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San Joaquin Valley Supplement to the Revised 2016 State Strategy for the State Implementation Plan

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CALIFORNIA
AIR RESOURCES BOARD

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Chapter 1: Introduction

Purpose of the Supplement to the State SIP Strategy

The *2016 State Strategy for the State Implementation Plan* (2016 State SIP Strategy)[1] was adopted in March 2017 by the California Air Resources Board (CARB or Board) and describes the State's initial commitment to take action on measures and to achieve the emission reductions necessary to attain federal ozone and fine particulate matter (PM2.5) standards across California. At the March 2017 Board meeting, CARB staff committed to identifying additional emission reductions for meeting PM2.5 standards in the San Joaquin Valley (Valley). The *San Joaquin Valley Supplement to the 2016 State Strategy for the State Implementation Plan* (Valley State SIP Strategy) describes CARB staff's proposal for a supplemental State commitment for measures and emission reductions to attain health-based federal air quality standards for PM2.5 in the Valley.

Under the federal Clean Air Act (Act), the United States Environmental Protection Agency (U.S. EPA) is required to periodically review the latest health research to ensure that ambient air quality standards remain protective of public health. Based on research demonstrating adverse health effects at lower exposure levels, U.S. EPA has set a series of increasingly health protective air quality standards. The Valley has the most burdensome PM2.5 challenge in the country, and is nonattainment for both the 65 and 35 micrograms per cubic meter ($\mu g/m^3$) 24-hour PM2.5 standards, with attainment dates of 2020 and 2024, respectively; and both the 15 and 12 $\mu g/m^3$ annual standards, with attainment dates of 2020 and 2025, respectively. The Valley is also one of only two areas in the country classified as an Extreme ozone nonattainment area.

Meeting the standards throughout the State will provide essential public health protection for the approximately 12 million Californians currently living in communities that exceed the federal standards for ozone and PM2.5. The health and economic impacts of exposure to elevated levels of ozone and PM2.5 in California are considerable, and meeting federal standards will pay substantial dividends in terms of reducing costs associated with emergency room visits and hospitalization for heart and lung related causes, lost work and school days and reducing incidences of asthma. Most critically, exposure to PM2.5 and ozone is also associated with increased risk of premature mortality, which has been estimated to contribute to 7,500 premature deaths each year in California.

[1] CARB (2017) "Revised Proposed 2016 State Strategy for the State Implementation Plan (State SIP Strategy)" https://www.arb.ca.gov/planning/sip/2016sip/2016sip.htm

Further, Assembly Bill (AB) 617, passed by the California Legislature in 2017, recognized that some communities still suffer greater impacts than others. Communities near ports, railyards, warehouses, and freeways, for example, experience significantly higher air pollution than other areas due to emissions from mobile sources such as cars, trucks, and locomotives. AB 617 along with CARB's new Community Air Protection Program prioritizes efforts in low-income and disadvantaged communities to address cumulative impacts in these communities. Measures in the 2016 State SIP Strategy and the Valley State SIP Strategy will provide substantial benefits for the State's communities most impacted by air pollution.

Given U.S. EPA's recent revisions to air quality standards that established lower, more health protective levels, substantial reductions from both mobile and stationary sources are necessary to reach attainment. This requires comprehensive actions to transform the technologies and fuels we use, the design of our communities, and the way we move people and freight throughout the State.

Such actions to control mobile sources are possible because of California's unique authority to regulate emissions from certain source categories more stringently than the federal government under the Act's §209(b) waiver provision. Over nearly five decades, CARB has consistently sought waivers and authorizations for its new motor vehicle regulations and has received waivers and authorizations for over 100 regulations. CARB's history of progressively strengthening standards as technology advances, coupled with the waiver process requirements, ensures that California's regulations remain the most stringent in the nation, and that necessary emission reductions from the mobile sector continue and ensures that all Californians will be able to breath healthy air in the future.

Mobile sources – cars, trucks, and myriad off-road equipment – and the fossil fuels that power them are the largest contributors to the formation of ozone, PM2.5, toxic diesel particulate matter (diesel PM), and greenhouse gas (GHG) emissions in California. The significant contribution of mobile sources, and the interconnected nature of strategies to meet California's goals, has fostered an integrated planning approach demonstrating the need for a comprehensive transformation to cleaner vehicle technologies, fuels, and energy sources. The measures included in the 2016 State SIP Strategy represent the elements of CARB's Mobile Source Strategy, coupled with measures to reduce emissions from consumer products, necessary to meet Act requirements.

The 2016 State SIP Strategy incorporated the most recently available inventory data, as well as refinements to measures in response to stakeholder feedback and continued technology assessments. The 2016 State SIP Strategy also includes an initial identification of emission reductions for PM2.5 attainment in the Valley, as well as a discussion of estimated funding needs and a process for securing funds to support needed reductions via accelerated turnover of older, dirtier engines and vehicles to the cleanest available technologies.

The Board adopted the 2016 State SIP Strategy on March 23, 2017, creating a commitment to adopt measures according to a defined schedule and a commitment to achieve specified emission reductions in the South Coast and the Valley by specific dates. Specifically for the Valley, the 2016 State SIP Strategy included a commitment for reductions in oxides of nitrogen (NOx) emissions to accelerate ozone progress for the 75 ppb 8-hour ozone standard, and a commitment to return to the Board with a comprehensive plan to attain the PM2.5 standards in the Valley, with a commitment to achieve additional reductions from mobile sources. Staff also received direction from the Board to address emissions from agricultural equipment. The Valley State SIP Strategy builds upon the actions in the 2016 State SIP Strategy and addresses Board direction to define the remainder of the commitment needed for the Valley to meet federal PM2.5 standards.

The Valley State SIP Strategy includes the State SIP Strategy as Appendix A and describes the complete strategy to control emissions from mobile sources to achieve the necessary reductions for attainment of federal PM2.5 standards in the Valley. At the same time, the San Joaquin Valley Air Pollution Control District (District) has developed new actions to further control emissions from stationary and area-wide sources. It is a broad suite of actions to reduce emissions across both the mobile and stationary source sectors that will provide a pathway for the Valley to meet federal PM2.5 standards.

Valley Emission Reduction Needs for PM2.5

The Valley has the most critical PM2.5 challenge in the nation, and - together with the South Coast - is one of only two Extreme ozone nonattainment areas. The Valley is nonattainment for multiple PM2.5 standards including: the 65 µg/m^3 24-hour standard, 15 µg/m^3 annual standard, the 35 µg/m^3 24-hour standard, and the 12 µg/m^3 annual standard, as shown in Table 1.

Table 1: Valley Attainment Dates for PM2.5 Standards

Standard	Attainment Date
65 µg/m^3 24-hour PM2.5 standard (1997 standard)	2020
15 µg/m^3 annual PM2.5 standards (1997 standard)	2020
35 µg/m^3 24-hour PM2.5 standard (2006 standard)	2024
12 µg/m^3 annual PM2.5 standard (2012 standard)	2025

The PM2.5 attainment strategy for the Valley must take into consideration the diversity of sources that contribute to PM2.5, as well as the specific timeframes of meeting both the annual and 24-hour PM2.5 standards. PM2.5 in the Valley comes from a variety of sources, including directly emitted particles such as carbon (smoke and soot), and dust,

as well as particles that are formed through interactions between precursor gases, such as ammonium nitrate and ammonium sulfate.

Air quality measurements and modeling have shown that mobile source emissions are a significant contributor to PM2.5 levels in the Valley. These contributions come through both directly emitted PM2.5, and gaseous precursors such as NOx, which can form secondary PM2.5 in the atmosphere. Overall, mobile sources contribute to about 50 to 60 percent of the particles that make up PM2.5 in the Valley. They are the dominant contributor to NOx emissions in the Valley, accounting for approximately 85 percent of NOx. Mobile sources also account for over 95 percent of toxic diesel particulate matter emissions. Diesel particulate matter is part of the carbon particles that are dominated by local sources such as residential wood burning and commercial cooking. The overall contribution of mobile sources to Valley PM2.5 pollution highlights the role of reducing emissions from these sources as part of a successful control strategy.

Current Control Program

CARB's existing mobile source control program has achieved substantial reductions in in the Valley, and will continue to provide further emission reductions from ongoing implementation. Since 2000, NOx and PM2.5 emissions from mobile sources have been reduced by over 60 percent. Continued implementation of CARB's current mobile source programs will result in significant further reductions by 2025, reducing NOx emissions from 2013 levels by 55 percent and PM2.5 emissions by nearly 40 percent.

These reductions have relied on a suite of policy and regulatory mechanisms that includes establishing emissions and performance standards for new vehicles and fuels, setting mandates and sales requirements for advanced technologies, creating pilot programs to encourage development of new technologies, and implementing incentive and other programs to accelerate technology deployment. Together, these approaches are designed to achieve progressively cleaner emission levels for the entire mobile fleet.

Unique to the Valley is the significant presence of agricultural operations throughout the area, with agricultural equipment emitting 18 percent of the total NOx emissions. The agricultural industry in the Valley has a long and successful history of efforts to secure funding for incentives to turn over the fleet of agricultural vehicles and engines that power these operations. Since 1992, the District's incentive program have provided over $688 million in incentive funds. This has been matched by cost-sharing on the part of participating businesses in the industry, public agencies, and residents, who together have invested over $526 million, for a total public/private investment of well over $1.2 billion in low and zero emissions equipment and operations. These combined efforts have accelerated the adoption of cleaner technologies achieving over 117,000 tons of lifetime emission reductions.[2]

[2] SJVAPCD "2017 Annual Demonstration Report" (August 2017)
http://www.valleyair.org/MOP/docs/2017_Final_AnnualDemonstrationReport_AppendixAB.PDF

2016 State SIP Strategy

Although the current control programs will continue to provide substantial reductions through 2025, significant further reductions will be required to meet air quality standards. Technology assessments have identified the next generation of technologies and fuels now becoming available that will need to comprise California's transition to a cleaner, more efficient transportation system.[3] The 2016 State SIP Strategy identified a suite of regulatory and incentive programs, referred to as SIP measures, designed to deploy the cleaner technologies and fuels identified in the technology assessments.

SIPs must contain enforceable commitments to achieve the level of emissions necessary to meet federal air quality standards as defined by the attainment demonstration. The 2016 State SIP Strategy that the Board approved in March 2017 included a commitment to bring to the Board or otherwise take action on defined measures according to the schedule identified. Shown in Table 2 are the measures that are a part of the mobile source program for the Valley; Table 2 does not include measures to further deployment of advanced technology included in the State SIP Strategy exclusively for the South Coast Air Basin as permitted under Clean Air Act section 182(e)(5).

[3] Technology and Fuels Assessments can be found at: https://www.arb.ca.gov/msprog/tech/tech.htm

Table 2: 2016 State SIP Strategy Measures and Schedule for the San Joaquin Valley

Measures	Agency	Action	Implementation Begins
2016 State SIP Strategy Measures			
Advanced Clean Cars 2 Reduced ZEV Brake and Tire Wear	CARB	2020 – 2021	2026
Lower In-Use Emission Performance Level: Lower Opacity Limits for Heavy-Duty Vehicles Amended Warranty Requirements for Heavy-Duty Vehicles Inspection and Maintenance Program for Heavy-Duty Vehicles	CARB	2017 – 2020	2018 +
Low-NOx Engine Standard – California Action	CARB	2019	2023
Low-NOx Engine Standard – Federal Action	U.S. EPA	2019	2024
Innovative Clean Transit	CARB	2018 – 2019	2020
Advanced Clean Local Trucks (Last Mile Delivery)	CARB	2019	2020
Zero-Emission Airport Shuttle Buses	CARB	2018	2023
More Stringent National Locomotive Emission Standards	U.S. EPA	2017	2023 +
Zero-Emission Off-Road Forklift Regulation Phase 1	CARB	2020	2023
Zero-Emission Airport Ground Support Equipment	CARB	2019	2023
Small Off-Road Engines	CARB	2018 – 2020	2022
Transport Refrigeration Units Used for Cold Storage	CARB	2018 – 2019	2020 +
Low-Emission Diesel Fuel Requirement	CARB	by 2020	2023

The 2016 State SIP Strategy also included an aggregate emission reduction commitment for 8 tpd of NOx reductions in the Valley from measures under CARB direct regulatory authority. This commitment, when coupled with strong action at the federal level, will achieve a total of 17 tpd of NOx emission reductions in the Valley in 2031, as shown in Table 3. While the commitment for quantified reductions in the San Joaquin Valley was adopted only for the year 2031, expected emission reductions from the measures in the 2016 State SIP Strategy were also calculated for 2025. These reductions reflect the benefits of new vehicles entering the fleet due to the regulatory measures in the 2016 State SIP Strategy to accelerate ozone progress, and serve as a down payment on the reductions needed to meet PM2.5 standards.

Table 3: Expected Emission Reductions in the San Joaquin Valley from 2016 State SIP Strategy Measures

Measures	2025^		2031
	NOx (tpd)	PM2.5 (tpd)	NOx (tpd)
2016 State SIP Strategy Measures			
Advanced Clean Cars 2 Reduced ZEV Brake and Tire Wear	--	--	0.2
Lower In-Use Emission Performance Level Lower Opacity Limits for Heavy-Duty Vehicles Amended Warranty Requirements for Heavy-Duty Vehicles Inspection and Maintenance Program for Heavy-Duty Vehicles	NYQ	<0.1	NYQ
Low-NOx Engine Standard – California Action	2	--	7
Low-NOx Engine Standard – Federal Action	2	--	8
Innovative Clean Transit	<0.1	<0.1	<0.1
Advanced Clean Local Trucks (Last Mile Delivery)	<0.1	<0.1	0.2
Zero-Emission Airport Shuttle Buses	--	--	<0.1
More Stringent National Locomotive Emission Standards	0.1	<0.1	1
Zero-Emission Off-Road Forklift Regulation Phase 1	--	<0.1	<0.1
Zero-Emission Airport Ground Support Equipment	<0.1	<0.1	<0.1
Small Off-Road Engines	0.1	<0.1	0.3
Transport Refrigeration Units Used for Cold Storage	NYQ	NYQ	NYQ
Low-Emission Diesel Fuel Requirement	1	0.1	0.5
Aggregate Emission Reductions	**6**	**0.1**	**17**

"NYQ" denotes emission reductions are Not Yet Quantified
"—" denotes no anticipated reductions
^ 2025 reductions quantified, but not committed to in the 2016 State SIP Strategy
The SIP-creditable measures as proposed by staff to the Board or adopted by the Board may provide more or less reductions than the amount shown.

For adopted measures that are not under CARB's regulatory authority, CARB staff committed to take the appropriate actions as identified in the proposed measure descriptions. These actions include petitioning U.S. EPA for federal action on sources under their authority and working with the California Bureau of Automotive Repair to

conduct an In-Use Performance Assessment. The measures committed to in the 2016 State SIP Strategy are fully described in Appendix A.

While Table 3 includes estimates of the emission reductions from each of the individual measures, CARB's overall commitment is to achieve the total emission reductions necessary 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 is still committed to achieving the total aggregate emission reductions. CARB's aggregate 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 the implementation of other enforceable measures.

Included in the 2016 State SIP Strategy was a call for action by U.S. EPA to develop a national low-NOx engine standard. In addition, local air districts in the State have formally petitioned U.S. EPA to adopt 0.02 g/bhp-hr NOx standards for medium- and heavy-duty truck engines nationally. As CARB moves forward with actions under its authority, staff continues to work with federal and international agencies to advocate for more stringent emission standards for sources that are not under CARB's regulatory purview.

Proposed State Measures for the Valley

Given the earlier attainment dates for PM2.5 compared to ozone, accelerating the pace of NOx reductions will be necessary. While ongoing mobile source NOx reductions will provide for significant regional improvement, strategic use of incentive funding will be essential to achieve earlier penetration of cleaner technologies. CARB's science-based assessment of a strategy focusing on both direct PM2.5 and NOx suggests that a total of 32 tpd of NOx reductions in 2024, in addition to the 157 tpd of NOx reductions from the existing program, would provide the share of mobile source NOx reductions needed to meet both the annual and 24-hour PM2.5 standards in the Valley.

Since Board adoption of the 2016 State SIP Strategy in March 2017, CARB staff has further refined the final emission reduction needs and strategies, including funding mechanisms, to accelerate turnover to the technologies identified in the State SIP Strategy. This also includes efforts to reflect the benefits of additional transformational efforts underway in the Valley as part of other planning efforts that are anticipated to provide criteria emission reduction co-benefits, such as climate programs and the Sustainable Freight Action Plan. As an outcome of that process, the Valley State SIP Strategy includes updates to certain measures in the 2016 State SIP Strategy and proposes additional mobile source measures needed for the Valley's PM2.5 SIP. Chapter 2 describes the updated 2016 State SIP Strategy measures and the Proposed State Measures for the Valley, and Chapter 3 describes CARB staff's proposed commitment for the Valley's PM2.5 SIP.

The measures in the Valley State SIP Strategy build upon the regulatory measures in the 2016 State SIP Strategy and accelerate turnover to the next generation of cleaner technologies in the Valley. These additional measures include new requirements that would ensure that on-road, heavy-duty vehicles remain as clean as possible throughout their lifetime, and incentive measures to accelerate the turnover of agricultural tractors, on-road heavy-duty vehicles, and off-road equipment. Given their contribution to ambient PM2.5 levels in the Valley, District measures to achieve additional reductions from local sources of directly emitted PM2.5 will also be critical.

Combined, the actions in the 2016 State SIP Strategy and the Valley State SIP Strategy provide the share of mobile source reductions needed for attainment. Table 4 summarizes the combined reductions that will accrue through implementation of the current control program, the measures committed to in the 2016 State SIP Strategy, and the measures in the Valley State SIP Strategy. In aggregate, they will reduce emissions from 2013 levels by 189 tpd NOx and 5.5 tpd PM2.5 by 2024, and 194 tpd NOx and 5.6 tpd PM2.5 by 2025.

Table 4: Emission Reductions from State Measures

	2024		2025	
	NOx (tpd)	**PM2.5** (tpd)	**NOx** (tpd)	**PM2.5** (tpd)
Current Control Program	157	4.6	162	4.7
Measures	32	0.9	32	0.9
2016 State SIP Strategy Measures	*9*	*0.1*	*12*	*0.1*
Proposed State Measures for the Valley	*23*	*0.8*	*20*	*0.8*
Total Reductions	189	5.5	194	5.6

Over 70 percent of the reductions needed to meet the standards in 2024 and 2025 will come from regulatory actions associated with ongoing implementation of the existing control program, combined with regulatory measures identified in the Valley State SIP Strategy. The remaining reductions will come from additional efforts to enhance the deployment of these cleaner technologies through new incentive funding. Given the need for near-term reductions, significant investments to support incentive programs will be critical to accelerate the penetration of the cleanest technologies.

Overview of Strategy

Regulatory actions comprise the core of the overall attainment strategy, although the relative proportion varies by sector reflecting differences in the maturity of the current control program, regulatory authority, and status of technology development. For on-road sectors, implementation of the current control program, coupled with new regulatory measures to require introduction of even cleaner technologies for cars and

trucks, provides a 70 percent reduction in NOx emissions by 2025 from 2013 levels. This strategy also includes a proposed commitment for additional reductions from accelerating the penetration of the cleanest near-zero and zero-emission trucks and buses. The success of current incentive programs provides a model for expanded funding to achieve this additional deployment. Combined, actions in this strategy for on-road sources will reduce NOx emissions over 80 percent by 2025, from 2013 levels.

Achieving reductions in the off-road sectors remains a greater challenge due to the diverse nature of these sources, regulatory authority that rests outside of CARB in many cases, and the length of time sources remain in the fleet. The 2016 State SIP Strategy includes key regulatory actions to establish the next tier of cleaner combustion for locomotives, and introduction of ZEV technologies for smaller off-road equipment. These actions, when coupled with current regulatory programs will reduce NOx emissions from off-road and federal sources by 37 percent by 2025, from 2013 levels. While regulatory actions will continue to drive the introduction of the cleanest mobile technologies in off-road sectors, the natural pace of fleet turnover will need to be accelerated to provide sufficient reductions to meet the Valley's PM2.5 attainment needs. CARB and District staff have identified opportunities for additional emission reductions through accelerating the turn-over of older, higher-emitting engines to the cleanest technologies including agricultural tractors, forklifts, transport refrigeration units, construction equipment, and drilling rigs. Accelerating the deployment of cleaner technologies in these categories provides the mechanism for additional reductions, which in combination with regulatory actions, will reduce NOx emissions from off-road sectors 51 percent by 2025, from 2013 levels.

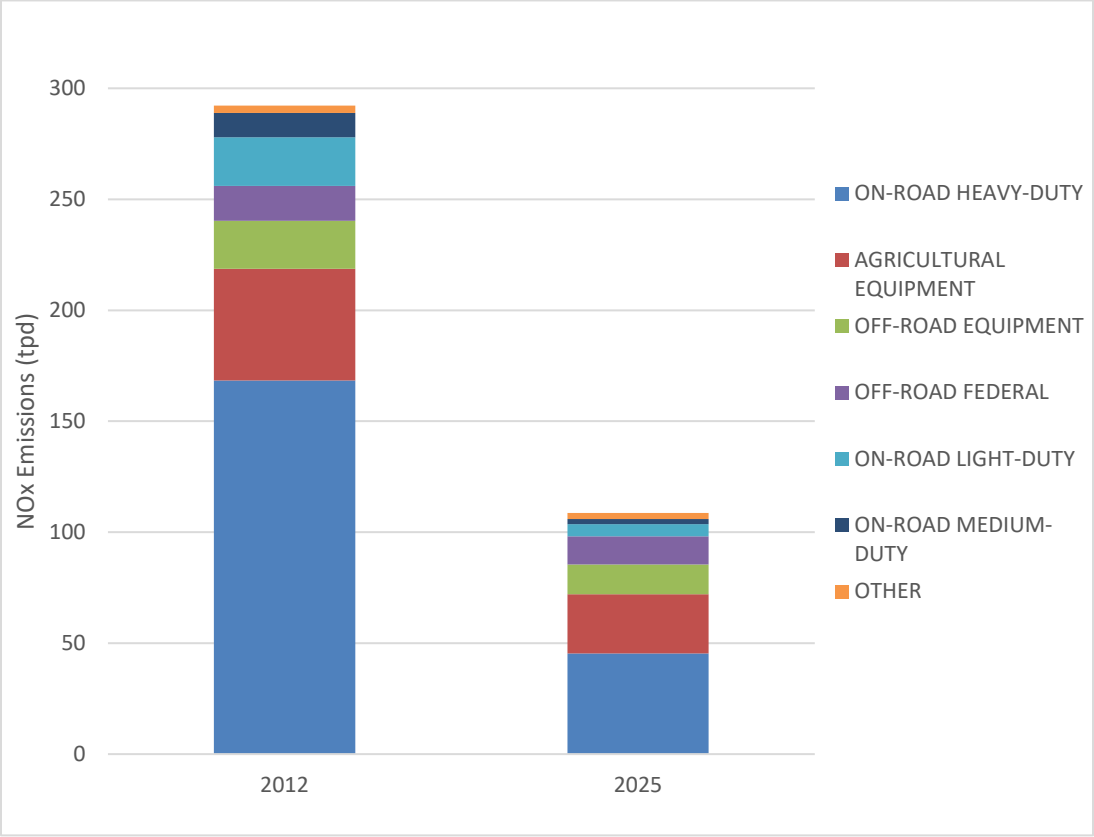
This document describes CARB staff's mobile source control strategy for attaining federal PM2.5 standards in the San Joaquin Valley. The 2016 State SIP Strategy, included here as Attachment A, included regulatory measures to require introduction of cleaner technologies for cars, trucks, and certain off-road equipment. The supplement provided in this document include updates and expansions to two measures in the adopted strategy, *Advanced Clean Cars 2* and *Lower In-Use Emission Performance Level,* as well as new measures. The new measures, titled the Proposed State Measures for the Valley, were developed specifically to reach attainment of PM2.5 standards in the Valley by accelerating turnover of both on- and off-road engines to near-zero and zero emission technology. Staff's proposal contained within the Valley State SIP Strategy is to adopt the Proposed State Measures for the Valley and to achieve the specified aggregate reductions in the 2024/2025 timeframe.

Chapter 2: Measures

Staff has identified certain categories as the best opportunities for additional PM2.5-related emission reductions from mobile sources in the Valley. The measures described in this chapter include actions that are updated elements of measures in the 2016 State SIP Strategy as well as the Proposed State Measures for the Valley. In addition, further opportunities to gain SIP-creditable criteria pollutant emission reductions from programs already in place have been identified and are described in this chapter.

As can be seen in Figure 1, on-road heavy-duty vehicles, agricultural equipment, and off-road equipment are the largest sources and contribute over 75 percent of mobile source NOx emissions in the Valley. Consequently, the measures in the Valley State SIP Strategy will target these three source categories through both regulatory and incentive measures.

Figure 1: Mobile Source NOx Emissions in the Valley
(under current program)



Updated State SIP Strategy Measures

Heavy-duty trucks with a gross vehicle weight rating (GVWR) over 8,500 pounds are the fastest growing transportation sector in the United States and are responsible for about 33 percent of total Statewide NOx emissions, approximately 26 percent of total Statewide diesel PM emissions, and are a significant source of GHG emissions. As shown in Figure 2, on-road heavy-duty vehicles are the single largest source of NOx emissions in the Valley, reflecting the role the Valley plays as an essential transportation corridor through the State. As such, the heavy-duty truck strategy for the Valley includes measures to reduce emissions from this sector through both regulatory and incentive programs.

Substantial progress has been made in refining staff's approach to controlling the in-use emissions from the on-road heavy-duty truck fleet, as originally described in the *Lower In-Use Emission Performance Level* 2016 State SIP Strategy measure. The actions initially proposed are now reflected in this document in three updated and separate descriptions: the *Lower Opacity Limits for Heavy-Duty Vehicles* element; the *Amended Warranty Requirements for On-Road Heavy-Duty Vehicles* element; and the *Heavy-Duty Vehicle Inspection and Maintenance Program* element.

Passenger cars and light trucks (up to 8,500 lbs., otherwise called light-duty vehicles), are another significant contributor to NOx emissions in California. The State's 39 million residents collectively own approximately 25 million passenger vehicles and drive more than most other Americans. The vast majority of these vehicles have internal combustion engines and use gasoline. A small portion is powered by diesel compression ignition engines, and a smaller portion has electric powertrains. The light-duty vehicle sector is projected to increasingly rely on new technology such as battery electric, plug-in hybrid, and fuel cell electric vehicles.

The 2016 State SIP Strategy also included the *Advanced Clean Cars 2* measure for CARB to consider expanded California-specific standards for new light-duty vehicles to increase the number of new ZEVs and plug-in hybrid electric vehicles (PHEV) sold in California, with the goal to make sure that near-zero and zero-emission technology options continue to be commercially available. CARB's Advanced Clean Cars program has in recent years been a driver of turnover to low- and zero-emission vehicles in the light-duty sector; the program combines the control of criteria pollutants and greenhouse gas emissions into a single coordinated set of requirements for light-duty vehicles of model years 2015 through 2025 ensuring the development of environmentally superior passenger cars and other vehicles.

In addition to the benefits of the SIP measure, there are criteria pollutant emission reductions from the Advanced Clean Cars program which have not been quantified for SIP purposes. Action to quantify these SIP-creditable reductions is described in the *Reduced ZEV Brake and Tire Wear* element.

Table 5 includes the full list of four items developed as updates to measures in the 2016 State SIP Strategy.

Table 5: Updates to 2016 State SIP Strategy Measures

2016 State SIP Strategy Measures
Lower In-Use Emission Performance Level
Lower Opacity Limits for Heavy-Duty Vehicles
Amended Warranty Requirements for On-Road Heavy-Duty Vehicles
Heavy-Duty Vehicle Inspection and Maintenance Program
Advanced Clean Cars 2
Reduced ZEV Brake and Tire Wear

Proposed State Measures for the Valley

On-road heavy-duty vehicles represent the first category to be targeted for accelerated turnover of the older, higher-emitting vehicles and engines to the cleanest technologies available. Given that there is potential to use both existing and new incentive funding, all possibilities are discussed in the *Accelerated Turnover of Trucks and Buses* measure.

In addition to on-road vehicles, tractors used in agricultural applications are a mobile category that offers the potential to achieve substantial further emission reductions by accelerating turnover. Since 2009, over $400 million in private and public funding has been invested in the Valley for the replacement of older agricultural tractors with newer, cleaner models, with significant continued investments ongoing. Further reductions from agricultural tractors will continue to play a significant role in our efforts to reduce emissions from mobile sources. The *Accelerated Turnover of Agricultural Tractors* measure describes the State's plan to use incentive funding to accelerate the turnover of these tractors in the near-term.

The *Cleaner In-Use Agricultural Equipment* measure is a proposed measure that is designed to increase the penetration of cleaner agricultural equipment in California. This measure would be developed by 2025 and incorporate a phase-in approach to support the use of tier 2 or cleaner engines in agricultural tractors in the Valley by 2030. The backstop could serve as an overall target, while at the same time acting as a catalyst for attracting early replacement of agricultural equipment using incentives.

Aside from agricultural tractors, other off-road equipment categories that offer the potential to achieve further emission reductions for the Valley through accelerated turnover include construction equipment, transport refrigeration units (TRU), forklifts, and drilling rigs. Of the construction equipment group, the greatest opportunity for NOx reductions lies in continuing to incentivize turnover to the current tier 4 new engine standard beyond the accelerated turnover already required by CARB's in-use off-road diesel vehicle regulation Replacing TRU combustion engines is another means for

emission reductions as there are many lower-emission engine options already commercially available. Given the nearly 4,000 forklifts and numerous drill rigs operating in the Valley, accelerating the turnover of combustion engines used in these applications to cleaner engines represents another excellent opportunity for NOx emission reductions.

Table 6 shows the measures in the Valley State SIP Strategy developed by CARB to achieve the mobile source emission reductions needed to attain federal PM2.5 standards in the Valley. Given the diversity of equipment and duty cycles that comprises these categories, each measure includes a more detailed description of the specific source.

Table 6: Measures in the Valley State SIP Strategy

Proposed State Measures for the Valley
Accelerated Turnover of Trucks and Buses
Existing Incentive Projects
New Incentive Projects
Accelerated Turnover of Agricultural Equipment
Existing Incentive Projects
New Incentive Projects
Cleaner In-Use Agricultural Equipment
Accelerated Turnover of Off-Road Equipment
New Incentive Projects

The remainder of this chapter includes the full descriptions of the updated 2016 State SIP Strategy measures and Proposed State Measures for the Valley.

Lower Opacity Limits for Heavy-Duty Vehicles (Updated 2016 State SIP Strategy Measure)

Overview:

As supplemental action of the original *Lower In-Use Emission Performance Level* measure, this element consists of lowering opacity limits for heavy-duty vehicles to limits that better reflect the current emission control technology equipped on today's heavy-duty diesel vehicles. The goal of this action is to ensure that in-use, heavy-duty vehicles continue to operate at their cleanest possible level. In July of 2018, the Board approved the staff-recommended lower opacity limits for heavy-duty trucks.

Background:

Heavy-duty vehicles in California are subject to in-use inspections in order to control excessive smoke emissions and tampering. CARB's current heavy-duty vehicle inspection programs are described below:

- The Heavy-Duty Vehicle Inspection Program (HDVIP), adopted into law in 1988, requires heavy-duty vehicles to be inspected for smoke opacity (i.e., excessive smoke), tampering, and engine certification label compliance. Any heavy-duty vehicle operating in California, including vehicles registered in other states and foreign countries, may be inspected. Inspections are performed by CARB inspection teams at border crossings, California Highway Patrol weigh stations, fleet facilities, and randomly selected roadside locations.

- The Periodic Smoke Inspection Program (PSIP), adopted into law in 1990, requires heavy-duty vehicle fleet owners to conduct annual smoke opacity inspections of their vehicles, and repair them if excessive smoke emissions are observed. In addition, CARB has the authority to perform random fleet audits, by reviewing the owners' maintenance and inspection records, and conducting opacity inspections on a representative sample of the vehicles.

- The Emissions Control Label Inspection Program requires all vehicles operating in California be equipped with engines that meet California and/or U.S. EPA emission standards. The engine must have an emissions control label which is legible, displayed as originally installed by the engine manufacturer, and must match the engine serial number stamped on the engine. Owners of applicable vehicles not meeting the emissions control label requirements are subject to a penalty.

The Board is in the process of changing the opacity limits required under the HDVIP and PSIP, which are currently 40 percent for 1991 model year (MY) and newer engines and 55 percent for pre-1991 MY engines. These opacity limits are no longer adequate to identify and require repairs of vehicles operating with damaged PM emission control components. To meet U.S. EPA and CARB new engine standards, beginning with the

2007 model year, all new heavy-duty engines come equipped with a diesel particulate filter (DPF). Because CARB has also established fleet rules that accelerate turnover to the 2007 and newer engines and require older vehicles to be retrofitted with DPFs, the vast majority of heavy-duty diesel vehicles on California's roads are equipped with a DPF. Vehicles operating with properly functioning DPFs emit exhaust at opacity levels at or near zero percent. Even vehicles with heavily damaged and malfunctioning emission control systems emit exhaust at opacity levels below the out-of-date, 40 and 55 percent opacity limits.

Actions:

In July of 2018, the Board approved for adoption staff's proposal to lower the opacity limits for heavy-duty trucks to limits that better reflect the current emission control technology equipped on today's heavy-duty diesel vehicles. The approved amendments lower the opacity limits to 5 percent for vehicles equipped with a DPF and also reduce the opacity limits for non-DPF equipped vehicles from their previous levels.

Lowering the opacity limits to the proposed levels will help ensure that the opacity limits are more representative of current PM emission control technology and that vehicles operating with malfunctioning PM emission control components are more readily identified and repaired.

Amended Warranty Requirements for On-Road Heavy-Duty Vehicles (Updated 2016 State SIP Strategy Measure)

Overview:

As supplemental action of the original *Lower In-Use Emission Performance Level* measure, this element consists of developing lengthened warranty period requirements for on-road heavy-duty vehicles with GVWR greater than 14,000 lbs. The primary goal of this action is to reduce NOx and PM emissions by encouraging vehicle owners to make emission-related repairs. This action may also encourage manufacturers to design more durable components.

Background:

In 1978, CARB adopted emission warranty regulations to clarify the rights and responsibilities of individual motor vehicle and engine owners, motor vehicle and engine manufacturers, and the service industry. The emission warranty is used to cover any repairs needed to correct defects in materials or workmanship which would cause an engine or vehicle not to meet its applicable emission standards.

In 1982, CARB adopted regulations that established California's first in-use recall program. These regulations were intended to reduce vehicular emissions by ensuring that noncompliant vehicles are identified, recalled, and repaired to comply with the applicable emission standards and regulations during customer use, and to encourage manufacturers to improve the design and durability of emission control components to avoid the expense of a recall.

In 1982 and 1984, U.S. EPA promulgated heavy-duty vehicle useful life and warranty requirements identical to those adopted in California. Both CARB and U.S. EPA require that heavy-duty vehicles meet emission standards throughout their useful life periods.

The current heavy-duty vehicle emission warranty period is 100,000 miles for all categories of heavy-duty vehicles with GVWR greater than 14,000 lbs. This mileage is typically reached relatively early in vehicle lives, especially for vehicles with GVWR greater than 33,000 lbs., and well before the mileage at which rebuild typically occurs.

Recent CARB studies have identified some heavy-duty vehicles with NOx emission levels significantly above their applicable certification standards while still within the vehicles' useful lives, and the Board is in the process of lengthening the warranty periods and making other improvements to the heavy-duty warranty requirements.

Actions:

In June of 2018, the Board approved for adoption staff's proposal to lengthen the current 100,000 mile emissions warranty period up to as high as 350,000 miles, as well as to strengthen maintenance intervals, link warranty to illumination of the on-board diagnostic malfunction indicator light, and clarify regulatory language. The June 2018

rulemaking is a first step, and will help ensure that emission-related parts are warranted throughout a greater portion of the vehicles' service life. A later second step is expected to be proposed within the next few years that could lengthen the mileage warranty periods further, potentially to the useful life or beyond, as applicable, for each classification of heavy-duty engine type.

Heavy-Duty Vehicle Inspection and Maintenance Program (Updated 2016 State SIP Strategy Measure)

Overview:

As a supplemental action of the original *Lower In-Use Emission Performance Level* measure, the goal of the Heavy-Duty Vehicle Inspection and Maintenance (HD I/M) program would be to ensure that in-use emission control components and systems are properly functioning so that these vehicles continue to operate at their cleanest possible levels for the duration of their on-road operation. For this action, CARB staff would develop and propose a regulatory program that reflects the current state of advanced engine and exhaust emission control technologies, including on-board diagnostics (OBD).

Background:

CARB's existing inspection programs for heavy-duty vehicles test for excessive smoke emissions and tampering, but not for other pollutants of concern from the heavy-duty vehicle sector. These programs, the HDVIP and the PSIP, are described below and discussed in more detail in the section on the measure for Lower Opacity Limits for Heavy-Duty Vehicles. These inspection programs have been successfully implemented since the early 1990s, and with recent amendments, better reflect the current emission control technology equipped on today's heavy-duty diesel vehicles.

- HDVIP, adopted into law in 1988, requires heavy-duty vehicles to be inspected for smoke opacity (i.e., excessive smoke), tampering, and engine certification label compliance. Any heavy-duty vehicle operating in California, including vehicles registered in other states and foreign countries, may be inspected. Inspections are performed by CARB inspection teams at border crossings, California Highway Patrol weigh stations, fleet facilities, and randomly selected roadside locations, and also include emissions control label inspections as described in the Lower Opacity Limits measure.

- PSIP, adopted into law in 1990, requires heavy-duty vehicle fleet owners to conduct annual smoke opacity inspections of their vehicles, and repair them if excessive smoke emissions are observed. In addition, CARB has the authority to perform random fleet audits, by reviewing the owners' maintenance and inspection records, and conducting opacity inspections on a representative sample of the vehicles.

Actions:

CARB staff's current concept for a comprehensive, multi-pollutant HD I/M program is based largely on the extensive capabilities of OBD systems in newer engines (2013 and later model year engines) for monitoring the performance of nearly every engine and emission control component. Under this program concept, heavy-duty vehicles would

be required to demonstrate annual compliance with the HD I/M program in order to register with the Department of Motor Vehicles. This program concept also includes the use of telematics for OBD data transmittal to provide ease-of-of access to truckers, kiosks located at border weigh stations to obtain OBD data from out-of-state vehicles entering California, physical testing for older vehicles with pre-OBD engines (e.g., smoke opacity testing), and a program validation component.

While CARB has overarching authority to regulate emissions from on-road heavy-duty vehicles, staff believes additional legislation that will enhance the regulatory authority for a HD I/M program sufficient to achieve the targeted reductions would be beneficial. In 2017, State Senator Connie Leyva introduced legislation (draft Senate Bill 210; 2017) that directed CARB to work with appropriate State agency partners to develop and implement a HD I/M program. While Senate Bill 210 did not move forward during the 2018 legislative session, CARB staff anticipates that HD I/M legislation will be re-introduced in the 2019 session.

Reduced ZEV Brake and Tire Wear (Updated 2016 State SIP Strategy Measure)

Overview:

As part of the *Advanced Clean Cars 2* measure, the goal of this action is to evaluate and quantify the benefits that will accrue from the expanded number of new ZEVs and PHEVs sold in California, which is driven by the Advanced Clean Cars program. As these vehicles continue to be commercially available, the new technologies they employ, including regenerative braking and lower rolling resistance tires, may reduce emissions from brake and tire wear.

Background / Regulatory History:

Since setting the nation's first motor vehicle exhaust emission standards in 1966 that led to the first pollution controls, California has dramatically tightened emission standards for light-duty vehicles. Through CARB regulations, today's new cars pollute 99 percent less than their predecessors did thirty years ago. In 1970, CARB required auto manufacturers to meet the first standards to control NOx emissions along with hydrocarbon emissions, which together form smog. The simultaneous control of emissions from motor vehicles and fuels led to the use of cleaner-burning gasoline that has removed the emissions equivalent of 3.5 million vehicles from California's roads. Since CARB first adopted it in 1990, the LEV I and LEV II, and the ZEV Programs have resulted in the production and sales of hundreds of thousands of ZEVs in California. More recently, there is a focus on reducing GHGs from motor vehicles. Transportation is California's largest source of carbon dioxide, with passenger vehicles and light-duty trucks creating more than 30 percent of total climate change emissions. CARB adopted the first GHG emission standards for new passenger vehicles in the United States, effective with the 2009 model year.

Actions:

For this element, CARB staff would quantify the benefits that may accrue from new technologies employed in fuel cell and plug-in electric vehicles, including regenerative braking and lower rolling resistance tires, which can reduce emissions from brake and tire wear. As increasing numbers of zero-emission vehicles enter the fleet over the coming decade, these technologies could offer opportunities to reduce PM2.5 emissions from the passenger vehicle fleet.

Estimated Emission Reductions:

While emission reductions have not been identified at this time, CARB will quantify any emission reductions from this action during the SIP-creditable measure development process.

Accelerated Turnover of Trucks and Buses (Proposed State Measure for the Valley)

Overview:

The goal of this proposed measure is to provide incentive funding to accelerate the penetration of near-zero and zero-emission engines beyond the rate of natural turnover achieved through implementation of the other measures identified for on-road heavy-duty trucks and buses. Reductions may also be quantified from projects already funded and executed that will provide SIP-creditable reductions in 2024 and 2025.

Background / Regulatory History:

While regulatory actions will continue to drive the introduction of the cleanest mobile technologies for heavy-duty trucks, the natural pace of fleet turnover will need to be accelerated to provide sufficient reductions to meet the Valley's PM2.5 attainment needs. Additional NOx emission reductions can be achieved through the use of existing and future incentive funds to help increase the penetration of the cleanest heavy-duty engine technology. The District's existing Truck Voucher Program has replaced more than 1,200 Valley-based heavy-duty trucks with newer, cleaner trucks to date, through allocation of over $50 million in incentive funds. The Truck Voucher Program operates as a partnership with Valley truck companies and truck dealerships to replace older, higher-polluting trucks with new, low-emission trucks. In January 2017, the District received an additional $2.5 million from U.S. EPA, which will be combined with a required District match of $2.9 million in incentive funds, which together is anticipated to fund approximately 45 percent of the cost of turning over 112 heavy-duty trucks.[4] The District has already achieved approximately 2 tpd of NOx reductions through allocation of existing incentive investments, which has helped to fund the replacement of over 2,700 heavy-duty trucks and buses.[5]

Several State and local incentive funding pools have been used historically -- and remain available -- to fund the accelerated turnover of on-road heavy-duty vehicles. These programs include the Carl Moyer Air Quality Standards Attainment Program, the Goods Movement Emission Reduction Program (Prop 1B), the Air Quality Improvement Program, and the Low Carbon Transportation Program. More recently, the Community Air Protection Program and the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) Program have made additional funds available for these purposes. These programs are described in depth in Chapter 3. Beyond these Statewide programs, the District receives local funds to improve air quality from sources

[4] SJVAPCD January 2017 "Governing Board Meeting Minutes January 19, 2017: Item Number 8: Accept and Appropriate $4,954,500 in Additional Revenue from the U.S. EPA to Fund the Replacement of Heavy-Duty Trucks and Wood Burning Devices"
http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2017/January/final/08.pdf
[5] SJVAPCD August 2016 "2016 Annual Demonstration Report"
http://www.valleyair.org/MOP/docs/AnnualDemonstrationReport_081816.pdf

including vehicle registration fees authorized by Assembly Bill (AB) 2766, AB 923, Senate Bill (SB) 709, and AB 2522.

At the Federal level, U.S. EPA's Diesel Emission Reduction Act (DERA) funds projects that reduce diesel emissions from on-road heavy-duty engines, including school buses, Class 5 – 8 heavy-duty interstate vehicles, locomotive engines, marine engines, and non-road engines, equipment or vehicles used in construction, cargo handling equipment, and off-road equipment used in agricultural, mineral, or energy production industries.

Proposed Actions:

This proposed measure would use existing and newly identified funding programs to help increase the penetration of near-zero and zero emission heavy-duty trucks targeting large fleets with significant activity in the Valley. Funding mechanisms would target technologies that meet or exceed an optional low-NOx standard until implementation of a new federal low-NOx standard begins and part of the current round of Moyer Program funding ends.

CARB staff is proposing to achieve a total of 10 tpd of NOx emission reductions through accelerating the turnover of heavy-duty diesel trucks. It is estimated that approximately 2 tpd would come from the quantification of reductions from the portion of the approximately 2,700 projects already funded or executed to date that will continue to provide SIP-creditable reductions in 2024 and 2025.

In addition, there remains opportunity to incentivize turnover of the remaining population of heavy-duty diesel vehicles. CARB staff is proposing to provide incentives to turn over approximately 33,000 heavy-duty diesel trucks including long haul trucks, trucks servicing the Port of Oakland and travelling through the Valley and garbage and other public fleets to the optional low-NOx standard or cleaner to reduce NOx emissions in the Valley by 8 tpd in 2024. It is expected that 2 tpd of these reductions will be achieved using funding from existing programs in future years, with the remaining 6 tpd to be achieved using funding sources to be defined during the measure development process.

While a majority of the incentivized on-road heavy-duty vehicles under this measure will be turnover to meet the California low-NOx engine standard, CARB continues to provide funding for zero-emission technologies where feasible. Additionally, there remains opportunities to achieve reductions from vehicles currently operating at higher emissions levels even than the 2010 engine standard. For example, when including natural turnover, the 2024 population of heavy-duty vehicles in the Valley is estimated to include around 2,500 solid waste collection and public fleet vehicles. Unlike most on-road heavy-duty vehicles, these types of vehicles are not required to meet CARB's 2010 engine standards by 2023 and provide an excellent opportunity to achieve surplus emission reductions by providing incentive funds to replace these engines or vehicles with cleaner technologies.

Implementation of this measure would require a commitment of State and District incentive funds through the programs described above to truck and bus replacement projects. In recent years, the CARB and the District have received elevated levels of funding for on-road heavy-duty vehicle and other incentive projects. For instance, through annual appropriation by the Legislature, CARB's Low Carbon Transportation and AQIP have in recent years received a total level of funding of more than $400 million per year. Of that annual amount, on-road heavy-duty vehicle projects in the Valley have received funding and will continue to receive funding through 2024. Recent legislation established a new funding source, the Community Air Protection Program, and appropriated about $250 million Statewide in each the 2017 and 2018 State Budgets. In 2017, $80 million went to heavy-duty projects in the Valley, with 2018 District allocations still pending. These funds, as well as others, could be used to help increase the penetration of the cleanest heavy-duty engine technology, with a focus on targeting applications that are well-suited for initial ZEV heavy-duty technologies.

It is important to note that funds under the control of the District may also be used to fund other types of projects, including off-road vehicles. Identifying the most effective use of funds in order to maximize emission reductions will depend on the incremental cost of technologies, cost effectiveness, and the type of financing mechanism employed. Accordingly, the use of these funds to maximize emission reductions for 2024 may be further refined in a future SIP-approvable measure.

Timing:

Proposed CARB Board hearing: by 2021
Proposed implementation schedule: on-going

Proposed SIP Commitment:

CARB staff proposes to commit to bring this measure to the Board as one or more SIP-creditable measures by 2021. Measures developed and proposed for Board approval may include implemented projects, projects funded with existing funding, and projects funded with future funding. CARB staff will initiate measure development processes designed to achieve the NOx and PM2.5 emission reductions in 2024 and 2025 shown in Table 4 for the San Joaquin Valley nonattainment area. The SIP-creditable measure(s) as proposed by staff to the Board or adopted by the Board may provide more or less emission reductions than the amount shown in Table 8.

Accelerated Turnover of Agricultural Equipment (Proposed State Measure for the Valley)

Overview:

The goal of this proposed measure is to provide incentive funding to accelerate beyond the rate of natural turnover the penetration of cleaner engines used in agricultural equipment. Reductions will also be quantified from projects already funded and executed that will provide SIP-creditable reductions in 2024 and 2025.

Background:

While regulatory actions will continue to drive the introduction of the cleanest mobile technologies in off-road sectors, the natural pace of fleet turnover will need to be accelerated to provide sufficient reductions to meet the Valley's PM2.5 attainment needs. Tractors used in agricultural applications are an off-road category that offers the potential to achieve further emission reductions through accelerating the turn-over of older, higher-emitting vehicles and engines to the cleanest technologies available.

Since 2009, the agricultural industry has helped secure over $500 million in private and public funding for the replacement of older agricultural tractors with newer, cleaner technology in the Valley. To implement the agricultural equipment measure in the 2007 SIP, the U.S. Department of Agriculture's (USDA) Natural Resource Conservation Service's grant program[6] in combination with the District's incentive programs, has provided over $129 million to date in incentive funding to assist farmers in replacing diesel-powered agricultural equipment, with significant continued investment currently ongoing. That 2007 SIP measure established an emission reduction goal to be achieved through incentives, with the potential for regulatory action as a backstop. The incentive funding invested to date has exceeded the SIP goal for 2017. Further reductions from agricultural tractors will continue to play a significant role in our efforts to reduce emissions from mobile sources.

CARB recently developed the FARMER Program, a program which will facilitate the distribution of State funds allocated by the California Legislature to incentivize turnover of agricultural equipment. The FARMER program guidelines, adopted in March 2018, detail the types of projects eligible for funding from the applicable allocations and specify the amount of funding various districts throughout the State will receive. The allocations recently adopted include $108 million for the Valley in fiscal year 2017-18. The 2018-19 fiscal year included $132 million Statewide for the FARMER program of which a portion will be allocated to the San Joaquin Valley. Further, the District receives local funds to improve air quality from sources that can be used to incentivize the accelerated turnover of agricultural equipment.

[6] SJVAPCD "2017 Annual Demonstration Report" (August 2017)
http://www.valleyair.org/MOP/docs/2017_Final_AnnualDemonstrationReport_AppendixAB.PDF

In addition to these efforts to provide funding for the cleanest agricultural equipment engines, CARB staff are working with the District and the agricultural industry to implement a new tractor trade-up program through funding originally provided by an AQIP grant and now an eligible project in the FARMER program. The trade-up program is designed to assist small farmers overcome potential financial barriers to accessing cleaner mobile agricultural technologies, and is intended to accelerate emission reductions by replacing the oldest tractors with cleaner used models. This is accomplished through a multi-step transaction in which an owner of an older, high-emitting piece of mobile agricultural equipment agrees to scrap that equipment in exchange for a previously used and reconditioned piece of equipment with a cleaner diesel engine at little or no out-of-pocket cost. The owner of the used equipment is provided incentive funding to assist in the purchase of new equipment that employs the cleanest, commercially available technology.

Proposed Actions:

CARB staff is proposing to use existing and new incentive funding programs to help increase the penetration of cleaner agricultural equipment to achieve a total of 11 tpd of NOx emission reductions from projects already funded and executed to date, and new projects. Implementation of this measure in conjunction with the *Cleaner In-Use Agricultural Equipment Measure* would require a commitment of State and District incentive funds through the programs described above to fund agricultural replacement projects. CARB staff is proposing to provide incentives to accelerate turnover of approximately 12,000 tier 0, tier 1 and tier 2 agricultural equipment to the cleanest equipment available to achieve the necessary NOx emission reductions in the Valley. In addition, eligible projects include electrifying agricultural equipment such as utility quads and small yard tractors that are used on farms and ranches.

It is important to note that funds under the control of the District may also be used to fund other types of projects, including on-road and other off-road vehicles. Identifying the most effective use of funds in order to maximize emission reductions will depend on the incremental cost of technologies, cost effectiveness, and the type of financing mechanism employed. Accordingly, the use of these funds to maximize emission reductions for 2024 and 2025 may be further refined in a future SIP-approvable measure.

While identifying and securing incentive funding will be an important element going forward, the proposed *Cleaner In-Use Agricultural Equipment* measure will serve as an overall emission reduction target and catalyst for attracting additional near-term investments.

Timing:

Proposed CARB Board hearing:	by 2020
Proposed implementation schedule:	on-going

Proposed SIP Commitment:

CARB staff proposes to commit to take action to gain SIP credit for reductions from this measure by 2020; actions could include inventory updates and one or more SIP-creditable measures for Board consideration. Measures developed and proposed for Board approval may include implemented projects, projects funded with existing funding, and projects funded with future funding. CARB staff will initiate measure development processes designed to achieve the NOx and PM2.5 emission reductions in 2024 and 2025 shown in Table 4 for the San Joaquin Valley nonattainment area. The SIP-creditable measure(s) as proposed by staff to the Board or adopted by the Board may provide more or less emission reductions than the amount shown in Table 8.

Cleaner In-Use Agricultural Equipment (Proposed State Measure for the Valley)

Overview:

The goal of this proposed measure is to increase the penetration of cleaner agricultural equipment used in California including advancing zero emission technology where feasible.

Background/Regulatory History:

San Joaquin Valley is home to one of the most productive agricultural regions in the world. The agricultural sector is an important partner in developing strategies that provide meaningful reductions while supporting economic growth and meeting our federal air quality standards and State greenhouse gas reduction targets. As such, understanding the economics of the industry while continuing to pursue regulatory and voluntary programs that encourage emission reductions through a variety of actions, including use of best practices to manage greenhouse gases, utilizing the cleanest available technologies, and others is essential.

New engines used in agricultural equipment, primarily tractors, must meet the same standards as other off-road engines ensuring that new equipment becomes progressively cleaner. Just as in other off-road applications, diesel agricultural equipment can remain in use for long periods of time. This long life means that equipment with new, lower emitting engines are introduced into the fleet at a relatively slower pace than what is needed to meet air quality standards. The cleanup of agricultural in-use equipment is primarily an issue in the San Joaquin Valley with their large agricultural economy.

The 2007 SIP included the Cleaner In-Use Agricultural Equipment Measure (Ag Measure) to achieve 5 to 10 tpd of NOx reductions in 2017 by modernizing agricultural equipment in the San Joaquin Valley. The San Joaquin Valley agricultural industry immediately began working on implementing this SIP measure by leveraging federal and local incentives to provide farmers assistance to replace their older, higher-polluting equipment with the cleanest available technology. Specifically, new incentive funds were secured through the federal Farm Bill to be used alongside funds from existing programs. Since 2009, over $400 million dollars in private and public funding has been invested in the San Joaquin Valley for the replacement of older agricultural tractors with newer, cleaner models, with significant continued investments ongoing. Through 2016, the USDA's Natural Resource Conservation Service's grant program, in combination with the District's program, has provided over $129 million that has helped in replacing over 5,000 tier 0 and tier 1 tractors to implement the Ag Measure and meet the 2017 SIP goal. The incentives targeted the largest and most used tractors in addition to other types of farm equipment. Figure 2 and Figure 3 highlight the success of implementing the 2007 SIP Cleaner In-Use Agricultural Equipment Measure and reducing emissions from the dirtiest tier 0 engines.

Figure 2: Impact of Valley Incentive Reductions through 2016

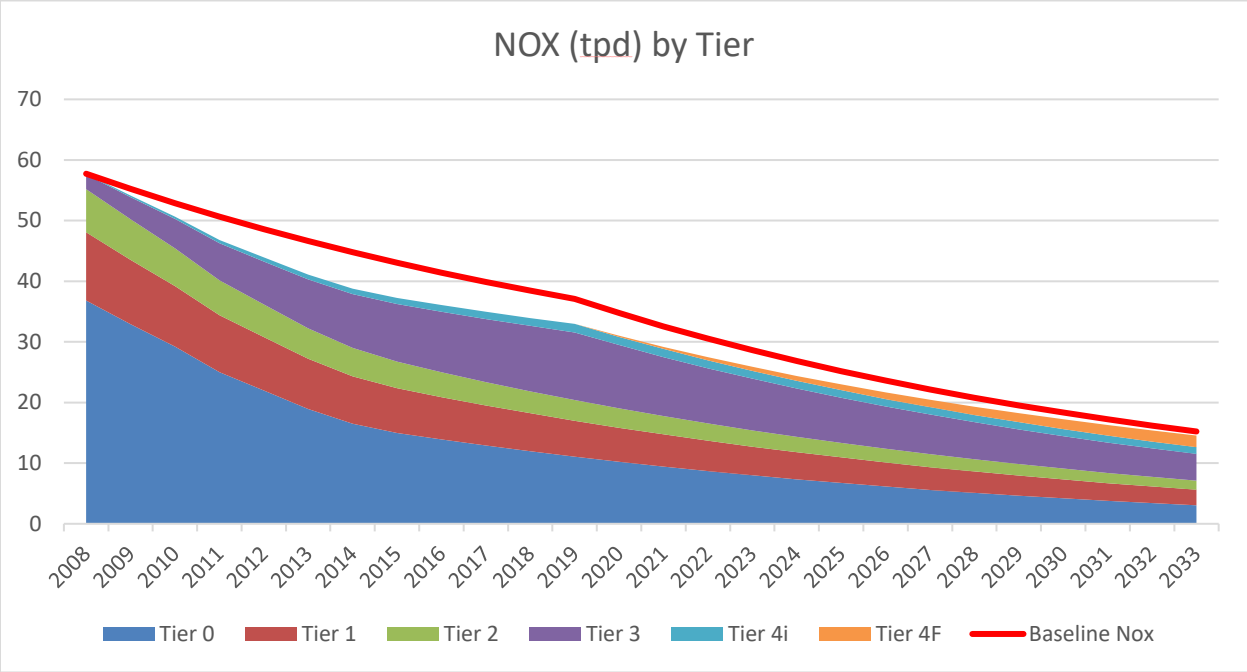
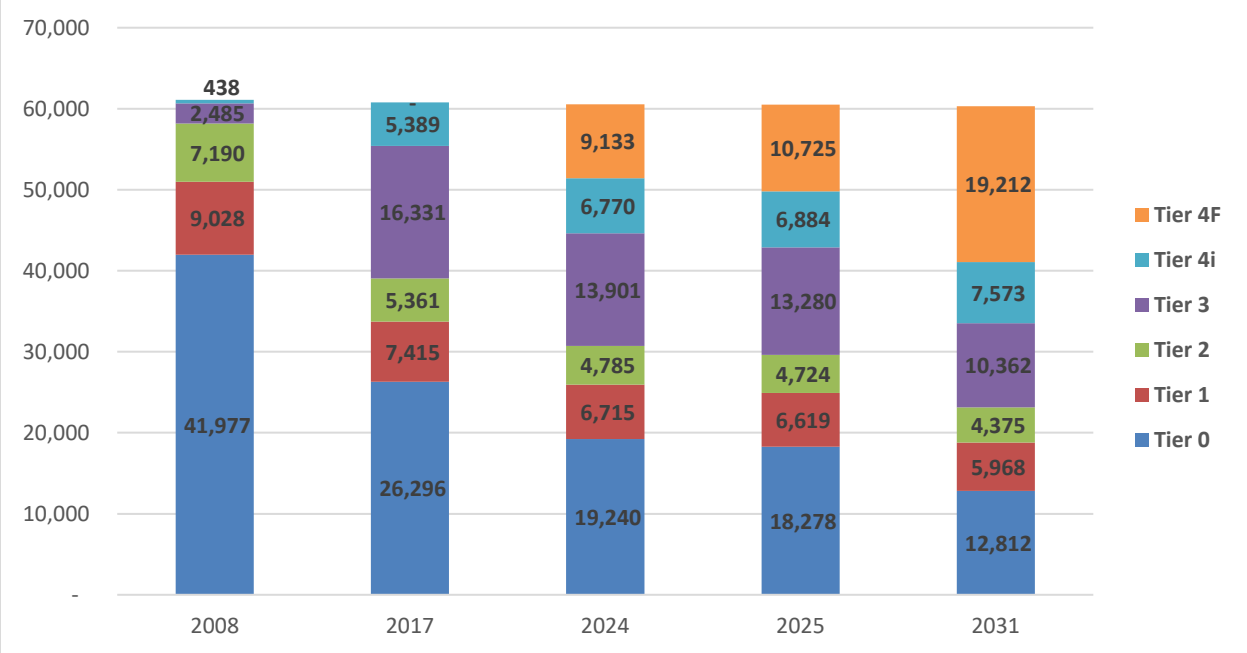


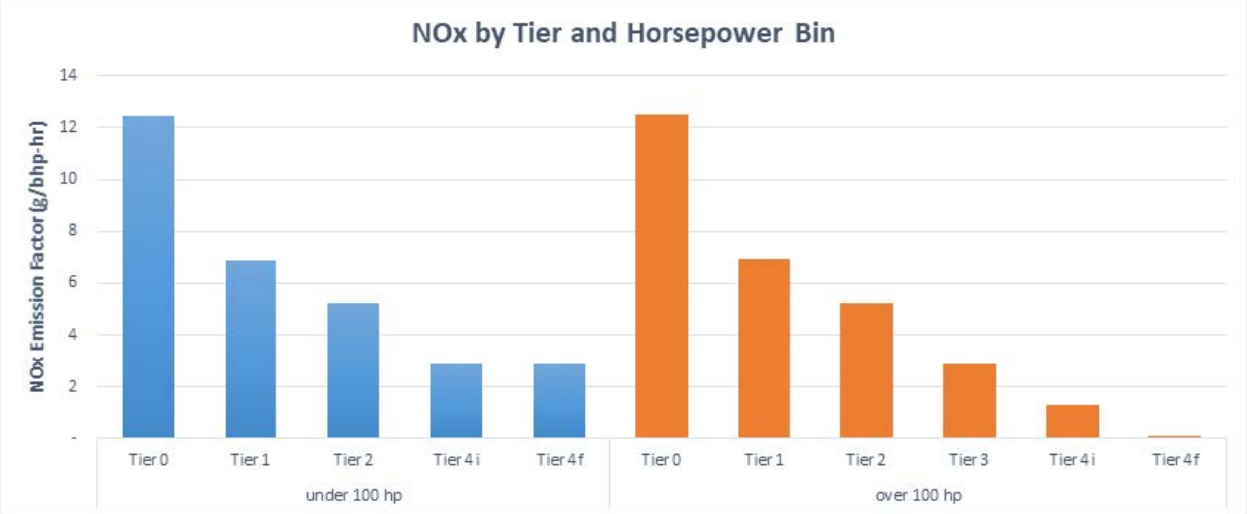
Figure 3: Change in Tractor Population
(with incentives to 2016)



Due to the success of these incentives, the agriculture industry continues to advocate for additional funding to incentivize the replacement of farm equipment. Since 2016, NRCS and the District have funded an additional 1000 projects. Overall, the incentive projects have targeted the larger horsepower farm equipment. Figure 4 shows that

smaller tier 4 engines have significantly higher NOx rates than the larger horsepower engines and therefore, are not as cost effective per emission reductions. Further, it may be more cost effective to go to zero for these smaller engines. In addition, their duty-cycles may be more primed to go to zero emissions.

Figure 4: NOx Emission Rates by Agricultural Engine Tier and Horsepower Bin



In conjunction with the *Accelerated Turnover of Agricultural Equipment Measure*, the goal of this measure is to accelerate fleet turnover to equipment with cleaner tier 4 engines. The advantage of setting a goal to tier 4 is that it ultimately results in the cleanest fleet. Since the current agricultural equipment emissions are based on a 2008 survey, during the measure development, CARB will also update agriculture equipment emissions by surveying farms on the use, size, age, etc. of their agriculture equipment.

Farmers face a unique market structure that affects their ability to pass costs on to their buyers. For some operations, especially the largest with advantage of economic scale, an equipment replacement schedule will already be part of their business plan. But for smaller operations or expensive equipment, the business plan may be to retain existing equipment as long as possible. To provide cleaner tractors to small farms, CARB staff along with the District and the agricultural industry are working to implement a new tractor trade up program through funding provided by two previous CARB AQIP grants and with the FARMER Program. This tractor trade up program is designed to assist small farmers in overcoming potential financial barriers to accessing cleaner mobile agricultural technologies, and is intended to accelerate emission reductions by replacing the oldest tractors with cleaner used models. Maximizing reductions in light of these factors that farmers face will require careful design of the measure and the optimum use of incentives.

Proposed Actions:

While identifying and securing incentive funding will be an important element going forward, similar to the 2007 SIP Ag Measure, a potential measure could serve as an overall emission reduction target, while at the same time acting as a catalyst for attracting early replacement of agricultural equipment using incentives . This measure will backstop the *Accelerated Turnover of Agricultural Equipment Measure* and ensure that by 2030 agricultural equipment operating in the Valley will be tier 2 or cleaner. In combination, the measure tractor trade-up, incentives and significant lead time, ensures cleaner agricultural equipment will be used in the Valley through 2030.

Timing:

Proposed CARB Board hearing:	2025
Proposed implementation schedule:	2030

Proposed SIP Commitment:

CARB staff will initiate a measure development process in 2024 designed to achieve the NOx and PM2.5 emission reductions shown in Table 4 for the San Joaquin Valley nonattainment area. The measure as proposed by staff to the Board or adopted by the Board may provide more or less emission reductions than the amount shown in Table 8.

Accelerated Turnover of Off-Road Equipment (Proposed State Measure for the Valley)

Overview:

The goal of this proposed measure is to provide incentive funding to accelerate the penetration of near-zero and zero-emission engines beyond the rate of natural turnover achieved through implementation of the other measures identified for off-road equipment.

Background:

While regulatory actions will continue to drive the introduction of the cleanest mobile technologies in off-road sectors, the natural pace of fleet turnover will need to be accelerated to provide sufficient reductions to meet the Valley's PM2.5 attainment needs. Off-road equipment categories that offer the potential to achieve further emission reductions for the Valley through accelerated turn-over are discussed below:

- *Construction Equipment:* The current construction equipment engine standard for newly purchased units is tier 4. Therefore, continuing to incentivize the current tier 4 engines standard by replacing older tiers provides the greatest opportunity for NOx reductions in this source sub-category.

- *Transport Refrigeration Units (TRUs):* Replacing TRU combustion engines with electrical engines represents the greatest opportunity in reductions, as hybrid electric TRUs, TRUs equipped with electric standby motors, and cryogenic transport refrigeration systems are commercially available.

- *Forklifts:* There are approximately 3,900 forklifts operating in the Valley, most of which are battery-electric, propane, diesel, or gasoline-fueled. Replacing forklift combustion engines with electric motors represent the greatest opportunity for emission reductions.

In addition to these categories, CARB staff is also exploring opportunities for additional cost-effective reductions from accelerating the turnover of drilling rigs to reduce emissions from these off-road engines. There are many drill rigs operating in the Valley, including diesel-power oil drilling rigs, water-well drilling rigs, and work-over rigs. Accelerating the turnover to cleaner, modern tier 4 engines for drill rigs represents the greatest opportunity to reduce emissions.

Proposed Actions:

This proposed measure would use innovative incentive funding programs to help increase the penetration of cleaner engine technology in off-road applications. CARB staff is proposing to achieve a total of 2 tpd of NOx emission reductions through

accelerating the turnover of off-road engines. Implementation of this measure would require a commitment of State and District incentive funds through the programs described above to off-road equipment replacement projects.

It is important to note that funds under the control of the District may also be used to fund other types of projects. Identifying the most effective use of funds in order to maximize emission reductions will depend on the incremental cost of technologies, cost effectiveness, and the type of financing mechanism employed. Accordingly, the use of these funds to maximize emission reductions for 2024 and 2025 may be further refined in a future SIP-approvable measure.

Timing:

Proposed CARB Board hearing: by 2021
Proposed implementation schedule: on-going

Proposed SIP Commitment:

CARB staff proposes to commit to bring this measure to the Board as a SIP-creditable measure by 2021. CARB staff will initiate a measure development process designed to achieve the NOx and PM2.5 emission reductions in 2024 and 2025 shown in Table 4 for the San Joaquin Valley nonattainment area. The SIP-creditable measure as proposed by staff to the Board or adopted by the Board may provide more or less emission reductions than the amount shown in Table 8.

Chapter 3:
Supplemental State Commitment from the Proposed State Measures for the Valley

This document proposes a commitment for the Valley that, upon adoption by the Board, would create a commitment for new emission reductions by the applicable attainment deadlines. This commitment consists of two components:

1. A commitment to bring to the Board or take action on the Proposed State Measures for the Valley; and
2. A commitment to achieve aggregate emission reductions in 2024 and 2025.

The commitment for the Valley would be submitted into the California SIP and would become federally enforceable upon approval by U.S. EPA. While the comprehensive mobile strategy for the San Joaquin Valley discussed in this document proposes a range of measures and indicates that CARB will undertake various actions, it remains a staff proposal at this stage. The proposed commitment is subject to CARB's formal approval process and will not be final until the Board formally takes action.

Commitment to Act on Proposed State Measures for the Valley

Table 7 shows the full list of State measures and schedule for consideration to support attainment of federal PM2.5 standards in the Valley. The Board has already approved the commitment for the 2016 State SIP Strategy measures and we are augmenting that commitment with additional State measures for the Valley. CARB staff proposes to bring to the Board or take action on the list of Proposed State Measures for the Valley shown in the bottom portion of Table 7. CARB staff will initiate a SIP-creditable measure development process for each proposed measure according to the schedule outlined. This development process will provide additional opportunity for public and stakeholder input, as well as ongoing technology review, and assessment of costs and environmental impacts.

Table 7: State Measures and Schedule for the San Joaquin Valley

Measures	Agency	Action	
Advanced Clean Cars 2 Reduced ZEV Brake and Tire Wear	CARB	2020 – 2021	2026
Lower In-Use Emission Performance Level:	CARB	2017 – 2020	2018 +
Lower Opacity Limits for Heavy-Duty Vehicles	CARB	2018	2018 – 2024
Amended Warranty Requirements for Heavy-Duty Vehicles	CARB	2018	2022
Heavy-Duty Vehicle Inspection and Maintenance Program	CARB	2020	2022 +
Low-NOx Engine Standard – California Action	CARB	2019	2023
Low-NOx Engine Standard – Federal Action	U.S. EPA	2019	2024
Innovative Clean Transit	CARB	2018 – 2019	2020
Advanced Clean Local Trucks (Last Mile Delivery)	CARB	2019	2020
Zero-Emission Airport Shuttle Buses	CARB	2018	2023
More Stringent National Locomotive Emission Standards	U.S. EPA	2017	2023 +
Zero-Emission Off-Road Forklift Regulation Phase 1	CARB	2020	2023
Zero-Emission Airport Ground Support Equipment	CARB	2019	2023
Small Off-Road Engines	CARB	2018 – 2020	2022
Transport Refrigeration Units Used for Cold Storage	CARB	2018 – 2019	2020 +
Low-Emission Diesel Fuel Requirement	CARB	by 2020	2023
Accelerated Turnover of Trucks and Buses Existing Incentive Projects New Incentive Projects	CARB / SJVAPCD	by 2021	ongoing
Accelerated Turnover of Agricultural Equipment Existing Incentive Projects New Incentive Projects	CARB / SJVAPCD	by 2020	ongoing
Cleaner In-Use Agricultural Equipment	CARB	2025	2030
Accelerated Turnover of Off-Road Equipment New Incentive Projects	CARB / SJVAPCD	by 2021	ongoing

Commitment to Achieve Aggregate Emission Reductions

The 2016 State SIP Strategy included an initial commitment to achieve an aggregate emission reduction of 8 tpd of NOx in the Valley by 2031, which serves as a down payment on the total emission reductions needed for the Valley's attainment of federal standards. This document proposes a commitment to achieve the aggregate emission reductions specified in Table 8 by 2024 and 2025.

CARB staff proposes to commit to achieve, in aggregate, 32 tpd of NOx emission reductions and 1 tpd of PM2.5 emission reductions in 2024, with those same emission reduction commitments carried through to 2025. These measures, in conjunction with the existing control program, identify all of the reductions required from mobile sources for the Valley's PM2.5 attainment needs. These measures reflect a combination of State actions and petitions for federal action to establish the policy and regulatory mechanisms to bring the needed advanced technologies into the California vehicle and equipment fleet, while pairing these actions with incentive and other programs to strategically accelerate the penetration of the cleanest technologies in each sector.

CARB's aggregate emission reduction commitment 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 the implementation of other enforceable measures. In some cases, actions by federal agencies will be needed. CARB will include these emission reductions in its aggregate commitment to ensure that reductions are achieved regardless of federal action. For example, if a federal heavy-duty low-NOx engine standard is not established, CARB will look to achieve the necessary reductions from other source categories, such as stationary sources. In other cases, programmatic approaches must be developed and funding secured to achieve the reductions outlined.

While Table 8 includes estimates of the emission reductions from each of the individual measures, final measures as proposed by staff to the Board or adopted by the Board may provide more or less than the initial emission reduction estimates. CARB's overall commitment is to achieve the total emission reductions necessary to attain the federal air quality standards while 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 is still committed to achieving the total aggregate emission reductions. If actual emission decreases occur that exceed the projections reflected in the current emissions inventory and the Valley State SIP Strategy, CARB will submit an updated emissions inventory to 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.

Table 8: San Joaquin Valley Expected Emission Reductions from State Measures

Reductions shown in tons per day (tpd)

Measures	2024		2025	
	NOx (tpd)	PM2.5 (tpd)	NOx (tpd)	PM2.5 (tpd)
2016 State SIP Strategy Measures				
Advanced Clean Cars 2	--	--	--	--
Reduced ZEV Brake and Tire Wear	--	NYQ	--	NYQ
Lower In-Use Emission Performance Level:	6.8	<0.1	6.8	<0.1
Lower Opacity Limits for Heavy-Duty Vehicles				
Amended Warranty Requirements for Heavy-Duty Vehicles				
Heavy-Duty Vehicle Inspection and Maintenance Program				
Low-NOx Engine Standard – California Action	0.7	--	2	--
Low-NOx Engine Standard – Federal Action	0.7	--	2	--
Innovative Clean Transit	<0.1	<0.1	<0.1	<0.1
Advanced Clean Local Trucks (Last Mile Delivery)	<0.1	<0.1	<0.1	<0.1
Zero-Emission Airport Shuttle Buses	NYQ	NYQ	NYQ	NYQ
More Stringent National Locomotive Emission Standards	0.1	<0.1	0.3	<0.1
Zero-Emission Off-Road Forklift Regulation Phase 1	--	--	--	--
Zero-Emission Airport Ground Support Equipment	<0.1	<0.1	<0.1	<0.1
Small Off-Road Engines	0.1	<0.1	0.2	<0.1
Transport Refrigeration Units Used for Cold Storage	NYQ	NYQ	NYQ	NYQ
Low-Emission Diesel Fuel Requirement	0.8	0.1	1	0.1
Total Reductions from 2016 State SIP Strategy Measures	**9**	**0.1**	**12**	**0.1**
Proposed State Measures for the Valley				
Accelerated Turnover of Trucks and Buses	10	NYQ	8	NYQ
Existing Incentive Projects				
New Incentive Projects				
Accelerated Turnover of Agricultural Equipment				
Existing Incentive Projects	3	0.2	2	0.2
New Incentive Projects	8	0.6	8	0.6
Cleaner In-Use Agricultural Equipment	NYQ	NYQ	NYQ	NYQ
Accelerated Turnover of Off-Road Equipment				
New Incentive Projects	2	NYQ	1.5	NYQ
Total Reductions from Proposed State Measures for Valley	**23**	**0.8**	**20**	**0.8**
Aggregate Emission Reductions	**32**	**1**	**32**	**1**

"NYQ" denotes emission reductions are Not Yet Quantified

"—" denotes no anticipated reductions

The measures as proposed by staff to the Board or adopted by the Board may provide more or less reductions than the amount shown.

Implementing the Proposed State Measures for the Valley

Implementation of the current control program and new regulatory actions to establish requirements for cleaner technologies comprise the core of the overall strategy for the Valley. The remaining increment of reductions will be achieved through the suite of actions described in Chapter 2 to accelerate the penetration of cleaner technologies through incentive programs. These actions will also further California's efforts to meet climate and risk reduction goals and enhance the continuing transformation to a cleaner, more efficient transportation system.

Air Quality Incentive Programs

The State in partnership with the air districts have a well-established history of using incentive programs to achieve emission reductions towards attainment of federal air quality standards. Since 1998, CARB and air districts have been administering incentives for cleaner heavy-duty vehicles, starting with the Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program). The scope and scale of California's air quality incentive programs has expanded greatly in the past 20 years in recognition of the key role the incentives play in complementing State and local air quality regulations to reduce emissions. Many new incentive programs have been established building on the success of the Carl Moyer Program.

Each of CARB's incentive programs has its own statutory requirements, emission reduction goals, and eligible projects making the portfolio diverse and far reaching. These programs fit together to address multiple goals, including:

- Turning over the legacy fleet to achieve cost-effective, near-term emission reductions in support of SIP, air toxics, and community air protection goals.
- Accelerating the introduction and deployment of zero-emitting technologies to meet California's longer-term air quality and climate change goals.
- Improving access to clean transportation for low-income households and investing in the disadvantaged and low-income communities most impacted by pollution.
- Supporting a green economy.

Carl Moyer Program: Provides incentives for vehicle and equipment owners to reduce pollution early or in excess of regulatory requirements by repowering or replacing engines or vehicles with commercialized cleaner engines or vehicles. The program pays the incremental cost of cleaner-than-required vehicles, engines, and equipment. Typical projects include clean trucks, buses, off-road construction and agricultural equipment, agricultural pumps, marine vessels, and locomotives. The program was established in 1998 to help air districts achieve cost-effective NOx emission reductions called for in the SIP by accelerating the turnover of older equipment and vehicles and later expanded to also consider ROG and toxic particulate matter emissions. Annual statewide funding is $70-80 million based on dedicated revenue from the DMV smog abatement fee and a fee on the purchase of new tires. The District's share in recent years has been about $8 million. CARB and air districts partner to run the program,

with CARB developing guidelines and districts making funding decisions for their regions.

AB 617 Community Air Protection: In 2017, the Legislature created a new Community Air Protection incentive program to achieve early emission reductions in communities most impacted by air pollution to support community emission reduction programs being developed pursuant to AB 617 (Garcia, Chapter 136, Statutes of 2017). In the 2017 State Budget, the Legislature appropriated $250 million in Cap-and-Trade auction proceeds to the program, including $80 million for the San Joaquin Valley. The Legislature also directed that the program be implemented using the existing Carl Moyer Program and Proposition 1B Goods Movement Emission Reduction Program framework for the first year, so it could be launched quickly. In the 2018 State Budget, the Legislature provided an additional $245 million in Cap-and-Trade auction proceeds for Community Air Protection incentives; air district allocations have not yet been set. The Legislature expanded the possible uses of these second year funds to include: Carl Moyer and Proposition 1B eligible projects with a priority on zero-emission projects; zero-emission charging infrastructure; stationary source projects; and additional projects developed by air districts through a public process with community input. CARB and air districts partner to run the program, with CARB developing guidelines and the districts making funding decisions for their regions. Funding for the Community Air Protection incentives is appropriated annually at the discretion of the Legislature. Unlike the Carl Moyer Program, this program does not have a dedicated funding source.

FARMER Program: As part of the 2017 State Budget, the Legislature appropriated of $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 new FARMER Program and approved guidelines in that establish the program framework, eligible projects, reporting requirements, and oversight provisions. CARB is directing this funding to air districts to administer for agricultural truck and equipment replacement projects. For 2017-18 budget cycle, $108 million is allocated to the San Joaquin Valley. For the first year, CARB is patterning the FARMER Program after existing incentive programs to expedite implementation. Funding is available for agricultural vehicle and equipment projects eligible under the Carl Moyer Program as well as zero-emission agricultural utility terrain vehicles and off-road agricultural equipment trade-ups in the San Joaquin Valley, both of which were piloted under the Air Quality Improvement Program (AQIP). The guidelines provide flexibility to add project categories as necessary. In the 2018 State Budget, the Legislature provided an additional $132 million; air district allocations have not yet been set. Funding is appropriated annually at the discretion of the Legislature. Unlike the Carl Moyer Program, this program does not have a dedicated funding source.

Low Carbon Transportation Program: This program, funded with Cap-and-Trade auctions proceeds, funds projects that accelerate the transition to low carbon freight and passenger transportation with a priority on providing health and economic benefits to California's most disadvantaged communities, low-income communities, and

low-income households. These investments support the State's climate change, air quality, ZEV deployment, and petroleum reduction goals, focusing on introduction and deployment of zero-emission technologies where feasible. Low Carbon Transportation funding is unique among CARB's incentives in that it can be used for pre-commercial demonstration projects and early commercial pilot deployment when a technology may not be fully proven. The Legislature has appropriated a total of $1.5 billion in Low Carbon Transportation Program funding to CARB since the 2013-14 budget cycle, including $455 million in the 2018 budget. The program funds: zero-emission and plug-in hybrid passenger vehicles through the Clean Vehicle Rebate Project (CVRP); transportation equity projects to increase access to the cleanest vehicles in and near disadvantaged communities and for low-income Californians; clean trucks and buses using zero-emission, hybrid, and low nitrogen NOx technologies through the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP); and demonstration and early commercial deployment of zero- and near zero-emission freight equipment. Funding for the program is subject to annual appropriations of Cap-and-Trade auction proceeds by the Legislature; it does not have dedicated funding.

Air Quality Improvement Program (AQIP): AQIP is a voluntary, mobile source incentive program established through AB 118 (Núñez, Chapter 750, Statutes of 2007) to reduce criteria pollutant and toxics emissions with concurrent reductions in greenhouse gas emissions. Funding for AQIP comes primarily from the DMV smog abatement fee. AQIP has an annual budget of about $25-30 million. AB 8 (Perea, Chapter 401, Statutes of 2013) extended program funding through 2024. In the initial years of AQIP, CARB focused these investments on technology advancing projects that support California's long-term air quality and climate change goals in addition to providing immediate emissions benefits, including CVRP, HVIP, and advanced technology freight demonstrations. These projects are now funded through the Low Carbon Transportation, and AQIP funds are primarily directed to the Truck Loan Assistance Program that helps small business truckers to secure financing for newer trucks and diesel exhaust retrofits to meet compliance deadlines for CARB's Truck and Bus Regulation.

Proposition 1B Goods Movement Emission Reduction Program: Proposition 1B, passed in 2006, authorized the Legislature to appropriate $1 billion in bond funding to CARB to reduce air pollution emissions and health risks from freight movement along California's four priority trade corridors – Los Angeles/Inland Empire, the Central Valley and Sacramento region, the San Francisco Bay Area, and the San Diego/Mexican border region. The program is a partnership between CARB and local air districts and ports. CARB established the program guidelines and awards funding to local agencies. The local agencies then use a competitive process to provide funding to equipment owners for cleaner technology upgrades. Eligible projects include cleaner trucks, locomotives, ships-at-birth, cargo handling equipment, transportation refrigeration units, and harbor craft. The program is now in its last round of funding, and nearly all of the funding has been awarded. However, the last clean truck and equipment replacement projects are still coming online to provide additional emission reductions. The program framework will live on as a mechanism to award clean truck funds. The Legislature has specified in its budget appropriations for the AB 617 Community Air Protection Program

that air districts have the option of using the Proposition 1B guidelines to evaluate possible truck projects.

In addition to these State-funded programs, the District has significant local funding from DMV fees and other sources available for incentives to help meet these SIP commitments. In partnership with efforts of the State, the District has long been effectively identifying funding and implementing incentive programs. – to date, programs managed by the District have invested over $2.1 billion in public and private funding, resulting in over 151,000 tons of lifetime emission reductions.

At the Federal level, U.S. EPA's Diesel Emission Reduction Act (DERA) program funds projects that reduce diesel emissions from on-road heavy-duty engines, including school buses, Class 5 – 8 heavy-duty interstate vehicles, locomotive engines, marine engines, and non-road engines, equipment or vehicles used in construction, cargo handling equipment, and off-road equipment used in agricultural, mineral, or energy production industries.

With the establishment of new programs by the Legislature, the San Joaquin Valley received about $200 million in the 2017-18 budget year in State funding through the Carl Moyer Program, FARMER, and AB 617 Community Air Protection incentive funding and is expected to receive a similar amount of funding in 2018-19. However, it should be noted that FARMER and AB 617 Community Air Protection funding is appropriated annually at the Legislature's discretion; these programs do not have a dedicated funding source. An expansion of current programs would provide an effective framework for achieving the necessary funding stream. Funding efforts may also be coordinated with those of the South Coast, as the need for cleaner technologies are similar and there are strong synergies in the deployment of cleaner trucks in both regions. For example, approximately 20 percent of truck travel through the San Joaquin Valley originates in the South Coast. Combined investments can therefore benefit both regions and reduce overall funding needs, while providing a strong platform to advocate for the health and economic benefits of meeting clean air standards.

CARB staff will also coordinate with U.S. EPA to develop the programmatic structure for use of incentive-based measures in the SIP to satisfy Clean Air Act requirements. These requirements include: 1) demonstration that the incentive program reductions are quantifiable, enforceable, permanent, and surplus; 2) provisions for an enforceable commitment; 3) technical analyses and supporting documentation; 4) demonstration of funding and legal authority; 5) procedures for public disclosure of information; and 6) provisions to measure and track program results.

Other Programs Facilitating Transformation

Beyond individual funding mechanisms, there are multiple State level programs and legislative mandates that are facilitating the overall transformation to cleaner, more efficient technologies in California. These programs are designed to provide an overall framework to support needed technology development and infrastructure, increase

consumer awareness and outreach, and provide for focused investments in individual communities. These efforts will also help meet the State's transportation electrification goals under SB 350 through pursuit of programs to catalyze widespread transportation electrification. Examples of the State's high level commitment to supporting this transformation include:

- Volkswagen (VW) Settlement Agreement: The VW California settlement agreement includes both a Mitigation Trust to mitigate the excess NOx emissions caused by the company's use of illegal defeat devices in their vehicles, as well as a ZEV Investment Commitment to help grow the State's expanding ZEV program. The Mitigation Trust includes approximately $423 million for California. Per the Beneficiary Mitigation Plan approved by CARB in 2018, this funding will be used to replace older heavy-duty trucks, buses, and freight vehicles and equipment with cleaner models with a focus on zero-emission technologies where available and low NOx everywhere else, as well as fund light-duty ZEV infrastructure. The emission reductions from the program will mitigate the excess NOx from the VW vehicles, so these investments will not provide SIP-creditable reductions. However, they will help accelerate the introduction of zero-emission technologies and support the transformation of the fleet.

  The ZEV Investment Commitment includes $800 million for California to support transportation electrification and the next generation of electric vehicles. Key focus areas will include installing zero-emission vehicle fueling infrastructure (for both battery electric and fuel cell electric cars), funding brand-neutral consumer awareness campaigns to increase the zero-emission vehicle market, and investing in projects such as car-sharing programs that will increase access to zero-emission vehicles for all consumers in California. The ZEV Investment Commitment funding also includes a Green City initiative that will demonstrate in a concentrated fashion the operation of car sharing services, ZEV/shuttle transit services, and ZEV freight transport projects.

- Transformative Climate Communities: The State of California is investing $150 million of cap-and-trade auction proceeds in the State's most disadvantaged communities through the Transformative Climate Communities Program, which integrates multiple, cross-cutting approaches to reduce GHG emissions. These revenues – $70 million for Fresno, $35 million for Los Angeles, and $35 million in a third location – are for broad-based GHG emission reduction projects that provide local economic, environmental, and health benefits to disadvantaged communities.[7]

- ZEV Action Plan: In October 2016, the Governor's Office released the 2016 ZEV Action Plan[8], which builds on the successful implementation of the 2013 ZEV Action Plan and identifies new actions State agencies will collaboratively take to raise consumer awareness about ZEVs; ensure ZEV accessibility to a broad range

[7] http://sgc.ca.gov/programs/tcc/
[8] https://www.gov.ca.gov/docs/2016_ZEV_Action_Plan.pdf

of Californians; achieve ZEV commercial availability in targeted heavy-duty applications and in the freight sector; and aid ZEV market growth beyond California.

- Veloz: Formerly the California Plug-In Electric Vehicle Collaborative, Veloz is a public/private organization focused on accelerating the adoption of plug-in electric vehicles (PEV) to meet California's economic, energy and environmental goals. Using the expertise of each member, Veloz follows emerging PEV market trends and works to address challenges and enable strong PEV market growth. The PEV Collaborative's 2010 Strategic Plan, ***Taking Charge***, was designed to facilitate PEV market growth so that, by the end of the decade, hundreds of thousands of PEVs will be sold annually in California, and the market will contribute significantly to California's ongoing economic, energy and environmental policy objectives. Its strategic focus is to solidify California as a technological, manufacturing, economic, and policy leader that benefits from – and shapes – the global PEV market for decades to come.

- California Fuel Cell Partnership: The California Fuel Cell Partnership is a collaboration of organizations, including auto manufacturers, energy providers, government agencies and fuel cell technology companies, that work together to promote the commercialization of hydrogen fuel cell vehicles. By working together, the Partnership helps ensure that vehicles, stations, regulations and people are in step with each other as the technology comes to market.

- California Sustainable Freight Action Plan: The California Sustainable Freight Action Plan outlines an integrated approach to coordinate State agency priorities and timing on actions to influence freight transportation and energy infrastructure, vehicle and equipment technologies, and facility and operations efficiency, rather than the traditional and separate planning efforts for transportation, environment, and energy. The Action Plan is the beginning of a process, and signals State government's interest in collaborating with stakeholders on defining the actions necessary to make the 2050 Vision for a sustainable freight transport system a reality. The Action Plan also includes 2030 targets to guide the State towards meeting this vision, as well as focused pilot projects to achieve near-term progress.

Programs to Support Continued Technology Advancement

CARB, along with other public and private partners, continue to sponsor research and demonstration programs to further promote advanced technology development. This will occur through CARB's annual research program, grant programs, and other cooperative agreements. For example, CARB, U.S. EPA, the San Joaquin Valley, and the South Coast are partners in a memorandum of understanding that commits to developing and testing new sustainable technologies by aligning resources and evaluating innovative technologies. CARB also supports technology demonstrations through various grant programs, including the aforementioned Transformative Climate Communities Program. These investments will be focused in the State's most disadvantaged communities, and help to fund projects that integrate multiple,

cross-cutting approaches to reduce emissions. Investments of these types will help support the comprehensive transformation needed for the Valley's attainment needs, while providing an overall framework to support needed technology development and infrastructure, increase consumer awareness and outreach, and provide for focused investments in individual communities.

In addition, several measures focus on deploying the cleanest technologies possible, including use of zero-emission vehicles and equipment in initial applications that are currently well-suited for broader market deployment. Depending upon the success of these applications and ongoing technology assessment, further regulatory mechanisms for additional applications may be feasible. For instance, NOx emissions from off-road compression-ignition engines are currently the second largest category of mobile source emissions subject to CARB regulation. Off-road compression-ignition engine NOx emissions are projected to make up 24 percent of the mobile source diesel emissions inventory, and 34 percent of the PM inventory, in 2030. The primary goal of this program would be to reduce emissions from new, off-road compression-ignition engines by adopting more stringent exhaust standards for all power categories, including those that do not currently utilize advanced exhaust aftertreatment. The standards would be more stringent than current U.S. EPA and European Stage V emission requirements. CARB could unilaterally lower standards for non-preempted off-road engines, but for farm and construction equipment under 175 horsepower, which is preempted by the federal Clean Air Act, federal action would be needed to adopt lower standards.

CARB will work with federal and international agencies to advocate for more stringent emission standards for sources that are not under CARB's regulatory purview. The status of technology development and identification of schedules for development of further regulatory approaches will be reported through workshops, conferences, symposia, and briefings to the Board.

Appendix A

Revised Proposed 2016 State Strategy for the State Implementation Plan

APPENDIX A TO BE INCLUDED IN FUTURE DRAFTS

Appendix B

Addendum Environmental Analysis Prepared for the San Joaquin Valley Supplement to the Revised Proposed 2016 State Strategy for the State Implementation Plan

APPENDIX B TO INCLUDED IN FUTURE DRAFTS

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