Progress Report and Technical Submittal for the 2012 PM2.5 Standard San Joaquin Valley

October 19, 2021

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Background and Valley Progress Towards Attainment of the 2012 PM2.5 Standard

Focus and Purpose of Technical Document

The focus and purpose of this technical document is to provide the U.S. Environmental Protection Agency (EPA) an update on the significant progress that has been made towards implementing the attainment strategy found within the *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards* (*2018 PM2.5 Plan* or Plan) for the 2012 annual fine particulate matter (PM2.5) National Ambient Air Quality Standard (standard), and to show that the emissions reductions need identified in the Plan between the California Air Resources Board (CARB) and the San Joaquin Valley Air Pollution Control District (District) is anticipated to be fulfilled, and even exceeded, by the attainment year of 2025 in the San Joaquin Valley (Valley). Although the combined emissions reductions need identified in the Plan is anticipated to be addressed through ongoing implementation, both CARB and the District are committed to fulfilling their respective aggregate commitments from the *2018 PM2.5 Plan* and continue to progress in developing their respective measures within the Plan. This document is meant to support EPA in their evaluation of the attainment plan for the 2012 annual PM2.5 standard.

Regulatory Background

The *2018 PM2.5 Plan* was adopted by the District Governing Board on November 15, 2018, and by CARB on January 24, 2019. The *2018 PM2.5 Plan* utilized extensive science and research, state of the art air quality modeling, and the best available information in developing a strategy for bringing the Valley into attainment with the 1997, 2006, and 2012 standards for PM2.5 as expeditiously as practicable by the respective deadlines of 2020, 2024, and 2025. EPA proposed and finalized its approval of the 2006 PM2.5 standard portion of the *2018 PM2.5 Plan* in June 2020. EPA has been in the process of reviewing the other portions of the *2018 PM2.5 Plan* related to the 1997 and 2012 PM2.5 standards since May 2019. With regards to the Valley's attainment classification for the 2012 PM2.5 standard, EPA revised the annual average PM2.5 standard to 12 micrograms per cubic meter (μg/m^3), while retaining the 24-hour standard of 35 μg/m^3 set in 2006[1]. In 2015, EPA designated the Valley as Moderate nonattainment for the 2012 PM2.5 standard, with an attainment deadline of December 31, 2021, as included in the *2018 PM2.5 Plan*.

In October 2016, CARB tabled the Plan at the request of the District and Valley stakeholders and directed CARB staff to return with additional measures to reduce mobile source emissions in the pre-2025 timeline that is critical for the Valley, and to work with the District to find additional measures to reduce directly emitted particulate matter from stationary sources. As detailed in Chapter 4, Appendix C, and Appendix D of the *2018 PM2.5 Plan*,

[1] National Ambient Air Quality Standards for Particulate Matter; Final Rule. 78 Fed. Reg. 10, pp. 3086-3287 (2013, January 15). (to be codified at 40 CFR Parts 50, 51, 52 et al. *http://www.gpo.gov/fdsys/pkg/FR-2013-01-15/pdf/2012-30946.pdf*

these additional measures were incorporated into the District's PM2.5 attainment strategy. The 2016 Moderate Plan was submitted to EPA by CARB as an addendum to the Plan to fulfill Clean Air Act (Act) requirements for a Moderate area that could not attain the standard within the six years of the effective date of designation. To achieve attainment of the annual 12 μg/m³ standard as expeditiously as practicable, District staff included the Serious area attainment plan for the 2012 PM2.5 standard in the comprehensive *2018 PM2.5 Plan*. To attain the 2012 PM2.5 standard, the Plan went beyond the requirements for a Serious area attainment plan to include the most stringent measures feasible for implementation in the Valley and was submitted years ahead of the deadline that would otherwise be applicable.

As part of the *2018 PM2.5 Plan*, CARB adopted the San Joaquin Valley Supplement to the 2016 State Strategy for the State Implementation Plan (Valley State SIP Strategy) which included CARB's commitments for measures and emission reductions to attain health-based federal air quality standards for PM2.5 in the Valley. The Valley State SIP Strategy built upon the regulatory actions in the 2016 State SIP Strategy by providing the accelerated mobile source reductions needed to meet the federal standards in the Valley by 2024 and 2025 and was adopted by CARB on October 25, 2018. The Valley State SIP Strategy is an integral part of the *2018 PM2.5 Plan* providing for the necessary emission reductions from mobile sources. CARB has made significant progress in implementing the Valley State SIP Strategy and will provide additional detail later in this document including the actions that CARB has approved as part of the *2018 PM2.5 Plan.*

The District Governing Board has approved a number of actions in 2019, 2020, and 2021 to continue to reduce PM2.5 emissions and fulfill the commitments in the *2018 PM2.5 Plan*. These actions include amendments to the following rules:

1. District Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters)
2. District Rule 4311 (Flares)
3. District Rules 4306/4320 (Boilers, Steam Generators, and Process Heaters)
4. District Rule 4702 (Internal Combustion Engines)

Additionally, District staff anticipate bringing a number of recommended actions to the Governing Board for consideration by December 2021 to fulfill *2018 PM2.5 Plan* commitments. These recommended actions will include potential amendments to District Rule 4354 (Glass Melting Furnaces), and District Rule 4352 (Solid Fuel-Fired Boilers, Steam Generators and Process Heaters) to achieve additional emissions reductions.

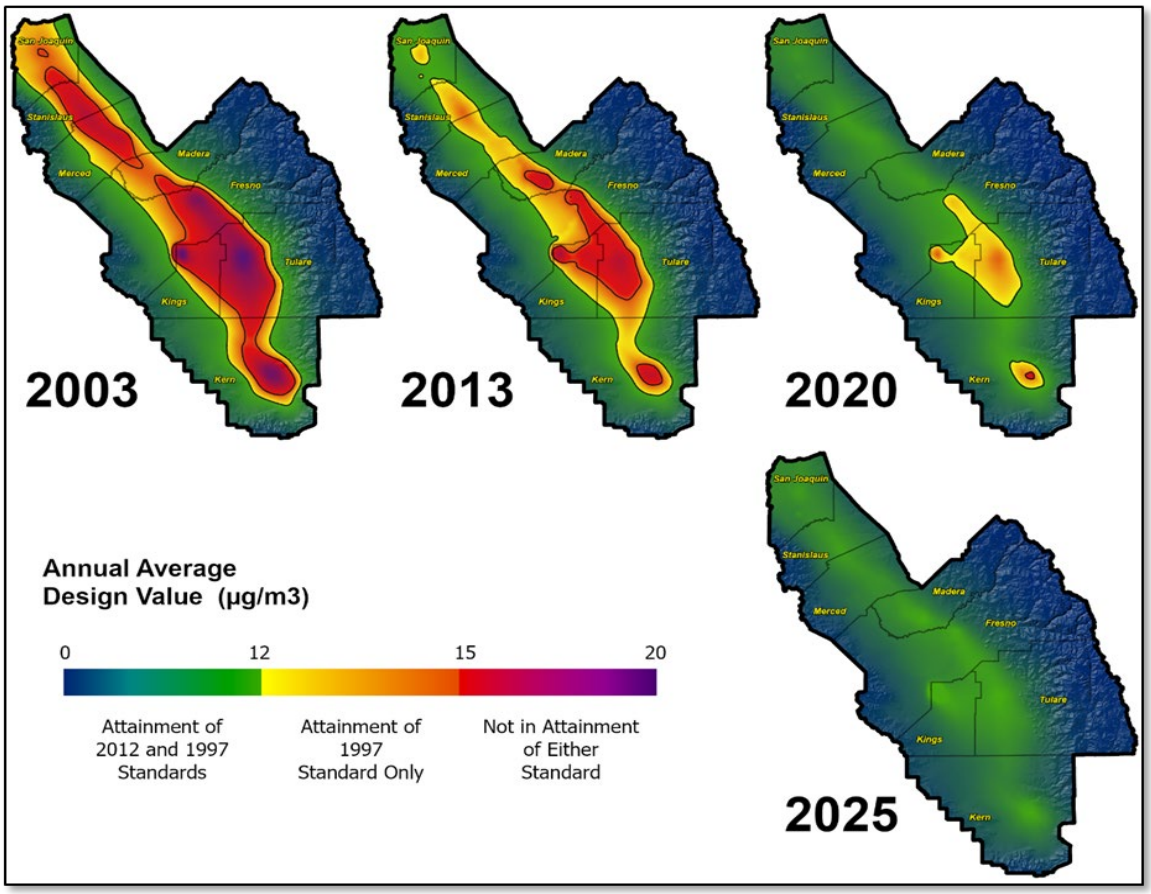
Beyond these regulatory development projects, the District is actively implementing incentive programs to further reduce emissions of PM2.5 and key precursor pollutants. The District's Burn Cleaner incentive program was amended per the commitment in the Plan and has already made significant progress towards meeting the District's emission reduction commitment. Additionally, concurrently with adopting the *2018 PM2.5 Plan*, the District Governing Board adopted three technology advancement incentive programs, including the Low-Dust Nut Harvesting Equipment Incentive Program, the Alternatives to Agricultural Open Burning Incentive Program, and the commercial Clean Green Yard Machine Program. These new programs have been highly successful since their launch in 2019. In June 2021, the District Governing Board also adopted a new strategy that establishes the near-complete

phase-out of agricultural open burning by January 1, 2025, which results in significant oxides of nitrogen (NOx) and PM2.5 emissions reductions.

Ongoing Progress in Improving Air Quality

Through the implementation of past attainment strategies, and through the ongoing implementation of the recently adopted *2018 PM2.5 Plan*, the Valley has made significant progress in reducing annual average PM2.5 concentrations since this standard was first established at 15 µg/m^3 by EPA in 1997. In 2003 when the PM2.5 air monitoring network became more established in the Valley, almost all areas of the region were exceeding the federal 1997 annual PM2.5 standard of 15 µg/m^3. Comparing this to the most recent three-year period of 2018-2020, and if wildfire impacted data are not included, all areas of the Valley have attained the 15 µg/m^3 annual standard except for the Bakersfield-Planz air monitoring site in Kern County (Figure 1, wildfire data removed for 2020 design value only). Figure 1 also shows that by 2025, all areas of the Valley are projected to attain the 2012 annual PM2.5 standard of 12 µg/m^3. The Valley would not have made this significant progress in reducing annual average PM2.5 without the dedication of Valley residents and businesses to take actions to reduce emissions.

Figure 1: Progress in Reducing Annual PM2.5 Design Values



Summary of Aggregate Commitments in the 2018 PM2.5 Plan

Through their respective board approvals of the *2018 PM2.5 Plan*, both CARB and the District committed to achieving aggregate emissions reductions for NOx and PM2.5 by 2024/2025 to bring the Valley into attainment of the federal PM2.5 standards. Specifically, CARB committed to an aggregate NOx emissions reduction of 32 tons per day (tpd), and an aggregate PM2.5 emissions reduction of 0.9 tpd. Similarly, the District committed to an aggregate NOx emissions reduction of 1.88 tpd, and an aggregate PM2.5 emissions reduction of 1.3 tpd. Together, these commitments represent a total of 33.88 tpd NOx, and 2.2 tpd PM2.5, as summarized in Table 1.

Table 1: CARB and District Aggregate Commitments from *2018 PM2.5 Plan*

Agency	NOx (tpd)	PM2.5 (tpd)
CARB	32	0.9
District	1.88	1.3
Total	33.88	2.2

In their approvals of the commitments within the *2018 PM2.5 Plan*, both CARB and the District included specific language in their respective board resolutions regarding the aggregate emissions reduction commitments. Specifically, the language in those respective resolutions is as follows:

CARB Resolution 18-49[2]

"Whereas, the Valley State SIP Strategy sets forth a commitment to achieve aggregate emissions reductions, begin the measure public process by specific enforceable dates, and prepare SIP measures for Board consideration;

"Whereas, the commitment to achieve aggregate emissions reductions is an overall commitment to achieve the total emission reductions necessary to attain the federal PM2.5 air quality standards, reflecting the combined reductions from the existing control strategy and new measures;

"Whereas, the commitment for aggregate emissions reductions may be achieved through the existing control program, measures identified in the Valley State SIP Strategy, alternative measures, incentive programs, and actual emission decreases that occur;

[2] CARB (2018, October 25) *San Joaquin Valley Supplement to the 2016 State Strategy for the State Implementation Plan Resolution 18-49*. Retrieved 9/11/2021 from *https://ww3.arb.ca.gov/planning/sip/2016sip/res18-49.pdf*

"Be it further resolved that the Board adopts the commitment to begin the measure's public process and bring to the Board for consideration the list of proposed SIP measures outlined in the Valley State SIP Strategy and included in Attachment A, according to the schedule set forth.

"Be it further resolved that the Board adopts the commitment to achieve the aggregate emissions reductions outlined in the Valley State SIP Strategy of 32 tpd of NOx and 0.9 tpd of PM2.5 emissions reductions in the San Joaquin Valley by 2024 and 2025."

District Resolution[3]

"Whereas, the commitment for aggregate emissions reductions may be achieved through the existing control program, measures identified in the Plan, alternative measures, incentive programs, and actual emission decreases that occur; and

"The Board adopts the commitment to achieve the aggregate emissions reductions of 1.88 tpd of NOx and 1.30 tpd of PM2.5 by 2024/2025. If the total emission reductions from the adopted rules or measures are less than those committed to in the Plan, the District Governing Board commits to adopt, submit, and implement substitute rules and measures that achieve equivalent reductions in emissions of direct PM2.5 or PM2.5 precursors in the same implementation timeframes or in the timeframes needed to meet CAA milestones."

Additional discussion follows in this technical document regarding the aggregate commitments and how the progress with both implemented and developing measures are anticipated to fulfill these aggregate commitments.

Progress in Implementing District Measures

The following section provides a brief overview of the measures the District has either already adopted, or is currently developing, along with the emissions reductions that can be applied against the aggregate commitments for 2025.

Adopted Measures

Rule 4901 (Wood-Burning Fireplaces and Wood Burning Heaters)

The District takes a multidimensional and proactive approach to reducing emissions in the Valley. This philosophy is especially true for reducing emissions from residential wood burning; with a combination of regulatory controls through Rule 4901, rigorous public outreach and education efforts, Check Before You Burn program, and the District's Burn Cleaner Wood Stove Change-out Program (Burn Cleaner Program). The District's approach to reducing emissions from residential wood burning empowers Valley residents to play a

[3] SJVAPCD (2018, November 15) *Item 10: Adopt 2018 PM2.5 Plan for the 1997, 2006, and 2012 PM2.5 Standards.* Retrieved 9/10/2021 from *http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2018/November/final/10.pdf*

major role in reducing emissions at almost no increased cost, and, in many cases, with savings in heating-related energy costs.

On June 20, 2019, the District Governing Board adopted amendments to Rule 4901[4]. These rule amendments included:

- Enhancing requirements for significant remodels of a fireplace and chimney that require the removal of open-hearth fireplaces or replacement to cleaner devices
- Requiring only seasoned wood to be burned
- Enhancing compliance during transfers of residential real property
- Restricting installations of new wood burning devices
- Enhancing visible emission limitations
- Establishing lower curtailment thresholds for hot spot counties (Madera, Fresno, and Kern)
- Achieved Emissions Reductions: In the District's staff report for this amendment to Rule 4901, the analysis estimated a PM2.5 emissions reduction of 0.26 tpd. However, in EPA's approval of the attainment plan for the 2006 PM2.5 standard, a PM2.5 emissions reduction credit of 0.2 tpd was approved[5]. In this document, and for the accounting of the District's progress towards meeting its aggregate commitments, an emissions reduction of 0.2 tpd is assumed.

Rule 4311 (Flares)

Rule 4311 controls emissions from flares used in the Valley at facilities such as, but not limited to, oil and gas production facilities, sewage treatment plants, waste incineration and petroleum refining operations. Under Rule 4311, flare operators are required to submit flare minimization plans, perform extensive monitoring and record keeping, submit reports of planned and unplanned flaring activities to the District, and meet petroleum refinery SO2 performance targets.

On December 17, 2020, the District Governing Board adopted amendments to Rule 4311[6]. These rule amendments included:

- Removing the non-major source exemption
- Removing the existing landfill exemption
- Adding performance standards that require Ultra Low NOx (ULN) technology in order to reduce emission from flaring

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[4] SJVAPCD (2019, June 20) *Item Number 13: Adopt Proposed Amendments to the District's Residential Wood Burning Emission Reduction Strategy.* Retrieved 9/3/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2019/June/final/13.pdf*

[5] EPA (2020, July 22) *Clean Air Plans; 2006 Fine Particulate Matter Nonattainment Area Requirements; San Joaquin Valley, California.* Retrieved 9/10/2021 from *https://www.govinfo.gov/content/pkg/FR-2020-07-22/pdf/2020-14471.pdf*

[6] SJVAPCD (2020, December 17) *Item Number 12 Adopt Proposed Amendments to Rule 4311 (Flares).* Retrieved 9/3/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/December/final/12.pdf*

- Achieved emissions reductions: In the District's staff report for this amendment to Rule 4311, the analysis estimated a NOx emissions reduction of 0.19 tpd, and a PM2.5 emissions reduction of 0.03 tpd. The amended rule was submitted to EPA for review and inclusion into the SIP on March 10, 2021.

Rules 4306/4320 (Boilers, Steam Generators, and Process Heaters)

Valley facilities with units subject to Rules 4306 and 4320 represent a wide range of industries, including but not limited to electrical utilities, cogeneration, oil and gas production, petroleum refining, manufacturing and industrial processes, food and agricultural processing, and service and commercial facilities. NOx emissions from this source category have been reduced by 96 percent through District regulations.

On December 17, 2020, the District Governing Board adopted amendments to Rule 4306 (Boilers, Steam Generators, and Process Heaters – Phase 3) and Rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBTU/HR)[7]. These rule amendments included:

- Establishing lower NOx emissions limits for a variety of unit classes and categories
- Establishing dates for emission control plans, authority to construct, and compliance dates
- Updating test methods to reflect the latest version of test methodology available
- Rule 4320 establishes NOx limits separate from Rule 4306 and provides Advanced Emission Reduction Options for rule compliance
- Requiring owners with units subject to Rule 4320 to choose to meet the NOx emission requirements or pay an annual emission fee
- Achieved emissions reductions: In the District's staff report for the amendments to Rules 4306/4320, the analysis estimated a NOx emissions reduction of 0.19 tpd. The amended rules were submitted to EPA for review and inclusion into the SIP on March 10, 2021.

Commercial Underfired Charbroiling Emission Reduction Strategy

District Rule 4692 (Commercial Charbroiling) reduces PM emissions by requiring catalytic oxidizers for chain-driven charbroilers, including those used in many typical fast-food restaurants. Rule 4692 is among the most stringent rules in the nation for controlling emissions from commercial charbroiling operations. The original rule, adopted in March 2002, reduced PM2.5 emissions from chain-driven charbroilers by 84 percent. The September 2009 rule amendment expanded rule applicability to more chain-driven charbroilers.

To assist with better understanding of cooking operations from underfired charbroilers in the Valley, and as an early measure in support of the District's commitment in the *2018 PM2.5*

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[7] SJVAPCD (2020, December 17) *Item Number 13: Adopt Proposed Amendments to Rule 4306 and Rule 4320.* Retrieved 9/3/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/December/final/13.pdf*

Plan, Rule 4692 was amended on June 21, 2018[8], to add reporting and registration requirements for commercial underfired charbroiler units including:

- Submittal of a one-time report to provide information about the location, size, fuel source, usage, and meat cooking throughputs of underfired charbroiler units;
- Record keeping of total quantity, in pounds, of meat cooked on commercial underfired charbroilers; and
- Permit-Exempt Equipment Registration (PEER) for units with a meat throughput greater than 400 pounds/week, or greater than 10,800 pounds/year, not to exceed 875 pounds/week.

As a next step, to address the commitment to achieve PM2.5 emissions reductions from commercial underfired charbroiling activities in the Valley, on December 17, 2020, the District Governing Board adopted a comprehensive Commercial Underfired Charbroiling Emission Reduction Strategy[9]. This strategy is comprised of a number of elements, including:

- Enhancing the District's Restaurant Charbroiler Technology Partnership incentive program to increase participation by Valley restaurants in successfully demonstrating new PM2.5 emission reduction technologies
- Developing more effective outreach with Valley restaurants
- Advocating for state funding support
- Developing guidance for interested cities and counties to assist in promoting PM2.5 control technologies during the approval of new large restaurants equipped with commercial underfired charbroilers
- Providing support to CARB in the development of their intended new statewide Suggested Control Measure to provide consistent guidance for equitably reducing emissions from commercial charbroiling operations throughout the state
- Establishing a new restaurant working group to collaboratively explore opportunities for underfired charbroiling control technologies

Benefiting from any information gained through these efforts, and in anticipation of economic recovery in the coming year, staff will continue evaluating potential amendments to Rule 4692 in the near future to achieve additional emissions reductions from commercial charbroiling operations, as technologically and economically feasible.

Rule 4702 (Internal Combustion Engines)

Rule 4702 applies to any internal combustion (IC) engine rated at 25 brake horsepower (bhp) or greater. The purpose of this rule is to limit NOx, CO, VOC, and SOx emissions from units subject to this rule. The rule originally established NOx limits between 25-50 ppmv achieving

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[8] SJVAPCD (2018, June 21) *Item Number 9: Adopt Proposed Amendments to Rule 4692 (Commercial Charbroiling).* Retrieved 9/9/2021 from *http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2018/June/final/09.pdf*

[9] SJVAPCD (2020, December 17) *Item Number 11: Adopt Proposed Commercial Underfired Charbroiling Emission Reduction Strategy*. Retrieved 9/3/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/December/final/11.pdf*

90-96 percent control for non-agricultural rich-burn engines and 65-75 ppmv achieving 85-90 percent control for non-agricultural lean burn engines. In its continuous effort to improve air quality in the Valley, the District has adopted numerous amendments to Rule 4702 that have resulted in significant reductions of NOx and PM emissions. August 2011 amendments implemented more stringent NOx limits as low as 11 ppmv for non-agricultural operations spark-ignited engines. Substantial emission reductions from agricultural IC engines have also been achieved through a combination of regulatory efforts and incentive actions. Rule 4702 has effectively reduced NOx emissions from agricultural engines by 84 percent since 2005.

On August 19, 2021, the District Governing Board adopted amendments to Rule 4702[10]. These rule amendments included:

- Lowering emission limits for NOx and VOCs for several categories of engines, and established PM requirements for IC engines operated in the Valley, as well as SOx control requirements for agricultural engines.
- Requiring that both non-AO (agricultural operations) and AO spark-ignited require engines to comply with applicable emissions limits by December 31, 2023
- Requiring AO lean-burn engines to comply with new emissions limits by December 31, 2029 or 12 years after installation of the unit, whichever comes later
- Requiring SOx emission control for ag engines to be consistent with requirements for non-AO engines
- Establishing PM control requirements for spark ignited engines based on SOx requirements
- Achieved emissions reductions: In the District's staff report for the amendments to Rule 4702, the analysis estimated a NOx emissions reduction of 0.61 tpd. The amended rule was submitted to EPA for review and inclusion into the SIP on October 15, 2021.

Rule 4103 (Open Burning) and Agricultural Burning Phase-Out

Through the requirements of Senate Bill (SB) 705 (2003 Florez) and amendments to District Rule 4103 (Open Burning), the Valley has implemented open burning prohibitions for 90 percent of the crops identified in SB 705. Before the decline of the biomass industry and the recent historic drought across the Western U.S., these efforts resulted in an 80 percent reduction in the open burning of agricultural material. As required under Rule 4103 and consistent with California Health and Safety Code §41855.5 and 41855.6, the *2020 Staff Report and Recommendations on Agricultural Burning* (2020 Report) is the District's latest evaluation of agricultural open burning and consideration of any additional prohibitions and postponements. After two decades of working to reduce agricultural open burning, the *2020*

[10] SJVAPCD. (2021, August 19) *Item Number 12: Adopt Proposed Amendments to Rule 4702 (Internal Combustion Engines)*. Retrieved 9/3/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2021/August/final/12.pdf*

Report[11], as adopted by the District Governing Board on December 17, 2020, established a final framework for the phase-out, as feasible, of agricultural managed burning. The adoption of the *2020 Report* included:

- Establishing a comprehensive approach to eliminate agricultural managed burning where feasible
- Requiring new prohibitions on open burning reliant on newly emergent alternatives
- Establishing a call for federal, State and local incentive funding to assist with the transition to costly new alternatives
- Establishing partnerships with agricultural stakeholders, CARB, and USDA-NRCS to assist with the final stages of development of feasible alternatives

On February 5, 2021, CARB staff published their recommendations regarding the District's 2020 Report, and on February 25, 2021, CARB approved their staff's recommendations[12]. This CARB action included full short-term concurrence with the District's *2020 Report* and recommendations through August 31, 2021, longer-term concurrence with many of the District's 2020 Report recommendations through 2025, and additional criteria that must be addressed for longer-term concurrence beyond August 31, 2021, including a timeline for the near-complete phase-out of open burning for the majority of remaining crop categories by January 1, 2025 (with some exceptions, such as diseased crops). Additionally, in supporting their concurrence action, CARB highlighted and affirmed the critical role that the State plays in securing needed State incentive funding to support the transition, and addressing barriers to the establishment of new bioenergy solutions.

In accordance with CARB's concurrence action, the District developed the *Supplemental Report and Recommendations on Agricultural Burning (Supplement)*, which was adopted by the District Governing Board on June 17, 2021[13]. The *Supplement* established an updated schedule for the near-complete phase-out of remaining agricultural open burning in the Valley by January 1, 2025.

- Achieved emissions reductions: District staff have estimated the emissions reductions that will be achieved by the near-complete phase-out of agricultural burning by 2025, with a NOx emissions reduction of 1.04 tpd, and a PM2.5 emissions reduction of 1.54 tpd. The District will soon submit to EPA the formal documentation for the emissions reductions achieved through this measure. The agricultural burning phase-out measure is a SIP strengthening measure for the San Joaquin Valley and will assist

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[11] SJVAPCD. (2020, December 17) *Item Number 15: Approve 2020 Staff Report and Recommendations on Agricultural Burning.* Retrieved 9/4/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/December/final/15.pdf*

[12] CARB. (2021, February) *Staff Recommendations San Joaquin Valley Agricultural Burning Assessment.* Retrieved 9/4/2021 from *https://ww2.arb.ca.gov/sites/default/files/2021-02/Staff_Recommendations_SJV_Ag_Burn.pdf*

[13] SJVAPCD. (2021, June 17) *Item Number 12: Approve Supplemental Report and Recommendations on Agricultural burning.* Retrieved 9/4/2021) from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2021/June/final/12.pdf*

the District in fulfilling its aggregate emissions reduction commitment and meeting the federal air quality standards.

Measures Currently Under Development

In addition to the measures that have already been adopted by the District through the implementation of the *2018 PM2.5 Plan* attainment strategy, the District has continued moving forward with technical evaluation and public engagement efforts for other scheduled regulatory measures, with several District rules scheduled for proposed amendments in the 2021-2022 timeframe. The following provides a summary of these measures being developed.

Rule 4354 (Glass Melting Furnace)

The *2018 PM2.5 Plan* includes commitments to evaluate potential emission reduction opportunities for container glass melting furnaces to the extent that such controls are technologically and economically feasible. As a part of this rule amendment, the District is evaluating potential opportunities to reduce emissions from other types of glass melting furnaces. The District has launched a public regulatory amendment process to evaluate the technological and economic feasibility of further reducing emission limits from glass melting furnaces located within the Valley. The District hosted a public scoping meeting on December 3, 2020[14], as an introduction to the rule making process, and a public workshop on September 30, 2021 detailing proposed rule amendment concepts[15]. The rule development and public engagement process is ongoing, with the Governing Board hearing anticipated by the end of 2021.

- Anticipated emissions reductions: District staff are currently analyzing the potential further emissions reductions possible from this source category, based on technological and economic feasibility. Based on current assessments of this rule amendment, the District conservatively estimates a NOx emissions reduction of 0.5 tpd, and a PM2.5 emissions reduction of 0.04 tpd. The ongoing development of this measure will refine the emissions reductions expected for the year 2025.

Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters)

The *2018 PM2.5 Plan* includes commitments to work with affected operators to further reduce NOx emissions for municipal solid waste-fired units to the extent that such controls are technologically and economically feasible. As a part of this rule amendment, the District is evaluating potential opportunities to reduce emissions from solid-fuel fired units located at biomass facilities. The District has commenced a public process to evaluate potential rule

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[14] SJVAPCD. (2020, December 3) *Public Scoping Meeting for Potential Amendments to District Rule 4354 (Glass Melting Furnaces)*. Retrieved 9/15/2021) from *https://www.valleyair.org/Workshops/postings/2020/12-03-20_r4354/presentation.pdf*

[15] SJVAPCD. (2021, September 30) *Public Workshop for Potential Amendments to District Rule 4354 (Glass Melting Furnaces)*. Retrieved 10/2/2021 from *https://www.valleyair.org/Workshops/postings/2021/09-30-21_r4354/Presentation.pdf*

amendments to achieve further emissions reductions from this source category. The District hosted a public scoping meeting on December 3, 2020[16], as an introduction to the rule making process, and a public workshop on September 30, 2021 detailing proposed rule amendment concepts[17]. The rule development and public engagement process is ongoing, with the Governing Board hearing anticipated by the end of 2021.

- Anticipated emissions reductions: District staff are currently analyzing the potential further emissions reductions possible from this source category, based on technological and economic feasibility. Based on current assessments of this rule amendment, the District conservatively estimates a NOx emissions reduction of 0.2 tpd, and a PM2.5 emissions reduction of 0.04 tpd. The ongoing development of this measure will refine the emissions reductions expected for the year 2025.

District Rule 4692 (Commercial Charbroiling)

As discussed earlier, the District continues to assess emissions control technologies for commercial underfired charbroilers, while actively implementing the Commercial Underfired Charbroiling Emission Reduction Strategy.

District Rule 4550 (Conservation Management Practices)

Rule 4550 was adopted to help bring the Valley into attainment of federal PM10 standards, and applies to on-field farming and agricultural operation sites located within the Valley. Rule 4550 was the first rule of its kind in the nation to target fugitive particulate emissions from agricultural operations, and it has served as a model for other regions. The implementation of Rule 4550 by agricultural operations has resulted in the reduction of PM2.5 emissions through the reduction of passes of agricultural equipment and implementation of other conservation practices. Although Rule 4550 already meets RACM, BACM and MSM for this source category, the District will go beyond MSM and is committing to further evaluate ways to promote conservation tillage practices and other potential enhancements to the Conservation Management Practices program to reduce dust from agricultural operations to the extent that they are found to practicably reduce PM2.5. The public engagement process for this measure is planned to begin by the end of 2021, with ongoing analysis in 2022.

Progress with Incentive-Based Measures

In addition to the regulatory measures that have been implemented or are in development, the District has continued to implement and administer a comprehensive suite of highly successful voluntary incentive programs which are critical to the Valley's attainment of the

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[16] SJVAPCD. (2020, December 3) *Public Scoping Meeting for Potential Amendments to District Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters).* Retrieved 9/15/2021) from *https://www.valleyair.org/Workshops/postings/2020/12-03-20_r4352/presentation.pdf*

[17] SJVAPCD. (2021, September 30) *Public Workshop for Potential Amendments to District Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters).* Retrieved 10/2/2021) from *https://www.valleyair.org/Workshops/postings/2021/09-30-21_r4352/Presentation.pdf*

federal air quality standards. The following provides a summary of these measures being developed.

Burn Cleaner Fireplace and Woodstove Change-out Program (Burn Cleaner)

The District's Burn Cleaner Program continues to be an important resource to help Valley residents make positive changes in reducing residential wood burning emissions during the winter season. Through Burn Cleaner, the District offers financial incentives for the change-out of old, high-polluting open-hearth fireplaces or uncertified devices with new cleaner, certified units. The program has provided the resources necessary for thousands of Valley residents to make positive changes in their residential wood-burning practices and is a significant part of the District's overall strategy to reduce the impacts of residential wood burning.

As a complementary strategy to the recent regulatory amendments, the District's Burn Cleaner incentive-based strategy is an important component of the District's *2018 PM2.5 Plan*. Along with amendments approved by the District Governing Board to the Residential Woodsmoke Reduction Strategy in June 2019, the District's Burn Cleaner Program was amended to support the implementation of enhanced curtailment thresholds in Hot Spot Counties. These changes provide residents of Hot Spot counties with increased incentive amounts while also limiting incentive options to natural gas devices. Given the potential high cost to replace older, high-polluting units, the Burn Cleaner Program also offers higher incentives for low-income households (up to $3,000) to provide additional assistance towards the purchase of a new, cleaner unit more economically feasible.

Specifically, on June 20, 2019, the District Governing Board adopted amendments to the District's Burn Cleaner Program[18]. These amendments included:

- Establishing additional financial incentives to Valley residents for the replacement of existing high polluting wood burning devices with cleaner devices
- Increasing incentive grants in areas subject to the new more stringent curtailment levels to encourage participation in an effort to transition to cleaner devices and associated emissions reductions
- Anticipated emissions reductions: District staff conservatively estimate these reductions to be at least 0.33 tpd of PM2.5. The District will soon submit to EPA the formal documentation for this emissions reduction credit to be applied to the aggregate commitment.

Agricultural Internal Combustion Engine Conversion Incentive (AG-ICE) Program

Building on past success in electrifying agricultural irrigation pumps through the AG-ICE program, the District will work with agricultural sources to further reduce NOx emissions

[18] SJVAPCD (2019, June 19) *Item Number 13: Adopt Proposed Amendments to the District's Residential Wood Burning Emission Reduction Strategy*. Retrieved 9/4/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2019/June/final/13.pdf*

through this incentive program. Through the AG-ICE Program, up to 85 percent of the costs to replace agricultural irrigation pumps is covered, encouraging a more rapid turnover of older agricultural engines. The District is assessing the emissions reductions that have been achieved through this incentive program, and is preparing the formal documentation for these emissions reductions to be applied to the aggregate commitment.

Other Ongoing Incentive Programs

In addition to the Burn Cleaner and AG-ICE programs, other District incentive programs continue to achieve emissions reductions across the Valley. Some notable programs include the Low-Dust Nut Harvester Incentive Program[19], the Zero-Emission Commercial Landscape Maintenance Equipment Program[20], the Alternatives to Agricultural Open Burning Incentive Program[21], and many others. The District will continue to evaluate the emissions reductions achieved through these programs and submit documentation to EPA to apply these reductions to the aggregate commitments from the *2018 PM2.5 Plan*, as appropriate.

Progress in Implementing CARB Measures

The following section will provide a brief overview of the measures that CARB has either already adopted, or is currently developing, along with the emissions reductions that can be applied against the aggregate commitments for 2025.

Adopted Measures

Innovative Technology Certification

In October 2016, CARB adopted California's *Regulation to Provide Certification Flexibility for Innovative Heavy-Duty Engines.*[22] This regulation encouraged manufacturers to accelerate development and market launch of a diversity of cleaner medium- and heavy-duty vehicles and engines by providing defined certification and on-board diagnostic (OBD) compliance flexibility.

- Achieved emissions reductions in SJV: No emissions reduction is expected from this measure in 2025

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[19] SJVAPCD (2019, November 19) *Item Number 7: Approve the Low-Dust Nut Harvester Incentive Program…* Retrieved 9/4/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/November/final/07.pdf*

[20] SJVAPCD (2018, November 15) *Item Number 9: Approve New Incentive Program to Support the Deployment of Zero-Emission Commercial Landscape Maintenance Equipment.* Retrieved 9/4/2021 from *http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2018/November/final/09.pdf*

[21] SJVAPCD (2021, August 19) *Item Number 10: Accept and Appropriate $178,200,000 in State Funding and Approve Enhancements to Alternatives to Agricultural Open Burning Incentive Program.* Retrieved 9/10/2021 from *https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2021/August/final/10.pdf*

[22] *https://ww3.arb.ca.gov/regact/2016/itr2016/itr2016.htm*

Medium and Heavy-Duty GHG Phase 2

The *GHG Emission Standards for Medium- and Heavy-Duty Engines and Vehicles (Phase 2)* regulation was adopted by the Board in February 2018. This new round of vehicle and engine GHG standards built upon the Phase 1 standards adopted federally in 2011 and in California in 2013. In addition to harmonizing with the federal Phase 2 standards finalized by EPA in October 2016, the CARB regulation includes some more stringent, California-only provisions that are necessary to meet California's unique air quality challenges.

- Achieved emissions reductions in SJV: No emissions reduction have been calculated for this measure in 2025

Lower In-Use Emission Performance Level

The Amendments to the Heavy-Duty Vehicle Inspection Program (HDVIP) and Periodic Smoke Inspection Program (PSIP) are designed to reduce emissions of particulate matter (PM) from diesel powered heavy-duty vehicles (HDV) powered by diesel engines. Emission reductions would primarily result from heavy-duty diesel (HDD) trucks, which include heavy heavy-duty diesel trucks (above 33,000 lbs. GVWR) and medium heavy-duty diesel trucks (14,001-33,000 lbs. GVWR).

The amendments to the HDVIP and PSIP regulation require diesel powered trucks and buses that are found to exceed i) the 20-40 percent opacity limit for non-DPF vehicles to repair their engines and ii) 5 percent opacity limit for DPF-equipped engines to either repair or replace their DPFs in order to reduce the opacity below the respective limits. The PM emissions benefits are the result of such repairs or replacement. More details on emissions inventory methods can be found in Appendix C of the Proposed Amendments of the Heavy-Duty Vehicle Inspection Program and Periodic Smoke Inspection Program Staff Report.[23]

- Achieved emissions reductions in SJV: 0.02 tpd PM2.5 in 2025

Innovative Clean Transit

The Innovative Clean Transit (ICT) regulation was adopted by CARB in 2019 and targets reductions in transit fleets by requiring transit agencies to gradually transition their buses to zero-emission technologies. ICT has helped to advance heavy-duty ZEV deployment, with buses acting as a beachhead in the heavy-duty sector. Based on the size of the transit agencies, they are categorized as small and large agencies. Starting calendar year 2023, large agencies follow the phase-in schedule to have a certain percentage of their new purchases as ZEB. For the small agencies, the start calendar year will be 2025. By 2030, all the agencies need to have 100 percent of their new purchases as ZEB. More details on the emissions benefit calculations can be found in Appendix L of the ICT's Staff Report.[24]

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[23] *https://ww2.arb.ca.gov/rulemaking/2018/heavy-duty-vehicle-inspection-program-and-periodic-smoke-inspection-program*

[24] *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2018/ict2018/appl.pdf*

- Achieved emissions reductions in SJV: 0.017 tpd NOx and <<0.01 tpd PM2.5 in 2025

Zero-Emission Airport Shuttle Buses

The *Zero-Emission Airport Shuttle Regulation* was adopted in June 2019 and targets airport shuttle buses, another beachhead market for zero-emission heavy-duty vehicles. The regulation requires airport shuttle operators to begin adding zero-emission shuttles to their fleets in 2027, and to complete the transition to ZEV by the end of 2035.

- Achieved emissions reductions in SJV: <0.01 tpd NOx and <0.01 tpd PM2.5 in 2025

Advanced Clean Trucks

The Last Mile Delivery measure in the Valley State SIP Strategy envisioned a regulation with a strong focus on last mile delivery vehicles. Through the regulatory development process, the program has evolved substantially into the Advanced Clean Trucks (ACT) Regulation. The ACT regulation approved on June 25, 2020 will achieve its electrification goal by gradually increasing the fraction of zero-emission vehicles (ZEVs) sold in California starting with model year 2024 vehicles to medium and heavy-duty vehicles with gross vehicle weight rating (GVWR) > 8,500 lbs. The detailed assumptions and methods of emission benefit analysis for the ACT regulation are shown in the Appendix F of the ACT Staff Report.[25]

- Achieved emissions reductions in SJV: 0.08 tpd NOx and <<0.01 tpd PM2.5 in 2025

Heavy-Duty Omnibus

CARB adopted the Heavy-Duty Omnibus regulation in August 2020, which applies to engine-certified vehicles with GVWR > 10,000 lbs. that are first sold or certified in California (see Section 4.5.3). Note that the majority (> 95 percent) of vehicles with GVWR 10,001-14,000 lbs. are chassis-certified and thus are excluded from the emissions benefit analysis. This program represents a comprehensive update to heavy-duty NOx emissions standards and ensures that heavy-duty engines will emit much lower NOx emissions throughout their lifetimes. This regulation includes:

- A tightened standard on the Federal Test Procedure (FTP),
- A new low-load certification cycle (LLC),
- Improvements to the existing heavy-duty in-use testing (HDIUT) program,
- Improvements to the durability demonstration program (DDP),
- Lengthened warranty and useful life (UL) mileages, and
- Amendments to the emission warranty information reporting (EWIR) program and corrective action procedures.

More details on each program element listed above, as well as emissions benefits methodology can be found in Appendix D of the HD Omnibus Staff Report.[26]

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[25] *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/appf.pdf*

[26] *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hdomnibuslownox/appd.pdf*

- Achieved emissions reductions in SJV: No emissions reduction is expected from this measure in 2025

Transport Refrigeration Units Used for Cold Storage

In September 2021, CARB adopted the regulatory measures for TRUs to include the transition of diesel truck TRUs to zero-emission, a more stringent diesel PM emission standard for the remaining TRU categories, and the use of lower global warming potential refrigerant. The transition of diesel truck TRUs to zero-emission supports the development of zero-emission infrastructure and is in alignment with Executive Order N-79-20. To reduce PM emissions and address the increasing population of TRUs equipped with diesel engines less than 25 horsepower, which have less stringent PM standards, trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generators sets manufactured in 2023 and later would be required to meet the most stringent standard for PM (Ultra-Low Emission TRU or ULETRU). While this measure does not focus on NOx reductions, CARB is evaluating the category for longer-term measures focused on full zero-emission operation of TRUs. For more details on emissions reductions associated with this measure, please refer to Appendix H of TRU Regulation Staff Report.[27]

- Achieved emissions reductions in SJV: 0.04 tpd NOx and 0.01 tpd PM2.5 in 2025

Measures Currently Under Development

In addition to the measures that have already been adopted by CARB as specified in the Valley State SIP Strategy, CARB continues to move forward on our regulatory calendar. The following provides a summary of these measures being developed.

Small Off-Road Engines

CARB is developing a proposal to implement significantly tightened exhaust and evaporative emission standards for generator engines and emission standards of zero for other small off-road engines by model year 2024. Starting in model year 2024, the new emission standards will accelerate a transition of all SORE regulated by CARB—or about 90 percent of all SORE in the State—to zero emissions. The regulation is expected to be considered by the Board in 2021. The remaining 10 percent of SORE includes new engines which are used in construction equipment/vehicles or used in farm equipment/vehicles which are smaller than 175 horsepower that fall under section 209, subsection (e)(1)(A) of the Act. The Act does not grant CARB the authority to regulate the emissions from engines used in these equipment types. For more details on emissions reductions associated with this measure, please refer to the Revised Draft 2020 Mobile Source Strategy document.[28] The Board will consider the SORE regulation in December 2021.

- Achieved emissions reductions in SJV: 0.16 tpd NOx and <0.01 tpd PM2.5 in 2025

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[27] *https://ww3.arb.ca.gov/board/rulemaking/tru2021/apph.pdf*

[28] *https://ww2.arb.ca.gov/sites/default/files/2021-09/Proposed_2020_Mobile_Source_Strategy.pdf*

Heavy-Duty Inspection and Maintenance Program

The Heavy-Duty I/M Program will ensure that in-use emission control components and systems on heavy-duty trucks (those above 14,000 pounds gross vehicle weight rating) are properly functioning, so that these vehicles continue to operate at their cleanest possible levels for the duration of their on-road operation. Since the initial concept in the Valley State SIP Strategy, California Senate Bill (SB) 210 (Leyva; Statutes of 2019) was passed by the Legislature and signed into law by Governor Newsom on September 20, 2019 to expand on the emission reduction opportunities. SB 210 enhanced the relevant regulatory authority by requiring that on-road heavy-duty diesel vehicles comply with the forthcoming Heavy-Duty I/M program in order to register annually with the California Department of Motor Vehicles (DMV). This direct tie-in to vehicle registration ensures that the program will achieve maximum emissions reductions.

The proposed program would apply to all on-road non-gasoline heavy-duty vehicles with a gross vehicle weight rating over 14,000 pounds that operate in California, including vehicles registered out of state and out of country. This robust program would be the first of its kind to rely on remote telematics to periodically download and transmit engines' OBD data to CARB for use in identifying malfunctioning emissions-related components and requiring timely repairs. The periodic testing component would be complemented by a new component, roadside emissions monitoring (remote sensing devices and/or CARB's Portable Emissions AcQuisition System, known as PEAQS) to detect high emitting vehicles between periodic test cycles and require additional testing and repair to ensure emissions control components are operating properly. Vehicle owners would be required to demonstrate that their vehicles' emissions control systems are properly functioning, thereby reducing excess NOx and PM emissions resulting from mal-maintenance and tampering. Key program elements include: 1) streamlined testing processes that nearly eliminate vehicle downtime for inspections; 2) requirements for all heavy-duty vehicles to possess a valid compliance certificate accessible upon request by CARB or California Highway Patrol (CHP) inspectors; and 3) the ability for the DMV to withhold vehicle registration on non-compliant California vehicles. The regulation is projected to begin implementation starting January 1, 2023.

To estimate emissions benefits from the proposed regulation, staff calculated scaling factors that are applied to vehicle deterioration rates to reflect lower rate of deterioration due to induced repairs and better maintenance required by the proposed HD I/M regulation. Important factors considered in the emissions benefits analysis includes effective repair rates, repair durability, and inspection frequency. More details on the emissions benefit calculations can be found in Appendix H of the HD I/M's Staff Report.[29] The Board will consider the HD I/M regulation in December 2021.

- Achieved emissions reductions in SJV: 14.7 tpd NOx and 0.03 tpd PM2.5 in 2025

[29] *https://ww2.arb.ca.gov/rulemaking/2021/hdim2021*

Advanced Clean Cars 2

The Advanced Clean Cars (ACC) will be heard by CARB in 2022. The ACC regulatory program, adopted in 2012 to control emissions from passenger vehicles, combined the control of smog-causing pollutants and GHG emissions into a single coordinated package of regulations: the Low-Emission Vehicle III Regulation for criteria (LEV III Criteria) and GHG (LEV III GHG) emissions, and a technology-forcing mandate for ZEVs. The program was developed in coordination with EPA and the National Highway Traffic Safety Administration (NHTSA) and includes emissions standards for vehicle model years through 2025. Because federal agencies have since reversed course and rolled back the national standards for model years 2021 through 2026, in addition to their decision to preempt California's authority to regulate light-duty vehicle GHG emissions and ZEV technology, it is even more important that CARB move forward with California standards for model years 2026 and beyond to preserve the critical emissions reductions from the passenger vehicle sector.[30] The Advanced Clean Cars II measure as discussed in the 2016 Strategy would increase the number of new ZEVs and plug-in hybrid electric vehicles (PHEVs) sold in California, and maximize criteria and GHG emissions reductions by setting standards for post-2025 model year vehicles. Advanced Clean Cars II is currently planned for consideration by the Board in 2022.

- Achieved emissions reductions in SJV: No emissions reduction have been calculated for this measure in 2025

Zero-Emission Forklift Regulation

CARB is preparing zero emissions requirements for forklifts, which are widely used in industrial and construction applications. The zero emissions requirements, currently in development for feasibility and cost effectiveness, will cover various forklift applications, including gasoline, natural gas, and diesel forklifts. This measure could be brought before the Board as early as 2022 with implementation starting in 2025. For more details on emissions reductions associated with this measure, please refer to the Revised Draft 2020 Mobile Source Strategy document.[31]

- Achieved emissions reductions in SJV: 0.02 tpd NOx and <0.01 tpd PM2.5 in 2025

In-Use Locomotive Measure

The draft in-use locomotive regulatory concepts include a Spending Account, Useful Life Limit, a 30-minute idling limit as well as reporting and recordkeeping requirements. The Spending Account rule would require railroads to deposit funds into an account, with a tentative schedule starting in 2024. The funds deposited are calculated based on the locomotive emission levels (NOx and PM) and the annual work performed in California. The deposited funds will be held in each individual railroad's Spending Account and would be

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[30] *See* The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program, 84 Fed. Reg. 51,310 (Sept. 27, 2019). Enforcing new California light-duty vehicle greenhouse gas emission and zero-emission vehicle regulations will depend on restoration of the State's authority to do so.

[31] *https://ww2.arb.ca.gov/sites/default/files/2021-09/Proposed_2020_Mobile_Source_Strategy.pdf*

required to be used to purchase Tier 4 or cleaner locomotives. CARB is also proposing to ban operation of old locomotives in California. Railroads traditionally remanufacture locomotives many times to extend their usage. The regulation would restrict the use in California of the oldest, dirtiest locomotives—those that exceed double their useful life and have already been rebuilt several times. The concepts will include mechanisms to transform California's locomotives to zero emissions as directed by Executive Order N-79-20. More details on this analysis will be included in the staff report for this proposed regulation.

- Achieved emissions reductions in SJV: 1.14 tpd NOx and 0.03 tpd PM2.5 in 2025

Cleaner In-Use Agricultural Equipment Measure

The Cleaner In-Use Agricultural Equipment measure is designed to increase the penetration of cleaner agricultural equipment used in California, including advancing zero-emission technology where feasible. CARB staff would develop a measure with deadlines to serve as an overall emission reduction target and to act as a catalyst for attracting early replacement of agricultural equipment through incentives. In combination with incentive programs and significant lead-time, this measure will ensure that cleaner agricultural equipment will be used in the Valley through 2030. This is a potential option CARB will explore if necessary, depending on availability and efficacy of incentive funding and therefore, no emissions reductions is yet quantified for this measure.

Low Emission Diesel Measure

CARB would bring to the Board a proposed measure that would require low-emission diesel comprise a steadily increasing percent of the CARB diesel pool. This standard is flexible and enables multiple fuel types to meet this standard. The specifications of low-emission diesel would require less than one percent aromatics, virtually no sulfur, and a blendstock carbon intensity maximum of 30-60 gCO2e/MJ. This standard is anticipated to increase consumption of low-emission diesel fuels, including: renewable diesel from biomass, NOx-mitigated biodiesel, renewable natural gas from biomethane, gas to liquid diesel from biomethane, renewable hydrocarbon diesel, and/or co-processed renewable hydrocarbon diesel. This proposed measure would provide NOx benefits predominately from legacy (pre-2010) on-road heavy-duty vehicles, off-road engines, stationary engines, portable engines, marine vessels and locomotives, as well as NOx and Diesel PM benefits in potentially all model year off-road engines, stationary engines, portable engines, marine vessels and locomotives. Interstate vehicles, even those registered out-of-state but operating on CARB diesel blended with low-emission diesel, are also anticipated to provide emission reduction benefits. Emissions reductions are not quantified for this measure.

Zero-Emission Airport Ground Support Equipment

CARB plans to develop and propose a regulation to transition diesel and LSI GSE to zero-emission technology. The current commercial availability of several GSE equipment types indicates the feasibility of this transition. Battery-electric GSE are the most common type of zero-emission GSE, and are available for several high-population equipment types. Many large air carriers which operate diesel GSE have already begun moving towards electric equipment. The added introduction of zero-emission GSE will act as a catalyst to further

zero-emission equipment penetration in the off-road equipment sector and other heavier duty-cycle and longer range applications.

A conservative strategy would rely on incentives and natural turnover, along with current in-use requirements, to replace equipment in which electric replacements are readily available, such as belt loaders, baggage tractors and cargo tractors. A more aggressive turnover and implementation strategy could utilize a memorandum of understanding, regulation, or a combination thereof, along with incentives for demonstration, to ensure 60 percent of existing diesel equipment in these categories would be replaced with zero-emission equipment by 2032, along with 50 percent of narrow body aircraft tugs and 30 percent existing wide-body aircraft tugs. Incentive funds would be targeted to demonstrating the feasibility of zero-emission technologies in the high-power equipment applications (e.g., wide-body aircraft tugs). Emissions reductions are not quantified for this measure.

Progress with Incentive-Based Measures

CARB's portfolio of incentive programs are used to accelerate all stages of technology commercialization by promoting the purchase of cleaner vehicles and equipment, assisting vehicle and equipment owners with the cost of upgrading their vehicles, and increasing development and deployment of cleaner and advanced zero-emission technologies. These programs include the Moyer Program, Low Carbon Transportation Investments, AQIP, the Truck Loan Assistance Program, and the Proposition 1B: Goods Movement Emission Reduction (Prop 1B) Program. More recently established programs include the FARMER Program, AB 617 CAPP incentives, and funds available through the Volkswagen (VW) Environmental Mitigation Trust.

The Moyer Program, funded by dedicated revenue from the DMV smog abatement fee and a fee on the purchase of new tires, provides approximately $94 million in grant funding annually through local air districts for cleaner-than-required engines and equipment. Due to the enactment of *Assembly Bill 1274*,[32] funding for the Moyer Program is expected to increase in future years. The Low Carbon Transportation and AQIP programs provide incentive funding with goals of improving access to clean transportation and mobility and reducing greenhouse gas emissions, criteria pollutants, and air toxics by funding accelerated development and early commercial deployment of the cleanest technologies. AQIP, while a related program, is appropriated from a different funding source, the Air Quality Improvement Fund.

Another more recently-established project under the Low Carbon Transportation investments is the Clean Off-Road Equipment Voucher Incentive Project, known as CORE. CORE is designed to accelerate deployment of cleaner off-road technologies by providing a streamlined way for fleets ready to purchase specific zero-emission equipment to receive funding to offset the higher cost of such technologies. This project is analogous to the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), but specifically targets zero-emission off-road freight equipment that is currently in the early stages of commercial

[32] O'Donnell, Chapter 633, Statutes of 2017

deployment. Borne out of a $40 million allocation of Low Carbon Transportation funds in the Fiscal Year 2017-18 CARB Low Carbon Transportation and AQIP Funding Plan, CORE provides vouchers to California purchasers and lessees of zero-emission off-road freight equipment on a first-come, first-serve basis, with increased incentives for equipment located in disadvantaged communities.

Given the COVID-19 pandemic and the resulting health and economic crisis, California's 2020 State Budget was drastically different from those enacted in recent years, and reflected estimated spending of $5.7 billion to respond directly to the COVID-19 pandemic. Despite this fact and the initial budget deficit last year, California has rebounded and proved resilient through the COVID-19 pandemic such that the fiscal outlook for 2021 is significantly better, as demonstrated by the 2021 State Budget. Among other things, the 2021-22 State Budget includes an unprecedented level of investment in ZEVs, with $2.3 billion for CARB over the next three years as part of a $3.9 billion comprehensive, multi-agency package to accelerate progress toward the State's 2035 and 2045 zero-emission vehicle goals.

Accelerated Turnover of Agricultural Equipment Phase I

As part of the 2017 State Budget, the Legislature appropriated $135 million to CARB to reduce agricultural sector emissions through grants, rebates, and other financial incentives for agricultural harvesting equipment, trucks, agricultural pump engines, tractors, and other equipment used in agricultural operations. CARB developed the FARMER Program and approved guidelines that establish the program framework, eligible projects, reporting requirements, and oversight provisions.

CARB adopted the San Joaquin Valley Agriculture Incentive Measure in December 2019. The measure quantifies the SIP-credible emission reductions from turning over older agricultural equipment with new cleaner equipment and meets EPA's integrity elements for achieving SIP credit for voluntary incentive measures. CARB and the District have been collaborating to implement the Measure using Moyer Program, NRCS, and FARMER Program incentive funds and the appropriate guidelines. The Measures achieves emission reductions due to already implemented Moyer Program and NRCS projects along with new projects funded through FARMER

- Achieved emissions reductions in SJV: 5.1 tpd of NOx and 0.3 tpd of PM2.5 in 2025

Accelerated Turnover of Agricultural Equipment Phase II

CARB plans to develop a second Agricultural Equipment Incentive Measure in 2024. The measure will account for the SIP-credible emission reductions using new funding not accounted for in the previous agricultural equipment measure. The projects will be in place. The recent budget provided $212.6 million statewide for FARMER.

- Achieved emissions reductions in SJV: 4.9 tpd of NOx and 0.5 tpd of PM2.5 in 2025

Accelerated Turnover of Trucks and Buses and Off-Road Equipment

CARB is currently assessing the viability of projects that meet EPA's requirements to receive SIP credit as part of a SIP credit measure. While incentives have paid for the turnover of

heavy-duty trucks and off-road equipment, many of the projects do not have contract lives that span the attainment year. Thus, they do not meet EPA SIP credit integrity element of being enforceable. CARB continues to assess the amount of emission reductions that can be assigned to this measure.

Progress Toward Meeting 2025 Aggregate Commitment

Factors Considered when Approving Enforceable Commitments

The Act allows for states to include enforceable commitments in their SIPs to meet air quality standards by their Act attainment deadlines. EPA considers three factors when approving an enforceable commitment which are: that the state is capable of fulfilling the commitment; the commitment is for a limited portion of the emission reductions; and the commitment is for a reasonable and appropriate period of time. Due to California's nonattainment issues, CARB and the District have included enforceable commitments in our past SIPs. Both CARB and the District's enforceable commitment is a two-pronged approach, commit to pursuing measures and an aggregate tonnage commitment. Basically, we specify that the measures can achieve more or less than what we estimated but we are held responsible for the aggregate amount. Further, the use of the enforceable aggregate commitment has been upheld in court.[33]

CARB and the District included an enforceable aggregate commitment for the 12 µg/m^3 annual PM2.5 standard in the *2018 PM2.5 Plan*. CARB committed to:

- Achieve aggregate emission reductions is an overall commitment to achieve the total emission reductions necessary to attain the federal PM2.5 air quality standards, reflecting the combined reductions from the existing control strategy and new measures; and
- Specifies that the aggregate emission reductions may be achieved through the existing control program, measures identified in the Valley State SIP Strategy, alternative measures, incentive programs, and actual emission decreases that occur.

The District also committed:[34]

- *"Whereas, the commitment for aggregate emissions reductions may be achieved through the existing control program, measures identified in the Plan, alternative measures, incentive programs, and actual emission decreases that occur;"*
- *And "The Board adopts the commitment to achieve the aggregate emissions reductions of 1.88 tpd of NOx and 1.30 tpd of PM2.5 by 2024/2025. If the total emission reductions from the adopted rules or measures are less than those committed to in the Plan, the District Governing Board commits to adopt, submit, and implement substitute rules and measures that achieve equivalent reductions in*

[33] Committee for a Better Arvin, et al. v. EPA, 786 F.3d 1169, 1181 (9th Cir. 2015)

emissions of direct PM2.5 or PM2.5 precursors in the same implementation timeframes or in the timeframes needed to meet CAA milestones."

Today, CARB and the District have developed this technical document to provide an update on the progress made in fulfilling our emission reduction commitment for the 12 μg/m^3 annual PM2.5 standard in support of EPA action on the portion of the *2018 PM2.5 Plan* related to the 12 μg/m^3 annual standard and attainment in 2025.

During the public process on the *2018 PM2.5 Plan*, CARB Board members and staff heard from the public regarding their concerns with the amount of reductions associated with the incentive measures for agricultural equipment, heavy-duty trucks and off-road equipment. In January 2019 when approving the *2018 PM2.5 Plan*, CARB asked that staff report back on an annual basis on the status of achieving our aggregate commitment including the reductions from incentive measures.

In September 2019, CARB staff provided the first update to the Board on implementing the State commitment in the *2018 PM2.5 Plan*. CARB staff highlighted the progress in both CARB and District measures including that 90 percent of the reductions were coming from regulatory measures. We also highlighted the incentive funds for agricultural equipment, heavy-duty trucks, and woodstoves along with the status of the agricultural equipment incentive measure.

In October 2020, CARB staff provided our second annual update in which we provided a status of meeting the aggregate commitment including where we were with existing and new measures. CARB identified two new opportunities for emissions reductions focusing on reducing emissions from locomotives and enhancing the HD I/M concept to achieve more emission reductions. We also acknowledged that CARB was still assessing opportunities to achieve 13 tpd of NOx reductions as part of our aggregate commitment. We highlighted new measures the District was pursing including their alternatives to agricultural burning pilot program.

In September 2021, CARB staff provided the third update to the Board which showed significant progress on achieving the CARB and District overall aggregate commitment due in large part to the District phase-out of agricultural burning in the Valley and the upcoming CARB HD I/M Program.

Table 2 quantifies CARB's progress to date on the aggregate commitment. To date, we have identified the strategies to achieve CARB's PM2.5 emission reduction commitment of 0.9 tpd. We are also well on our way to meeting the NOx aggregate commitment. Further, CARB's NOx aggregate commitment anticipated emission reductions from EPA action on federal sources; 2 tpd NOx from a federal low-NOx emission standard for heavy-duty trucks and 0.3 tpd NOx from a more stringent national locomotive emission standard.

Table 2: CARB Measure Implementation Progress and Projected Emissions Reductions

CARB Measure	Status	12 µg/m³ annual standard: 2025			
		2018 PM2.5 Plan Emissions Reduction Commitment (tpd)		Updated Expected Emissions Reductions (tpd)	
		NOx	PM2.5	NOx	PM2.5
Advanced Clean Cars 2 (Reduced ZEV Brake and Tire Wear)	2022	.	.	N/A	N/A
Lower In-Use Emission Performance Level: Lower Opacity Limits for HD Vehicles	Adopted May 2018			0	0.02
Lower In-Use Emission Performance Level: HD Vehicle Inspection and Maintenance Program	December 2021	6.8	< 0.1	14.7	0.03
Lower In-Use Emission Performance Level: Amended Warranty Requirements for HD Vehicles	Adopted June 2018			0.34	<<0.01
Low-NOx Engine Standard - California Action (Adopted as HD Low-NOx Omnibus)	Adopted August 2020	2		0	0
Advanced Clean Local Trucks (Last Mile Delivery) (Adopted as Advanced Clean Trucks)	Adopted June 2020	<0.1	<0.1	0.08	<<0.01
Low-NOx Engine Standard - Federal Action	Petition Sent	2	.	0	0

CARB Measure	Status	12 µg/m³ annual standard: 2025			
		2018 PM2.5 Plan Emissions Reduction Commitment (tpd)		Updated Expected Emissions Reductions (tpd)	
		NOx	PM2.5	NOx	PM2.5
Innovative Clean Transit	Adopted December 2018	<0.1	<0.1	0.017	<<0.01
Zero-Emission Airport Shuttle Buses	Adopted June 2019	.	.	<<0.01	<<0.01
More Stringent National Locomotive Emission Standards	Petition Sent	0.3	<0.1	0	0
Zero-Emission Off-Road Forklift Regulation Phase 1	2022	.	.	0.02	<<0.01
Zero-Emission Airport Ground Support Equipment	Ongoing	<0.1	<0.1	N/A	N/A
Small Off-Road Engines	December 2021	0.2	<0.1	0.155*	0.007*
Transport Refrigeration Units Phase 1	Adopted September 2021	.	.	0.04	0.01
Low-Emission Diesel Fuel Requirement	2022	1	0.1	N/A	N/A
Accelerated Turnover of Trucks and Buses	Ongoing	8	.	N/A	N/A
Accelerated Turnover of Agricultural Equipment Phase I	Adopted December 2019	5.1	0.3	5.1	0.3

CARB Measure	Status	12 µg/m³ annual standard: 2025			
		2018 PM2.5 Plan Emissions Reduction Commitment (tpd)		Updated Expected Emissions Reductions (tpd)	
		NOx	PM2.5	NOx	PM2.5
Accelerated Turnover of Agricultural Equipment Phase 2	2024	4.9	0.5	4.9	0.5
Cleaner In-Use Agricultural Equipment	2025	.	.	N/A	N/A
Accelerated Turnover of Off-Road Equipment	Ongoing	1.5	.	N/A	N/A
Locomotive Measure	2022			1.14*	0.03*
Total		**32**	**0.9**	**26.5**	**0.9**

*Estimated reductions based on measures and/or documentation being developed.

CARB's latest estimate documents that we are achieving more emission reductions from HD I/M and includes emission reduction estimates from the locomotive measure. CARB staff have determined that while incentive money has increased and will accelerate emission reductions and benefits for our most disadvantaged communities, the types of projects that qualify for EPA's SIP measure requirements are limited. As stated earlier, the incentive measures for heavy-duty trucks and off-road equipment will not be providing the SIP measure credible emission reductions as originally envisioned. However, those incentive dollars have provided for cost effective emission reductions and incentives will continue to be a critical piece of CARB's strategy. Finally, the federal controls for locomotives and trucks also did not materialize.

Further, the District is also on track and has identified new emission reduction strategies. Table 3 below shows the District is exceeding their commitment. Of note, the District phase-out of agricultural burning provides significant NOx and PM2.5 reductions. As the table documents, the District is achieving more NOx and PM2.5 reductions in aggregate in large part to the phase out of agricultural burning in the Valley.

Table 3: District Measure Implementation Progress and Projected Emissions Reductions

District Measure	Status	12 µg/m³ annual standard: 2025			
		2018 PM2.5 Plan Emissions Reduction Commitment (tpd)		Updated Expected Emissions Reductions (tpd)	
		NOx	PM2.5	NOx	PM2.5
Rule 4311 (Flares)	Adopted December 2020	0.05	0	0.19	0.03
Rule 4306 (Boilers, Steam Generators, and Process Heaters - Phase 3) Rule 4320 (Advanced Emission Reduction Options for B., S.G., and P.H. > 5.0 MMBtu/hr)	Adopted December 2020	1.83	0.03	0.19	0
Rule 4702 (Internal Combustion Engines)	Adopted August 2021			0.61	0
Rule 4354 (Glass Melting Furnaces)	2021			0.5*	0.04*
Rule 4352 (Solid Fuel-Fired B., S.G., and P.H.)	2021			0.2*	0.04*
Rule 4550 (Conservation Management Practices)	2022	0	0.32	0	0.32*
Rule 4692 Commercial Underfired	2020	0	0.53	0	TBD

District Measure	Status	12 µg/m³ annual standard: 2025			
		2018 PM2.5 Plan Emissions Reduction Commitment (tpd)		Updated Expected Emissions Reductions (tpd)	
		NOx	PM2.5	NOx	PM2.5
Charbroiling (Hot-Spot Strategy)					
Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters) (Hot-Spot Strategy)	Rule 4901 Adopted June 2019	0	0.42	0	0.20
	Incentive Measure			0	0.33
Rule 4103 (Open Burning) Agricultural Burning Phase-out	Adopted June 2021	0	0	1.04*	1.54*
Total		**1.88**	**1.30**	**2.73**	**2.50**

*Estimated reductions based on measures and/or documentation being developed.

In total, the State still needs to achieve 4.65 tpd of NOx reductions; however, the District has overachieved on the PM2.5 aggregate commitment by 1.2 tpd. CARB and the District have been identifying new measures throughout the process. We are confident we can achieve the remaining 4.65 tpd of NOx emissions out of the 207.48 tpd in total needed for attainment. Again, while incentives were not spent on trucks or off-road equipment, specifically for Carl Moyer, this money was spent on SIP-creditable projects and we can take credit for them in the future.

The existing mobile source control program provides for 162 tpd of NOx and 4.7 tpd of PM2.5 emission reductions along with existing stationary/area source reductions of 11.6 tpd of NOx. For PM2.5, the 2025 commitment was to achieve 0.9 tpd reductions from the State and 1.3 tpd reductions from the District. To date, CARB and the District have identified reductions in excess of the aggregate commitment for PM2.5.

The NOx aggregate commitment is a limited portion of the total commitment. Figure 2 documents that out of the 207.48 tpd NOx needed for meeting the 12 µg/m³ standard, only 10.7 tpd remain after 2021. The remaining NOx emission reduction commitment is for a limited portion of the emission reductions needed for attainment. Figure 3 shows that the 6.3 tpd of PM2.5 needed for meeting the 12 µg/m³ standard will be met and exceeded by 1.2 tpd.

As discussed earlier in this document, the emissions reductions achieved through the agricultural burning phase-out are significant and play a large role in limiting the remaining portion of NOx reductions needed for the Valley to show attainment. The agricultural burning phase-out measure is a SIP strengthening measure for the San Joaquin Valley and will assist the region's goals in meeting the federal air quality standards.

Figure 2: Total NOx Emission Reductions to meet 12 µg/m³ PM2.5 standard

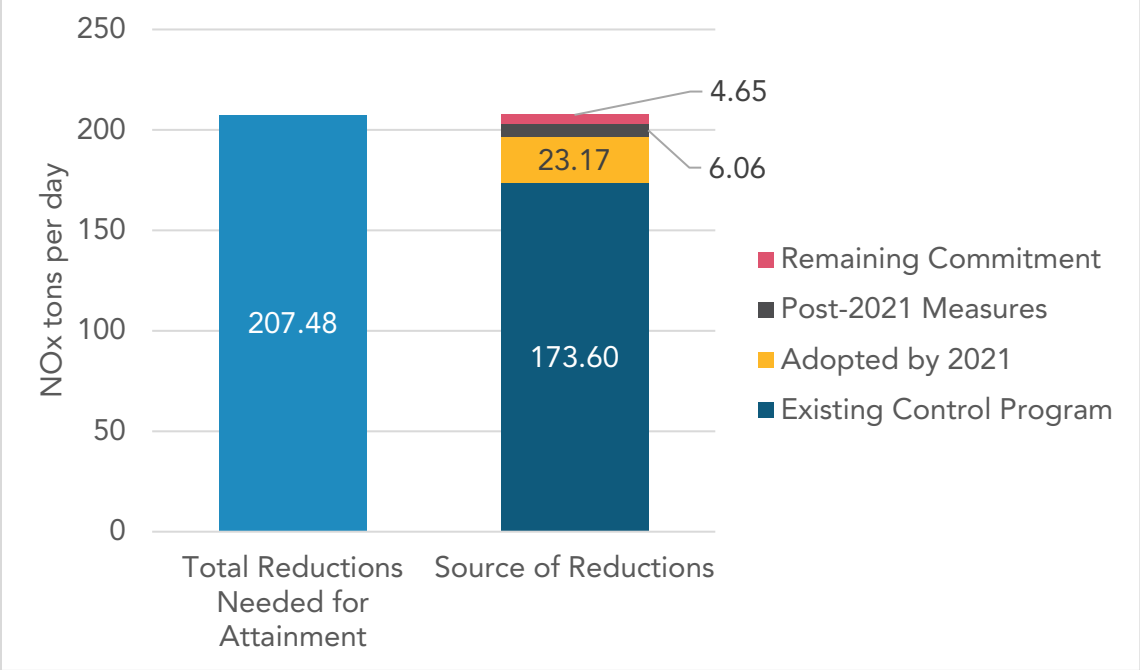
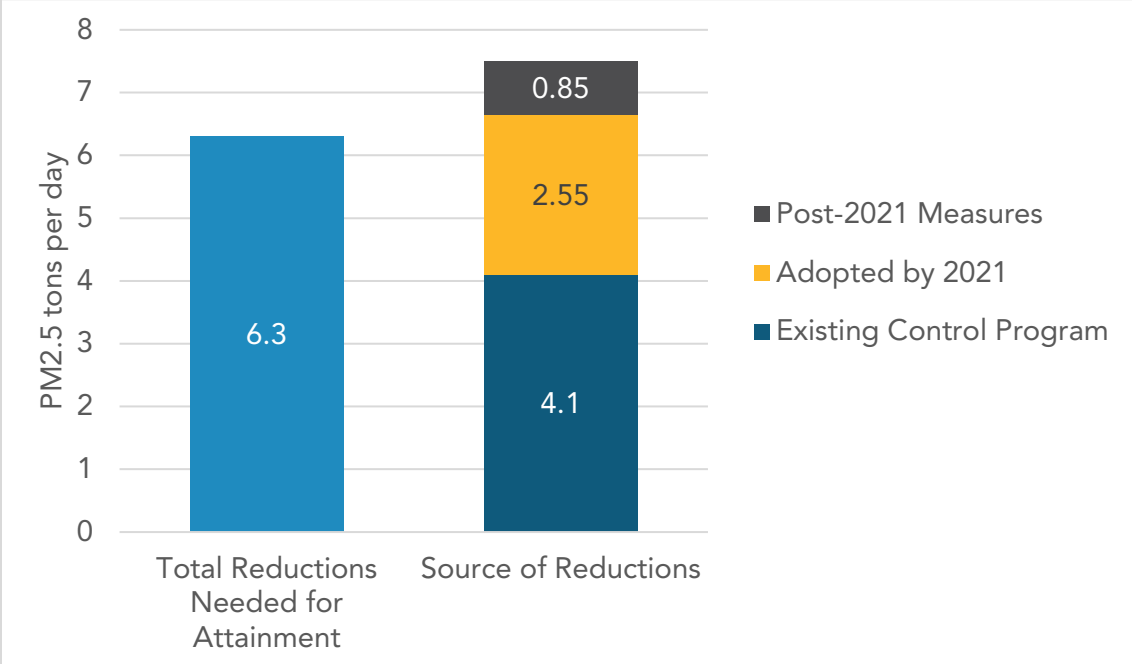


Figure 3: Total PM2.5 Emission Reductions to meet 12 µg/m³ PM2.5 standard



CARB and the District's schedule provides measures to be considered throughout the years with all emission reductions in place by January 1, 2025. CARB and the District have been adopting the measures listed as part of our commitment and will be achieving the total aggregate emission reduction commitment by January 1, 2025.

Aggregate Commitment for 2025 is Reasonable and Approvable

CARB and the District are on track to meeting our 2025 aggregate commitment. CARB and the District continue to explore emission reduction opportunities, and upcoming regulations could achieve more reductions than envisioned. CARB is currently assessing the viability of projects that meet EPA's requirements to receive SIP credit as part of a SIP credit measure. While incentives have paid for the turnover of trucks and off-road, many of the projects do not have contract lives that span the attainment year. CARB continues to assess the amount of emission reductions that can be deemed SIP-credible using incentive reduction projects.

Further, the District has achieved more PM2.5 reductions than originally envisioned. These reductions come directly out of the air, and not through reducing emissions involved in the secondary formation of PM2.5. Based on modeling sensitivity, the extra PM2.5 emission reductions are equivalent to approximately 6.54 tpd of NOx reductions, as shown in Table 4 below.

Table 4: Demonstration of Meeting Total Aggregate Commitment

SJV PM2.5 SIP NOx Emission Reduction Commitments (tpd) for 2025			
	2018 PM2.5 Plan NOx Commitment	**Updated NOx Estimate**	**Shortfall (Updated – 2018)**
CARB Measures	32	26.5	-5.5
District Measures	1.88	2.73	0.85
TOTAL 2018 PM2.5 Plan Commitment	33.88	29.23	-4.65
Additional PM2.5 Benefit (e.g., Rules, Ag Burn Phasedown*)		1.2	
Conversion of PM2.5 to NOx Benefit		7.2	7.2
TOTAL Updated Estimate	**33.88**	**36.43**	**2.55**
*Assumes 1.2 tpd PM2.5 beyond aggregate PM2.5 commitment x 6 tons NOx/1 ton PM2.5 = 7.2 tpd NOx			

As shown here, through the adoption of CARB and District measures, and through the implementation of upcoming additional measures, the total aggregate commitment for the 2012 PM2.5 standard will not only be met, it will be exceeded by 2.55 tpd NOx.

While the above calculations of existing adopted measures illustrate the significant progress made by the District and CARB on achieving and exceeding the collective emissions reductions included in the Plan, the District and CARB continue to implement measures in accordance with their respective Plan control measures and aggregate commitments.

PM2.5 Precursor Sensitivity Modeling Analysis and Trading Ratios

Trading Excess PM2.5 Achieved for Needed NOx Emissions for the Annual PM2.5 Standard

The *2018 PM2.5 Plan* relied on reductions of directly emitted PM2.5 and NOx, which is a precursor of PM2.5, to demonstrate attainment. CARB and the District intend to continue pursuing the PM2.5 and NOx reductions set forth in the *2018 PM2.5 Plan* to meet the aggregate commitment. This section, however, describes that, if needed, excess PM2.5 reductions being achieved could be used instead of NOx to achieve the same air quality benefits via inter-pollutant trading, an approach which EPA has historically supported. Reductions of directly emitted PM2.5 are a more efficient and cost-effective way to improve overall air quality compared to reductions of NOx. As discussed below, eliminating one ton of direct PM2.5 emissions is equivalent to removing several tons of NOx emissions.

The *2018 PM2.5 Plan* Appendix K[35] included precursor sensitivity simulations that can be used to develop a PM2.5 to NOx trading ratio. In other words, the amount of NOx emission reductions equivalent to 1 tpd of PM2.5 reductions. While not explicitly estimated in the *2018 PM2.5 Plan*, CARB staff used modeling emissions inventories from Appendix K Table 14 and precursor sensitivity analysis located in Appendix K Table 49 to calculate PM2.5/NOx trading ratios.

The *2018 PM2.5 Plan* included 2024 precursor sensitivity analysis involving 30 percent reduction in Valley anthropogenic emissions of potential PM2.5 precursors. CARB used 30 percent since EPA guidance for assessing precursors included this level as a starting threshold for precursor evaluation. Given that the 2024 and 2025 Valley emissions for PM2.5 and PM2.5 precursors are similar (Table 5), it is expected that sensitivity runs' results would also be similar.

Table 5. Valley Annual Modeling Emissions (tpd) for 2024 and 2025

Year	NOx	ROG	PM2.5	SOx	NH3
2024 Valley modeling emissions	107.6	295.1	53.5	7.9	330.2
2025 Valley modeling emissions	104.6	295.4	53.6	7.9	330.0
2024 vs. 2025 difference (%)	2.8	0.1	0.2	0	0

To determine the PM2.5 to NOx trading ratio in the Valley, CARB utilized the two PM2.5 precursor sensitivity simulations involving 30 percent reductions in 2024 anthropogenic PM2.5 and NOx emissions in the Valley. The baseline model simulation was the 2024 attainment run from the *2018 PM2.5 Plan*. The difference in annual design values (DVs) from

[35] *http://valleyair.org/pmplans/documents/2018/pm-plan-adopted/K.pdf*

the precursor sensitivity run and the baseline run is the impact on annual DVs from the 30 percent anthropogenic emission reductions. In 2024, the total anthropogenic emissions for primary PM2.5 and NOx emissions in the Valley (i.e., based on the modeling inventory and on an annual average basis) are 53.5 tpd and 107.6 tpd, respectively.

Table 6 first shows the change in annual PM2.5 DVs corresponding to the 30 percent reductions in anthropogenic PM2.5 and NOx emissions in the Valley in 2024. Then the change in annual DVs were divided by 30 percent of the corresponding emission totals to calculate the impact on DVs from a ton of emission reduction. Finally, the PM2.5/NOx trading ratio for the annual standard is computed as the change in DVs per ton of PM2.5 emission reduction divided by the change in DVs per ton of NOx emission reduction. These trading ratios are shown in Table 6 for PM2.5 monitors in the Valley.

Table 6: PM2.5 to NOx trading ratios for the annual PM2.5 standard*

Site	ΔDV from a 30% $PM_{2.5}$ reduction	ΔDV from a 30% NO_x reduction	ΔDV/ton of $PM_{2.5}$ reduction	ΔDV/ton of NO_x reduction	Annual $PM_{2.5}$ trading ratio
Bakersfield – Planz*^	1.93	0.48	0.120	0.015	8.1
Madera^	1.17	0.58	0.073	0.018	4.1
Hanford*^	0.98	0.8	0.061	0.025	2.5
Visalia*^	1.46	0.57	0.091	0.018	5.2
Clovis^	1.62	0.38	0.101	0.012	8.6
Bakersfield – California*^	1.81	0.45	0.113	0.014	8.1
Fresno – Garland*^	1.51	0.38	0.094	0.012	8.0
Turlock^	1.07	0.5	0.067	0.015	4.3
Fresno – Hamilton &Winery*	1.44	0.38	0.090	0.012	7.6

Stockton	0.76	0.26	0.047	0.008	5.9
Merced – S. Coffee	0.91	0.43	0.057	0.013	4.3
Modesto	0.97	0.38	0.060	0.012	5.1
Merced – M. Street	0.95	0.24	0.059	0.007	8.0
Manteca	0.43	0.25	0.027	0.008	3.5
Tranquility	0.32	0.23	0.020	0.007	2.8

*: These trading ratios were calculated based on the 2024 30 percent PM2.5 and NOx precursor sensitivity runs from the 2018 SJV PM2.5 Plan.

CARB staff used multiple methods to assess the appropriate trading PM2.5 to NOx trading ratio based on the predicted 2025 DV for each site (Table 7). The first method uses the top two sites with the highest modeled 2025 DV, Bakersfield Planz and Madera, which calculates to a PM2.5 to NOx trading ratio trading of 6.1 tpd of NOx emissions to 1 tpd of PM2.5 emissions. The second method uses the average of all sites which calculates to a PM2.5 to NOx trading ratio of 5.7 tpd of NOx emissions to 1 tpd of PM2.5 emissions. The third method uses an average of all sites with a modeled 2025 DV greater than 11.00 µg/m³, which calculates to a PM2.5 to NOx trading ratio of 6.4 tpd of NOx emissions to 1 tpd of PM2.5 emissions. The fourth method uses the sites in Table 6 with annual DVs over the standard in 2020 considering the impact of exceptional events, Bakersfield Planz, Bakersfield California, Fresno Garland, Fresno Hamilton, Hanford and Visalia. This method results in PM2.5/NOx trading ratio of 6.6 tpd of NOx emissions to 1 tpd of PM2.5 emissions. Table 8 summarizes the four methods.

Table 7: Base and Projected 2025 Annual Design Values Used to Select/Prioritize Sites for Calculating an Average Trading Ratio

Site	Base DV (µg/m³)	2020 Annual DV (µg/m³)	2025 Annual DV (µg/m³)
Bakersfield – Planz	17.2	15.4	12.0
Madera	16.9	10.5	12.0
Hanford	16.5	13.8	10.5
Visalia	16.2	14.7	11.5

Site	Base DV ($\mu g/m^3$)	2020 Annual DV ($\mu g/m^3$)	2025 Annual DV ($\mu g/m^3$)
Clovis	16.1	11.7	11.4
Bakersfield – California	16.0	14.1	11.0
Fresno – Garland	15.0	12.9	10.4
Turlock	14.9	11.5	11.1
Fresno – Hamilton &Winery	14.2	13.3	10.0
Stockton	13.1	11.0	10.6
Merced – S. Coffee	13.1	10.4	9.6
Modesto	13.0	9.6	9.9
Merced – M. Street	11.0	10.7	8.6
Manteca	10.1	9.4	8.0
Tranquility	7.7	6.7	5.5

Table 8: Summary of Analysis

Method	PM2.5/NOx trading ratio
Average of 2 sites with highest modeled 2025 DV	6.1
Average of all sites	5.7
^Average of sites with a modeled 2025 DV over 11.00 $\mu g/m^3$	6.4
*Average of sites with a 2020 DV over 12 $\mu g/m^3$	6.6

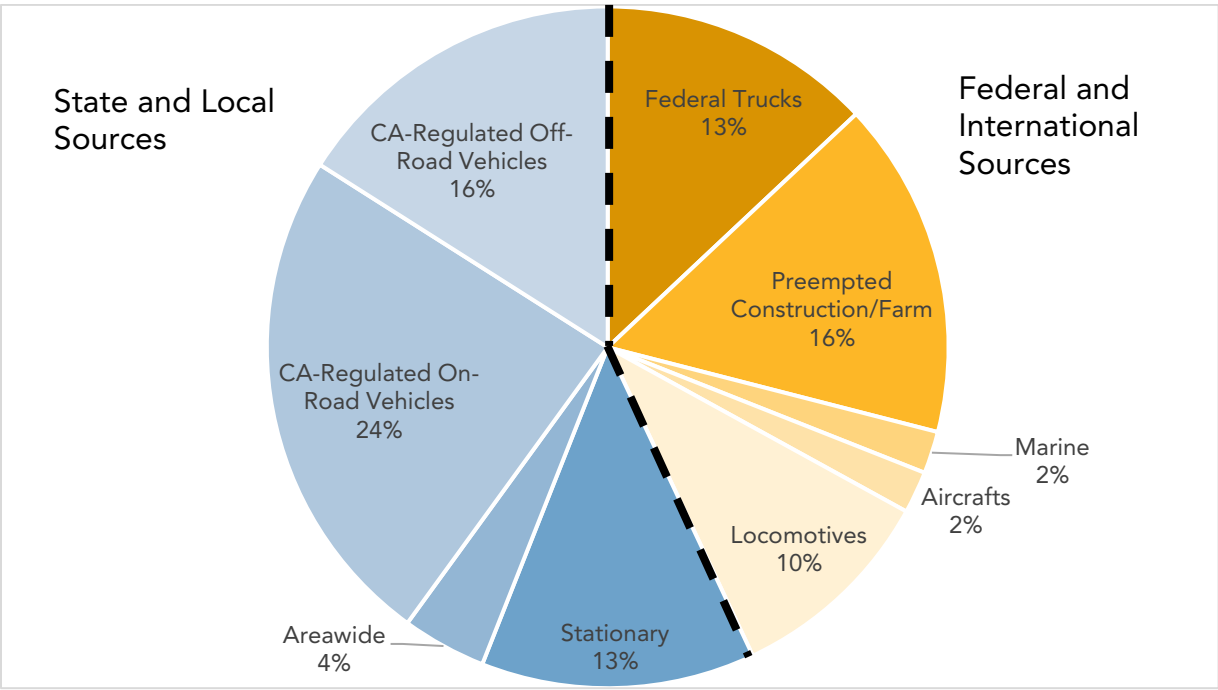
CARB selected a trading ratio of 6 tpd of NOx to 1 tpd of PM2.5 since it is conservative and is significantly less than the ratios at the high sites located in Bakersfield. Further, the trading ratio is conservative when looking at the average of trading ratios at Bakersfield-Planz and Madera, which are the top two annual PM2.5 design value sites (based on 2012-2014 annual design values) in the 2018 PM2.5 Plan. Individually, the PM2.5/NOx trading ratio is 8.1 at Bakersfield-Planz and 4.1 at Madera. However, the Madera site has showed significant decrease in annual PM2.5 design values (well below 15 $\mu g/m^3$ based on the 2018-2020

annual design values). Therefore, the Bakersfield-Planz site is of more concern, and its trading ratio is actually higher than 6 (i.e., meaning more conservative).

Emission Reductions from Federal Sources Vital to Ensure Ongoing Air Quality Improvements

As CARB and the District continue to adopt rules reducing emissions, federal sources become even more prominent. For the Valley, it is imperative that through a combination of regulatory action and infusion of incentive funding, the federal government act decisively to significantly reduce emissions from federally regulated sources of air pollution in California, including interstate trucks, ships, locomotives, aircraft, and certain categories of off-road equipment. Figure 4 shows that NOx emissions from federally regulated and international sources, shown in yellow, contribute over 40 percent of mobile source NOx emissions in the San Joaquin Valley in 2024. This graphic clearly demonstrates why the lack of action by the previous federal administration has hindered the region in achieving the emissions reductions identified in the Valley State SIP Strategy needed to attain the PM2.5 and emphasizes the need for aggressive and immediate actions to address emissions from these sources.

Figure 4: Federal and International Annual NOx Emission Contributions in SJV (2024)



As Figure 4 shows, most of the federal emissions in the Valley come from federal heavy-duty trucks, locomotives and preempted construction and farm equipment. We need to have the federal government address these sources as follows:

Heavy-duty trucks

- Adopt federal Low-NOx heavy-duty truck emission standards

- Enable state leadership on zero emission trucks by prioritizing federal grants toward zero emission technology and their associated infrastructure

Locomotives

- Adopt more stringent standards for new locomotives and require remanufactured locomotives to meet current standards
- Establish zero emission standards for switchers and provide funding toward technology and infrastructure development for zero emission line-haul locomotives

Off-Road Engines

- Adopt more stringent emission standards for off-road engines (gasoline and diesel) including preempted categories
- Establish zero emission standards for off-road engines where feasible
- Prioritize federal technology demonstration funding to zero emission off-road equipment

CARB will continue to work closely with EPA and other federal agencies on these proposed concepts to ensure that they achieve the needed emissions reductions for meeting air quality standards and support development of future state implementation plans. While regulatory action at the federal level will help drive the introduction of cleaner technologies, fuels, and fueling infrastructure, their emissions reductions rely on the pace of natural fleet turnover which is not always sufficient to meet California's immediate near-term needs. Additional funding mechanisms, partnerships, research and demonstration projects, and other innovative strategies can incentivize accelerated deployment of the cleanest technologies.