the graph do not match with the draft AQMP inventory. This discrepancy will be resolved in the final AQMP.

TABLE 4-8

## SOUTH COAST NOX EMISSION REDUCTIONS FROM CARB PROGRAMS

CARB Programs in South Coast	2037 <u>NOx</u> Emission Reductions (tons per day) <sup>17</sup>	Percent of Needed Reductions
Current Control Program	<del>151.1</del> <u>166.4</u>	55%
Potential CARB Emissions Reductions Commitments*	<u>95.7</u>	
2016 State SIP Strategy Measures (Not yet adopted in baseline inventory)	<del>5.8</del> <u>6.4</u>	2%
New Proposed Measures	<del>72.9</del> <u>89.3</u>	26%
<b>Total Reductions</b>	<del>229.8</del> <b><u>262.1</u></b>	<b>83%</b>

\* includes “Zero Emission Standard for Space and Water Heaters” which overlaps with South Coast AQMD’s R-CMB-01, R-CMB-02, C-CMB-01 and C-CMB-02.

Table 4-9 shows the emission reductions of NOx and VOC in 2037 in the South Coast Air Basin expected from the 2022 State SIP strategy.

<sup>17</sup> Numbers may not add up due to rounding.

<sup>18</sup> Draft 2022 State SIP Strategy.

CARB draft emissions inventory; Current Control Program represents the current baseline emissions out to 100 nautical miles with adopted CARB and district measures. Emissions inventories are still under development and will be finalized prior to release of the Proposed 2022 State SIP Strategy. (Source 2022 CEPAM v1.01).

TABLE 4-9

SOUTH COAST EXPECTED EMISSIONS REDUCTIONS FROM THE 2022 STATE SIP STRATEGY<sup>19</sup>

<b>Proposed Measure</b>	<b>2037 (tons per day)</b>	
	<b>NO<sub>x</sub></b>	<b>VOC</b>
<b>On-Road Heavy-Duty</b>		
Advanced Clean Fleets Regulation	<del>5.36.6</del>	0.5
Zero Emissions Trucks Measure	<del>NYQ<sup>a</sup>4.1</del>	<del>NYQ0.4</del>
Total On-Road Heavy-Duty Reductions	<del>5.310.7</del>	<del>0.50.9</del>
<b>On-Road Light-Duty</b>		
On-Road Motorcycle New Emissions Standards	<del>0.90.8</del>	2.1
Clean Miles Standard	<0.1	<0.1
Total On-Road Light-Duty Reductions	<del>0.98</del>	2.1
<b>Off-Road Equipment</b>		
Tier 5 Off-Road Vehicles and Equipment	<del>1.82.7</del>	NYQ
Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation	<del>1.31.0</del>	0.1
Transport Refrigeration Unit Regulation Part 2	<del>4.65.0</del>	<del>NYQ0.7</del>
Commercial Harbor Craft Amendments	2.6	0.2
Cargo Handling Equipment Amendments	<del>1.20.6</del>	<del>0.30.4</del>
Off-Road Zero Emission Targeted Manufacturer Rule	<del>1.1NYQ</del>	NYQ
Clean Off-Road Fleet Recognition Program	NYQ	NYQ
Spark-Ignition Marine Engine Standards	0.3	<del>1.20.7</del>
Total Off-Road Equipment Reductions	<del>12.912.2</del>	<del>1.82.0</del>
<b>Other</b>		
Consumer Products Standards	<del>NYQ</del>	8
Zero Emission Standard for Space and Water Heaters <sup>20</sup>	<del>5.83.2</del>	<del>0.85</del>
Enhanced Regional Emission Analysis in State Implementation Plans	NYQ	NYQ
Pesticides: 1,3-Dichloropropene Health Risk Mitigation	-	<del>NYQ</del>
Total Other Reductions	<del>5.8<sup>b</sup>3.2</del>	<del>8.88.5</del>
<b>Primarily-Federally and Internationally Regulated Sources – CARB Measures</b>		
In-Use Locomotive Regulation	<del>12.710.9</del>	<del>0.30.4</del>
Future Measures for Aviation Emission Reductions	NYQ	NYQ
Future Measures for Ocean-Going Vessel Emissions Reductions	NYQ	NYQ
Total Primarily-Federally and Internationally Regulated Sources – CARB Measures Reductions	<del>12.710.9</del>	<del>0.30.4</del>
<b>Primarily-Federally and Internationally Regulated Sources – Federal Action Needed<sup>21</sup></b>		
On-Road Heavy-Duty Vehicle Low-NO <sub>x</sub> Engine Standards	<del>10.23.8</del>	<del>NYQ&lt;0.1</del>
On-Road Heavy-Duty Vehicle Zero Emission Requirements	NYQ	NYQ
Off-Road Equipment Tier 5 Standard for Preempted Engines	<del>2.01.6</del>	NYQ
Off-Road Equipment Zero Emission Standards Where Feasible	<del>1.22.2</del>	NYQ
More Stringent Aviation Engine Standards	NYQ	NYQ

<sup>19</sup> Numbers may not add up due to rounding.<sup>20</sup> Reductions may be achieved through CARB and/or complementary South Coast AQMD control measures for this sector.<sup>21</sup> Request U.S. EPA approval under the provisions of section 182(e)(5) of the Clean Air Act.

<b>Proposed Measure</b>	<b>2037 (tons per day)</b>	
	<b>NO<sub>x</sub></b>	<b>VOC</b>
Cleaner Fuel and Visit Requirements for Aviation	<del>NYQ</del> <u>10.2</u>	NYQ
Zero Emission On-Ground Operation Requirements at Airports	NYQ	NYQ
<u>Airport Aviation Emissions Cap</u>	<u>9.2</u>	<u>NYQ</u>
More Stringent National Locomotive Emission Standards	NYQ	NYQ
Zero Emission Standards for <del>switch</del> -Locomotives	NYQ	NYQ
Address <u>Unlimited</u> Locomotives Remanufacturing <del>Loophole</del>	NYQ	NYQ
More Stringent NO <sub>x</sub> and PM Standards for Ocean-Going Vessels	0.8	NYQ
Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels	<del>21.1</del> <u>23.7</u>	NYQ
Total Primarily-Federally and Internationally Regulated -Federal Action Needed Reductions	<del>35.3</del> <u>51.5</u>	<del>NYQ</del> <u>&lt;0.1</u>
<b>Aggregate Emissions Reductions</b>	<b><del>72.9</del><u>89.3</u></b>	<b><del>13.5</del><u>13.9</u></b>

<sup>a</sup> "NYQ" denotes emission reductions are Not Yet Quantified.

<sup>b</sup> The reductions are not reflected in the attainment demonstration to avoid double counting of reductions. However, CARB and South Coast AQMD collaborate closely to develop regulations and implementation of the measure.

## CARB Measures

### *On-Road Heavy-Duty*

#### **Advanced Clean Fleets Regulation**

This measure accelerates zero emission vehicle adoption in the medium- and heavy-duty sectors by setting zero emission requirements for fleets and 100 percent zero emission vehicle sales requirement in California for manufacturers of Class 2b through 8 vehicles. The Advanced Clean Fleets Regulation will focus on strategies to ensure that the cleanest vehicles are deployed by government, business, and other entities in California to meet their transportation needs. The requirements would be phased-in on varying schedules for different fleets including public, drayage trucks, and high priority private and federal fleets. Public fleets would be required to phase-in purchase requirement starting at 50 percent of new purchases in 2024 and 100 percent starting in 2027. All drayage trucks operating at seaports and intermodal railyards would be required to be zero emission by 2035. Drayage trucks will also have new registration and reporting requirements, starting in 2023. High priority private and federal fleets would be required to phase-in zero emission vehicles as a percentage of the total fleet. The fleet requirements are based on zero emission suitability and are phased-in by vehicle body type. The Advanced Clean Fleets Regulation would also include a requirement that 100 percent of Class 2b and above vehicle manufacturer sales in California are zero emissions starting in 2040.

#### **Zero Emission Trucks Measure**

This measure would increase the number of zero emission vehicles and require cleaner engines to achieve ~~emissions~~ ~~emissions~~ reductions from fleets that are not affected by the ~~proposed~~ Advanced Clean Fleets measure. This would include potential zero emissions zone concepts around warehouses and sensitive communities if CARB is given new authority to enact indirect source rules in combination with strategies to upgrade older trucks to newer and cleaner engines. This would be a transitional strategy to achieve zero emissions medium- and heavy-duty vehicles everywhere feasible by 2045.

### *On-Road Light-Duty*

#### **On-Road Motorcycles New Emissions Standards**

This measure would reduce emissions from new, on-road motorcycles by adopting more stringent exhaust and evaporative emissions standards along with limited on-board diagnostics requirements and zero emissions sales thresholds with an associated credit program to help accelerate the development of zero emissions motorcycles. The new exhaust emissions standards include substantial harmonization with the more stringent European motorcycle emissions standards already in place. The new evaporative emissions standards are based on more aggressive CARB off-highway recreational vehicle emissions standards that exist today. This measure also proposes significant zero emission motorcycle sales thresholds beginning in 2028 and increasing gradually through 2035.

#### **Clean Miles Standard**

The Clean Miles Standard was adopted by CARB on May 20, 2021. The primary goals of this measure are to reduce GHG emissions from ride-hailing services offered by transportation network companies (TNCs) and promote electrification of the fleet by setting an electric vehicle mile target, while achieving criteria

pollutant co-benefits. TNCs would be required to achieve zero grams CO<sub>2</sub> emissions per passenger mile traveled and 90 percent electric vehicle miles traveled (VMT) by 2030.

## Off-Road Equipment

### Tier 5 Off-Road Vehicles and Equipment

This measure would reduce NO<sub>x</sub> and particulate matter (PM) emissions from new off-road compression-ignition (CI) engines by adopting more stringent exhaust standards for all power categories, including those that do not currently utilize exhaust aftertreatment such as diesel particulate filters and selective catalytic reduction. This measure would be more stringent than required by current U.S. EPA and European Stage V nonroad regulations and would require the use of best available control technologies.

For this measure, CARB staff would develop and propose standards for new off-road CI engines including the following: aftertreatment-based PM standards for engines less than 19 kilowatt (kW) (25 horsepower [hp]), aftertreatment-based NO<sub>x</sub> standards for engines greater than or equal to 19 kW (25 hp) and less than 56 kW (75 hp), and more stringent PM and NO<sub>x</sub> standards for engines greater than or equal to 56 kW (75 hp). Other possible elements include enhancing in-use compliance, proposing more representative useful life periods, and developing a low load test cycle. It is expected that this comprehensive off-road Tier 5 regulation would rely heavily on technologies manufacturers are developing to meet the recently approved low NO<sub>x</sub> standards and enhanced in-use requirements for on-road heavy-duty engines.

### Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation

This measure would further reduce emissions from the in-use off-road diesel equipment sector by adopting more stringent requirements to the In-Use Off-Road Diesel-Fueled Fleets Regulation. These amendments would create additional requirements to the currently regulated fleets by targeting the oldest and dirtiest equipment that is allowed to operate indefinitely under the current regulation's structure.

The amendments would include an operational backstop to the current In-Use Off-Road Diesel-Fueled Fleets Regulation for most Tier 0, 1, and 2 engines between 2024 and 2032. This will allow ~~an eight-~~ a 12 year phase out of these oldest engines. Along with the operational backstop, adding vehicle provisions in the current regulation will be extended to phase in a limitation on the adding of Tier 3 and Tier 4i vehicles to fleets. The amendments also include proposed new requirements for most fleets to use renewable diesel, proposed requirements for prime contractors and public works awarding bodies to increase the enforceability of the regulation, and optional flexibility provisions for fleet adoption of zero emission vehicles. Additional modifications could include clarification to implementation and sunset provisions that would have allowed small fleets to continue to operate vehicles that could not be retrofitted with a verified diesel emission control strategy indefinitely.

### Transport Refrigeration Unit Regulation Part 2 (Non-Truck TRUs)

This measure is the second part of a two-part rulemaking to transition diesel-powered transport refrigeration units (TRUs) to zero emission technologies. This measure would require zero emission equipment for non-truck TRUs (trailer TRUs, domestic shipping container TRUs, railcar TRUs, TRU generator sets, and direct-drive refrigeration units).

### Commercial Harbor Craft Amendments

This measure proposes that starting in 2023 and phasing in through 2031, most commercial harbor crafts (CHCs) (except for commercial fishing vessels and categories listed below) would be required to meet the cleanest possible standard (Tier 3 or 4) and retrofit with diesel particulate filters (DPFs) based on a compliance schedule. The current regulated CHC categories are ferries, excursion, crew and supply, tug/tow boats, barges, and dredges. The amendments would impose in-use requirements on the rest of vessel categories except for commercial fishing vessels, including workboats, pilot vessels, commercial passenger fishing, and all barges over 400 feet in length or otherwise meeting the definition of an ocean-going vessel. The amendments would also remove the current exemption for engines less than 50 hp.

The measure also proposes that, starting in 2025, all new excursion vessels be required to be plug-in hybrid vessels that ~~can derive~~ are capable of deriving 30 percent or more of combined propulsion and auxiliary power from a zero emission tailpipe emission source. Starting in 2026, all new and in-use short run ferries would be required to be zero emission; and starting in 2030 and 2032, all commercial fishing vessels would need to meet a Tier 2 standard at minimum.

### Cargo Handling Equipment Amendments

This measure would start transitioning Cargo Handling Equipment (CHE) to full zero emission in 2026, with over 90 percent penetration of ZE equipment by 2036. Based on the current state of zero emission CHE technological developments, the transition to zero emission would most likely be achieved largely through the electrification of CHE. This assumption about aggressive electrification is supported by the fact that currently some electric RTG cranes, electric forklifts, and electric yard tractors are already commercially available. Other technologies are in early production or demonstration phases.

### Off-Road Zero Emission Targeted Manufacturer Rule

The Off-Road Zero Emission Targeted Manufacturer Rule would accelerate the development and production of zero emission off-road equipment and powertrains. Existing zero emission regulations and regulations currently under development target a variety of sectors (e.g., forklifts, cargo handling equipment, off road fleets, Small Off-Road Engines (SORE), etc.). However, as technology advancements occur, more sectors including wheel loaders, excavators, and bulldozers could be accelerated. Fully addressing control of emissions from new farm and construction equipment under 175 horsepower that are preempted, will require partnership on needed Federal zero emission standards for off-road equipment.

This measure would require manufacturers of off-road equipment and/or engines to produce for sale zero emission equipment and/or powertrains as a percentage of their annual statewide sales volume. Sales/production mandate levels would be developed based on the projected feasibility of zero emission technology to enter and grow in the various off-road equipment types currently operating in California. This measure is expected to increase the availability of zero emission options in the off-road sector and support other potential measures that promote and/or require the purchase and use of such options. A targeted manufacturer regulation will need to ~~consider~~ take into account parameters such as the number of equipment and engine manufacturers producing off-road equipment for sale in California, along with sales volumes, to ensure that such an effort is cost-effective and technologically feasible.

### Clean Off-Road Fleet Recognition Program

This measure would create a non-monetary incentive to encourage off-road fleets to go above and beyond existing regulatory fleet rule compliance and adopt advanced technology equipment with a strong emphasis on zero emission technology. The Clean Off-Road Fleet Recognition Program would provide a standardized methodology for contracting entities, policymakers, ~~State~~ and local government, and other interested parties to establish contracting criteria or require participation in the program to achieve their individual policy goals.

The Clean Off-Road Fleet Recognition Program framework would encourage entities with fleets to incorporate advanced technology and zero emission vehicles into their fleets, prior to or above and beyond regulatory mandates based on fleet size. The program would provide standardized criteria or a rating system for participation at various levels to reflect the penetration of advanced technology and zero emission vehicles into a fleet. Levels could be scaled over time as zero emission equipment becomes more readily available. CARB anticipates the next several years of technology advancements and demonstrations to drive the stringency of the rating system. Participation in the program would be voluntary for entities with fleets, however, designed in a manner that provides them motivation to go beyond business as usual. The program would offer value for entities with fleets to participate by potentially providing them increased access to jobs/contracts, public awareness, and marketing opportunities.

### Spark-Ignition Marine Engine Standards

For this measure, CARB will develop and propose catalyst-based standards for outboard and personal watercraft engines less than or equal to 40 kW in power that will gradually reduce emission standards to approximately 70 percent below current levels. For outboard and personal watercraft engines under 40 kW, more stringent exhaust standards will be developed and proposed based on the incorporation of electronic fuel injection that will gradually reduce emission standards 40 percent below current levels. This measure would require a 5.0 g/kW-hr HC+NO<sub>x</sub> standard for outboard engines and personal watercraft engines at or above 40 kW in power and a 10.0 g/kW-hr HC+NO<sub>x</sub> standard for engines less than 40 kW.

In addition to requiring more stringent exhaust standards, CARB is considering actions consistent with Executive Order N-79-20 that would require a percentage of outboard and personal watercraft vessels to be propelled by zero emission technologies for certain applications. Outboard engines less than 19 kW, which are typically not operated aggressively or for extended periods, could potentially be phased-out and gradually replaced with zero emission technologies. Some personal watercraft applications could also potentially be replaced with zero emission technologies.

### Other

#### Consumer Products Regulation Standards

This measure will further reduce VOC and equivalent VOC emissions from consumer products to expedite attainment of national ambient air quality standards for ozone. As with previous rulemakings, emission reductions will be achieved by setting regulatory standards applicable to the content of consumer products. To meet emission reduction targets for the measure, CARB staff will evaluate categories with relatively high contributions to ozone formation, whether currently regulated or unregulated. Staff will consider the merits of proposing VOC content standards as well as reactivity limits. Staff developing

proposed amendments to the Consumer Products Regulation will also consider investigating concepts for expanding manufacturer compliance options, market-based approaches, and reviewing existing exemptions. Staff will work with stakeholders to explore mechanisms that would encourage the development, distribution, and sale of cleaner, very low, or zero-emitting products. In undertaking these efforts staff will prioritize strategies that achieve the maximum feasible reductions in ozone forming, toxic air contaminant, and GHG emissions. This measure complements a parallel measure in CARB's Climate Change Scoping Plan Update, to be considered by the CARB Board in 2022, to phase down use of HFC-152a and other GHGs in consumer products.

#### **Zero Emission Standard for Space and Water Heaters**

For this measure, CARB would develop and propose zero GHG emission standards for space and water heaters sold in California; CARB could also work with air districts to further tighten district rules to drive zero emission technologies. This measure would not mandate retrofits in existing buildings, but some buildings would require retrofits to be able to use the new technology that this measure would require. Beginning in 2030, 100 percent of sales of new space and water heaters (for either new construction or replacement of burned-out equipment in existing buildings) would need to meet zero emission standards. It is expected that this regulation would rely heavily on heat pump technologies currently being sold to electrify new and existing homes.

#### **Enhanced Regional Emissions Analysis in SIPs**

The primary goal of this measure is to reduce criteria pollutant and GHG emissions that come from on-road mobile sources through reductions in VMT. In addition, lowering VMT will help alleviate traffic congestion, improve public health, reduce consumption of fossil fuels, and reduce infrastructure costs. CARB is exploring three options to reduce ~~reactive organic gases (ROG)~~ VOC and NOx emissions through reductions in VMT. First, CARB will consider whether and how to change the process for developing Motor Vehicle Emissions Budget (MVEB) by evaluating the existing MVEB development process to meet NAAQS. In addition, CARB will assess and improve the Reasonably Available Control Measures (RACM) analysis in the SIP by providing a comprehensive list of Transportation Control Measures (TCMs) and emission quantification methodology. Finally, CARB will consider updating the guidelines for the California Motor Vehicle Registration Fee (MV Fees) Program and the Congestion Mitigation and Air Quality Improvement (CMAQ) Program to fund a broader range of transportation and air quality projects that advance new approaches and technologies in reducing air pollution.

#### **1,3-Dichloropropene Health Risk Mitigation**

Pesticides are regulated under both federal and state law. California Department of Pesticide Regulation (DPR) is the agency responsible for regulating the sale and use of pesticides in California. DPR can generally reduce exposures to pesticides through the development and implementation of necessary restrictions on pesticide sales and use and by encouraging integrated pest management. Considered a VOC, 1,3-Dichloropropene (1,3-D) is a fumigant used to control nematodes, insects, and disease organisms in soil.

DPR is developing a regulation to address both cancer and acute risk to non-occupational bystanders from the use of 1,3-D. The regulation will be developed in consultation with the County Agricultural Commissioners (CACs), the local air districts, CARB, the Office of Environmental Health Hazard Assessment (OEHHA), and the California Department of Food and Agriculture (CDFA). Once implemented, DPR's regulation would require applicators to use totally impermeable film (TIF) tarpaulins or other mitigation measures that provide a comparable degree of protection from exposure.

### *Primarily-Federally and Internationally Regulated Sources – CARB Measures*

In addition to reducing emissions from the above sources, it is critical to achieve ~~emissions~~emissions reductions from sources that are primarily regulated at the federal and international level. It is imperative that the federal government and other relevant regulatory entities act decisively to reduce emissions from these primarily-federally and internationally regulated sources of air pollution. CARB and the air districts in California have taken actions to not only petition federal agencies for action, but also to directly reduce emissions using programmatic mechanisms within our respective authorities. CARB continues to explore additional actions, many of which may require a waiver or authorization under the Clean Air Act, as described below.

#### **In-Use Locomotive Regulation**

This measure would use mechanisms available under CARB's regulatory authority to accelerate the adoption of advanced, cleaner technologies, and include zero emission technologies, for locomotive operations. The In-Use Locomotive Regulation would apply to all locomotives operating in the State of California with engines that have a total rated power of greater than 1,006 horsepower, excluding locomotive engines used in training of mechanics, equipment designed to operate both on roads and rails, and military locomotives. The measure reduces emissions by increasing use of cleaner diesel locomotives and zero emission locomotives through a spending account, in-use operational requirements, and by an idling limit. By July 1, 2024, a spending account would be established for each locomotive operator. Funds in the account would only be used toward Tier 4 or cleaner locomotives until 2030, and at any time toward zero emission locomotives, zero emission pilot or demonstration projects, or zero emission infrastructure.

For the in-use operational requirements, beginning January 1, 2030, only locomotives built after January 1, 2007 may operate in California. Each year after January 1, 2030, only locomotives less than 23 years old may operate in California. Additionally, under the in-use operational requirements, starting January 1, 2030, all switch, industrial, and passenger locomotives operating in California with an original engine build date 2030 or newer will be required to be zero emission. Starting January 1, 2035, all freight line haul locomotives operating in California with an original engine build date 2035 or newer must be zero emission. Locomotives equipped with automatic engine stop/start systems are to idle no more than 30 minutes unless an exemption applies. Also, locomotive operators would report locomotive engine emissions levels and activity on an annual basis.

#### **Future Measures for Aviation Emissions Reductions**

Future measures for aviation would reduce emissions from airport and aircraft related activities. The identified emission sources for the aviation sector are main aircraft engines, auxiliary power units (APU), and airport ground transportation. Emission reductions can be achieved by pursuing incentive and regulatory measures.

CARB would evaluate federal, ~~State~~state, and local authority in setting operational efficiency practices to achieve emission reductions. Operational practices include landing, takeoff, taxi, and running the APU, and contribute to on-ground and near-ground emissions. Near ground emissions are emissions between ground level up to 3,000 feet. Operational practices such as de-rated take-off and reduced power taxiing have the potential to achieve emission reductions.

CARB would similarly work with ~~the~~ U.S. EPA, Air Districts, airports, and industry stakeholders in a collaborative effort to develop regulations, voluntary measures, and incentive programs. CARB would

evaluate the incentive amounts that would be required to encourage aircrafts to voluntarily use cleaner engines and fuels. Incentives to encourage the use of cleaner engines and fuels for aircraft in California would involve identification of funding sources and implementation mechanisms such as development of new programs.

#### Future Measures for Ocean-Going Vessel Emissions Reductions

Future measures for OGVs would reduce emissions from OGVs that are transiting, maneuvering, or anchoring in regulated California waters and while docking at berth in California seaports. Despite the reductions achieved by existing regulatory and incentive programs, additional measures are needed to achieve further ~~emission~~emissions reductions from OGVs to protect public health and meet federal air quality standards. Due to the international nature of OGVs, advocacy and coordination with federal and international oversight and regulatory organizations may be needed to achieve additional ~~emission~~emissions reductions.

Future measures for OGVs could achieve additional reductions through the use of operational changes and new technologies currently in development, including advances in exhaust capture and control, mobile shore power connections, cleaner fuels (such as liquified natural gas [LNG], hydrogen, methanol, ammonia, etc.), alternative power sources (including batteries and fuel cells), as well as potential vessel side technologies (such as water-in-fuel emulsion). In pursuing regulatory measures, CARB would work with ~~the~~ U.S. EPA, California Air Districts, seaports, and industry stakeholders in a collaborative effort to determine which measure would provide the most effective ~~emission~~emissions reductions, as well as CARB's ability to implement each potential measure. Advocacy at the federal and international levels may be necessary to achieving additional ~~emission~~emissions reductions from OGVs given the international nature of sea trade.

Incentive or regulatory measures could be pursued to achieve further ~~emission~~emissions reductions from OGVs, including using cleaner engines or cleaner fuels than those required by ~~the~~ U.S. EPA and the International Maritime Organization (IMO), reducing emissions while anchored within regulated California waters (RCW), sailing at slower speeds while in RCW, and requiring bulk and general cargo vessels to reduce emissions while at berth.

Additionally, CARB staff have committed to assessing the feasibility, benefits, and cost-effectiveness of control technologies for bulk/general cargo vessels and vessels at anchor (which are ~~currently~~ not subject to emissions control requirements in the 2020 At Berth Regulation) as part of the 2020 At Berth Regulation's Interim Evaluation. This evaluation will occur in 2021–2022, with a public report due by December 1, 2022.

#### ~~Primarily Federally and Internationally Regulated Sources~~ — **Federal Actions Needed**

For California to meet air quality standards, it is imperative that the federal government and other relevant regulatory entities act decisively to reduce emissions from these primarily-federally and internationally regulated sources of air pollution. Absent further action, by 2030, Statewide NO<sub>x</sub> emissions from primarily-federally regulated sources will be double the emissions from California-regulated mobile sources by 2030. For the following measures, CARB would petition and/or advocate to ~~the~~ U.S. EPA and other federal and international entities for actions to control emissions as described below.

## On-Road Heavy-Duty Vehicle Low NOx Engine Standards Vehicles

~~Due to the preponderance of interstate trucking's contribution to emissions in California, timely federal action to implement a national low-On-Road Heavy-Duty Vehicle Low NOx engine standard is critical to provide the emission reductions needed for attainment. Engine Standards~~

In the 2016 State SIP Strategy, CARB included ~~outlined~~ a measure to petition for a federal low-NOx standards that would apply to all new heavy-duty trucks sold nationwide starting in 2024 or later. This ~~would~~ will ensure that all trucks traveling within California would eventually be equipped with an engine meeting the lower NOx standard. Federal action is critical to implement this emission standard, since ~~emission~~ emissions reductions from a California-only CARB regulation would come mostly from Class 4-6 vehicles (as most Class 7 and 8 vehicles operating in California were originally purchased outside the State).

~~In June of 2016, the South Coast, San Joaquin Valley and Bay Area air districts and nine other State and local air control agencies formally petitioned the U.S. EPA to adopt 0.02 g/bhp-hr NOx standards for medium and heavy duty truck engines nationally. The U.S. EPA responded to those petitions on December 20, 2016, stating that they will initiate the work necessary to issue a Notice of Proposed Rulemaking for a new on-road heavy-duty NOx program, with the intention of proposing standards that could begin in model year Although 2024, consistent with the lead-time requirements of the Clean Air Act. In November 2018, the U.S. EPA announced the national program, known as the Cleaner Trucks Initiative (CTI),<sup>22</sup> and an Advanced Notice of Proposed Rulemaking was released on January 21, 2020.<sup>23</sup> On August 5, 2021, the U.S. EPA announced an update to CTI called the Clean Trucks Plan (CTP).<sup>24</sup> And finally, just recently on ) proposal released in March 3, 2022, the U.S. EPA published a Notice of Proposed Rulemaking<sup>25</sup> that includes two proposed provides options for levels at which the emissions standard could be set and implementation timelines, along with an additional alternative, on which they that are currently accepting public comment. less stringent, U.S. EPA is moving forward with the federal CTP, and CARB will would advocate to align the federal CTP with CARB's low-NOx omnibus Omnibus regulations to the maximum degree possible, given the need for deep ~~emission~~ emissions reductions and the benefits of consistency in this area given the multiple jurisdictions in which trucks are purchased and used.~~

### On-Road Heavy-Duty Vehicle Zero Emission Requirements

In addition to the need for cleaner combustion engine standards, actions are also needed at the federal level to drive the introduction of zero emission heavy-duty vehicles into the on-road fleet nation-wide. CARB would petition and/or advocate to ~~the~~ U.S. EPA for federal zero emission on-road heavy-duty vehicle requirements, along with more stringent GHG standards for medium- and heavy-duty vehicles that would apply to new heavy-duty trucks sold nationwide. to achieve the needed NOx emissions reductions for the South Coast in 2037. Additionally, CARB would advocate that ~~the~~ U.S. EPA enable State state leadership

<sup>22</sup> ~~<https://www.epa.gov/regulations-emissions-vehicles-and-engines/cleaner-trucks-initiative>.~~

<sup>23</sup> ~~*Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine Standards*, 85 Fed. Reg. 3306 (Jan. 21, 2020). <https://www.govinfo.gov/content/pkg/FR-2020-01-21/pdf/2020-00542.pdf>.~~

<sup>24</sup> ~~<https://www.epa.gov/regulations-emissions-vehicles-and-engines/clean-trucks-plan>.~~

<sup>25</sup> ~~<https://www.epa.gov/system/files/documents/2022-03/hd2027stds-nprm-2022-03.pdf>.~~

on zero emission trucks by prioritizing federal grants toward zero emission technology and their associated infrastructure.

### Pre-empted Off-Road Equipment Tier 5 Standard

#### **More Stringent Emission Standards for Preempted Off-Road Engines–**

Off-road equipment regulated at the federal level also contributes significant ozone precursor emissions in California. ~~Included in the Draft 2022 State SIP Strategy is a potential measure for Tier 5 standards on State regulated off-road equipment.~~ CARB would also petition and/or advocate to the U.S. EPA to promulgate off-road equipment Tier 5 compression-ignition standards and new spark-ignition standards for preempted engines to achieve the needed NOx emissions reductions for the South Coast in 2037, akin to those that CARB is pursuing for equipment under State authority to prevent the availability of equipment meeting a less stringent standard.

#### **Off-Road Equipment Zero Emission Standards Where Feasible**

Given the availability of zero emission equipment in certain off-road sectors, zero emissions requirements are also feasible and needed, as discussed in various CARB measures in the Off-Road Equipment portion of the ~~Draft 2022 State SIP Strategy~~. CARB would also petition and/or advocate to the U.S. EPA to require zero emission standards for off-road equipment where the technology is feasible to achieve the needed NOx emissions reductions for the South Coast in 2037. Zero emission technology is maturing and penetrating the off-road equipment categories, and federal zero emission standards for off-road equipment would provide a clear path for zero emission technology to continue maturing.

### Aviation

#### **More Stringent Aviation Engine Standards**

In California, aircraft are projected to make up 9.5 percent of mobile source NOx emissions in 2035, increasing from 5.4 percent in 2020. While CARB continues to explore options available under its regulatory authority to control emissions from aviation, CARB would petition and/or advocate to the U.S. EPA/ICAO for more stringent criteria and GHG standards for aircraft engines to achieve the needed NOx emissions reductions for the South Coast in 2037. With innovative research and advanced optimization of engine design, it has been demonstrated that NOx emissions can be further reduced beyond the CAEP/8 standards as seen under the FAA's Continuous Lower Energy, Emissions, and Noise Phase II (CLEEN II) Program.

#### **Cleaner Fuel and Visit Requirements for Aviation**

In addition to needing more stringent engine standards, there are other mechanisms by which regulatory entities could require ~~emission~~emissions reductions from aircraft in California. CARB would petition and/or advocate to the U.S. EPA to require aircraft to use cleaner fuels when ~~travelling~~traveling through California, and to require visits from cleaner aircraft to achieve the needed NOx emissions reductions for the South Coast in 2037. Using the aircraft engine certification data manufacturers report to International Civil Aviation Organization (ICAO), CARB staff has identified the Airbus 320-NEO and Airbus 319-100 Series as the cleanest options for NOx emissions among aircraft commonly visiting California, with NOx emissions 40 percent below the weighted-average aircraft visit.

### Zero Emission On-Ground Operation Requirements at Airports

The on-ground operations at airports present additional opportunities for ~~emission~~emissions reductions for aviation. Typical aircrafts include an auxiliary power unit (APU) which is a small turbine engine that starts the aircraft main engines and powers the electrical systems on the aircraft when the main engines are off. Requirements for switching to the on-board rechargeable batteries as the power supply, it would reduce the usage of the gas turbine APU and hence emissions. Taxiing is another on-ground operation where emissions can be reduced through reduced power during taxiing, improved taxi-time, and the use of new technologies ~~such as Taxi bot. Taxi bot is utilized during pushback operations and allows immediate taxiing with the engines stopped eliminating bottlenecks in the gate area while also eliminating emissions from the main engines.~~ CARB would petition and/or ~~advocated~~advocate to the U.S. EPA to require zero emission on-ground operation at California airports to achieve the needed NOx emissions reductions for the South Coast in 2037.

### Airport Aviation Emissions Cap

In addition to the three proposed aviation actions above, CARB would petition and/or advocate to appropriate agencies, including the U.S. EPA, for additional actions to control emissions from aviation, such as requiring an aviation emissions cap at each California airport to achieve the needed NOx emissions reductions for the South Coast in 2037. This emissions cap would set an emissions level for all aircraft activities related to the airports preventing emissions to increase with airport growth and reduce existing emissions by replacing airport activities with cleaner combustion and zero emission technologies. These additional reductions could potentially also be achieved through incentivized turnover of aircraft or upgrades to cleaner engines, or other available regulatory mechanisms.

## Locomotives

### More Stringent National Locomotive Emission Standards

Locomotives are another source primarily regulated at the federal level that contribute significant NOx emissions in California. In the 2016 State SIP Strategy, CARB ~~included~~outlined a ~~measure to~~ petition for ~~more stringent~~new national locomotive emission standards. ~~The goal of a more stringent national locomotive emission standard is to reduce~~ for significant additional reductions in criteria and toxic pollutants, and GHG emissions from ~~existing and future~~ locomotives in order to meet air quality and climate change goals. On April 13, 2017, CARB petitioned the U.S. EPA<sup>26</sup> to promulgate both Tier 5 national emission standards for newly manufactured locomotives, and more stringent national requirements for remanufactured locomotives, ~~to reduce criteria and toxic pollutants, fuel consumption, and GHG emissions.~~ CARB is waiting for the U.S. EPA to act on ~~the~~this petition to promulgate Tier 5 national emission~~these~~ standards for newly manufactured locomotives and more stringent national and requirements for remanufactured locomotives.

### Zero Emission Standards for ~~Switch~~Locomotives

~~Switchers~~Locomotive switchers, or switchers, move railcars and sections of trains in and around railyards (but should not be confused with rubber tired railcar movers, smaller off road vehicles than move

<sup>26</sup> ~~<https://ww2.arb.ca.gov/resources/documents/petition-rulemaking-seeking-amendment-locomotive-emission-standards>~~

~~individual railcars in yards, but are not considered switchers). Switchers that~~ and account for about 10 percent of freight diesel use ~~could be converted. The 2017 petition to electric.~~ U.S. EPA included a proposed standard for zero emission technology for use in certain overburdened areas and communities near railyards, but zero emission technology is now feasible for additional locomotive applications and geographical areas. For this measure, CARB would petition and/or advocate to ~~the~~ U.S. EPA to promulgate national zero emission standards for ~~switchers,~~ locomotives to reduce criteria and toxic pollutants, fuel consumption, and GHG emissions to achieve the needed NOx emissions reductions for the South Coast in 2037.

#### **Address Unlimited Locomotive Remanufacturing Loophole**

Federal rules currently define remanufactured locomotives as “new” when they are remanufactured, and do not set limits on how often locomotives can be remanufactured. ~~The result is~~ For this measure, CARB would petition and/or advocate to U.S. EPA to address the regulatory provisions that allows continued remanufacturing of old and polluting locomotives to the same pollution tier standards, and persistent pollution from these sources. For this measure, CARB would petition and/or advocate to the U.S. EPA to remove this regulatory loophole, in addition to the State level rules discussed above to achieve the needed NOx emissions reductions for the South Coast in 2037.

### *Ocean-Going Vessels*

#### **More Stringent NOx and PM Standards for Ocean-Going Vessels**

Emissions from main engines and auxiliary engines of ~~ocean-going vessels~~ OGVs during transit, anchorage, and maneuvering must be addressed in order to achieve NOx reductions needed to meet ~~California’s near- and mid-term air quality goals~~ standards in California. Currently, very few vessels with Tier 3 main engines visit California ports, even though the Tier 3 engine standard applied to new marine engines beginning in 2016. Tier 2 vessels emit three times higher NOx than Tier 3 vessels; thus, phasing out of older Tier 5 vessels is key to reducing criteria and toxics emissions from OGVs.

CARB would petition and/or advocate to ~~the~~ U.S. EPA and International Maritime Organization (IMO) for cleaner marine standards to achieve the needed NOx emissions reductions for the South Coast in 2037. While marine Tier 3 is considerably cleaner than Tier 2, the Tier 3 NOx standard is still 5 to 10 times higher than the standards for other diesel equipment sectors, and does not include a PM standard. CARB will work with ~~the~~ U.S. EPA, U.S. Coast Guard, and other partners to urge IMO to adopt more stringent Tier 4 marine standard and establish efficiency requirements for existing vessels.

#### **Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels**

In addition to more stringent engine standards, there are other mechanisms by which regulatory entities could require ~~emission~~ emissions reductions from OGVs in California and along the California coast. ~~CARB would petition and/or advocate to the U.S. EPA to require vessels to use cleaner fuels and visits from cleaner OGVs.~~ To the maximum extent possible all Tier 0, Tier 1, and Tier 2 vessel visits should be replaced with visits made by Tier 3 or cleaner vessels ~~by 2031.~~ Current Tier 3 vessel manufacturing data suggest that there may not be sufficient Tier 3 vessels to meet the satisfy all vessel visits to the State, even if California were to receive a large majority of the worldwide Tier 3 vessels. However, these reductions may be achieved by incentivizing visits from Tier 2 vessels that have been retrofitted to reduce NOx emissions. ~~Current~~ Some of the current retrofit technologies for marine engines include ~~water in fuel emulsion,~~ exhaust gas recirculation (EGR) and SCR. ~~Both EGR and SCR, which both~~ have shown potential to reduce

emissions by up to 80 percent. ~~Water in fuel emulsion strategies have shown up to 40 percent reduction in NOx emissions and may provide significant and cost-effective reductions options (particularly at near-port and low load conditions where it is possible that Tier 3 and other retrofit options strategies may not operate at achieve full potential). Biofuels benefits when operating or maneuvering at lower loads in the vicinity of seaports in Regulated California Waters. Therefore, other strategies such as water-in-fuel emulsion, biofuels, renewable hydrogen and other hydrogen-derived fuels such as ammonia, methanol, batteries and fuel cells are being considered as potential or complementary fuel choices for vessels to achieve maximum emissions reductions. All options need to be considered to achieve the needed emission reductions.~~ emissions reductions. CARB would petition and/or advocate to U.S. EPA to require vessels to use cleaner fuels and visits from cleaner OGVs to achieve the needed NOx emissions reductions for the South Coast in 2037.

## SCAG's Regional Transportation Plan/Sustainable Communities Strategy and Transportation Control Measures

Measures from the Southern California Association of Governments' Regional Transportation Plan/Sustainable Communities Strategy and Transportation Control Measures (RTP/SCS and TCMs) also play a key role in the 2022 AQMP. This section summarizes SCAG's RTP/SCS and TCMs. More details of SCAG's RTP/SCS is included in Appendix IV-C, which is based on SCAG's Final 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy (2020 RTP/SCS, also known as Connect SoCal) and 2021 Federal Transportation Improvement Program (FTIP), as amended. The RTP/SCS and FTIP were developed in consultation with federal, State, and local transportation and air quality planning agencies and other stakeholders. The four County Transportation Commissions (CTCs) in the South Coast Air Basin, namely Los Angeles County Metropolitan Transportation Authority, Riverside County Transportation Commission, Orange County Transportation Authority, and the San Bernardino County Transportation Authority, were actively involved in the development of the regional transportation measures of this Appendix.

### Introduction

As required by federal and State laws, SCAG is responsible for ensuring that the regional transportation plan, program, and projects are supportive of the goals and objectives of applicable AQMPs and State Implementation Plans (AQMPs/SIPs). SCAG is also required to develop demographic projections and regional transportation strategy and control measures for the South Coast AQMD's AQMP/SIP.

As the Metropolitan Planning Organization (MPO) for the six-county region comprising SCAG's jurisdiction, SCAG is obligated to develop an RTP/SCS every four years. The RTP/SCS is a long-range regional transportation plan that provides for the development and integrated management and operation of transportation systems and facilities that will function as an intermodal transportation network for the SCAG region. The RTP/SCS also outlines certain land use growth strategies that provide for more integrated land use and transportation planning and enhance transportation investments. The RTP/SCS is required by federal laws to demonstrate transportation conformity and also to achieve regional GHG

reduction targets set by the California Air Resources Board (CARB) pursuant to SB 375. Pursuant to the California Health and Safety Code, the RTP/SCS constitutes the Regional Transportation Plan/Sustainable Communities and Transportation Control Measures of the South Coast AQMD's AQMPs.

In addition, SCAG develops the biennial FTIP. The FTIP is a list of multimodal capital improvement projects to be implemented over a six-year period. The FTIP implements the programs and projects in the RTP/SCS.

## Regional Transportation Plan/Sustainable Communities Strategy and Transportation Control Measures

The SCAG region faces many critical challenges including demographics, transportation system preservation, transportation funding, goods movement, housing, air quality, climate change, and public health. Under the guidance of the goals and objectives adopted by SCAG's Regional Council, SCAG's governing board, the Connect SoCal was developed to provide a blueprint to integrate land use and transportation strategies to help achieve a coordinated and balanced regional transportation system. Connect SoCal represents the culmination of more than three years of work involving dozens of public agencies, 197 local jurisdictions in the SCAG region, hundreds of local, county, regional and State officials, the business community, environmental groups, as well as various nonprofit organizations. Connect SoCal was adopted by SCAG's governing board, the Regional Council, on May 7, 2020 for transportation conformity purposes only and on September 3, 2020 for all purposes.

To realize a sustainable and connected region, Connect SoCal includes a Core Vision that centers on maintaining and better managing the transportation network for moving people and goods, while expanding mobility choices by locating housing, jobs and transit closer together and increasing investment in transit and complete streets; five Key Connections that augment the Core Vision to address trends and emerging challenges while closing the gap between what can be accomplished through intensification of core planning strategies alone and what must be done to meet increasingly aggressive greenhouse gas reduction goals; as well as action-oriented transportation strategies and Sustainable Communities Strategy.

### *Core Vision*

- Sustainable Development
- System Preservation and Resilience
- Demand and System Management
- Transit Backbone
- Complete Streets
- Goods Movement

### *Key Connections*

- Smart Cities and Job Centers
- Housing Supportive Infrastructure
- Go Zones

- Accelerated Electrification
- Shared Mobility and Mobility as a Service

### *Transportation Strategies*

- Preserve and Optimize Our Current System
  - Congestion Management
  - Congestion Pricing
  - Transportation Demand Management (TDM)
  - Transportation System Management (TSM)
- Completing Our Transportation System
  - Transit
  - Passenger Rail
  - Active Transportation
  - Transportation Safety
  - Highway and Arterial Network
  - Regional Express Lane Network
  - Goods Movement
  - Aviation
  - Technological Innovations and Emerging Technology

### *Sustainable Communities Strategy*

- Focus Growth Near Destinations and Mobility Options
- Promote Diverse Housing Choices
- Leverage Technology Innovations
- Support Implementation of Sustainability Policies
- Promote a Green Region

### *Transportation Control Measures*

Connect SoCal includes, as a subset of transportation strategies, SIP-committed transportation programs and projects that reduce vehicle use or change traffic flow or congestion conditions for the purposes of reducing emissions from transportation sources and improving air quality, better known as Transportation Control Measures or “TCMs.” In the South Coast Air Basin, TCMs include the following three main categories of transportation improvement projects and programs that have funding programmed for right-of-way and/or construction in the first two years of the 2021 FTIP:

- Transit and non-motorized modes;
- High Occupancy Vehicle (HOV) Lanes and their pricing alternatives; and
- Information-based strategies (e.g., traffic signal synchronization).

Attachment A of Appendix IV-C is a list of transportation control measure projects that are from SCAG's 2021 FTIP and specifically identified and committed to in the Draft Final 2022 AQMP/SIP. Per the federal Clean Air Act, these committed TCMs are required to receive funding priority and be implemented in a timely manner. In the event that a committed TCM cannot be delivered or will be significantly delayed, there must be a substitution for the TCM. It is important to note that as the SCAG's FTIP is updated every two years, new committed TCMs are automatically added to the applicable SIP from the previous FTIP.

### *Plan Emissions Reduction Benefits*

If the future vehicle fleet mix and emission factors are held constant as those in the Connect SoCal base year 2016, Connect SoCal is estimated to yield a reduction in NOx emissions by about 1.5 tons per day in 2025, 4.1 tons per day in 2035, and 6.8 tons per day in 2045 compared with their respective Baselines without Connect SoCal. However, if accounting for mandated future improvement in vehicle fleet mix and emission factors, the estimated NOx emission reduction from Connect SoCal is reduced by 60 to 73 percent, because the vehicles as a whole are becoming much cleaner, and reduction of every vehicle mile traveled from Connect SoCal yields less reduction in NOx emissions.

### *Plan Investment*

The total expenditure for the various strategies in Connect SoCal is forecasted to be \$638.9 billion for the entire six-county SCAG region. Connect SoCal has identified the same amount of total revenues from both existing and several new funding sources that are reasonably expected to be available.

### *Cost-Benefit Analysis*

Implementation of Connect SoCal will secure a safe, efficient, sustainable, and prosperous future for the SCAG region. To demonstrate how effective Connect SoCal would be toward achieving our regional goals, SCAG conducted a Connect SoCal vs. Connect SoCal Baseline cost-benefit analysis utilizing the Cal-B/C Model to calculate regional network benefits – essentially comparing how the region would perform with and without implementation of the Connect SoCal.

Compared with the alternative without the Plan, Connect SoCal would result in significant benefits to our region, not only with respect to mobility and accessibility, but also in the areas of air quality, economic growth and job creation, sustainability, and environmental justice. Altogether, the transportation investments in Connect SoCal will provide a return of two dollars for every dollar invested compared with the Baseline alternative.

### *TCM Reasonably Available Control Measure Analysis*

As required by the CAA, a Reasonably Available Control Measure (RACM) analysis must be included as part of the overall control strategy in the ozone SIP to ensure that all potential control measures are evaluated for implementation and that justification is provided for those measures that are not implemented. Appendix IV-C contains the TCM RACM component for the South Coast ozone control strategy. In accordance with the U.S. EPA procedures, this analysis considers TCMs in Connect SoCal, measures identified by the CAA, and relevant measures adopted in other ozone nonattainment areas of the country.

Based on this comprehensive review, it is determined that the TCMs being implemented in the South Coast Air Basin are inclusive of all TCM RACM.

## Contingency Measures

Contingency measures are required by the Clean Air Act to be implemented should an area fail to make reasonable further progress or attain the NAAQS by the required date. Over the last few years, multiple court decisions in the 9<sup>th</sup> circuit and nation-wide have effectively disallowed the SIP-approved approach which CARB and the districts have historically used to meet contingency measure requirements. South Coast AQMD and CARB continue to strive to meet the requirements, but the U.S. EPA has not yet released comprehensive and updated guidance encompassing the full scope of contingency measure requirements, in light of the results of the varying court decisions. Guidance is needed for CARB, and other air agencies across California and the U.S., to ensure that any resources devoted to creating, adopting, and implementing a measure will result in one that meets the requirements and be approved into the SIP.

Additionally, California faces the most difficult air quality challenges in the nation and, accordingly, leads the country with the most stringent air pollution control programs. Historically, the U.S. EPA guidance required contingency measures to achieve approximately one year's worth of emission reductions. CARB's mobile source control programs are advanced, and but primarily-federally regulated sources contribute over half of the emissions. South Coast AQMD also has one of the most stringent stationary source control programs in the country and has recently expanded its regulatory activities to mobile sources using innovative approaches such as indirect source rules, voluntary Memoranda of Understanding, and incentive measures. Opportunities for a triggered contingency measure that can be implemented by the State and the South Coast AQMD and result in one year's worth of emission reductions in the required time frame are slim to non-existent. Further, even if there existed were measures capable of achieving this level of emission reductions, it they would not be withheld for contingency purposes. Instead, it they would be adopted to improve air quality and in furtherance of the obligation to meet the NAAQS as soon as feasible. Despite recent court decisions, the U.S. EPA has the opportunity to justify a revised approach for contingency measures recognizing the maturity of control programs or allow states to provide a reasoned justification for achieving less than the required amount. California continues to work towards meeting contingency measure requirements, but the U.S. EPA must issue guidance to provide clarity and direction for states to move forward and pursue contingency measures that will meet the requirements.

## Background

The Clean Air Act specifies that SIPs must provide for contingency measures, defined in section 172(c)(9) as "specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national primary ambient air quality standard by the attainment date...." The Clean Air Act is silent though on the specific level of emission reductions that must flow from contingency measures. In the absence of specific requirements for the amount of emission reductions required, in 1992, the U.S. EPA conveyed that the "contingency measures should, at a minimum, ensure that an appropriate level of emissions reduction progress continues to be made if attainment of RFP is not achieved and additional planning by the State is needed" (57 Federal Register 13510, 13512 (April 16, 1992)). Further, the U.S. EPA ozone guidance states that "contingency measures should represent one year's worth of progress

amounting to reductions of 3 percent of the baseline emissions inventory for the nonattainment area.”<sup>27</sup> The U.S. EPA, though, has accepted contingency measures that have equal to or less than a year’s worth of progress when the circumstances fit under the “U.S. EPA’s long-standing recommendation that states should consider ‘the potential nature and extent of any attainment shortfall for the area’ and that contingency measures ‘should represent a portion of the actual emission reductions necessary to bring about attainment in the area.’”<sup>27</sup>

Historically, the U.S. EPA allowed contingency measure requirements to be met via excess emission reductions from ongoing implementation of adopted emission reduction programs, a method that CARB has used for a contingency measure and the U.S. EPA has approved in the past. In 2016, in *Bahr v. U.S. Environmental Protection Agency*<sup>28</sup> (*Bahr*), the 9<sup>th</sup> Circuit Court of Appeals determined the U.S. EPA erred in approving a contingency measure that relied on an already-implemented measure for a nonattainment area in Arizona, thereby rejecting the U.S. EPA’s longstanding interpretation of section 172(c)(9). The U.S. EPA staff interpreted this decision to mean that contingency measures must include a future action triggered by a failure to attain or failure to make reasonable further progress. This decision was applicable to the states covered by the 9<sup>th</sup> Circuit Court. In the rest of the country, the U.S. EPA was still approving contingency measures using their pre-Bahr stance. In January 2021, in *Sierra Club v. Environmental Protection Agency*,<sup>29</sup> the United States Court of Appeals for the D.C. Circuit, ruled that already implemented measures do not qualify as contingency measures for the rest of the country (*Sierra Club*).

In response to *Bahr* and as part of the 75 ppb 8-hour ozone SIPs due in 2016, CARB developed the statewide Enhanced Enforcement Contingency Measure (Enforcement Contingency Measure) as a part of the *2018 Updates to the California State Implementation Plan* to address the need for a triggered action as a part of the contingency measure requirement. CARB worked closely with the U.S. EPA regional staff in developing the contingency measure package that included the triggered Enforcement Contingency Measure, a district triggered measure and emission reductions from implementation of CARB’s mobile source emissions program. However, as part of the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard* SIP action, the U.S. EPA wrote in their final approval that the Enforcement Contingency Measures did not satisfy requirements to be approved as a “standalone contingency measure” and approved it only as a “SIP strengthening” measure. The U.S. EPA did approve the district triggered measure and the implementation of the mobile reductions along with a CARB emission reduction commitment as meeting the contingency measure requirement for this SIP.

Subsequently, South Coast AQMD initiated an independent response to *Bahr* that involved submitting contingency measure commitment letters to U.S. EPA and amending to Rule 445. On January 9, 2019, South Coast AQMD submitted a letter to U.S. EPA committing to adopt a new rule or amend an existing rule to satisfy the contingency measure requirement. On May 2, 2019, the Executive Officer sent an additional clarification letter, explaining what specific requirements would be changed in the rules if that rule is selected for a contingency measure. These actions culminated in the adoption of an amendment

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<sup>27</sup> See, e.g. 78 Fed. Reg. 37741, 37750 (Jun. 24, 2013), approval finalized with 78 Fed. Reg. 64402 (Oct. 29, 2013).

<sup>28</sup> *Bahr v. U.S. Environmental Protection Agency*, (9th Cir. 2016) 836 F.3d 1218.

<sup>29</sup> *Sierra Club v. Environmental Protection Agency*, (D.C. Cir. 2021) 985 F.3d 1055.

to Rule 445, which curtails wood-burning through “No-Burn” days when poor air quality is forecast. The amendment expanded the “No-Burn” season to encompass September-April and included contingency triggers for PM2.5. In addition, the amendment included contingency triggers for ozone which would automatically establish a No-Burn day threshold when the daily maximum 8-hour ozone is forecast to exceed 80 ppb in any Source Receptor Area. The threshold would automatically be lowered to 75 ppb and 70 ppb for a second and third U.S. EPA finding of a failure to comply with a milestone/attainment requirement by the applicable due date, respectively.

In addition to *Bahr*, the Association of Irrigated Residents filed a lawsuit against the U.S. EPA for their approval of various elements within the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard*, including the contingency measure. The 9<sup>th</sup> Circuit Court of Appeals issued its decision in *Association of Irrigated Residents v. EPA*<sup>30</sup> (*AIR*) that the U.S. EPA’s approval of the contingency element was arbitrary and capricious and rejected the triggered contingency measure that achieves much less than one year’s worth of emission reductions. Most importantly, the 9<sup>th</sup> Circuit Court said that, in line with the U.S. EPA’s longstanding interpretation of what is required of a contingency measure and the purpose it serves, together with *Bahr*, all reductions needed to satisfy the Clean Air Act’s contingency measure requirements need to come from the contingency measure itself and the amount of reductions needed for contingency should not be reduced by the fact of surplus emission reductions from ongoing programs absent the U.S. EPA formally changing its historic stance on the amount of reductions required. The U.S. EPA staff has interpreted *AIR* to mean that triggered contingency measures must achieve the entirety of the required one year’s worth of emission reductions on their own. In addition, surplus emission reductions from ongoing programs cannot reduce the amount of reductions needed for contingency.

In response to *Bahr* and *Sierra Club*, in 2021, the U.S. EPA convened a nation-wide internal task force to develop guidance to support states in their development of contingency measures. That task force is now also considering the impact of *AIR*. The U.S. EPA has indicated that the contingency measure guidance may be released fall 2022. The SIPs for the 70 ppb 8-hour ozone standard are due to the U.S. EPA by August 3, 2022. In their updated guidance, the U.S. EPA needs to recognize that many State control programs are mature and opportunities to withhold measures for contingency are scarce.

Since *Bahr*, South Coast AQMD and CARB ~~has~~have worked closely with the U.S. EPA regional office in developing contingency measures with little success. South Coast AQMD and CARB ~~is~~are committed to meeting the Clean Air Act requirements for contingency measures, but without finalized national guidance on this complex issue, it is not a good use of resources to pursue contingency measures that may not ultimately coincide with the upcoming new guidance.

## CARB’s Opportunities for Contingency Measures

Much has changed since the U.S. EPA’s 1992 guidance on contingency measures. Control programs across the country have matured as have the health-based standards. Ozone standards have strengthened in 2008 and 2015 with attainment years out to 2037. California has the only two “extreme” areas in the

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<sup>30</sup> *Association of Irrigated Residents v. U.S. Environmental Protection Agency*, (9th Cir. 2021) 10 F.4th 937.

country. Control measures identified for these areas must be implemented for meeting the standard and not held in reserve.

To address contingency measure requirements given the courts' decisions and current U.S. EPA guidance, CARB and local air districts would need to develop a measure or measures that, when triggered by a failure to attain or failure to meet RFP, will achieve one year's worth of emission reductions for the given nonattainment area, or approximately 3 percent of total baseline emissions.

Given CARB's wide array of mobile source control programs, the relatively limited portion of emissions primarily regulated by the local air district, and the fact that primarily-federally regulated sources are expected to account for approximately 56 percent of statewide NO<sub>x</sub> emissions by 2037,<sup>31</sup> finding a single triggered measure that will achieve the required reductions would be nearly impossible. That said, even discounting reducing the amount required percentage reductions to reflect the proportion of emissions that is primarily-federally regulated, approximately 1.3 percent of total baseline emissions would still be needed- from CARB and the district from contingency measures. Even targeting a lower percentage, additional control measures that can be identified by CARB are scarce or nonexistent that would achieve the require emission reductions needed for a contingency measure.

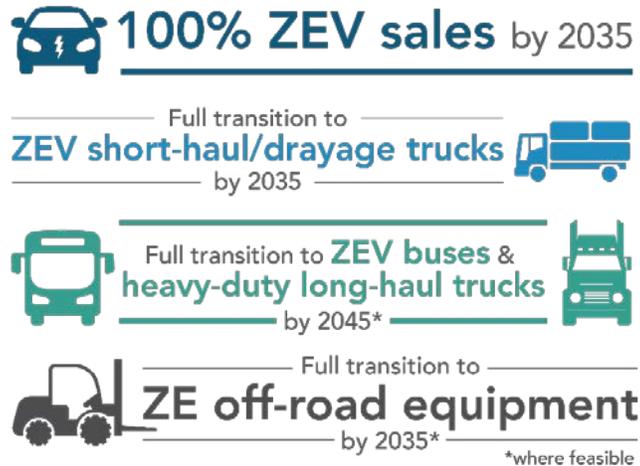
Adding to the difficulty of identifying available control measures, not only does the suite of contingency measures need to achieve a large amount of reductions, but it will also need to achieve these reductions in the year following the year in which the failure to attain or meet RFP has been identified. Control measures achieving the level of reductions required may take years to implement and will likely not result in immediate reductions. In the 2022 State SIP Strategy, CARB's three largest NO<sub>x</sub> reduction measures, In-Use Locomotive Regulation, Zero Emission Standards for Space and Water Heaters and Advanced Clean Fleets, rely on accelerated turnover of older engines/trucks. Buildup of infrastructure and equipment options limits the availability to have significant emission reductions in a short amount of time. Unless the U.S. EPA changes its historic stance or finds a reasoned justification for requiring less than the stated amount, adopting a single triggered measure that can be implemented and achieve the necessary reductions in the time frame required is scarce/difficult in California and may not be possible.

CARB has over 50 years of experience reducing emissions from mobile and other sources of pollution under State authority. The Reasonably Available Control Measures for State Sources analysis illustrates the reach of CARB's current programs and regulations, many of which set the standard nationally for other states to follow. Few sources CARB has primary regulatory authority over remain without a control measure, and all control measures that are in place support the attainment of the NAAQS. There is a lack or scarcity of additional control measures that would be able to achieve the necessary reductions for a contingency measure. Due to the unique air quality challenges California faces, should such additional measures exist, CARB would pursue those measures to support expeditious attainment of the NAAQS and would not reserve such measures for contingency purposes. Nonetheless, CARB continues to explore options for potential statewide contingency measures utilizing its authorities in anticipation of the U.S. EPA's written guidance. CARB anticipates that the U.S. EPA's guidance will allow an assessment of viability of such a State-wide measure.

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<sup>31</sup> Source: CARB 2019 CEPAM v1.03; based on 2037 emissions totals.

A central issue in considering a statewide contingency measure under CARB’s authority, is that CARB is already fully committed to the “drive to zero” effort. In 2020, Governor Newsom signed Executive Order N-79-20 (Figure 4-6) that established a first-in-the-nation goal for 100 percent of California sales of new passenger cars and trucks to be zero emission by 2035. The Governor’s order set a goal to transition 100 percent of the drayage truck fleet to zero emission by 2035, all off-road equipment where feasible to zero emission by 2035, and the remainder of the medium and heavy-duty vehicles to zero emission where feasible by 2045.



**FIGURE 4-6**  
**GOVERNOR NEWSOM EXECUTIVE ORDER N-79-20**

CARB is committed to achieving these goals. CARB’s programs therefore not only go beyond emissions standards and programs set at the federal level, but many include zero emissions requirements or otherwise, through incentives and voluntary programs, drive mobile sources to zero emissions, as listed in Table 4-10 below. CARB is also exploring and developing a variety of new measures to drive more source categories to zero emissions and reduce emissions even further, as detailed in the 2022 State Strategy for the State Implementation Plan. With most source categories being driven to zero emissions, opportunities for which a triggered measure that could reduce emissions by the amount required for contingency measures are scarce.

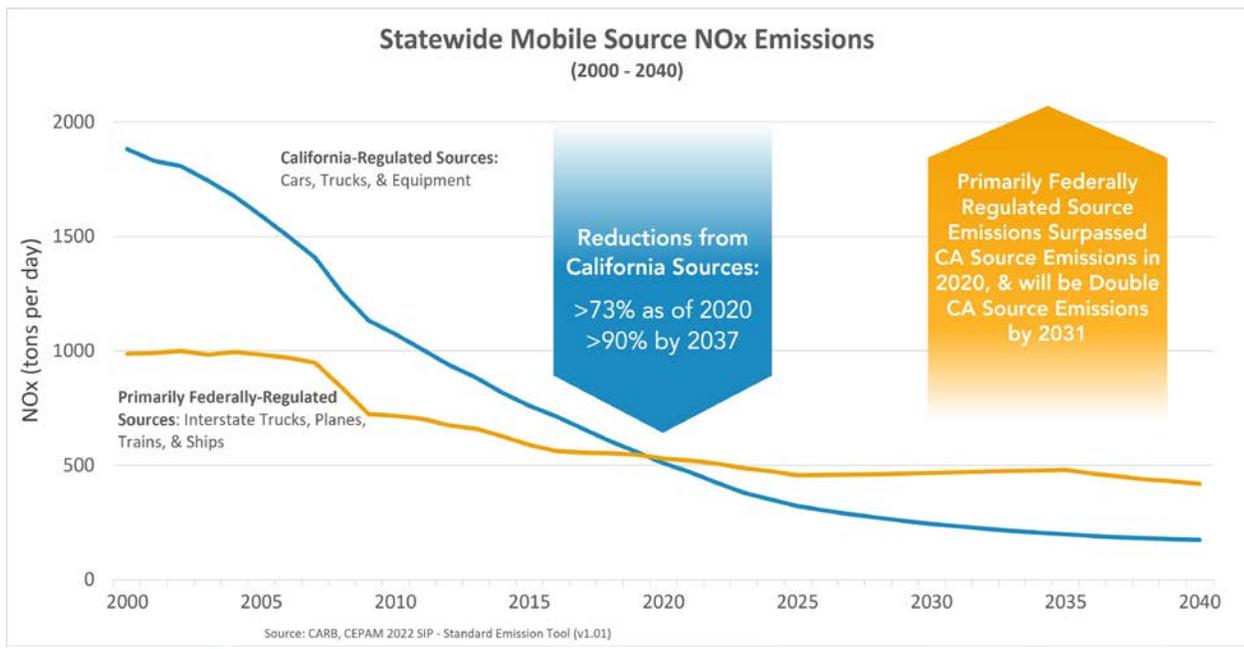
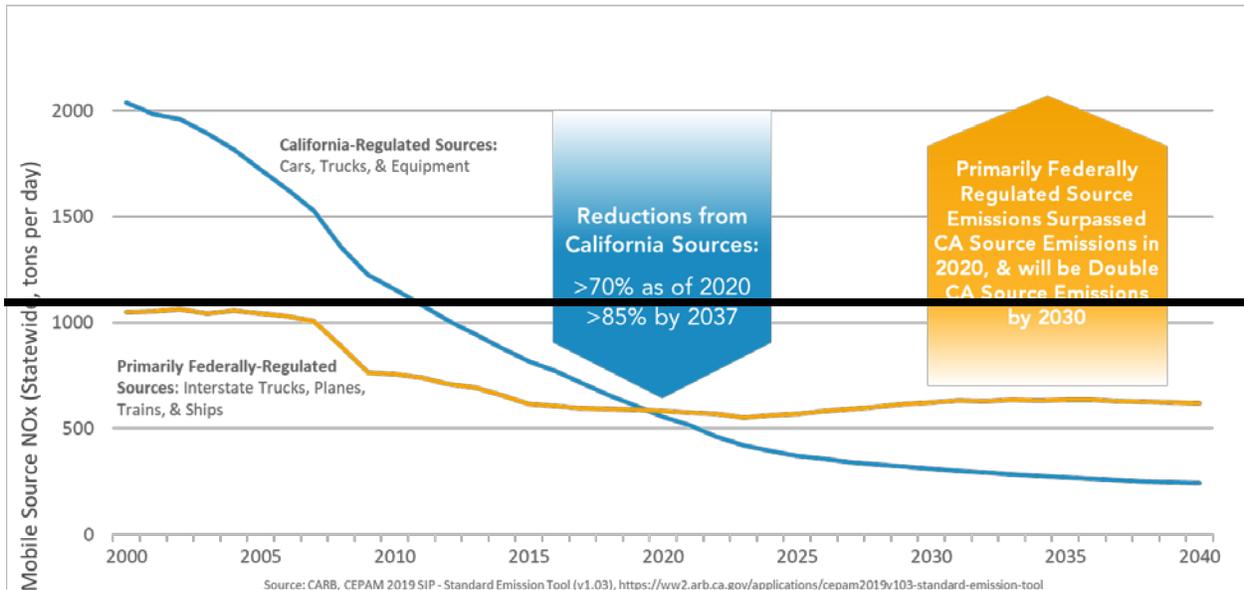
**TABLE 4-10**  
**EMISSIONS SOURCES AND RESPECTIVE CARB PROGRAMS WITH A ZERO EMISSIONS**  
**REQUIREMENT/COMPONENT**

Emission Source	Regulatory Programs
Light-Duty Passenger Vehicles and Light-Duty Trucks	<ul style="list-style-type: none"> <li>• Advanced Clean Cars Program (I and II<sup>a</sup>), including the Zero Emission Vehicle Regulation</li> <li>• Clean Miles Standard <sup>a</sup></li> </ul>
Motorcycles	<ul style="list-style-type: none"> <li>• On-Road Motorcycle Regulation <sup>a</sup></li> </ul>
Medium-Duty Trucks	<ul style="list-style-type: none"> <li>• Advanced Clean Cars Program (I and II<sup>a</sup>), including the Zero Emission Vehicle Regulation</li> <li>• Zero Emission Powertrain Certification Regulation</li> <li>• Advanced Clean Trucks Regulation</li> <li>• Advanced Clean Fleets Regulation <sup>a</sup></li> </ul>
Heavy-Duty Trucks	<ul style="list-style-type: none"> <li>• Zero Emission Powertrain Certification Regulation</li> <li>• Advanced Clean Trucks Regulation</li> <li>• Advanced Clean Fleets Regulation <sup>a</sup></li> </ul>
Heavy-Duty Urban Buses	<ul style="list-style-type: none"> <li>• Innovative Clean Transit</li> <li>• Advanced Clean Fleets Regulation <sup>a</sup></li> </ul>
Other Buses, Other Buses – Motor Coach	<ul style="list-style-type: none"> <li>• Zero Emission Airport Shuttle Regulation</li> <li>• Advanced Clean Fleets Regulation <sup>a</sup></li> </ul>
Commercial Harbor Craft	<ul style="list-style-type: none"> <li>• Commercial Harbor Craft Regulation</li> </ul>
Recreational Boats	<ul style="list-style-type: none"> <li>• Spark-Ignition Marine Engine Standards <sup>a</sup></li> </ul>
Transport Refrigeration Units	<ul style="list-style-type: none"> <li>• Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (Parts I and II <sup>a</sup>)</li> </ul>
Industrial Equipment	<ul style="list-style-type: none"> <li>• Zero Emission Forklifts <sup>a</sup></li> <li>• Off-Road Zero Emission Targeted Manufacturer Rule <sup>a</sup></li> </ul>
Construction and Mining	<ul style="list-style-type: none"> <li>• Off-Road Zero Emission Targeted Manufacturer Rule <sup>a</sup></li> </ul>
Airport Ground Support Equipment	<ul style="list-style-type: none"> <li>• Zero Emission Forklifts <sup>a</sup></li> </ul>
Port Operations and Rail Operations	<ul style="list-style-type: none"> <li>• Cargo Handling Equipment Regulation</li> <li>• Off-Road Zero Emission Targeted Manufacturer Rule <sup>a</sup></li> </ul>
Lawn and Garden	<ul style="list-style-type: none"> <li>• Small Off-Road Engine Regulation</li> <li>• Off-Road Zero Emission Targeted Manufacturer Rule <sup>a</sup></li> </ul>
Ocean-Going Vessels	<ul style="list-style-type: none"> <li>• At Berth Regulation</li> </ul>
Locomotives	<ul style="list-style-type: none"> <li>• In-Use Locomotive Regulation <sup>a</sup></li> </ul>

<sup>a</sup> Indicates program or regulation is in development.

There are few sources remaining without a control measure implemented by CARB, and those that do remain are primarily-federally regulated sources (Figure 4-7). This includes interstate trucks, ships, locomotives, aircraft, and certain categories of off-road equipment, constituting a large source of potential emission reductions. Since these are primarily regulated at the federal and, in some cases,

international level, options to implement a contingency measure with reductions approximately equivalent to one year’s worth of emission reductions are limited.



**FIGURE 4-7**  
**COMPARISON OF STATEWIDE NOx EMISSIONS SOURCES REGULATED**  
**PRIMARILY BY THE FEDERAL GOVERNMENT AND PRIMARILY BY CALIFORNIA**

## South Coast AQMD's Opportunities for Contingency Measures

South Coast AQMD has over 40 years of experience regulating stationary point and area sources with highly mature rules and programs in place to reduce emissions. Given the maturity of our control programs, opportunities to identify contingency measures that would achieve surplus reductions are limited – most feasible measures to reduce emissions have already been taken. Our ability to identify contingency measures is further hampered by recent case law as previously discussed. Contingency measures must take effect only if South Coast AQMD fails to meet Clean Air Act milestones. The primary milestone for the 2022 AQMP is the attainment year, 2037, which therefore requires us to anticipate a contingency measure that is surplus to our control strategy and could be enacted in 2038 if the South Coast Air Basin fails to attain the 70 ppb standard. Were such a measure to be identified, South Coast AQMD would not delay implementation until 2038, but would instead implement the measure as soon as possible to assist with attainment of other air quality standards with upcoming attainment deadlines.

Stationary sources are composed of several categories ranging from fuel combustion to surface coatings. A full list of stationary source emission source categories is shown in Table 4-11, which also displays the corresponding NOx and VOC rules. Developing a contingency measure would be straightforward if an emission source category remained unregulated. The only source category with the potential to emit VOC or NOx that does not have a corresponding rule is Pesticides/Fertilizers; however, a control measure targeting this category would achieve only marginal VOC reductions. Every other source category is already covered by at least one rule and as many as thirteen rules. Additional measures are proposed in the 2022 AQMP including those for residential and commercial buildings to ensure that all combustion sources are addressed. Thus, there are no unregulated emission sources in the Basin, highlighting an additional hurdle to designing effective contingency measures.

TABLE 4-11

## SOUTH COAST AQMD RULES COVERING STATIONARY MAJOR SOURCE CATEGORIES (MSC)

MSC	Description	VOC Rules	NOx Rules
<b>Fuel Combustion</b>			
<u>10</u>	<u>Electric Utilities</u>		<u>Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities</u> <u>Rule 429.2 - Start-Up and Shutdown Exemption Provisions for Oxides of Nitrogen from Electricity Generating Facilities</u>
<u>20</u>	<u>Cogeneration</u>		<u>Rule 1134 - Emissions of Oxides of Nitrogen from Stationary Gas Turbines</u> <u>Rule 429 - Start-Up and Shutdown Exemption Provisions for Oxides of Nitrogen</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>30</u>	<u>Oil and Gas Production (combustion)</u>	<u>Rule 1118.1 – Control of Emissions from Non-Refinery Flares</u>	<u>Rule 1118.1 – Control of Emissions from Non-Refinery Flares</u>
<u>40</u>	<u>Petroleum Refining (combustion)</u>	<u>Rule 1114 – Petroleum Refinery Coking Operations</u>	<u>Rule 1109.1 - Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations</u> <u>Rule 429.1 - Start-Up and Shutdown Provisions at Petroleum Refineries and Related Operations</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>50</u>	<u>Manufacturing and Industrial</u>	<u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u>	<u>Rule 1112 – Emissions of Oxides of Nitrogen from Cement Kilns</u> <u>Rule 1117 – Emissions from Container Glass Melting and Sodium Silicate Furnaces</u> <u>Rule 1147 – NOx Reductions from Miscellaneous Sources</u> <u>Rule 1147.1 - NOx Reductions from Aggregate Dryers</u> <u>Rule 1147.2 - NOx Reductions from Metal Melting and Heating Furnaces</u> <u>Rule 1159 – Nitric Acid Units – Oxides of Nitrogen</u> <u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u> <u>Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces</u> <u>Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</u>

MSC	Description	VOC Rules	NOx Rules
			<p><u>Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</u></p> <p><u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u></p> <p><u>Rule 476 – Steam Generating Equipment</u></p>
52	<u>Food and Agricultural Processing</u>	<p><u>Rule 1138 – Control of Emissions from Restaurant Operations</u></p> <p><u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u></p>	<p><u>Rule 1153.1 - Emissions of Oxides of Nitrogen from Commercial Food Ovens</u></p> <p><u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u></p> <p><u>Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces</u></p> <p><u>Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</u></p> <p><u>Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</u></p> <p><u>Rule 1147 – NOx Reductions from Miscellaneous Sources</u></p> <p><u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u></p> <p><u>Rule 476 – Steam Generating Equipment</u></p>
60	<u>Service and Commercial</u>	<u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u>	<p><u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u></p> <p><u>Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces</u></p> <p><u>Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</u></p> <p><u>Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</u></p> <p><u>Rule 1147 – NOx Reductions from Miscellaneous Sources</u></p> <p><u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u></p> <p><u>Rule 476 – Steam Generating Equipment</u></p>
99	<u>Other (fuel combustion)</u>	<u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u>	<p><u>Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines</u></p> <p><u>Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces</u></p> <p><u>Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial</u></p>

<u>MSC</u>	<u>Description</u>	<u>VOC Rules</u>	<u>NOx Rules</u>
			<u>Boilers, Steam Generators, and Process Heaters</u> <u>Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</u> <u>Rule 1147 – NOx Reductions from Miscellaneous Sources</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<b>Waste Disposal</b>			
<u>110</u>	<u>Sewage Treatment</u>	<u>Rule 1179 – Publicly Owned Treatment Works Operations</u> <u>Rule 442 – Usage of Solvents</u>	<u>Rule 1179.1 – Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities</u> <u>Rule 1118.1 – Control of Emissions from Non-Refinery Flares</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>120</u>	<u>Landfills</u>	<u>Rule 1150 – Excavation of Landfill Sites</u> <u>Rule 1150.1 – Control of Gaseous Emissions from Municipal Solid Waste Landfills</u> <u>Rule 1150.2 – Control of Gaseous Emissions from Inactive Landfills</u> <u>Rule 442 – Usage of Solvents</u>	<u>Rule 1150.3 – Emissions of Oxides of Nitrogen from Combustion Equipment at Landfills</u> <u>Rule 1118.1 – Control of Emissions from Non-Refinery Flares</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>130</u>	<u>Incineration</u>		<u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u>
<u>140</u>	<u>Soil Remediation</u>	<u>Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil</u>	<u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u>
<u>199</u>	<u>Other (Waste Disposal)</u>	<u>Rule 1133.1 – Chipping and Grinding Activities</u> <u>Rule 1133.2 – Emission Reductions from Co-Composting Operations</u> <u>Rule 1133.3 – Emission Reductions from Greenwaste Composting Operations</u> <u>Rule 442 – Usage of Solvents</u>	<u>Rule 1118.1 – Control of Emissions from Non-Refinery Flares</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<b>Cleaning and Surface Coatings</b>			
<u>210</u>	<u>Laundering</u>	<u>Rule 1102 – Dry Cleaners Using Solvent Other Than Perchloroethylene</u>	
<u>220</u>	<u>Degreasing</u>	<u>Rule 1122 – Solvent Degreasers</u>	

MSC	Description	VOC Rules	NOx Rules
		<u>Rule 1171 – Solvent Cleaning Operations</u> <u>Rule 442 – Usage of Solvents</u>	
230	<u>Coatings and Related Processes</u>	<u>Rule 1104 – Wood Flat Stock Coating Operations</u> <u>Rule 1106 – Marine and Pleasure Craft Coating</u> <u>Rule 1107 – Coating of Metal Parts and Products</u> <u>Rule 1115 – Motor Vehicle Assembly Line Coating Operations</u> <u>Rule 1124 – Aerospace Assembly and Component Manufacturing Operations</u> <u>Rule 1125 – Metal Container, Closure, and Coil Coating Operations</u> <u>Rule 1126 - Magnet Wire Coating Operations</u> <u>Rule 1132 – Further Control of VOC Emissions from High-Emitting Spray Booths</u> <u>Rule 1136 – Wood Products Coatings</u> <u>Rule 1145 – Plastic, Rubber, Leather, and Glass Coatings</u> <u>Rule 1151 – Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations</u> <u>Rule 1162 – Polyester Resin Operations</u> <u>Rule 442 – Usage of Solvents</u>	
240	<u>Printing</u>	<u>Rule 1128 – Paper, Fabric, and Film Coating Operations</u> <u>Rule 1130 – Graphic Arts</u> <u>Rule 1130.1 – Screen Printing Operation</u> <u>Rule 442 – Usage of Solvents</u>	
250	<u>Adhesives and Sealants</u>	<u>Rule 1168 – Adhesive and Sealant Applications</u> <u>Rule 442 – Usage of Solvents</u>	
299	<u>Other (Cleaning and Surface Coatings)</u>	<u>Rule 442 – Usage of Solvents</u> <u>Rule 1144 – Metalworking Fluids and Direct-Contact Lubricants</u> <u>Rule 1171 – Solvent Cleaning Operations</u>	
<b>Petroleum Production and Marketing</b>			

MSC	Description	VOC Rules	NOx Rules
310	<u>Oil and Gas Production</u>	<u>Rule 1148 – Thermally Enhanced Oil Recovery Wells</u> <u>Rule 1148.1 – Oil and Gas Production Wells</u> <u>Rule 1148.2 – Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers</u> <u>Rule 1176 – VOC Emissions from Wastewater Systems</u> <u>Rule 463 – Organic Liquid Storage</u>	
320	<u>Petroleum Refining</u>	<u>Rule 1123 - Refinery Process Turnarounds</u> <u>Rule 1149 – Storage Tank and Pipeline Cleaning and Degassing</u> <u>Rule 1173 – Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants</u> <u>Rule 1176 – VOC Emissions from Wastewater Systems</u> <u>Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities</u> <u>Rule 1180 – Refinery Fenceline and Community Air Monitoring</u> <u>Rule 462 – Organic Liquid Loading</u> <u>Rule 463 – Organic Liquid Storage</u> <u>Rule 464 – Wastewater Separators</u> <u>Rule 465 – Refinery Vacuum-Producing Devices or Systems</u> <u>Rule 466 – Pumps and Compressors</u> <u>Rule 466.1 – Valves and Flanges</u> <u>Rule 467 – Pressure Relief Devices</u>	
330	<u>Petroleum Marketing</u>	<u>Rule 1170 – Methanol Compatible Fuel Storage and Transfer</u> <u>Rule 1142 – Marine Tank Vessel Operations</u>	

<u>MSC</u>	<u>Description</u>	<u>VOC Rules</u>	<u>NOx Rules</u>
		<u>Rule 461 – Gasoline Transfer and Dispensing</u> <u>Rule 461.1 – Gasoline Transfer and Dispensing for Mobile Fueling Operations</u>	
<u>399</u>	<u>Other (Petroleum Production and Marketing)</u>	<u>Rule 1176 – VOC Emissions from Wastewater Systems</u> <u>Rule 1177 – Liquified Petroleum Gas Transfer and Dispensing</u> <u>Rule 1189 – Emissions from Hydrogen Plant Process Vents</u> <u>Rule 462 – Organic Liquid Loading</u> <u>Rule 463 – Organic Liquid Storage</u>	
<b><u>Industrial Processes</u></b>			
<u>410</u>	<u>Chemical</u>	<u>Rule 1103 – Pharmaceutical and Cosmetic Manufacturing Operations</u> <u>Rule 1141 – Control of Volatile Organic Compound Emissions from Resin Manufacturing</u> <u>Rule 1141.1 – Coatings and Ink Manufacturing</u> <u>Rule 1141.2 – Surfactant Manufacturing</u> <u>Rule 1163 – Control of Vinyl Chloride Emissions</u> <u>Rule 1173 - Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants</u> <u>Rule 442 – Usage of Solvents</u> <u>Rule 462 – Organic Liquid Loading</u> <u>Rule 463 – Organic Liquid Storage</u>	<u>Rule 1159 – Nitric Acid Units – Oxides of Nitrogen</u>
<u>420</u>	<u>Food and Agriculture</u>	<u>Rule 1131 – Food Product Manufacturing and Process Operations</u> <u>Rule 1138 – Control of Emissions from Restaurant Operations</u> <u>Rule 1153 – Commercial Bakery Ovens</u> <u>Rule 442 – Usage of Solvents</u>	
<u>430</u>	<u>Mineral Processes</u>	<u>Rule 442 – Usage of Solvents</u>	
<u>440</u>	<u>Metal Processes</u>	<u>Rule 442 – Usage of Solvents</u>	

<u>MSC</u>	<u>Description</u>	<u>VOC Rules</u>	<u>NOx Rules</u>
<u>450</u>	<u>Wood and Paper</u>	<u>Rule 442 – Usage of Solvents</u>	
<u>460</u>	<u>Glass and Related Products</u>	<u>Rule 442 – Usage of Solvents</u>	
<u>470</u>	<u>Electronics</u>	<u>Rule 1164 – Semiconductor Manufacturing</u>	
<u>499</u>	<u>Other (Industrial Processes)</u>	<u>Rule 1133 Composting and Related Operations – General Administrative Requirements</u> <u>Rule 1133.1 – Chipping and Grinding Activities</u> <u>Rule 1133.2 – Emission Reductions from Co-Composting Operations</u> <u>Rule 1133.3 – Emission Reductions from Greenwaste Composting Operations</u> <u>Rule 1162 – Polyester Resin Operations</u> <u>Rule 442 – Usage of Solvents</u> <u>Rule 462 – Organic Liquid Loading</u> <u>Rule 463 – Organic Liquid Storage</u>	
<b><u>Solvent Evaporation</u></b>			
<u>510</u>	<u>Consumer Products</u>	<u>Rule 1143 – Consumer Paint Thinners and Multi-Purpose Solvents</u> <u>Rule 1168 – Adhesive and Sealant Applications</u>	
<u>520</u>	<u>Architectural Coatings and Related Solvent</u>	<u>Rule 1113 – Architectural Coatings</u>	
<u>530</u>	<u>Pesticides/Fertilizers</u>	<u>Rule 1133.2 – Emission Reductions from Co-Composting Operations</u> <u>Rule 1133.3 – Emission Reductions from Greenwaste Composting Operations</u>	
<u>540</u>	<u>Asphalt Paving/Roofing</u>	<u>Rule 1108 – Cutback Asphalt</u> <u>Rule 1108.1 – Emulsified Asphalt</u> <u>Rule 470 – Asphalt Air Blowing</u>	
<b><u>Miscellaneous Processes</u></b>			
<u>610</u>	<u>Residential Fuel Combustion</u>		<u>Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces</u> <u>Rule 1121 – Control of Nitrogen Oxides from Residential Type, Natural-Gas-Fired Water Heaters</u>

<u>MSC</u>	<u>Description</u>	<u>VOC Rules</u>	<u>NOx Rules</u>
<u>620</u>	<u>Farming Operations</u>	<u>Rule 1127 – Emission Reductions from Livestock Waste</u>	<u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>630</u>	<u>Construction and Demolition</u>	<u>N/A</u>	<u>N/A</u>
<u>640</u>	<u>Paved Road Dust</u>	<u>N/A</u>	<u>N/A</u>
<u>645</u>	<u>Unpaved Road Dust</u>	<u>N/A</u>	<u>N/A</u>
<u>650</u>	<u>Fugitive Windblown Dust</u>	<u>N/A</u>	<u>N/A</u>
<u>660</u>	<u>Fires</u>	<u>Rule 444 – Open Burning</u> <u>Rule 445 – Wood Burning</u>	<u>Rule 444 – Open Burning</u> <u>Rule 445 – Wood Burning</u>
<u>670</u>	<u>Waste Burning and Disposal</u>	<u>Rule 473 – Disposal of Solid and Liquid Wastes</u>	<u>Rule 473 – Disposal of Solid and Liquid Wastes</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>690</u>	<u>Cooking</u>	<u>Rule 1174 – Control of Volatile Organic Compound Emissions from the Ignition of Barbecue Charcoal</u>	<u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>699</u>	<u>Other (Miscellaneous Processes)</u>	<u>Rule 442 – Usage of Solvents</u> <u>Rule 472 – Reduction of Animal Matter</u>	<u>Rule 1147 – NOx Reductions from Miscellaneous Sources</u> <u>Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen</u> <u>Rule 476 – Steam Generating Equipment</u>
<u>999</u>	<u>RECLAIM</u>	<u>N/A</u>	<u>Rule 2002 – Allocations for Oxides of Nitrogen (NOx) and Oxides of Sulfur (SOx)</u>

An additional factor that hampers efforts to develop approvable contingency measures is the stringency of the 2022 AQMP control strategy. The Draft Final 2022 AQMP includes 49 control measures, 31 of which target stationary sources. An aggressive drive to zero emission technologies is embedded within most control measures demonstrating the scarcity of remaining emissions that could be targeted for contingency purposes. Case law further dictates that contingency measures must either follow U.S. EPA's current guidance regarding the amount of emission reductions required, which is 3 percent of base year emissions, or be supported by a reasoned justification for departing from such guidance. U.S. EPA is considering issuing revised guidance that may address this concern. For the 2018 base year, this equates to approximately 10.5 tons per day of NOx emissions. Of the 49 control measures in the 2022 AQMP, no measure achieves the required amount of NOx reductions in 2037. This highlights the challenge of developing approvable contingency measures and also the need for such measures to be included in the control strategy rather than reserving them for contingency purposes.

## Summary

At this time, Both South Coast AQMD and CARB have decades of experience developing stringent regulations and, as a result, have robust control programs which limit the ability to identify potential contingency measures that achieve surplus reductions. The Draft Final 2022 AQMP further raises the bar by including a zero emission component wherever feasible in most of our regulations, both those already adopted and those that are in development, and the vast majority of these regulations are statewide control measures. Beyond the wide array of sources CARB has that have been regulating regulated over the last few decades, and especially considering those we are driving to zero emission, there are few sources of emissions left for CARB or South Coast AQMD to implement additional controls under its our authorities. The few source categories that do not have control measures are primarily federally and internationally regulated.

Given the courts' decisions over the last few years, CARB and local air districts will need to implement contingency measures that, when triggered, would need to achieve one year's worth of emission reductions, or at least the relevant portion equivalent to the contribution of sources primarily regulated at the State and local level, unless a reasoned rationale for achieving less emission reductions can be provided. Considering the air quality challenges California and local air districts face, CARB such a measure would implement the measure logically be implemented as soon as possible to support expeditious attainment of the NAAQS as the Clean Air Act requires rather than withhold withholding it for contingency measure purposes. Should there be Furthermore, it is unreasonable to withhold a measure achieving that achieves the required requisite emission reductions, the measure would likely as such large emission reductions typically take more than one year to reduce the necessary emissions several years to achieve following approval.

CARB and South Coast AQMD fully intends intend to meet the contingency requirement as required by the Clean Air Act, but written U.S. EPA guidance that addresses the dilemma California faces is needed to provide direction and clarity for CARB and local air districts to develop and adopt approvable contingency measures. CARB continues and South Coast AQMD continue to explore potential contingency measures while awaiting the U.S. EPA's revised written guidance. Further, since it's been about Considering that 30 years, have elapsed since the U.S. EPA developed the original guidance was published, this may be the time for the U.S. EPA to update the guidance by formally changing its historic stance on the amount of

reductions required to meet the contingency measure requirement and allowing states with mature control programs to demonstrate that contingency measure opportunities are scarce.

## SIP Emission Reduction Commitment

The SIP emission reduction commitment in the 2022 AQMP reflects the estimated emission reductions from adopted rules and proposed measures. These are the emission reductions that we use to show progress in reducing emissions in an expeditious manner, and how the region will be able to meet the 2015 8-hour ozone standard. Not all emission reductions that occur are SIP-creditable – meaning they do not count for purposes of showing how an area will be able to meet federal air quality standards. To be SIP-creditable, emission reductions must meet specific U.S. EPA criteria (integrity elements) to provide confidence that the emission reductions relied upon to meet the standards will occur. The following sections first describe the methodology for calculating SIP emissions and creditable SIP reductions, then describe what procedures will be followed to ensure fulfillment of the commitment.

### SIP Emission Reduction Tracking

For purposes of tracking progress in emission reductions, the baseline emissions for the year 2037 (summer planning inventory) in the 2022 AQMP will be used, regardless of any subsequent new inventory information that may reflect more recent knowledge. This is to ensure that the same “currency” is used in measuring progress as was used in designing the AQMP and that there is an “apples to apples” comparison in evaluating emissions.

Any emission reductions achieved beyond the existing South Coast AQMD regulations are creditable only if there is also a mechanism to ensure that the commitments to achieve those emission reductions are enforceable. Therefore, in certain instances, the South Coast AQMD may have to adopt regulations to reflect the existing industry practices in order to claim SIP reduction credit, with the understanding that there may not be additional reductions beyond what has already occurred. Exceptions can be made where reductions are real, quantifiable, surplus to the 2022 AQMP baseline inventories, and enforceable through other State and/or federal regulations. Further, any emission inventory revisions, which have gone through a peer review and public review process, can also be SIP creditable.

The 2022 AQMP includes emission reductions from voluntary incentive measures to help meet the 2015 8-hour ozone standard. With reliance on voluntary incentive measures to achieve attainment of the federal ozone standard and for those measures to be SIP approved, the South Coast AQMD must design programs such that the emission reductions from these incentive measures are proven to be real, quantifiable, surplus, enforceable, and permanent.

There are key components required of a SIP submittal in order to rely on discretionary incentive programs to satisfy the CAA emission reduction requirements. These components include a demonstration addressing the “integrity elements” (the five requirements listed above), federally enforceable “backstop” commitments, technical support, funding, legal authority, public disclosure and provisions to track results that are common among the various voluntary incentive programs. The “backstop” commitments include a requirement to monitor emission reductions achieved by the voluntary incentive measures and to report annually to the U.S. EPA the amount of reductions achieved. If the U.S. EPA determines that insufficient

progress has been made, then substitute measures must be implemented to rectify the shortfall prior to the statutory implementation deadline. The South Coast AQMD is committed to developing detailed guidelines for voluntary incentive programs for individual incentive measures in accordance with the U.S. EPA's economic incentive programs guidelines. The following describes the necessary criteria that will be included in each of the incentive measures:

### *Integrity Elements to ensure Emission Reductions from Incentive Programs*

To be SIP-creditable, emission reductions from voluntary incentive measures must meet the U.S. EPA's integrity elements. The emission reductions must be real, quantifiable, surplus, enforceable, and permanent. This demonstration must include project type(s); project life; applicable incentive program guidelines by title and year; and analysis of applicable incentive program guidelines for consistency with the integrity elements. For the purposes of this demonstration, the following defines and provides examples of the key elements:

#### **Quantifiable**

Emission reductions are quantitatively measurable, supported by existing and acceptable technical data. The quantification should use well-established, publicly available, and approved emission factors and accepted calculation methodology. There must be procedures to evaluate and verify over time the level of emission reductions that are actually achieved.

#### **Surplus**

Emission reductions must be above and beyond all current and known future District, State, or federal regulations already included in the SIP. Annual tracking will account for any potential overlapping future regulations that could conflict with the surplus reductions. Emission reductions used to meet air quality attainment requirements are surplus as long as they are not otherwise relied on in the SIP, SIP-related requirements, and other State air quality programs adopted but not in the SIP, a consent decree, or federal rules that focus on reducing criteria pollutants or their precursors. In the event that a voluntary incentive program's emission reductions are already relied on to meet air quality-related program requirements, they are no longer surplus. In addition, the emission reductions are available only for the remaining useful life of the equipment being replaced (e.g., if the equipment being replaced had a remaining useful life of five years, the additional emission reductions from the new equipment are available for SIP or conformity purposes under this guidance only for five years).

#### **Enforceable**

The South Coast AQMD will be responsible for assuring that the emission reductions credited in the SIP will occur. Emission reductions and other required actions are enforceable if:

- a. They are independently verifiable;
- b. Program violations are defined;
- c. Those liable for emission reductions can be identified;
- d. The South Coast AQMD and the U.S. EPA maintain the ability to apply penalties and secure appropriate corrective action where applicable;
- e. The general public has access to the emissions-related information obtained from the source;

- f. The general public can file suits against sources for violations (with the exception of those owned and operated by Tribes); and
- g. They are practically enforceable in accordance with other U.S. EPA guidance on practicable enforceability.

Actual emission reductions, for example, can be assured through replacement equipment registration, recordkeeping and reporting, and inspections (initial inspection after installation and subsequent inspections on a regular basis thereafter, if needed) throughout the term of project. Specific enforcement mechanisms will be addressed in the guidelines for the individual incentive measures.

#### Permanent

The emission reductions are permanent if they occur over the duration of the voluntary incentive program, and for as long as they are relied on in the SIP. For example, those awarded incentives would need to ensure the projects are properly implemented and the reductions are occurring and will continue to occur. Recipients of the incentive awards would therefore agree to contract provisions, such as recordkeeping and reporting to track reductions and agreements that newly installed equipment would not be removed without concurrence of the South Coast AQMD (i.e., permanent placement) and the proof that the replaced equipment would be destroyed or at least not be operated in the Basin (e.g., pictures, certification). Detailed procedures to ensure permanent reductions will be described in the guidelines for the individual incentive measures.

## Reductions from Adopted Rules

A number of control measures contained in the 2016 AQMP have been adopted as rules. These adopted rules and their projected emission reductions become assumptions in developing the AQMP future year inventories. Although they are not part of the control strategy in the 2022 AQMP, continued implementation of those rules is essential in achieving clean air goals and maintaining the attainment demonstration. Table 1-2 of Chapter 1 lists the rules/control measures adopted into rules by the South Coast AQMD since the adoption of the 2016 AQMP and their expected emission reductions.

## Reductions from South Coast AQMD Control Measures

For purposes of implementing an approved SIP, the South Coast AQMD is committed to adopt and implement control measures that will achieve, in aggregate, emission reductions to demonstrate expeditious progress toward meeting the federal 2015 8-hour ozone standard. The South Coast AQMD is committed to adopt the control measures in Tables 4-2 and 4-3 unless these measures or a portion thereof are found infeasible, and other substitute measures that can achieve equivalent reductions in the same adoption or implementation timeframes are adopted. Findings of infeasibility will be made at a regularly scheduled meeting of the South Coast AQMD Governing Board with proper public notification. For purposes of the SIP commitment, infeasibility means that the proposed control technology is not reasonably likely to be available by the implementation date in question, or achievement of the emission reductions by that date is not technically or economically feasible. The reductions in Tables 4-2 and 4-3 are committed only to the extent needed to achieve attainment by the 2038 attainment deadline. If any substitution is needed, the alternative measures will need to achieve the same emission reductions or air quality benefit. The aggregate emission reduction commitments, along with the anticipated specific

control measures to meet that reduction commitment are made with the understanding that if there is a shortfall in the individual measures for a particular year, emission reductions from other control measures could be substituted. The South Coast AQMD acknowledges that this commitment is enforceable under CAA section 304(f). The U.S. EPA will not credit SIP reductions unless the control measures are adopted and approved into the SIP at the time the U.S. EPA takes action on the plan.<sup>32</sup>

## Cost Effectiveness

The CAA does not contemplate cost as a consideration in meeting NAAQS, and Supreme Court case law expressly prohibits the U.S. EPA from considering costs in establishing NAAQS. The cost of achieving additional emission reductions necessary to meet the standards will increase as the most cost-effective controls have already been implemented. Health and Safety Code (HSC) Section 40922 requires that the preliminary cost-effectiveness of each control measure be evaluated to the extent possible in the AQMP, and then ranked by cost-effectiveness. This cost-effectiveness ranking of each control measure is included in Chapter 6.–

~~For stationary source rules that will be implementing measures in the AQMP~~ **Cost-Effectiveness Thresholds for Rulemaking**

~~Cost-effectiveness must be considered as part of the development of both the AQMP as well as rules where Best Available Retrofit Control Technology (BARCT) emission standards will be established, the Health and Safety Code Section 40920.6 establishes specific requirements for evaluating. Although not a required component of the cost effectiveness during rulemaking. Previous AQMPs have established AQMP, cost-effectiveness thresholds have been established in previous AQMPs to be considered during subsequent help guide the rule making efforts development process. These thresholds are screening levels; they are not intended to use serve as a guidehard cap on cost-effectiveness for establishing new a given regulatory option. The section below discusses two potential options for thresholds and the process that would follow if a threshold is exceeded during rule development.~~

### **Background**

~~To help guide the rule development process, past AQMPs have developed cost-effectiveness thresholds for VOC and revised BARCT emission standards NOx. Thresholds were established based on the expected cost of controls in these previous plans. The 2012 AQMP established \$16,500 per ton of VOC and \$22,500 per ton of NOx (in 2012 dollars), and the 2016 AQMP established thresholds of \$30,000 per ton of VOC and \$50,000 per ton of NOx (in 2015 dollars) as the thresholds to help guide the analysis in subsequent rulemaking. In 2021 dollars, the threshold 2016 AQMP thresholds would be \$36,000 per ton of VOC and \$59,000 per ton of NOx. In order to account, adjusting for normal inflation that occurs every year, these~~

<sup>32</sup> U.S. EPA has in the past allowed about 10 percent of required reductions to be in the form of “enforceable commitments.”

values will be adjusted and without considering updates to the dollar year used for socioeconomic modeling in each subsequent rulemaking.<sup>33</sup>—control cost estimates.<sup>34</sup>

Staff is seeking input regarding revisions to the NOx threshold recognizing that the most cost-effective controls have likely been implemented and that additional NOx reductions from stationary sources are expected to cost more with less reductions than prior rulemaking efforts. As shown in Table 4-11 At the August 2022 Board meeting, staff provided an update on the Draft 2022 AQMP. Several board members had expressed concern that a NOx cost-effectiveness threshold of \$59,000 (as proposed in the Draft 2022 AQMP) may be too low to achieve the needed stationary source emission reductions. The Draft Final 2022 AQMP includes an aggressive stationary source control strategy that is generally based on a hierarchy of where emission standards would be based on technical and economic feasibility of first zero emission technologies, then low NOx emission technologies, and lastly ultra low NOx combustion technologies. Since the Draft 2022 AQMP has a higher commitment to zero emission and low NOx emission technologies, many stationary control measures have cost-effective ranges that are expected to be well above \$59,000 per ton of NOx reduced.

The methods to estimate costs during rulemaking are well established, however the thresholds used when considering those costs can vary. Below are two potential options for thresholds where staff is seeking feedback. As discussed in detail below, the first option would adjust the threshold put forward in the 2016 AQMP from \$50,000/ton of NOx and \$30,000/ton of VOC to \$59,000/ton NOx and \$36,000/ton VOC. These thresholds are based on previous costs of control technology as well as inflation of costs through time. The second option would consider the potential monetized health benefits of reducing pollution. This health-based option would result in a threshold of \$325,000/ton NOx. Staff sought comment on these two options. The proposed public process would be the same regardless of the threshold option that will be used to help guide future rulemaking. If a threshold is exceeded, staff would hold a public meeting to discuss rule options above and below the cost-effectiveness threshold, and seek public feedback. The rule package presented to the Board for its consideration would also include options above and below the threshold.

While both options are described below, the Draft Final AQMP adopts the health-based approach to cost-effectiveness outlined in Option 2. This option is more consistent with the benefit/cost analysis used in federal and CARB rulemaking, and ensures that the social costs/health impacts associated with air pollution are fully considered as well as the costs of compliance. Note that staff will continue to seek out the most cost-effective approach to reduce emissions during rulemaking, and the \$325,000/ton threshold neither considered a starting point for control costs, nor an absolute cap.

### **Option 1 – Thresholds Based on Control Costs**

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<sup>33</sup> Traditionally, the socioeconomic impact assessment accompanying each rulemaking uses the Marshall and Swift Equipment Cost Index to bring all costs to the same dollar year.

<sup>34</sup> The values shown here for stationary sources use the discounted cash flow method.

This option reflects the approach used in previous AQMPs. Using the cost-effectiveness thresholds from the 2016 AQMP and adjusting for inflation, the thresholds for the 2022 AQMP would be \$36,000 per ton of VOC and \$59,000 per ton of NOx. This option would also adjust cost-effectiveness thresholds for inflation annually instead of waiting for the next AQMP to update these values.<sup>35</sup>

As shown in Table 4-12 below, the cost-effectiveness of recently adopted or amended rules were generally under the cost-effective thresholds established in the 2016 AQMP. During the rulemaking process, emission standards that had controls that were well above the cost-effectiveness threshold were rejected with the goal of keeping the average cost-effectiveness for each class and category of equipment under the cost-effectiveness threshold. Additional details are available in the staff report for each adopted or amended rule.

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<sup>35</sup> Traditionally, the socioeconomic impact assessment accompanying each rulemaking uses the Marshall and Swift Equipment Cost Index to bring all costs to the same dollar year.

**TABLE 4-11****TABLE 4-12****COST-EFFECTIVENESS FOR RECENTLY ADOPTED SOUTH COAST AQMD RULES**

Rule Adoption/Amendment*	Rule Adoption/ Amendment Year	Cost-Effectiveness (\$/ton)**
1150.3 – Emissions of Oxides of Nitrogen from Combustion Equipment at Landfills	2021	\$27,200
1147.1 – NOx Reductions from Aggregate Dryers	2021	\$46,000
1109.1 – Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations	2021	\$11,000 to \$50,500
1117 – Emissions from Container Glass Melting and Sodium Silicate Furnaces	2020	\$22,700
1179.1 – Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities	2020	\$50,000
1118.1 – Control of Emissions from Refinery Flares	2019	\$45,000
1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines	2019	\$4,900 to \$11,500
1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines	2019	\$41,000
1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities	2018	\$5,630 to \$23,000
1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters/1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters/1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters	2018	\$26,500
1168 – Adhesive and Sealant Applications	2017	\$12,400

\* Rules only shown if they required a cost-effectiveness calculation in the socioeconomic analysis.

\*\* Cost-effectiveness is for NOx, except for Rule 1168 which is for VOC.

The cost-effectiveness thresholds are designed to provide a guide for establishing BARCT emission standards. To ensure that the maximum emission reductions can be achieved, it is important that an emission standard that can achieve significant reductions that are above the cost-effectiveness threshold are not automatically rejected. During the rulemaking process, if a proposed BARCT emission standard has a cost-effectiveness that is above the threshold, staff will hold a public meeting to discuss other emission standards with a cost-effectiveness at or below the cost-effectiveness threshold and/or compliance or implementation options to address an emission standard that is above the cost-effectiveness threshold. At the public hearing for the adoption or amendment of the emission standard,

staff must present the options to the emission standard if the cost-effectiveness is above the threshold, highlighting the potential emission reductions associated with each option. Staff is seeking input on this approach.

The South Coast AQMD rulemaking has traditionally focused on stationary source rules, however the 2016 AQMP and the 2022 AQMP include several mobile source control measures to be developed by the South Coast AQMD. The cost-effectiveness thresholds established in previous AQMPs have been developed specifically in consideration of costs that stationary sources are anticipated to face. Mobile source controls typically have higher costs per ton of emissions than stationary controls, especially if the control measure requires turnover before the end of the useful life of the mobile source equipment. As an example, many stationary controls allow for add-on controls to existing equipment, whereas mobile source controls often require complete replacement of vehicles by a compliance date or during the end of vehicle life. Another consideration is that mobile source technology is rapidly evolving, and costs for zero emissions vehicles are often anticipated to be significantly lower in future years (e.g., in the 2030s and 2040s). CARB implements many control measures related to mobile sources, including regulations and incentives, and cost data from those efforts can inform how the South Coast AQMD may consider cost-effectiveness for implementation of its own control measures. Given the anticipated rapidly declining costs of zero emissions technology, the potential overall costs of a mobile source regulation will vary depending on the time horizon evaluated, with near-term actions typically resulting in higher costs. Table 4-12~~13~~ below shows the cost-effectiveness of recent CARB rulemakings through 2032. ~~Most~~ Similarly, ~~most~~ of the Rule 2305 - Warehouse Indirect Source Rule options also are within the range of cost-effectiveness shown in Table 4-12~~13~~, with 14 of 18 scenarios analyzed below \$315,000/ton.

**TABLE 4-13**

**TABLE 4-12**

**NEAR-TERM COST-EFFECTIVENESS FOR RECENTLY ADOPTED CARB MOBILE SOURCE RULES**

CARB Regulation	Approximate Cost-Effectiveness (through 2032)
Airport Shuttle Bus	\$430,000/ton NOx
Innovative Clean Transit	\$271,000/ton NOx
At Berth (Ocean Going Vessels)	<del>\$83</del> 120,000/ton NOx
Low NOx Omnibus	\$39,000/ton NOx
Advanced Clean Trucks	\$22,000/ton NOx

An additional point of reference is the cost-effectiveness approach that CARB uses to implement various mobile source funding programs. While an incentive-based approach has many differences with a regulatory approach, it provides an example of potential costs to replace older, higher emitting vehicles with newer, lower emitting vehicles. For incentive programs, CARB typically calculates a weighted cost-effectiveness using multiple pollutants where the incentive cost is divided by  $\text{NO}_x + \text{reactive organic gas (ROG)} + \text{VOC} + (20 \times \text{PM})$ . ~~For on-road heavy duty zero~~ As mobile source fleets continue to move to lower emissions technologies through regulations (e.g., CARB's Truck and Bus rule), cost-effectiveness values are expected to increase because newer, more expensive technologies will achieve less emission vehicles following reductions relative to a cleaner fleet. This is reflected in how cost-effectiveness thresholds have evolved through the years for Carl Moyer Guidelines, CARB recently increased project funding. For example, in 1998 the cost-effectiveness as high as a limit was \$12,000 per weighted ton. As of 2021, this value has increased to \$33,000 per weighted ton for all projects, and up to \$500,000 per weighted ton for zero emissions on-road heavy duty projects.<sup>36,37</sup> In addition, a summary of recent funding program implementation is shown in Table 4-13~~14~~ below, with their cost-effectiveness values calculated based on the Carl Moyer Guidelines.<sup>38</sup> \_

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<sup>36</sup> Carl Moyer Guidelines Appendix C: [https://ww2.arb.ca.gov/sites/default/files/2022-01/FINAL\\_2017\\_gl\\_appendix\\_c\\_ADA\\_2021%20Board%20Approved%20Changes\\_11.19.21%20v1.2.pdf](https://ww2.arb.ca.gov/sites/default/files/2022-01/FINAL_2017_gl_appendix_c_ADA_2021%20Board%20Approved%20Changes_11.19.21%20v1.2.pdf).

<sup>37</sup> Weighted ton is a combined total emissions reduction based on the following formula:  $\text{NO}_x + \text{ROG} + \text{VOC} + (20 \times \text{PM})$

<sup>38</sup> Fiscal Year 2021-2022 Funding Plan for Clean Transportation Incentives Appendix H: [https://ww2.arb.ca.gov/sites/default/files/2021-10/fy21-22\\_fundingplan\\_appendix\\_h.pdf](https://ww2.arb.ca.gov/sites/default/files/2021-10/fy21-22_fundingplan_appendix_h.pdf).

**TABLE 4-13****TABLE 4-14****NEAR-TERM COST-EFFECTIVENESS FOR RECENTLY ADOPTED CARB MOBILE SOURCE INCENTIVES\***

<b>Funding Program</b>	<b>Project Type</b>	<b>Average Cost-Effectiveness (\$/weighted ton)<sup>a</sup></b>	<b>Total Funding (\$ millions)</b>
<b>Funding Program</b>	<b>Project Type</b>	<b>Average Cost-Effectiveness (\$/weighted ton)<sup>**</sup></b>	<b>Total Funding (\$ millions)</b>
Funding Agricultural Replacement Measures for Emissions Reductions (FARMER)	Off-Road Agriculture	\$12,900	\$131
	On-Road Trucks	\$946,000	\$22
	Zero Emission Agricultural Utility Terrain Vehicles (UTV)	\$129,000	\$18
Community Air Protection (AB 617)	Infrastructure	N/A	\$30
	Locomotives	\$18,000	\$25
	Marine Vessels	\$23,000	\$38
	Off-Road Agricultural	\$8,000	\$71
	Off-Road Other	\$24,358	\$58
	On-Road	\$101,000	\$55
Carl Moyer	Infrastructure	N/A	\$23
	Locomotives	\$12,000	\$84
	Marine Vessels	\$14,000	\$160
	Off-Road Agricultural	\$12,000	\$375
	Off-Road Other	\$18,000	\$264
	On-Road	\$39,000	\$210
	Car Scrap	\$12,000	\$33

TABLE 4-1314 (CONTINUED)

## NEAR-TERM COST-EFFECTIVENESS FOR RECENTLY ADOPTED CARB MOBILE SOURCE INCENTIVES\*

Funding Program	Project Type	Average Cost-Effectiveness (\$/weighted ton) <sup>a**</sup>	Total Funding (\$ millions)
Low Carbon Transportation (Vehicle Purchase)	Clean Vehicle Rebate Project (Standard)	\$258,705	\$991
	Clean Vehicle Rebate Project (Increased)	\$581,936	\$100
	Clean Cars 4 All	\$463,187	\$104
	Financing Assistance for Low Income Consumers	\$912,243	\$9
Low Carbon Transportation (Clean Mobility)	Clean Mobility Options	\$6,043,789	\$10
	Clean Mobility in Schools	\$1,283,000	\$25
	Agricultural Worker Vanpools	\$714,020	\$6
	Rural School Bus Pilot	\$78,234	\$62
Low Carbon Transportation (Heavy-Duty and Off-Road)	Heavy-Duty Demos and Pilots	\$760,000	\$149
	Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP)	\$213,776	\$385
	Clean Off-Road Equipment (CORE)	\$222,458	\$19
	Truck Loan Assistance Program	\$16,093	\$108

\* This table shows average cost-effectiveness of funded projects in the past several years. Individual projects within each program are more expensive than the averages shown here (e.g., projects within Carl Moyer can reach \$500,000/weighted ton).

\*\* Weighted ton is a combined total emissions reduction based on the following formula:  $\text{NO}_x + \text{CO} + \text{VOC} + (20 \times \text{PM})$ .

The average cost-effectiveness across the \$3.5 billion of projects shown in Table 4-1314 is about \$200,000 per weighted ton.<sup>39</sup> This cost-effectiveness level is the proposed threshold that would be applied to the South Coast AQMD mobile source control measures. Similar to the thresholds proposed for stationary sources, this threshold would be inflated through time to the dollar year used in a control measure-specific socioeconomic analysis. The proposed cost-effectiveness thresholds presented here do not consider the potential reduction in cost due to availability of incentives. Table 4-1415 presents a summary of proposed the Option 1 cost-effectiveness thresholds that would be considered during implementation of control measures.

<sup>39</sup> The values shown for mobile source incentives do not use the discounted cash flow method, and instead are more similar to a levelized cash flow method.

**TABLE 4-1415**  
**PROPOSED COST-EFFECTIVENESS THRESHOLDS TRIGGERING ADDITIONAL ANALYSIS**  
**DURING SOUTH COAST AQMD CONTROL MEASURE IMPLEMENTATION**

Source Type	Cost-Effectiveness Threshold <sup>a,b</sup>
Stationary Sources	\$59,000/ton NO <sub>x</sub> / \$36,000/ton VOC
Mobile Sources	\$200,000/weighted ton $[NO_x + ROG + VOC + (20 \times PM)]$

- <sup>a</sup> Thresholds are in 2021 dollars and ~~will~~would be inflated to the dollar year used in a socioeconomic analysis for each specific control measure as it is implemented.
- <sup>b</sup> The threshold for stationary sources is based on the Discounted Cash Flow method, as traditionally used in South Coast AQMD rulemaking. In comparison, the threshold for mobile sources is based on the Levelized Cash Flow method to be consistent with CARB practice for statewide mobile source regulations. The Socioeconomic Report for each AQMP will continue to present the cost-effectiveness values using both methods for each control measure with quantified emission reductions.

With release of the Draft 2022 AQMP staff sought input regarding revisions to the NO<sub>x</sub> threshold recognizing that the most cost-effective controls have likely been implemented and that additional NO<sub>x</sub> reductions from stationary sources are expected to cost more with less reductions than prior rulemaking efforts. Two concerns raised about Option 1 are that costs are expected to be higher than the thresholds presented in Option 1, and setting a threshold too low could forego some needed emission reductions. Secondly, inconsistent thresholds for mobile and stationary sources may not be appropriate because emission reductions that are not achieved in one sector will need to be achieved in the other sector. Option 2 described below provides an alternative threshold approach to Option 1, and is the approach adopted in the Draft Final 2022 AQMP.

### **Option 2 – Health Benefit Based Threshold**

The approach described above for Option 1 is unique, and agencies such as CARB and U.S. EPA instead use a different approach of comparing the potential societal benefits of a regulation against the costs. Rulemaking for these agencies generally can proceed if the benefits of the regulation are expected to exceed its costs.<sup>40</sup>

This approach utilizes a benefit-cost analysis as a screening threshold instead of a cost-based approach. U.S. EPA has developed societal monetized benefit-per-ton estimates for PM<sub>2.5</sub> and ozone for many industrial sectors.<sup>41</sup> This analysis considers the societal public health benefit from improved air quality, such as reduced hospitalizations, reduced premature mortality, and other adverse public health outcomes. U.S. EPA's analysis includes estimates for 21 industrial sectors at the national level, with more refined analysis of some sectors at the state level. An example of national-level estimates of NO<sub>x</sub> reductions and their contribution to ozone and PM<sub>2.5</sub> reductions across 21 industrial sectors is shown in Table 4-16 below. Total benefit-per-ton of NO<sub>x</sub> reduction ranges from about \$71,000 to about \$159,000. The monetized benefits in Table 4-16 are based on avoided premature mortality and other less severe

<sup>40</sup> Guidelines for Preparing Economic Analyses, 2010. <https://www.epa.gov/sites/default/files/2017-08/documents/ee-0568-50.pdf>.

<sup>41</sup> [www.epa.gov/benmap/estimating-benefit-ton-reducing-directly-emitted-pm25-pm25-precursors-and-ozone-precursors](http://www.epa.gov/benmap/estimating-benefit-ton-reducing-directly-emitted-pm25-pm25-precursors-and-ozone-precursors).

health outcomes associated with either short-term (e.g., 8-hours) or long-term (e.g., several months) exposure to ozone, as well as exposure to PM<sub>2.5</sub>. Appendix I describes the expected health effects from ozone and PM<sub>2.5</sub> exposure in more detail.

TABLE 4-16

**NATIONAL ESTIMATES OF MONETIZED SOCIETAL BENEFITS-PER-TON OF NO<sub>x</sub> REDUCTION IN 2035  
ACROSS 21 INDUSTRIES (2016 DOLLARS)**

<b>Industrial Sector</b>	<b>Short Term Ozone*</b>	<b>Long Term Ozone*</b>	<b>PM<sub>2.5</sub>**</b>	<b>Total</b>
<u>Oil and Natural Gas</u>	<u>\$6,280</u>	<u>\$54,800</u>	<u>\$9,800</u>	<u>\$70,880</u>
<u>Taconite Mining</u>	<u>\$6,060</u>	<u>\$55,300</u>	<u>\$11,150</u>	<u>\$72,510</u>
<u>Primary Copper Smelting</u>	<u>\$8,560</u>	<u>\$63,300</u>	<u>\$5,365</u>	<u>\$77,225</u>
<u>Internal Combustion Engines</u>	<u>\$7,620</u>	<u>\$66,900</u>	<u>\$13,000</u>	<u>\$87,520</u>
<u>Residential Woodstoves</u>	<u>\$5,620</u>	<u>\$48,700</u>	<u>\$40,600</u>	<u>\$94,920</u>
<u>Oil and Natural Gas Transmissions</u>	<u>\$8,190</u>	<u>\$74,000</u>	<u>\$16,400</u>	<u>\$98,590</u>
<u>Boilers</u>	<u>\$8,850</u>	<u>\$79,400</u>	<u>\$18,600</u>	<u>\$106,850</u>
<u>Refineries</u>	<u>\$8,420</u>	<u>\$71,000</u>	<u>\$28,900</u>	<u>\$108,320</u>
<u>Coke Ovens</u>	<u>\$7,900</u>	<u>\$73,800</u>	<u>\$30,650</u>	<u>\$112,350</u>
<u>Cement Kilns</u>	<u>\$9,630</u>	<u>\$85,100</u>	<u>\$17,800</u>	<u>\$112,530</u>
<u>Synthetic Organic Chemical</u>	<u>\$9,240</u>	<u>\$85,300</u>	<u>\$20,600</u>	<u>\$115,140</u>
<u>Pulp and Paper</u>	<u>\$10,300</u>	<u>\$93,100</u>	<u>\$13,700</u>	<u>\$117,100</u>
<u>Integrated Iron and Steel</u>	<u>\$9,250</u>	<u>\$84,200</u>	<u>\$28,300</u>	<u>\$121,750</u>
<u>Electric Arc Furnaces and Argon-Oxygen Decarburization</u>	<u>\$10,200</u>	<u>\$90,700</u>	<u>\$23,400</u>	<u>\$124,300</u>
<u>Brick</u>	<u>\$10,800</u>	<u>\$97,000</u>	<u>\$33,200</u>	<u>\$141,000</u>
<u>Iron and Steel Foundries</u>	<u>\$11,400</u>	<u>\$102,000</u>	<u>\$28,950</u>	<u>\$142,350</u>
<u>Ferrous Alloys</u>	<u>\$12,300</u>	<u>\$115,000</u>	<u>\$18,600</u>	<u>\$145,900</u>
<u>Secondary Lead Smelters</u>	<u>\$12,500</u>	<u>\$111,000</u>	<u>\$28,400</u>	<u>\$151,900</u>
<u>Electrical Generating Unit</u>	<u>\$15,400</u>	<u>\$136,000</u>	<u>\$7,645</u>	<u>\$159,045</u>

\* 3% Discount Rate, \*\* Mid-Point Estimate

More specific state-level analysis is available for three industrial sectors, including Internal Combustion Engines, Boilers, and Electrical Generating Units (Table 4-16), for both NO<sub>x</sub> and VOC. Although there are only three sectors detailed at the state level, these sectors are all present widely in the South Coast Air Basin and are broadly representative in terms of cost for the 21 sectors shown in Table 4-16. The total benefits-per-ton in Table 4-17 can be viewed as the monetized societal benefit of reducing one ton of NO<sub>x</sub>. The costs are higher in Table 4-16 for the California-specific analysis compared to national estimates in Table 4-16 due to the higher population in California compared to other states (and hence greater monetized health benefits for reduced pollution) as well as the benefits from reducing emissions in regions with much higher pollution levels (e.g., South Coast Air Basin ozone and PM<sub>2.5</sub> levels are higher than elsewhere in the nation).

TABLE 4-17

**2035 BENEFITS-PER-TON OF NO<sub>x</sub> ESTIMATES IN CALIFORNIA (2021 DOLLARS)**

<u>Sector Name</u>	<u>NO<sub>x</sub> (tpy)<sup>*</sup></u>	<u>Short-Term O<sub>3</sub> Exposure</u>	<u>Long-Term O<sub>3</sub> Exposure</u>	<u>PM2.5</u>	<u>Total</u>
Boilers	5,706	\$14,793	\$119,972	\$57,074	\$191,839
ICE	4,121	\$22,946	\$180,540	\$88,057	\$291,543
EGU	9,403	\$40,767	\$313,325	\$30,867	\$384,959
<b><i>Benefits-per-ton (weighted by tons reduced)</i></b>					<b><i>\$307,636</i></b>

\* Technical Support Document: Estimating the Benefit per Ton of Reducing Directly-Emitted PM2.5, PM2.5 Precursors and Ozone Precursors from 21 Sectors, [www.epa.gov/system/files/documents/2021-10/source-apportionment-tsd-oct-2021\\_0.pdf](http://www.epa.gov/system/files/documents/2021-10/source-apportionment-tsd-oct-2021_0.pdf)

As an additional check on this estimate based on U.S. EPA analysis, a comparison can be made with estimates from the 2016 AQMP and its associated Socioeconomic Impact Assessment. The 2016 AQMP called for reducing 603,167 tons of NO<sub>x</sub> between 2017-2031. The total monetized public health benefit was estimated to be \$173.2 billion (in 2015 dollars). This results in a benefit of about \$342,000 per ton (2021 dollars), which is about 11% higher than the \$307,636 estimate in Table 4-17. Based on these analyses, Option 2 would use a screening threshold of \$325,000 per ton (2021 dollars) when evaluating the cost-effectiveness of proposed rules (\$325,00 is the mid-point between the estimates from the 2016 AQMP and Table 4-17). Cost-effectiveness would continue to be evaluated as the cost of controls divided by the tons of NO<sub>x</sub> reduced.

The mobile source regulatory and incentive-based cost-effectiveness values shown in Tables 4-13 and 4-14 are similar to the \$325,000 per ton screening threshold shown for Option 2. In order to be consistent across stationary and mobile source measures, the same screening threshold would be used for both mobile and stationary sources. This approach would be consistent with the monetized public health benefit analysis of the overall benefits of the AQMP, which account for all control measures (stationary and mobile). This benefits-based screening threshold would be inflated through time to the dollar year used in a control measure-specific socioeconomic analysis.

**Public Process if a Cost-Effectiveness Threshold is Exceeded**

It is important to set a threshold that is reflective of the cost of the technologies needed to achieve the emission reductions required for attainment. During the rulemaking process, if a proposed BARCT emission standard has a cost-effectiveness that is above the threshold, staff will hold a public meeting to discuss 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. At the public hearing for the adoption or amendment of the emission standard, staff must present the options to the emission standard if the cost-effectiveness is above the threshold, highlighting the potential emission reductions associated with each option.

The 2022 AQMP proposes to use the health benefit based cost-effectiveness threshold for NO<sub>x</sub> as a screening tool moving forward. This will align South Coast AQMD's cost-effectiveness approach with those of CARB and U.S. EPA. VOC measures would continue to use the cost-effectiveness threshold previously adopted in the 2016 adjusted with consumer price index. That value is currently \$36,000/ton VOC, and would be inflated by the consumer price index annually.

## Alternative/Substitute Measures

Under the 2022 AQMP, the South Coast AQMD will be allowed to substitute South Coast AQMD measures in Tables 4-2 and 4-3 with other measures, provided the overall equivalent emission reductions by the implementation dates in Tables 4-2 and 4-3 are maintained and the applicable measure in Tables 4-2 and 4-3 is deemed infeasible. In order to provide meaningful public participation, when new control concepts are introduced for rule development, the South Coast AQMD is committed to provide advanced public notification beyond its regulatory requirements (i.e., through its Rule Forecast Report). The South Coast AQMD will also report quantitatively on the AQMP's implementation progress annually at its regularly scheduled Governing Board meetings. Included in the reports will be any control measures being proposed or measures, or portions thereof, that have been found to be infeasible and the basis of such findings. In addition, at the beginning of the year, any significant emission reduction related rules to be considered are listed in the Governing Board's Rule Forecast Report. The annual report would also provide any finding of a new feasible control measure to substitute for a measure that has been deemed infeasible. The existing rule development outreach efforts such as public workshops, stakeholder working group meetings or public consultation meetings will continue to solicit public input. In addition, if additional technical analysis, including source testing, indicates that actual emissions are less than previously estimated, the reductions would then be creditable toward SIP commitments. In order for reductions from improved emission calculation methodologies to be SIP creditable, a public process and the Governing Board adoption hearing will also be instituted to solicit comments and make appropriate revisions, if necessary.

## Reductions from CARB Control Measures

The CARB proposed control measures presented in Table 4-9, combined with ongoing implementation of current control programs, will provide further reductions to enhance air quality progress and achieve the 2015 8-hour ozone standard. Ongoing implementation of current control programs is projected to reduce NOx emissions in the South Coast Air Basin from today's levels by ~~154~~167 tons per day in 2037. Achieving the benefits projected from the current control program will continue to require significant efforts for implementation and enforcement and thus, represents an important element of the overall strategy. The new measures contained in the 2022 State SIP Strategy commitment reflect a combination of State actions, petitions and advocacy for federal action, as well as actions that outline an additional transition to cleaner technologies and systems. Emissions reductions in the South Coast Air Basin from the new measures identified and quantified to date in the ~~Draft 2022~~2022 State SIP Strategy are estimated to be ~~72,989.3~~72,989.3<sup>42</sup> tons per day of NOx and 13.5 tons per day of VOC in 2037. Even when coupled with the emission reductions associated with ongoing implementation of the existing control program, additional reductions were needed to meet the 2015 8-hour ozone standard, which is significantly more stringent than previous ozone standards.

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<sup>42</sup> ~~CARB 2022 Draft State SIP Strategy ([https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft\\_2022\\_State\\_SIP\\_Strategy.pdf](https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft_2022_State_SIP_Strategy.pdf)), CARB 2022 State SIP Strategy can be downloaded at CARB's website: <https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy>.~~

## Overall Emission Reductions

Tables 4-1518 and 4-1619 identify projected reductions for the South Coast Air Basin based on the summer planning inventory for NOx and VOC emissions for the year of 2037 and 2032 respectively. These reductions reflect the emission reductions associated with implementation of control measures under local, State, and federal jurisdiction. Emission reductions represent the difference between the projected baseline and the remaining emissions.

**TABLE 4-1518**  
**EMISSION REDUCTIONS FOR 2032 BASED ON SUMMER PLANNING INVENTORY**  
**(TONS PER DAY)**

Sources	NOx	VOC
<b>Year 2032 Baseline<sup>a</sup></b>	<u>230199</u>	<u>386345</u>
<b>Emission Reductions:</b>		
South Coast AQMD Stationary Sources	3	1
South Coast AQMD Mobile Sources	<u>117</u>	0
<u>Sources under CARB's Direct Authority</u>	<u>24</u>	<u>5.5</u>
<u>CARB Mobile Sources Primarily-Federally and Internationally Regulated Sources – CARB Measures</u>	<u>6610</u>	<u>390.5</u>
<u>Federal Measures Primarily-Federally and Internationally Regulated Sources – Federal Action Needed<sup>b</sup></u>	<u>041</u>	<u>02</u>
<b>Total Reductions (all measures)<sup>bc</sup></b>	<u>8085</u>	<u>4010</u>
<b>2032 Remaining Emissions</b>	<u>151114</u>	<u>346336</u>

<sup>a</sup> Emission assumptions from SCAG's 2020 RTP/SCS are already reflected in the AQMP baseline, including TCMS

<sup>bb</sup> 182(e)(5) reductions from federal measures are allowed only for "extreme" nonattainment area. Include 26.2 tons per day NOx reduction from Ocean Going Vessel and 14.6 tons per day NOx reduction from aircraft emissions interpolated from 2022 to 2037.

<sup>c</sup> Numbers may not sum due to rounding

**TABLE 4-16**

**TABLE 4-19**

**EMISSION REDUCTIONS FOR 2037 BASED ON SUMMER PLANNING INVENTORY  
(TONS PER DAY)**

Sources	NOx	VOC
<b>Year 2037 Baseline<sup>a</sup></b>	<b>220184</b>	<b>389339</b>
<b>Emission Reductions:</b>		
South Coast AQMD Stationary Sources <sup>b</sup>	<del>2119</del>	1
South Coast AQMD Mobile Sources	<del>107</del>	0
CARB's Zero Emission Standard for Space and Water Heaters <sup>c</sup>	<u>3</u>	<u>0</u>
Sources under CARB's Direct Authority except residential and commercial Space and Water Heaters	<u>30</u>	<u>17.5</u>
CARB SIP Strategy <sup>b</sup> Primarily-Federally and Internationally Regulated Sources – CARB Measures	<del>10411</del>	<del>690.5</del>
Aircraft Primarily-Federally and Internationally Regulated Sources – Federal Action Needed	<del>1951</del>	3
South Coast Stationary Sources – Further Deployment of Cleaner Technology	3	<u>0</u>
<b>Total Reductions (all measures)</b>	<del>157125</del>	<del>7322</del>
Set-Aside Accounts <sup>d</sup>	-0.5	-4
<b>2037 Remaining Emissions<sup>de</sup></b>	<b><u>6360</u></b>	<b>321</b>

<sup>a</sup> Emission assumptions from SCAG's 2020 RTP/SCS are already reflected in the AQMP baseline, including TCMs.

<sup>b</sup> ~~Reductions from mobile sources include CARB 2016 and 2022 State Strategy. The emission reductions do not match with the draft 2022 SIP Strategy due to discrepancy in emissions inventory versions and base year used to forecast future emissions from. Final version will reconcile the discrepancy.~~

<sup>eb</sup> Exclude South Coast AQMD's C-CMB-01, C-CMB-02, R-CMB-01 and R-CMB-02 reductions

<sup>c</sup> South Coast AQMD's C-CMB-01, C-CMB-02, R-CMB-01 and R-CMB-02 will assist the CARB's measure

<sup>d</sup> SIP reserve for potential technology assessment and phaseout of toxics for VOC.

<sup>de</sup> Numbers may not sum due to rounding.

## Implementation of the ~~Proposed~~ Control Strategy

The 2022 AQMP requires significant amount of NOx emission reductions to meet the 2015 8-hour ozone standard. The only viable pathway to achieving this standard is a significant push to zero emissions technology across all sectors, where feasible, and implementation of the cleanest technologies available where not feasible. This approach requires economy-wide transition to different energy sources. The following sections ~~discussed~~ discuss the plans to implement the control strategies of the 2022 AQMP.

## Regulatory and Incentive Approach

The control strategies in the 2022 AQMP include new regulations and the development of incentive programs and supporting infrastructure for early deployment of advanced control technologies. The regulatory approach for the control strategy is described in detail for individual control measure as included in Appendix IV-A. Tables 4-1720 and 4-1821 list proposed adoption and implementation dates of the proposed stationary source control measures and mobile source control measures, respectively.

**TABLE 4-20**

**TABLE 4-17**

**ADOPTION AND IMPLEMENTATION SCHEDULE OF STAIONARY SOURCE CONTROL MEASURES**

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
<b>South Coast AQMD Stationary Source NOx Measures:</b>			
<b><i>Residential Combustion Source Measures:</i></b>			
R-CMB-01	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Water Heating [NOx]	2024	2029
R-CMB-02	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Space Heating [NOx]	2024	2029
R-CMB-03	Emissions Reductions from Residential Cooking Devices [NOx]	2024	2029
R-CMB-04	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Other Combustion Sources [NOx]	2024	2029
<b><i>Commercial Combustion Source Measures:</i></b>			
C-CMB-01	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Water Heating [NOx]	2025	2031
C-CMB-02	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Space Heating [NOx]	2025	2031
C-CMB-03	Emission Reductions from Commercial Cooking Devices [NOx]	2025	2031
C-CMB-04	Emission Reductions from Small Internal Combustion Engines [NOx]	2025	2026
C-CMB-05	NOx Reductions from Small Miscellaneous Commercial Combustion Equipment (Non-Permitted) [NOx]	2027	2037

TABLE 4-1720 (CONTINUED)

## ADOPTION AND IMPLEMENTATION SCHEDULE OF STAIONARY SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
<b>South Coast AQMD Stationary Source NOx Measures:</b>			
<b>Large Combustion Source Measures:</b>			
L-CMB-01	NOx Reductions from RECLAIM Facilities [NOx]	2022	2025
L-CMB-02	Reductions from Boilers and Process Heaters (Permitted) [NOx]	2027	2037
L-CMB-03	NOx Emission Reductions from Permitted Non-Emergency Internal Combustion Engines [NOx]	2026	2031
L-CMB-04	Emission Reductions from Emergency Standby Engines (Permitted) [NOx, VOC/VOCs]	2025	2031
L-CMB-05	NOx Emission Reductions from Large Turbines [NOx]	2027	2037
L-CMB-06	NOx Emission Reductions from Electric Generating Facilities [NOx]	2027	2037
L-CMB-07	Emission Reductions from Petroleum Refineries [NOx]	2027	2037
L-CMB-08	NOx Emission Reductions from Combustion Equipment at Landfills and Publicly Owned Treatment Works [NOx]	2025	2037
L-CMB-09	NOx Reductions from Incinerators [NOx]	2024	2029
L-CMB-10	NOx Reductions from Miscellaneous Permitted Equipment [NOx]	2027	2037
<b>South Coast AQMD Co-Benefits from Energy and Climate Change Programs Measures:</b>			
ECC-01	Co-Benefits from Existing and Future Greenhouse Gas Programs, Policies, and Incentives [NOx]	2023	2023
ECC-02	Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures [NOx, VOCs]	2024	2024
ECC-03	Additional Enhancements in Reducing Existing Residential Building Energy Use [NOx, VOCs]	2025	2029

TABLE 4-1720 (CONCLUDED)

ADOPTION AND IMPLEMENTATION SCHEDULE OF ~~STATIONARY~~STATIONARY SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
<b>South Coast AQMD Stationary Source VOC Measures:</b>			
FUG-01	Improved Leak Detection and Repair [VOCs]	2023	2028
FUG-02	Emission Reductions from Industrial Cooling Towers [VOCs]	2026	2031
CTS-01	Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants [VOCs]	2023	2031
FLX-02	Stationary Source VOC Incentives [VOCs]	2024	2025
BIO-01	Assessing Emissions from Urban Vegetation [VOCs]	2025	2025
L-CMB-04 <sup>a</sup>	Emission Reductions from Emergency Standby Engines (Permitted) [NO <sub>x</sub> , <del>VOC</del> VOCs]	2025	2031
<b>South Coast AQMD Stationary Source Other Measures:</b>			
MCS-01	Application of All Feasible Measures [All Pollutants]	2023	2037
MCS-02	Wildfire Prevention [NO <sub>x</sub> , PM]	2026	2031
FLX-01	Improved Education and Public Outreach [All Pollutants]	2023	2023

<sup>a</sup> This is a NO<sub>x</sub> control measure with co-benefits of VOC reductions.

TABLE 4-1821

## ADOPTION AND IMPLEMENTATION SCHEDULE OF MOBILE SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
<b><i>Emission Growth Management Measures:</i></b>			
EGM-01	Emission Reductions from New Development and Redevelopment [All Pollutants]	2025	2026-2037
EGM-02	Emission Reductions from Projects Subject to General Conformity Requirements [All Pollutants]	2026	2026-2037
EGM-03	Emission Reductions from Clean Construction Policy [All Pollutants]	2025	2025-2037
<b><i>Facility-Based Mobile Source Measures:</i></b>			
MOB-01	Emission Reductions at Commercial Marine Ports [NOx, SOx, PM]	2023	2023-2037
MOB-02A	Emission Reductions at New Rail Yards and Intermodal Facilities [NOx, PM]	2022-2024	2023-2037
MOB-02B	Emission Reductions at Existing Rail Yards and Intermodal Facilities [NOx, PM]	2022-2024	2023-2037
MOB-03	Emission Reductions at Warehouse Distribution Centers [NOx]	Adopted 2021 (Reassess every three years)	2022-2037
MOB-04	Emission Reductions at Commercial Airports [All Pollutants]	Approved 2019 (Reassess in 2027)	2020-2037
<b><i>On-Road and Off-Road Mobile Source Measures:</i></b>			
MOB-05	Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles [VOC, NOx, CO, PM]	N/A	Ongoing
MOB-06	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]	N/A	Ongoing
MOB-07	On-Road Mobile Source Emission Reduction Credit Generating Program [NOx, PM]	TBD	TBD
MOB-08	Small Off-Road Engine Equipment Exchange Program [VOC, VOCs, NOx, PM]	N/A	Ongoing
MOB-09	Further Emission Reductions from Passenger Locomotives [NOx, PM]	N/A	Ongoing
MOB-10	Off-Road Mobile Source Emission Reduction Credit Generation Program [NOx, PM]	TBD	TBD

TABLE 4-1821 (CONTINUED)

## ADOPTION AND IMPLEMENTATION SCHEDULE OF MOBILE SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
<b><i>Incentive-Based Measures:</i></b>			
MOB-11	Emission Reductions from Incentive Programs [NO <sub>x</sub> , PM]	N/A	Ongoing
MOB-12	Pacific Rim Initiative for Maritime Emission Reductions	N/A	Ongoing
<b><i>Other Measures</i></b>			
MOB-13	Fugitive VOC Emissions from Tanker Vessels [VOC/VOCs]	2024	2024-2037
MOB-14	Rule 2202 – On-Road Motor Vehicle Mitigation Options [VOC/VOCs, NO <sub>x</sub> , CO]	2023	2023-2037
MOB-15	Zero Emission Infrastructure for Mobile Sources [All Pollutants]	N/A	Ongoing

In addition to the regulatory approach, incentive funds will be used to subsidize low-emitting or zero emission equipment purchases. Expansion of supporting infrastructure for implementation of cleaner fuels also helps to accelerate the use of ultra-low emitting and zero-emitting vehicles and equipment. For implementation of incentive programs/measures, two key approaches are (1) promoting widespread deployment of available zero and low NO<sub>x</sub> technologies and (2) developing new zero emissions and ultra-low NO<sub>x</sub> technologies for other use cases where technology is not currently available.

Stationary source control measures for R-CMB series, C-CMB series, and ECC-03 target emission reductions from residential and commercial buildings, include incentive components as part of the proposed control approach. Among control measures R-CMB-01, R-CMB-02, R-CMB-04, C-CMB-01 and C-CMB-02, a mitigation fee will be considered where appropriate. The mitigation fee collected would be utilized as incentives to accelerate the adoption of zero emission units or utilized to assist in panel upgrades or infrastructure at residences in disadvantaged communities.

Incentive programs will be of particular importance for measures regarding zero emission building electrification measures. Programs to change out gas appliances, heaters and boilers may be *cost-effective*, but not necessarily *affordable*. First, there is the cost of replacing the appliances themselves – which would not be insignificant for many smaller businesses or residential households. Second, 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. These issues are further magnified in economically disadvantaged communities, where switches from gas to electrical appliances may be cost-prohibitive unless a substantial portion of those costs – if not all – are covered by other programs. Existing rebate programs, such as the South Coast AQMD’s Clear Air Furnace program, funded by Rule 1111 mitigation fees, provides rebates to those installing a residential electric heat pump to replace a natural gas furnace. In addition, a specific percentage of the funding was dedicated to those applying from a

disadvantaged community. This program can be further funded to enhance the existing rebate program or expanded to include other building appliances such as water heaters. In addition, partnerships with other organizations, such as Technology and Equipment for Clean Heating (TECH) Clean California or Southern California Edison, with similar programs and directives could assist in providing more rebate money to further incentivize early deployment of cleaner technologies. Evaluating funding needs and sourcing funding to support control measures associated with zero emission building electrification measures will therefore be critical. But a much larger issue will be structuring incentive/rebate programs in a way that is equitable and does not leave economically disadvantaged communities behind. In developing these incentive programs, the South Coast AQMD will seek community input and also evaluate ways to prioritize distribution of funding to benefit the most disadvantaged communities.

## Coordination with Other Agencies

The 2022 AQMP relies strongly upon partnerships at federal, State, and local levels, seeking to expand existing collaborations and establish new coalitions. To achieve widespread adoption of clean fuel policies and technologies, close coordination with other agencies will be necessary. To implement zero and low NOx technologies in a cost-effective manner, incentive funding programs for stationary sources should align with other local, State, and federal initiatives.

**CARB** - As part of the 2022 State Strategy for the State Implementation Plan (~~2022 State SIP Strategy~~), CARB has proposed statewide emissions standards for combustion-based appliances in residential and commercial buildings to accelerate the transition from fossil fuels. CARB proposed to adopt a statewide zero emission GHG standard for space and water heaters, which would have co-benefits of reducing criteria pollutants. Beginning in 2030, 100 percent of sales of new space and water heaters would need to meet zero emission standards. This requirement applies to both new construction and replacement of burned-out equipment in existing buildings. As part of the public measure suggestions, the 2022 State SIP Strategy includes the possibility of additional emissions standards for combustion-based appliances used in buildings such as stoves, work with air districts to set further such standards, work with building and energy code agencies to ready more buildings for zero emission appliances, or take other actions (including potentially incentive programs) to accelerate the removal of fossil fuels from the building stock in both new and existing buildings. The South Coast AQMD will work closely with ~~ARB~~CARB in the development of such measures and address the concerns on cost feasibility and affordability especially in environmental justice (EJ) areas.

**California Public Utilities Commission (CPUC)** - As part of the State's efforts to reduce GHG emissions, in January 2019, the CPUC instituted a new rulemaking on building decarbonization (R.19-01-011) including implementation of incentive programs and establishing a building decarbonization policy framework. Examples of CPUC approved zero emission building electrification measures incentive programs include Self-Generation Incentive Program Heat Pump Water Heaters (SGIP HPWH) and TECH (Technology and Equipment for Clean Heating).

**California Energy Commission (CEC)** - CEC is the State's primary energy policy and planning agency, and one of its core responsibilities is to establish certain appliance efficiency regulations with Title 20 and building standards with Title 24. CEC is also responsible for developing the Integrated Energy Policy Report (IEPR) every two years, an integrated assessment of major energy trends and issues facing California's

electricity, natural gas, and transportation fuel sectors. CEC has also recently launched the Building Initiative for Low-Emissions Development (BUILD) Program, which is designed to provide incentives for new all-electric low-income residential buildings that reduce GHG emissions.

Overall, there are ongoing efforts statewide to continue to reduce GHG from various sectors. The South Coast AQMD will work with agencies, utilities, and other stakeholders to further implement measures that provide co-benefit of criteria pollutant reductions within the Basin.

## Incentive Approach for Mobile Sources

Given the significant level of NO<sub>x</sub> reductions needed to attain the 2015 8-hour ozone standard by the 2037 attainment year, regulations alone will not provide sufficient emission reductions. There is a clear need to promote and accelerate the deployment of zero and low NO<sub>x</sub> technologies as we reach the limits of the emission reductions achievable through conventional technologies. The need is even greater for national and international transportation sources to develop and commercialize the cleanest locomotives, ocean-going vessels, and aircraft as well as to promulgate cleaner exhaust emissions standards. One of the effective approaches to accelerate the deployment of cleaner technologies is through financial incentive measures to encourage the targeted industries to adopt new technologies. This approach also provides a signal for technology providers, engine and automobile manufacturers, and academic researchers to develop and commercialize the cleanest technologies possible and further the efforts to commercialize zero emission technologies into a wider market.

The South Coast AQMD has a long history of successful implementation of incentive programs that help fund the accelerated deployment of cleaner technologies in on-road vehicles and off-road mobile equipment. Some of the major incentive programs that are administered by the South Coast AQMD include Carl Moyer Memorial Air Quality Standards Attainment Program, Proposition 1B Goods Movement Emissions Reductions Program, and Lower School Bus Emission Program. Recently, Community Air Protection Program and VW Environmental Mitigation Trust for California were also added to the portfolio of the South Coast AQMD-administered incentive programs. These incentive programs are further described in the South Coast AQMD's mobile source control measures (Appendix IV-A).

In order to estimate the prospective emission reductions from these incentive programs, South Coast AQMD staff conducted an analysis to forecast the incentive funding through 2036 based on the current or projected allocations. These allocations are assumed to be maintained through 2036 and applied to mobile source sectors based on program-specific guidelines and internal projections. For example, CARB recently increased Carl Moyer Program funding. As a result of AB 1274 which expands the smog check exemption to vehicles that are seven and eight model years old with an assessment of a \$25 smog abatement fee on these vehicles. Most of the fee revenues collected will be directed to the Carl Moyer Program with approximately \$20 million in additional funding to be provided to the South Coast AQMD. South Coast AQMD staff assumed that the increased Moyer funding allocation will be maintained through 2036 and applied it to the following sectors in this analysis: on-road (10 percent), off-road (58 percent), locomotive (1 percent), marine harbor craft (15 percent), TRU (1 percent), and infrastructure (15 percent).

Table 4-1922 below shows the estimated incentive funding for each mobile source sector based on the projected funding allocations for the South Coast AQMD-administered incentive programs.

**TABLE 4-1922**  
**ESTIMATED ANNUAL INCENTIVE FUNDING FOR MOBILE SOURCE SECTORS**

Mobile Source Sector	Annual Funding*
Light- and Medium-Duty Vehicles	\$16,372,000 <u>396</u>
Heavy Heavy-Duty Trucks	\$34,326,000 <u>32,442,160</u>
School Buses	\$21,637,000 <u>623,250</u>
Off-Road Agriculture	\$5,229,000 <u>1,692,918</u>
Off-Road Construction	\$60,243,000 <u>55,017,213</u>
Other Off-Road and Cargo Handling Equipment (CHE)	\$4,491,000 <u>22,525,515</u>
Marine Harbor Craft	\$24,212,000 <u>14,855,608</u>
Transport Refrigeration Units (TRU)	\$1,399,000 <u>970,713</u>
Locomotives	\$6,275,000 <u>15,782,837</u>
Residential/Commercial Lawn and Garden	\$875 <u>1,000,000</u>
Infrastructure	\$25,147,000 <u>16,779,164</u>
<b>Total</b>	<b>\$200,206,000<u>61,774</u></b>

Annual Funding includes administrative cost which is typically 6.25 percent.

As shown in Table 4-2023, NOx emission reductions are calculated based on these incentive funding estimates with the following assumptions:

- Average NOx emission reductions and average incentive amount per vehicle/equipment from existing projects that have been funded from 2018 through 2021 are used as the basis;
- For mobile sources other than on-road sectors, control factors from CARB are applied to the average NOx emission reductions to discount for future reductions from the proposed regulations and SIP strategies. Additional adjustment factors for the implementation of zero emission technologies are also applied to agricultural equipment and harbor ~~crafts~~craft;
- For on-road vehicle sectors (LD and MD vehicles, HD vehicles and school buses), the Calculator for Spending Incentives (CSI), which is an internally developed model to identify at a screening level the most cost-effective projects, is used to calculate NOx emission reductions. Additional adjustment

factors for electrification or other zero emission technology implementation in 2037 is also applied; and

- Carl Moyer Program's maximum project life is used to calculate SIP-eligible emission reductions. For example, the maximum project life allowed for the replacement of HD trucks is 7 years according to the 2017 Carl Moyer Guidelines whereas the useful life for new HD trucks is likely to be longer. If SB 1 milestones were to be used as the guide, it would be 13+ years. The use of maximum project life in the analysis is to ensure that the emission reductions from the South Coast AQMD-administered incentive programs would satisfy the SIP eligibility elements per the U.S. EPA protocols.

**TABLE 4-23****TABLE 4-20****PRELIMINARY 2037 NOX REDUCTIONS FROM INCENTIVE PROGRAMS\***

Mobile Source Sector	Project Type	NOx Emission Reduction** (tons/day)	Affected Population	Average Funding per Unit	Total Incentive Funding
Light- and Medium-Duty Vehicles	Replacement	0.1611	5,440	\$5,000	\$31,999,272,000
Heavy-Duty Vehicles	Replacement	2.67134	16,083,214	\$10,700,176	\$186,011,145,200
School Buses	Replacement	0.3130	8,937,032	\$21,300,237	\$203,759,190,400
Off-Road Agriculture	Replacement	0.5908	388,125	\$134,800,135,626	\$52,380,000,16,886,589
Off-Road Construction	Repower	2.00118	746,656	\$291,200,307,545	\$217,086,000,201,665,966
Off-Road Construction	Replacement	1.30062	564,365	\$264,300,286,351	\$148,896,000,104,399,982
Other Off-Road and CHE	Replacement	0.0537	90,428	\$194,200,235,335	\$17,460,000,100,623,218
Marine Harbor Craft	Repower	2.61182	1,199,683	\$300,900,322,000	\$360,899,000,220,005,964
TRU	Replacement	0.01	145,224	\$45,500,533	\$6,670,000,10,194,772
Locomotives	Replacement	0.3998	57,125	\$1,611,100,854,353	\$91,827,000,232,347,363
Commercial Lawn and Garden	Replacement	0.001	2,986	\$550	\$1,640,000
<b>Total</b>		<b>10.096.8</b>			<b>\$1,318,627,000</b> <b>248,923,855</b>

\* Based on active projects with emission reductions in 2037 using the maximum project life allowed per 2017 Carl Moyer Guidelines.

\*\* Annual Average Summer Planning-based NOx reductions.

In summary, the NOx emission reductions from the continued implementation of the South Coast AQMD-administered incentive programs are estimated to be 10.096.8 tons per day in 2037. This is based on the average funding allocation of \$205.200 million per year through 2036. As noted earlier, the NOx reductions

are estimated using the maximum project life in the 2017 Carl Moyer Guidelines to quantify prospective SIP credits.

## Future Funding Opportunities

Achieving the emission reductions from 2022 AQMP incentive-based control measures for mobile sources will likely require at least \$200 million per year. Although the South Coast AQMD currently has received about this level of funding for incentives over the past few years, it is not certain that this level of funding will persist out through 2037. In addition, new funding streams will need to be identified for technology research, design, and development for some source categories in order to achieve ‘black box’ emission reductions (e.g., for aircraft emissions). black box measures for stationary sources. Given the emission reductions needed to attain federal and State ozone air quality standards, additional actions by local, State, and federal government, and other partnerships will be needed to ensure the requisite levels of funding are secured as early as possible and sustained out to 2037. The South Coast AQMD will work with interested stakeholders from the public and private sector to identify and pursue potential new funding opportunities.

## Proposed Workplan on Zero Emissions Fueling/Charging Infrastructure

The 2022 AQMP relies on a significant transition to zero emissions technologies across many sectors. Two leading fuels for zero emissions technologies today that have the potential to be adopted at scale by 2037 are electricity and hydrogen. Each of these fuels present unique challenges including production, regional and local distribution, fueling locations, policy approaches, regulatory environment, costs, incentive programs, etc. These challenges require many different levels of government to engage and participate in policy development to ensure that they are appropriately addressed to meet the many goals of the State, including attainment of air quality standards.

MOB-15 includes a proposed workplan for the South Coast AQMD specifically related to zero emissions fueling and charging infrastructure. The workplan includes broad strategies as well as specific actions that the South Coast AQMD would take to implement those strategies. All actions would require close partnership with many different stakeholders. Potential actions include identifying and carrying out key research needs, targeted advocacy for policy goals with other agencies, developing specific data products for other agencies to use in their assessments, convening stakeholders together to focus on air quality goals as a primary

### Strategies in Proposed South Coast AQMD Workplan for Zero Emissions Fueling / Charging Infrastructure

- *Assess Zero Emission Infrastructure Needs for the South Coast AQMD*
- *Assist in Developing Cost Projections*
- *Assist in Assessing Funding Needs*
- *Identify Targeted Policies and Strategies to Support Zero Emission Vehicle Adoption*
- *Collaborate with Local Utilities*
- *Identify Policy Needs Across Different Sectors*
- *Pursue Equitable and Affordable Solutions*
- *Align Efforts with Other Local, State, and Federal initiatives*

component of zero emissions planning efforts, and potentially including zero emissions fueling and charging infrastructure in proposed rules (e.g., indirect source rules).

## Responsible Agencies

Implementation of the control strategies in the 2022 AQMP is not within the control of the South Coast AQMD alone. Instead, meeting the standard will require a cooperative partnership of governmental agencies at the federal, State, regional and local level.

At the federal level, the U.S. EPA, and sometimes other federal agencies, are charged with reducing emissions from federally controlled sources such as aircraft, trains, marine vessels, and other sources. Emissions from sources subject to federal authority are projected to comprise approximately ~~9585~~ tons per day of NO<sub>x</sub> in 2037. This is just ~~over 50~~ approximately 42 percent above the maximum amount of NO<sub>x</sub> that can remain in the atmosphere and still meet the standard. At that level it will be impossible for the Basin to meet the 2015 8-hour standard regardless of the actions taken by the South Coast AQMD and CARB. Further, regulations to address NO<sub>x</sub> emissions from these sources have not kept pace with the need for emission reductions, and emissions from many of these sources are projected to increase by 2037 absent further action. It is therefore essential that the federal government start developing the regulatory plan to address federally-regulated sources.

At the State level, CARB is primarily responsible for reducing emissions from motor vehicles and consumer products. CARB has developed a robust regulatory scheme to reduce mobile source emissions subject to State authority and would continue to do so under the ~~Draft~~ 2022 State SIP Strategy. Given that mobile sources comprise over 80 percent of NO<sub>x</sub> emissions in the basin, continued regulatory action and incentive programs will be key to future attainment.–

At the regional level, SCAG assists sub-regional and local governments in playing a formative role in the air quality elements of transportation planning. In addition, local governments serve an important role in developing and implementing the transportation control measures that are included in the 2022 AQMP. SCAG is responsible for providing the socioeconomic forecast (e.g., population and growth forecasts) upon which the AQMP is based. SCAG also provides assessments for conformity of regionally significant transportation projects with the overall AQMP and is responsible for the adoption of the RTP and the Regional Transportation Improvement Program (RTIP) which include growth assumptions and transportation improvement projects that could have significant air quality impacts, and transportation control measures as required by the CAA.–

At the regional level, the South Coast AQMD is responsible for the overall development and implementation of the AQMP. The South Coast AQMD is specifically authorized to reduce the emissions from stationary point and some area sources such as coatings and industrial solvents. Emission reductions are also sought through funding programs designed to accelerate vehicle turnover and the purchase of cleaner vehicles. In addition, the South Coast AQMD has authority to regulate indirect sources under the California Health and Safety Code Sections 40716 (a)(1) and 40440(b)(3). As a means of achieving further emission reductions, the South Coast AQMD may seek additional authority to regulate sources that have not been completely under the South Coast AQMD's jurisdiction in the past such as marine vessels, consumer products, and other on-road and off-road sources. The South Coast AQMD implements its responsibilities with participation from the regulated community and other stakeholders through an

extensive rule development and implementation program. This approach maximizes the input of those parties affected by the proposed rule through consultation meetings, public workshops, and ongoing working groups.