

## **APPENDIX H**

**Appendix D from the 2022 Ozone Plan**

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# Appendix D

Mobile Source Control Strategy



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## Appendix D: Mobile Source Control Strategy

### D.1 KEY MOBILE SOURCE REGULATIONS AND PROGRAMS PROVIDING EMISSION REDUCTIONS

*[This section provided by California Air Resources Board]*

Given the severity of California's air quality challenges and the need for ongoing emission reductions, the California Air Resources Board (CARB or Board) has implemented the most comprehensive mobile source emissions control program in the nation. CARB's comprehensive program relies on four fundamental approaches:

- Stringent emissions standards that minimize emissions from new vehicles and equipment;
- In-use programs that target the existing fleet and require the use of the cleanest vehicles and emissions control technologies;
- Cleaner fuels that minimize emissions during combustion; and,
- Incentive programs that remove older, dirtier vehicles and equipment and replace those vehicles with the cleanest technologies.

This multi-faceted approach has spurred the development of increasingly cleaner technologies and fuels and achieved significant emission reductions across all mobile source sectors that go far beyond national programs or programs in other states. These efforts extend back to the first mobile source regulations adopted in the 1960s, and pre-date the federal Clean Air Act Amendments (Act) of 1970, which established the basic national framework for controlling air pollution. In recognition of the pioneering nature of CARB's efforts, the Act provides California unique authority to regulate mobile sources more stringently than the federal government by providing a waiver of preemption for its new vehicle emission standards under Section 209(b). This waiver provision preserves a pivotal role for California in the control of emissions from new motor vehicles, recognizing that California serves as a laboratory for setting motor vehicle emission standards. Since then, CARB has consistently sought and obtained waivers and authorizations for its new motor vehicle 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.

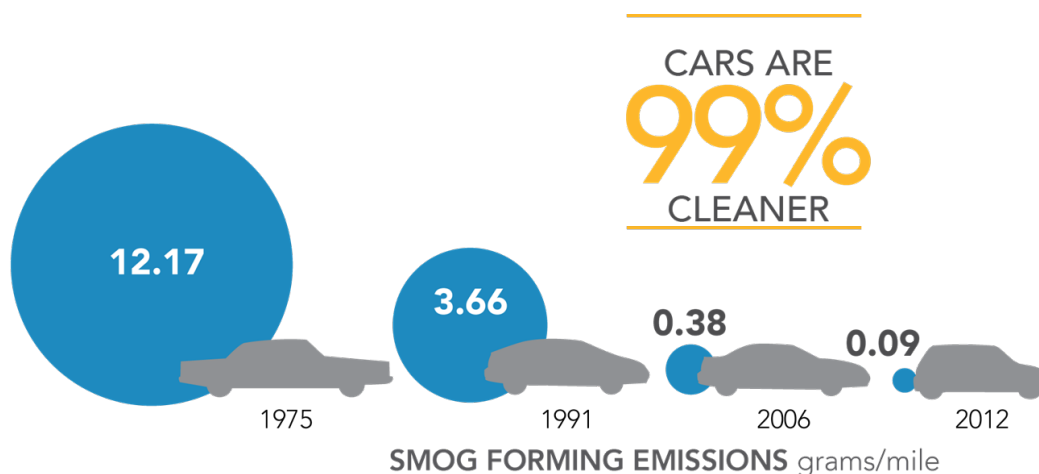
In 1998, CARB identified diesel particulate matter as a toxic air contaminant. Since then, CARB adopted numerous regulations aimed at reducing exposure to diesel particulate matter while concurrently providing reductions in oxides of nitrogen (NOx) from freight transport sources like heavy-duty diesel trucks, transportation sources like passenger cars and buses, and off-road sources like large construction equipment. Phased implementation of these regulations will continue to produce emission reduction benefits through 2037 and beyond, as the regulated fleets are retrofitted, and as older and dirtier portions of the fleets are replaced with newer and cleaner models at an accelerated pace.

Further, CARB and District staff work closely on identifying and distributing incentive funds to accelerate cleanup of vehicles and engines. Key incentive programs include: Low Carbon Transportation, Air Quality Improvement Program, VW Mitigation Trust, Community Air Protection, Carl Moyer Program, Goods Movement Program, Clean Off-Road Equipment (CORE) and Funding Agricultural Replacement Measures for Emission Reductions (FARMER). These incentive-based programs work in tandem with regulations to accelerate deployment of cleaner technology.

### D.1.1 Light-Duty Vehicles

Figure D-1 illustrates the trend in CARB smog forming emission standards for light-duty vehicles. Cars are 99 percent cleaner than they were in 1975 due to CARB's longstanding light-duty mobile source program. 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. In 1970, CARB required auto manufacturers to meet the first standards to control NOx emissions along with hydrocarbon emissions. The simultaneous control of emissions from motor vehicles and fuels led to the use of cleaner-burning reformulated gasoline (RFG) that has removed the emissions equivalent of 3.5 million vehicles from California's roads. Since CARB first adopted it in 1990, the Low Emission Vehicle Program (LEV and LEV II) and Zero-Emission Vehicle (ZEV) Program have resulted in the production and sales of hundreds of thousands of zero-emission vehicles (ZEVs) in California.

**Figure D-1 Light-Duty Emission Standards**



As a result of these efforts, light-duty vehicle emissions in the San Joaquin Valley have been reduced significantly since 1990 and will continue to go down through 2037. From today, light-duty vehicle NOx emissions are projected to decrease by over 64 percent in 2037. Key light-duty programs include Advanced Clean Cars (ACC), On-Board Diagnostics, Reformulated Gasoline, Incentive Programs, and the Enhanced Smog Check Program.



### **D.1.1.1      *Advanced Clean Cars***

CARB's groundbreaking ACC program is now providing the next generation of emission reductions in California, and ushering in a new zero emission passenger transportation system. The success of this program is evident: California is the world's largest market for Zero Emission Vehicles (ZEVs), with over 87 models available today, including battery-electric, plug-in hybrid electric, and fuel cell electric vehicles. A wide variety are now available at lower price points, attracting new consumers. As of February 2022, Californians, who drive only 10 percent of the nation's cars, now account for over 40 percent of all zero-emission cars in the country. The U.S. makes up about half of the world market. This movement towards commercialization of advanced clean cars has occurred due to CARB's ZEV requirements, part of ACC, which affects passenger cars and light-duty trucks.

CARB's ACC Program, approved in January 2012, is a pioneering approach of a 'package' of regulations that - although separate in construction - are related in terms of the synergy developed to address both ambient air quality needs and climate change. The ACC program combines the control of smog, soot causing pollutants, and greenhouse gas (GHG) emissions into a single coordinated package of requirements for model years 2015 through 2025. The program assures the development of environmentally superior cars that will continue to deliver the performance, utility, and safety vehicle owners have come to expect

The ACC Program also included amendments affecting the current ZEV requirements through the 2017 model year in order to enable manufacturers to successfully meet 2018 and subsequent model year requirements. These ZEV amendments are intended to achieve commercialization through simplifying the regulation and pushing technology to higher volume production in order to achieve cost reductions. The ACC Program will continue to achieve benefits into the future as new cleaner cars enter the fleet and displace older and dirtier vehicles.

Going beyond these regulations, California will be transitioning to zero emissions. In support of California's transition to zero-emission vehicles, in 2020, Governor Newsom signed [Executive Order N-79-20](#)<sup>1</sup> which established a goal that 100 percent of California sales of new passenger cars and trucks be zero-emission by 2035. Advanced Clean Cars II (ACC II), a measure in the 2016 State SIP Strategy, is a significant effort critical to meeting air quality standards, and was adopted recently by the CARB Board in August 2022. ACC II is consistent with the Governor Newsom's Executive Order and has the goal of cutting emissions from new combustion vehicles while taking all new vehicle sales to 100 percent zero-emission no later than 2035.

With this order and many other recent actions, Governor Newsom has recognized that air pollution remains a challenge for California that requires bold action. Zero-emission vehicle commercialization in the light-duty sector is well underway. Longer-range

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<sup>1</sup> Executive Order N-79-20 <https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf>

battery electric vehicles are coming to market that are cost-competitive with gasoline fueled vehicles and hydrogen fuel cell vehicles are now also seeing significant sales. Autonomous and connected vehicle technologies are being installed on an increasing number of new car models. A growing network of retail hydrogen stations is now available, along with a rapidly growing battery charger network.

#### ***D.1.1.2 On Board Diagnostics (OBD)***

OBD systems serve an important role in helping to ensure that engines and vehicles maintain low emissions throughout their full life. OBD systems are designed to identify when a vehicle's emission control systems or other emission-related computer-controlled components are malfunctioning, causing emissions to be elevated above the vehicle manufacturer's specifications. Many states currently use the OBD system as the basis for passing and failing vehicles in their inspection and maintenance programs, as is exemplified by California's Smog Check program.

California's first OBD regulation required manufacturers to monitor some of the emission control components on vehicles starting with the 1988 model year. In 1989, CARB adopted OBD II, which required 1996 and subsequent model year passenger cars, light duty trucks, and medium duty vehicles and engines to be equipped with second-generation OBD systems. The Board has modified the OBD II regulation in regular updates since initial adoption to address manufacturers' implementation concerns and, where needed, to strengthen specific monitoring requirements. Most recently, the Board amended the regulation in 2021 to require manufacturers to implement Unified Diagnostic Services (UDS) for OBD communications, which will provide more information related to emissions-related malfunctions that are detected by OBD systems, improve the usefulness of the generic scan tool to repair vehicles, and provide needed information on in-use monitoring performance. UDS implementation would be required for all 2027 and subsequent model year light- and medium-duty vehicles and engines, as well as some heavy-duty vehicles and engines.

#### ***D.1.1.3 California Enhanced Smog Check Program***

The Bureau of Automotive Repair (BAR) is the State agency charged with administration and implementation of the Smog Check Program. The Smog Check Program is designed to reduce air pollution from California registered vehicles by requiring periodic inspections for emission-control system problems, and by requiring repairs for any problems found. In 1998, the Enhanced Smog Check program began in which Smog Check stations relied on the BAR-97 Emissions Inspection System (EIS) to test tailpipe emissions with either a Two-Speed Idle (TSI) or Acceleration Simulation Mode (ASM) test depending on where the vehicle was registered. For instance, vehicles registered in urbanized areas received an ASM test, while vehicles in rural areas received a TSI test.

In 2009, the following requirements were added in to improve and enhance the Smog Check Program, making it more inclusive of motor vehicles and effective on smog reductions:

- Low pressure evaporative test;
- More stringent pass/fail cutpoints;
- Visible smoke test; and
- Inspection of light- and medium-duty diesel vehicles.

The next major change in the Program was due to AB 2289, adopted in October 2010, a new law restructuring California's Smog Check Program, streamlining and strengthening inspections, increasing penalties for misconduct, and reducing costs to motorists. This new law, supported by CARB and BAR, promised faster and less expensive Smog Check inspections by taking advantage of the second generation of OBD software installed on all vehicles. The new law also directs vehicles without this equipment to high-performing stations, helping to ensure that these cars comply with current emission standards. This program will reduce consumer costs by having stations take advantage of diagnostic software that monitors pollution-reduction components and tailpipe emissions. Beginning mid-2013, testing of passenger vehicles using OBD was required on all vehicles model years 2000 or newer.

#### ***D.1.1.4 Reformulated Gasoline (CaRFG)***

Since 1992, CARB has been regulating the formulation of gasoline through the California Reformulated Gasoline program (CaRFG). The CaRFG program has been implemented in three phases, and has resulted in California gasoline being the cleanest in the world. California's cleaner-burning gasoline regulation is one of the cornerstones of the State's efforts to reduce air pollution and cancer risk. Reformulated gasoline is fuel that meets specifications and requirements established by CARB, which reduced motor vehicle toxics by about 40 percent and reactive organic gases by about 15 percent. The results from cleaning up fuel can have an immediate impact as soon as it is sold in the State. Vehicle manufacturers design low-emission vehicles to take full advantage of cleaner-burning gasoline properties.

#### ***D.1.1.5 Incentive Programs***

There are many different incentive programs focusing on light-duty vehicles that produce extra emission reductions beyond traditional regulations. Incentive programs encourage both the early retirement of dirty, older cars and the purchase of newer, lower-emitting vehicle engines and technologies. 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.

The State, in partnership with the local air districts, has a well-established history of using incentive programs to advance technology development and deployment, and to achieve early emission reductions. Since 1998, CARB and California's local air districts

have been administering incentive funding to accelerate the deployment and turnover to cleaner vehicles, starting with the Moyer Program. In recognition of the key role that incentives play in complementing State and local air quality regulations to reduce emissions, the scope and scale of California's air quality incentive programs has since greatly expanded. Each of CARB's incentive programs has its own statutory requirements, goals, and categories of eligible projects that collectively provide for a diverse and complex incentives portfolio. CARB uses this portfolio approach to incentives to accelerate development and early commercial deployment of the cleanest mobile source technologies and to improve access to clean transportation.

The Fiscal Year (FY) 2021-22 State Budget included an unprecedented level of investment in ZEVs, with \$2.3 billion allocated for CARB over the next three years, specifically dedicated to incentive-based turnover of mobile source vehicles and equipment, as part of a \$3.9 billion comprehensive, multi-agency package to accelerate progress toward the State's zero-emission vehicle goals established under Executive Order N-79-20. With the 2022-23 State Budget, Governor Newsom is further reinforcing California's commitment to transitioning away from combustion vehicles with an additional \$6.1 billion in ZEV investments over the next 5 years.

a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

California's Low Carbon Transportation Investments and the Air Quality Improvement Program form CARB's major incentive funding program, which works in concert with the State's larger portfolio of clean transportation investments. Together, the Low Carbon Transportation Investments and Air Quality Improvement Program are known as the Clean Transportation Incentives program; they provide mobile source incentives to reduce greenhouse gas, criteria pollutant, and toxic air contaminant emissions through the deployment of advanced technology and clean transportation in the light-duty and heavy-duty sectors.

The Clean Transportation Incentives Program is part of California Climate Investments, and is designed to accelerate the transition to advanced technology low carbon freight and passenger transportation, with a priority on providing health and economic benefits to California's most disadvantaged communities, and with a focus on increasing deployment of zero-emission vehicles and equipment wherever possible. Low Carbon Transportation Investments are supported by California's Cap-and-Trade auction proceeds. The Air Quality Improvement Program (AQIP) is a mobile source incentive program that focuses on reducing criteria pollutant and diesel particulate emissions with concurrent GHG reductions. AQIP is appropriated from the Air Quality Improvement Fund.

Each year, the legislature appropriates funding to CARB for the Low Carbon Transportation Investments and Air Quality Improvement Programs, and allocations are used to fund multiple programs in the passenger vehicle, on-road heavy-duty, and off-road vehicle sectors, including: the Clean Vehicle Rebate Project (CVRP); Enhanced

Fleet Modernization Program and Plus-Up Pilot Project (Clean Cars 4 All); and the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).

*i. Clean Vehicle Rebate Program (CVRP)*

As one of the programs funded through the Clean Transportation Incentives program, CVRP is a vehicle purchasing incentives program that provides consumer rebates to reduce the price for new ZEV purchases, and is designed to offer vehicle rebates on a first-come, first-serve basis for light-duty ZEVs, plug-in hybrid electric vehicles, and zero-emission motorcycles. In FY 2021-22, CVRP was allocated \$525 million.

*ii. Clean Cars 4 All (CC4A)*

Clean Cars 4 All (formerly known as the Enhanced Fleet Modernization Program Plus-Up Pilot Project) is another Clean Transportation Incentives program for passenger vehicles. Clean Cars 4 All provides incentives for lower-income consumers living in and near disadvantaged communities who scrap their old vehicles and purchase new or used hybrid, plug-in hybrid, or zero-emission vehicle replacement vehicles. The budget for FY 2021-22 included \$75 million for the statewide expansion of CC4A.

*iii. Other Clean Transportation Equity Investments*

CARB also funds a suite of transportation equity pilot projects aimed at increasing access to clean transportation and mobility options for priority populations in disadvantaged and low-income communities, and for lower-income households. This includes clean vehicle ownership projects, clean mobility options, streamlining access to funding and financing opportunities, and increasing community outreach, education and exposure to clean technologies. Clean Transportation Equity pilot projects exemplify the importance of understanding the unique needs across communities and provide lessons for how we most directly address barriers to collectively achieve our equity, air quality, and climate goals. Major Clean Transportation Equity Investment programs include: Clean Mobility Options, Clean Mobility in Schools, Financing Assistance; and Sustainable Transportation Equity Project (STEP). Clean Transportation Equity Investment projects were allocated \$150 million in the FY 2021-22 budget, which includes the \$75 million for CC4A mentioned above.

Financing Assistance provides eligible consumers buy-down and financing opportunities to purchase or lease a new or used clean vehicle, such as a conventional hybrid electric vehicle (HEV), plug-in hybrid (PHEV), or battery electric vehicle (BEV). Clean Mobility in Schools Projects are located within disadvantaged communities, and are intended to encourage and accelerate the deployment of new zero-emission school buses, school fleet vehicles, passenger cars, lawn and garden equipment, and can incorporate alternative modes of transportation like transit vouchers, active transportation elements, and bicycle share programs. In the light-duty sector, some of the Clean Mobility Options programs that CARB funds include the Clean Mobility Options Voucher Pilot Program (CMO). CMO provides voucher-based funding for low-income, tribal, and

disadvantaged communities to fund zero-emission shared and on-demand services such as carsharing, ridesharing, bike sharing, and innovative transit services. STEP is a new transportation equity pilot program that funds zero-emission carsharing, bike sharing, public transit and shared mobility subsidies, among other projects.

b) Consumer Assistance Program

California's voluntary vehicle retirement program, the Consumer Assistance Program (CAP), is administered by BAR and provides low-income consumers repair assistance including up to \$1,200 in emissions-related repairs if their vehicle fails its biennial Smog Check Test inspection, and/or up to \$1,500 per vehicle for retiring operational vehicles at BAR-contracted dismantler sites.

### D.1.2 Medium- and Heavy-Duty On-Road Trucks

Due to the benefits of CARB's longstanding heavy-duty mobile source program, heavy-duty on-road vehicle emissions in the San Joaquin Valley have been reduced significantly since 1990 and will continue to decrease through 2037. From today, medium- and heavy-duty NOx emissions are projected to decrease by over 79 percent in 2037. Key programs contributing to those reductions include new heavy-duty engine standards, cleaner diesel fuel requirements, California's Truck and Bus Regulation and incentive programs.

#### D.1.2.1 Heavy-Duty Engine Standards

Since 1990, heavy-duty engine NOx emission standards have become dramatically more stringent, dropping from 6 grams per brake horsepower-hour (g/bhp-hr) in 1990 down to the current 0.2 g/bhp-hr standard, which took effect in 2010. In addition to mandatory NOx standards, there have been several generations of optional lower NOx standards put in place over the past 15 years. Most recently in 2015, engine manufacturers were allowed to certify to three optional NOx emission standards of 0.1 g/bhp-hr, 0.05 g/bhp-hr, and 0.02 g/bhp-hr (i.e., 50 percent, 75 percent, and 90 percent lower than the current mandatory standard of 0.2 g/bhp-hr). The optional standards allow local air districts and CARB to preferentially provide incentive funding to buyers of cleaner trucks, and to encourage the development of cleaner engines.

#### D.1.2.2 Optional Low-NOx Standards for Heavy-Duty Diesel Engines

In 2013, California established optional low-NOx standards for heavy-duty diesel engines (Optional Reduced Emissions Standards for Heavy-Duty Engines regulation), with the most aggressive standard being 0.02 g/bhp-hr, 90 percent below the federally required standard. The optional low-NOx standards were developed to pave the way for more stringent mandatory standards by encouraging manufacturers to develop and certify low-NOx engines, and incentivizing potential customers to purchase these low-NOx engines. By 2019, a total of fifteen engine families, some using natural gas and others using liquefied petroleum gas, had been certified to the optional low-NOx

standards.

### ***D.1.2.3 Heavy-Duty Engine and Vehicle Omnibus Regulation***

In 2021, CARB comprehensively overhauled how NOx emissions from new heavy-duty engines are regulated in California through the adoption of the Heavy-Duty Engine and Vehicle Omnibus Regulation, which reduces NOx emissions from the engines in medium- and heavy-duty vehicle classes. The Omnibus Regulation includes NOx certification emission standards and in-use standards that significantly reduce tailpipe NOx emissions during most vehicle operating modes such as high-speed steady-state, transient, low load urban driving, and idling modes of operation. Additionally, revisions to the emissions warranty, useful life, emissions warranty and reporting information and corrective action procedures, and durability demonstration procedures provide additional emission benefits by encouraging more timely repairs to emission-related malfunctions and encouraging manufacturers to produce more durable emission control components, thereby reducing the rate at which engine emission controls fail and emissions increase.

### ***D.1.2.4 Cleaner In-Use Heavy-Duty Trucks (Truck and Bus Regulation)***

California's Truck and Bus Regulation or In-Use Heavy-Duty Truck Rule was first adopted in December 2008. This rule represents a multi-year effort to turn over the legacy fleet of heavy-duty on-road engines and replace them with the cleanest technology available. In December 2010, CARB revised specific provisions of the In-Use Heavy-duty Truck Rule, in recognition of the deep economic effects of the recession on businesses and the corresponding decline in emissions.

Starting in 2012, the Truck and Bus Regulation phases in requirements applicable to an increasingly larger percentage of California's truck and bus fleet over time, so that by 2023 nearly all older vehicles will be upgraded to have exhaust emissions meeting 2010 model year engine emissions levels. The regulation applies to nearly all diesel-fueled trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds that are privately or federally owned, including on-road and off-road agricultural yard goat trucks, and privately and publicly owned school buses. Moreover, the regulation applies to any person, business, school district, or federal government agency that owns, operates, leases or rents affected vehicles. The regulation also establishes requirements for any in-State or out-of-state motor carrier, California-based broker, or any California resident who directs or dispatches vehicles subject to the regulation. Finally, California sellers of a vehicle subject to the regulation would have to disclose the regulation's potential applicability to buyers of the vehicles. Approximately 170,000 businesses in nearly all industry sectors in California, and almost a million vehicles that operate on California roads each year are affected. Some common industry sectors that operate vehicles subject to the regulation include: for-hire transportation, construction, manufacturing, retail and wholesale trade, vehicle leasing and rental, bus lines, and agriculture.

In 2017, California passed legislation ensuring compliance with the Truck and Bus Regulation through the California Department of Motor Vehicles (DMV) vehicle registration program. Starting January 1, 2020, DMV verifies compliance to ensure that vehicles subject to the Truck and Bus Regulation meet the requirements prior to obtaining DMV vehicle registration. The law requires the DMV to deny registration for any vehicle that is non-compliant or has not reported to CARB as compliant or exempt from the Truck and Bus Regulation.

CARB compliance assistance and outreach activities that are key in support of the Truck and Bus Regulation include:

- The Truck Regulations Upload and Compliance Reporting System (TRUCRS), an online reporting tool developed and maintained by CARB staff;
- The Truck and Bus regulation's fleet calculator, a tool designed to assist fleet owners in evaluating various compliance strategies;
- Targeted training sessions all over the State; and
- Out-of-state training sessions conducted by a contractor.

CARB staff also develops regulatory assistance tools, conducts and coordinates compliance assistance and outreach activities, administers incentive programs, and actively enforces the entire suite of regulations. Accordingly, CARB's approach to ensuring compliance is based on a comprehensive outreach and education effort.

#### ***D.1.2.5 Heavy-Duty Inspection and Maintenance Regulation***

To ensure heavy-duty trucks remain clean in-use, CARB adopted in 2021 the Heavy-Duty Inspection and Maintenance Regulation, which requires periodic demonstrations that vehicles' emissions control systems are properly functioning in order to legally operate within the State. This regulation is designed to achieve criteria emissions reductions by ensuring that malfunctioning emissions control systems are repaired in a timely fashion.

#### ***D.1.2.6 Heavy-Duty On-Board Diagnostics (HD OBD)***

OBD systems serve an important role in helping to ensure that engines and vehicles maintain low emissions throughout their full life. OBD systems monitor virtually all emission controls on gasoline and diesel engines, including catalysis, particulate matter (PM) filters, exhaust gas recirculation systems, oxygen sensors, evaporative systems, fuel systems, and electronic powertrain components as well as other components and systems that can affect emissions when malfunctioning. The systems also provide specific diagnostic information in a standardized format through a standardized serial data link on-board the vehicles. The use and operation of OBD systems ensure reductions of in-use motor vehicle and motor vehicle engine emissions through improvements in emission system durability and performance.



The Board originally adopted comprehensive Heavy-Duty OBD regulations in 2005 for model year 2010 and subsequent heavy-duty engines and vehicles, referred to as HD OBD. In 2009, the Board updated the HD OBD regulation, adopted specific enforcement requirements, and aligned the HD OBD with OBD requirements for medium-duty vehicles. In 2021, the Board again amended the HD OBD regulation; the 2021 amendments require manufacturers to implement Unified Diagnostic Services for OBD communications, which will provide more information related to emissions-related malfunctions that are detected by OBD systems, improve the usefulness of the generic scan tool to repair vehicles, and provide needed information on in-use monitoring performance.

#### ***D.1.2.7 Clean Diesel Fuel***

Since 1993, CARB has required that diesel fuel have a limit on the aromatic hydrocarbon content and sulfur content of the fuel. Diesel powered vehicles account for a disproportionate amount of diesel particulate matter, which is considered a toxic air contaminant in California. In 2006, CARB required a low-sulfur diesel fuel to be used not only by on-road diesel vehicles but also for off-road engines. The diesel fuel regulation allows alternative diesel formulations as long as emission reductions are equivalent to the CARB formulation.

#### ***D.1.2.8 Advanced Clean Truck Regulation (ACT)***

In June 2020, CARB adopted the Advanced Clean Trucks regulation, a first of its kind regulation requiring medium- and heavy-duty manufacturers to produce ZEVs as an increasing portion of their sales beginning in 2024. The Advanced Clean Trucks regulation is a manufacturers ZEV sales requirement and a one-time reporting requirement for large entities and fleets. This regulation is expected to result in roughly 100,000 heavy-duty ZEVs operating on California's roads by 2030 and nearly 300,000 heavy-duty ZEVs by 2035. With the adoption of the Advanced Clean Trucks regulation, CARB Resolution 20-19 directs staff to return to the Board with a zero-emission fleet rule and sets the following targets for transitioning California's heavy-duty vehicle sectors to ZEVs:

- 100 percent zero-emission drayage, last mile delivery, and government fleets by 2035;
- 100 percent zero-emission refuse trucks and local buses by 2040;
- 100 percent zero-emission-capable vehicles in utility fleets by 2040; and
- 100 percent zero-emission everywhere else, where feasible, by 2045.

As mentioned earlier, the Governor signed Executive Order N-79-20 in September 2020, which directs CARB to adopt regulations to transition the State's transportation fleet to ZEVs. This includes transitioning the State's drayage fleet to ZEVs by 2035 and transitioning the State's truck and bus fleet to ZEVs by 2045 where feasible.

### **D.1.2.9 Innovative Clean Transit (ICT) and Zero-Emission Airport Shuttle Regulation**

To achieve the needed emission reductions from heavy-duty applications, CARB is driving the use of zero-emission heavy-duty vehicles in strategic applications, including urban transit buses and airport ground transportation. The [Innovative Clean Transit regulation](#) was the first of these programs. It was adopted in December 2018 and requires all public transit agencies to gradually transition to a 100 percent zero-emission bus fleet and encourages them to provide innovative first- and last-mile connectivity and improved mobility for transit riders. Beginning in 2029, 100 percent of new purchases by transit agencies must be Zero-Emission Buses, with a goal for full transition by 2040. It applies to all transit agencies that own, operate, or lease buses in California with a GVWR greater than 14,000 lbs. It includes standard, articulated, over-the-road, double-decker, and cutaway buses.

The Zero-Emission Airport Shuttle Regulation, adopted in June 2019, requires airport shuttle operators in California to transition to 100 percent ZEV technologies. Airport shuttle operators must begin adding zero-emission shuttles to their fleets in 2027, and complete the transition to ZEVs by the end of 2035. The regulation applies to airport shuttle operators who own, operate, or lease vehicles at any of the 13 California airports regulated under this rule.

### **D.1.2.10 Incentive Programs**

There are many different incentive programs focusing on heavy-duty vehicles that accelerate turnover to cleaner technologies, and thereby produce extra emission reductions beyond traditional regulations. 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.

- a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

In addition to funding passenger vehicle incentive programs, the Low Carbon Transportation Investments and the Air Quality Improvement Program (Clean Transportation Incentives) also provides incentive funding for heavy-duty vehicles. This program both funds projects to accelerate fleet and engine turnover to cleaner existing technologies through the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) and Truck Loan Assistance program, as well as funding demonstration and pilot projects.

Beyond the vehicle purchasing incentives programs (CVRP and Clean Cars 4 All) and Clean Transportation Equity Investments, an additional \$873 million was allocated in the FY 2020-2021 budget for on-road heavy-duty trucks and off-road equipment. CARB provides these incentive funds following the principles of the portfolio approach, meaning that funding is provided across multiple sectors and applications – as well as

across multiple technologies to support both the technologies that are providing emission reductions today, as well as those that are needed to meet future goals as the technology matures. This includes funding for demonstration and pilot projects, vouchers for advanced clean technologies, and financing and support for small fleets transitioning to cleaner technologies. Additionally, this year funding was set aside specifically for drayage trucks, transit buses, and school buses, all of which are primed to rapidly transition to zero-emission.

*i. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)*

CARB's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) serves as the cornerstone program in CARB's advanced technology heavy-duty incentive portfolio. HVIP has provided funding since 2010 to support the long-term transition to cleaner combustion and zero-emission vehicles in the heavy-duty market. The program helps offset the higher costs of clean vehicles, and additional incentives are available for providing disadvantaged community benefits. HVIP responds to a key market challenge by making clean vehicles more affordable for fleets through point of purchase price reductions. With an HVIP voucher, technology-leading vehicles can be as affordable as their traditional fossil-fueled counterparts, enabling fleets of all sizes to deploy advanced technologies that are cleaner and quieter. HVIP is the earliest model in the United States to demonstrate the function, flexibility, and effectiveness of first-come first-served incentives that reduce the incremental cost of commercial vehicles. HVIP is fleet-focused, providing a streamlined and user-friendly option to encourage purchases and leases of advanced clean trucks and buses throughout California. Approved dealers are a key part of HVIP success and are trained to facilitate the application process. Vocations include freight and drayage trucks, delivery vans, utility vehicles, transit, school, and shuttle buses, refuse trucks, and more. In FY 2021-22, the Legislature allocated \$569.5 million for HVIP.

*ii. Truck Loan Assistance Program*

CARB's Truck Loan Assistance Program was created through a one-time appropriation of approximately \$35 million in the 2008 State Budget to implement a heavy-duty loan program that assists on-road fleets affected by the Truck and Bus Regulation and the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation. CARB has continued to operate this program with subsequently appropriated AQIP funds of around \$28 million annually to provide financing opportunities to small business truckers who don't meet conventional lending criteria and are unable to qualify for traditional financing for cleaner trucks. As of February 2022, about \$187 million in Truck Loan Assistance Program funding has been provided to small business truckers for the purchase of approximately 36,000 cleaner trucks, exhaust retrofits, and trailers. In FY 2021-22, \$28.6 million was allocated for the Truck Loan Assistance Program.

*iii. Demonstration and Pilot projects*

In addition to funding HVIP and the Truck Loan Assistance Program, the Clean Transportation Incentives program is the only program in CARB's portfolio, and one of the only programs in the State, that funds demonstration and pilot projects to support early market deployment of nascent zero-emission technologies. The purpose of the Advanced Technology Demonstration and Pilot Projects is to help accelerate the next generation of advanced technology vehicles, equipment, or emission controls, which are not yet commercialized. As such, it provides a testing ground for innovative projects focused on improving access to clean transportation for priority communities. In FY 2021-22, \$80 million was allocated for heavy-duty advanced technology demonstration and pilot projects, which are intended to help bring to market readiness zero-emission (ZE) heavy-duty technologies that are poised to deploy commercially in the near future in both on- and off-road applications. This includes zero-emission long-haul trucks, strategic truck range extenders, and ZE applications along freight facilities/corridors.

In heavy-duty applications, the goods movement sector is a focus for incentive funding, with CARB funding multiple demonstration and pilot programs to drive zero-emission technologies in last mile delivery trucks, drayage trucks, and heavy-duty trucks and tractors. The *USPS Zero-Emission Delivery Truck Pilot Commercial Deployment Project* is deploying battery electric last-mile delivery trucks in the USPS fleet, together with the associated charging infrastructure. The project will demonstrate the practicality and economic viability of the widespread adoption of a variety of ZE medium- and heavy-duty vehicle technologies in delivery applications. The *Battery Electric Drayage Truck Demonstration* project is a \$40 million Statewide demonstration of forty-four zero-emission battery electric and plug-in hybrid drayage trucks that, since 2018, have been in operation serving major California ports in five air districts (San Joaquin Valley, South Coast, Bay Area, Sacramento, and San Diego). Battery electric drayage trucks are used to transport cargo to or from California's ports and intermodal rail yards. Installation of charging infrastructure that enables safe charging of the trucks for statewide demonstration is also included as part of this project. To accelerate the deployment of zero-emission technologies in heavier freight applications, the \$44.8 million *Volvo Low Impact Green Heavy Transportation Solutions* project is funding Class 8 heavy-duty battery electric trucks equipped with battery electric tractors to facilitate creation of a zero-emission goods movement system from the Ports of Long Beach and Los Angeles to four freight handling facilities in disadvantaged communities.

Clean transportation incentives have also funded demonstration and pilot projects for ZE urban transit buses. The \$22.3 million *Fuel Cell Electric Bus Commercialization Consortium* in the Bay Area and Southern California is funding battery and fuel cell urban transit buses, which will better serve communities' transit needs, substantially reduce greenhouse gas emissions, eliminate criteria pollutants, and provide economic benefits.

*iv. Clean Transportation Equity Investments*

As mentioned earlier, Clean Mobility in Schools Projects are also encouraging and accelerating the deployment of new zero-emission heavy-duty engines and vehicles, including battery electric school buses and clean school fleet vehicles.

*b) Moyer Program*

The Carl Moyer Memorial Air Quality Standards Attainment Program (Moyer Program), funded by dedicated revenue from the DMV's smog abatement fee and a fee on the purchase of new tires, provides approximately \$60 million in grant funding annually through local air districts for cleaner-than-required engines and equipment. Since 1998, approximately \$1 billion has been allocated to date. The Moyer Program provides monetary grants to private companies and public agencies to clean up their heavy-duty engines beyond that required by law through retrofitting, repowering or replacing their engines with newer and cleaner ones. These grants are issued locally by air districts. Projects that reduce emissions from heavy-duty on-road engines qualify, including heavy-duty trucks, drayage trucks, emergency vehicles, public agency and utility vehicles, school buses, solid waste collection vehicles, and transit fleet vehicles.

As the regulatory, technological, and incentives landscape has changed significantly since the creation of the Moyer Program and to address evolving needs, the Legislature has periodically modified the program to better serve California. Most recently, Senate Bill (SB) 513 (Beall, 2015) has provided new opportunities for the Moyer Program to contribute significant emission reductions alongside implemented regulations, advance zero and near-zero technologies, and combine program funds with those of other incentive programs.

In the FY 2021-22 budget, the Legislature appropriated an additional \$45 million in Moyer Program funding to support the replacement of diesel trucks with ultra-low NOx trucks certified to meet the 0.02 g/bhp-hr NOx standard or lower. Currently, only the San Joaquin Valley Air Pollution Control District and the South Coast Air Quality Management District would be eligible for these funds. In November 2021, the Board approved increases to the Moyer Program cost-effectiveness limits and funding caps for optional advanced technology and zero-emission replacement projects for on-road heavy-duty trucks. Increasing the cost-effectiveness thresholds is designed to increase funding opportunities, and ensures that the Moyer Program continues to focus on developing the most advanced zero-emission and low emission technologies, consistent with encouraging further emissions reductions. These changes included increasing the threshold for on-road zero-emission vehicles, which includes zero-emission school buses, from \$100,000 to \$500,000 per unit.

The Moyer Program also funds CARB's On-Road Heavy-Duty Voucher Incentive Program (VIP), which provides funding opportunities for small fleet owners with 10 or fewer vehicles to quickly replace their older heavy-duty diesel or alternative fuel vehicles. Under this program, fleet owners may be eligible for funding of up to \$410,000

for replacing their existing vehicle(s) to be scrapped and replaced by new trucks (zero-emission or certified to the optional 0.02 g/bhp-hr NO<sub>x</sub> standard), or up to \$50,000 for replacing their existing fleet with used vehicles with 2013 model year or later engines. Air districts have the discretion to set certain local eligibility requirements based upon local priorities.

c) Goods Movement Emission Reduction Program (Prop 1B)

The Prop 1B Program was created to reduce exposure for populations living near freight corridors and facilities that were being adversely impacted by emissions from goods movement. This program provided incentives to owners of equipment used in freight movement to upgrade to cleaner technologies sooner than required by law or regulation. Voters approved \$1 billion in total funding for the air quality element of the Prop 1B Program to complement \$2 billion in freight infrastructure funding under the same ballot initiative.

Beginning in 2008, the Goods Movement Emission Reduction Program funded by Prop 1B has funded cleaner trucks for the region's transportation corridors; the final increment of funds implemented projects through 2020. The \$1 billion program was a partnership between CARB and local agencies, air districts, and seaports to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. While all Prop 1B Program funds have been awarded to the local air districts for implementation, the program framework exists to serve as a mechanism to award clean truck funds through newer funding programs.

d) Volkswagen (VW) Mitigation Trust

In 2015, after a CARB-led investigation, in concert with the United States Environmental Protection Agency (U.S. EPA), VW admitted to deliberately installing emission defeat devices on nearly 600,000 VW, Audi, and Porsche diesel vehicles sold in the United States, approximately 85,000 of which were sold in California. The VW California settlement agreement includes both a Mitigation Trust to mitigate the excess NO<sub>x</sub> 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 to be used as specified in the settlement agreement. 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 cleaner combustion everywhere else, as well as to fund light-duty ZEV infrastructure. In addition, there have been mitigation funds established as the result of other settlements from which funding is used to support clean technologies.

e) Community Air Protection Incentives (AB 617 | Community Air Protection Program)

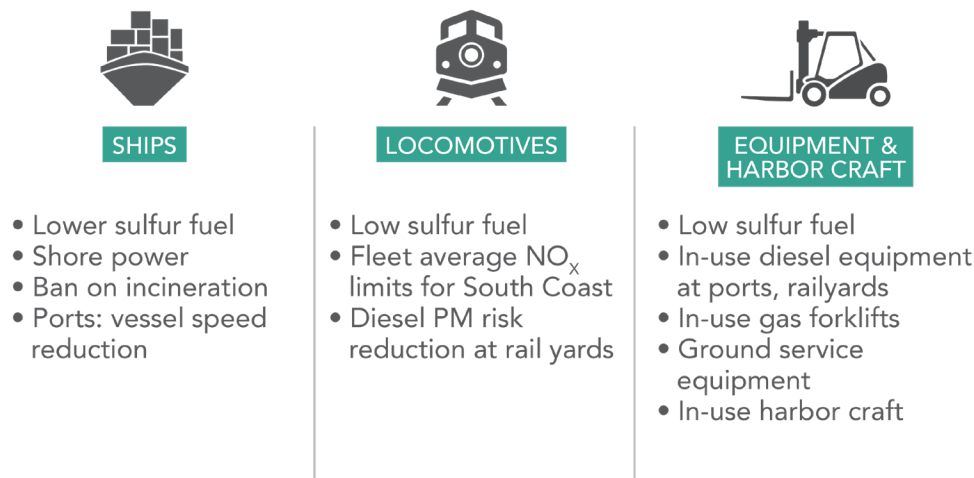
Since the 2016 State SIP Strategy elucidated the need for additional legislative assistance in funding turnover programs to accelerate the deployment and adoption of cleaner technologies, the Legislature has since 2017 established a number of new incentive programs that are implemented through CARB through various budget bills. The State Legislature has provided substantial funding to achieve early emissions reductions in the communities most impacted by air pollution. In its 2018 funding allocation, the Legislature expanded the possible uses of AB 617 funds to include Moyer and Proposition 1B eligible projects with a priority on zero-emission projects, zero-emission charging infrastructure, stationary source projects, and additional projects consistent with the CERPs.

CARB and air districts partner to run the programs, with CARB developing guidelines and the districts administering funds for their regions. In most cases throughout the State, selected communities have identified mobile source emissions as a target for reductions. It is likely that a significant portion of the AB 617-allocated funding will incentivize the accelerated turnover to cleaner vehicles and equipment in and around low-income and disadvantaged communities.

### **D.1.3 Off-Road Sources**

Off-road sources encompass equipment powered by an engine that does not operate on the road. Sources vary from ships to lawn and garden equipment and for example, include sources like locomotives, aircraft, tractors, harbor craft, off-road recreational vehicles, construction equipment, forklifts, and cargo handling equipment.

Figure D-2 illustrates the comprehensive suite of emission control measures applicable to the broad variety of engines and vehicle that fall under the Off-Road category. As a result of these emission control efforts, off-road emissions in the San Joaquin Valley have been reduced significantly since 1990 and will continue to decrease through 2037. From today, off-road NO<sub>x</sub> emissions are projected to be reduced by over 51 percent by 2037. Key programs in this sector include the Off-Road Engine Standards, Locomotive Engine Standards, Clean Diesel Fuel, Cleaner In-Use Off-Road Regulation and In-Use Large Spark Ignition (LSI) Fleet Regulation.

**Figure D-2 Off-Road Vehicle and Equipment Control Programs**

### **D.1.3.1 Off-Road Engine Standards**

The Clean Air Act preempts states, including California, from adopting requirements for new off-road engines less than 175 HP used in farm or construction equipment. California may adopt emission standards for in-use off-road engines pursuant to Section 209(e)(2), but must receive authorization from U.S. EPA before it may enforce the adopted standards.

CARB first approved regulations to control exhaust emissions from small off-road engines (SORE) such as lawn and garden equipment in December 1990 with amendments in 1998, 2003, 2010, 2011, 2016, and 2021. The 1990 - 2016 regulations were implemented through three tiers of progressively more stringent exhaust emission standards that were phased in between 1995 and 2008. The most recent suite of amendments (December 2021) requires most newly manufactured SORE engines be zero-emission starting in 2024.

Manufacturers of forklift engines are subject to new engine standards for both diesel and Large Spark Ignition (LSI) engines. Off-road diesel engines were first subject to engine standards and durability requirements in 1996 while the most recent Tier 4 Final emission standards were phased in starting in 2013. Tier 4 emission standards are based on the use of advanced after-treatment technologies such as diesel particulate filters and selective catalytic reduction. LSI engines have been subject to new engine standards that include both criteria pollutant and durability requirements since 2001 with the cleanest requirements phased in starting in 2010.

To control emissions from Transport Refrigeration Units (TRUs), CARB adopted in 2004 the Airborne Toxic Control Measure (ATCM) for In-Use Diesel-Fueled TRUs, TRU Generator Sets, and Facilities where TRUs Operate, which set increasingly stringent engine standards to reduce diesel particulate matter emissions from TRUs and TRU generator sets. The ATCM for TRUs was subsequently amended in 2010 and 2011,



and most recently in February 2022, as the first phase of CARB's current push to develop new requirements to transition diesel-powered TRUs to zero-emission technology in two phases. The February 2022 adoption, Part 1 amendments to the existing TRU Airborne Toxic Control Measure (ATCM), requires the transition of diesel-powered truck TRUs to zero-emission. CARB plans to develop a subsequent Part 2 regulation to require zero-emission trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generator sets, for future Board consideration.

### ***D.1.3.2 Cleaner In-Use Off-Road Equipment (Off-Road Regulation)***

The Off-Road Regulation was first approved in 2007 and subsequently amended in 2010 in light of the impacts of the economic recession. Equipment affected by this regulation are used in construction, manufacturing, the rental industry, road maintenance, airport ground support and landscaping. In December 2011, the Off-Road Regulation was modified to include on-road trucks with two diesel engines.

The Off-Road Regulation will significantly reduce emissions of diesel PM and NOx from the over 150,000 in-use off-road diesel vehicles that operate in California. The Regulation affects dozens of vehicle types used in thousands of fleets by requiring owners to modernize their fleets by replacing older engines or vehicles with newer, cleaner models, retiring older vehicles or using them less often, or by applying retrofit exhaust controls.

The Off-Road Regulation imposes idling limits on off-road diesel vehicles, requires a written idling policy, and requires a disclosure when selling vehicles. The Regulation also requires that all vehicles be reported to CARB and labeled, restricts the addition of older vehicles into fleets, and requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing verified exhaust retrofits. The requirements and compliance dates of the Off-Road Regulation vary by fleet size.

Fleets are subject to increasingly stringent restrictions on adding older vehicles. The regulation also sets performance requirements. While the regulation has many specific provisions, in general by each compliance deadline, a fleet must demonstrate that it has either met the fleet average target for that year, or has completed the Best Available Control Technology requirements. The performance requirements of the Off-Road Regulation were phased in from January 1, 2014 through January 1, 2019.

Compliance assistance and outreach activities in support of the Off-Road Regulation include:

- The Diesel Off-road On-line Reporting System, an online reporting tool developed and maintained by CARB staff;
- The Diesel Hotline (866-6DIESEL), which provides the regulated public with questions about the regulations and access to CARB staff. Staff is able to respond to questions in English, Spanish and Punjabi; and

- The Off-road Listserv, providing equipment owners and dealerships with timely announcement of regulatory changes, regulatory assistance documents, and reminders for deadlines.

### **D.1.3.3 Clean Diesel Fuel**

Since 1993, CARB has required that diesel fuel have a limit on the aromatic hydrocarbon content and sulfur content of the fuel. Diesel powered vehicles account for a disproportionate amount of the diesel particulate matter which is considered a toxic air contaminant by the State of California. In 2006, CARB required a low-sulfur diesel fuel to be used not only by on-road diesel vehicles but also for off-road engines. The diesel fuel regulation allows alternative diesel formulations as long as emission reductions are equivalent to the CARB formulation.

### **D.1.3.4 Locomotive Engine Standards**

The Clean Air Act and the U.S. EPA national locomotive regulations expressly preempt states and local governments from adopting or enforcing “any standard or other requirement relating to the control of emissions from new locomotives and new engines used in locomotives” (U.S. EPA interpreted new engines in locomotives to mean remanufactured engines, as well). U.S. EPA has approved two sets of national locomotive emission regulations (1998 and 2008). In 1998, U.S. EPA approved the initial set of national locomotive emission regulations. These regulations primarily emphasized NO<sub>x</sub> reductions through Tier 0, 1, and 2 emission standards. Tier 2 NO<sub>x</sub> emission standards reduced older uncontrolled locomotive NO<sub>x</sub> emissions by up to 60 percent, from 13.2 to 5.5 g/bhphr.

In 2008, U.S. EPA approved a second set of national locomotive regulations. Older locomotives upon remanufacture are required to meet more stringent particulate matter (PM) emission standards which are about 50 percent cleaner than Tier 0-2 PM emission standards. U.S. EPA refers to the PM locomotive remanufacture emission standards as Tier 0+, Tier 1+, and Tier 2+. The new Tier 3 PM emission standard (0.1 g/bhphr), for model years 2012-2014, is the same as the Tier 2+ remanufacture PM emission standard. The 2008 regulations also included new Tier 4 (2015 and later model years) locomotive NO<sub>x</sub> and PM emission standards. The U.S. EPA Tier 4 NO<sub>x</sub> and PM emission standards further reduced emissions by approximately 95 percent from uncontrolled levels.

In April 2017, CARB petitioned U.S. EPA for rulemaking, seeking the amendment of emission standards for newly built locomotives and locomotive engines and lower emission standards for remanufactured locomotives and locomotive engines. The petition asks U.S. EPA to update its standards to take effect for remanufactured locomotives in 2023 and for newly built locomotives in 2025. The new emission standards would provide critical criteria pollutant reductions, particularly in the disadvantaged communities that surround railyards. U.S. EPA has not yet responded to this petition.

### ***D.1.3.5 Marine Sources and Ocean-Going Vessels (OGVs)***

To reduce emissions from Ocean Going Vessels (OGV), CARB has adopted the Ocean-Going Vessel Fuel Regulation, “Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline” (2008) and the Ocean-Going Vessels At Berth Regulation (2007).

The At-Berth Regulation requires container ships, passenger ships, and refrigerated-cargo ships at six California ports to meet compliance requirements for auxiliary engines while they are docked, including emission or power reduction requirements. Reduced vessel speeds also provide emission reduction benefits, and programs are operated by local air districts along the California coast to incentivize lower speeds. CARB staff received comments during the public process about including a statewide vessel speed reduction program. In the 2022 State SIP Strategy, the CARB measure for ‘Future Emissions Reductions from Ocean-Going Vessels’ considers options available under CARB authority to achieve further emissions reductions, including developing a statewide vessel speed reduction program.

In 2007, CARB adopted the Commercial Harbor Craft Regulation (CHC Regulation), which reduces toxic and criteria emissions. Commercial harbor craft include any private, commercial, government, or military marine vessels including, but not limited to ferries, excursion vessels, tugboats (including ocean-going tugboats), barges, and commercial and commercial passenger fishing boats. This regulation was subsequently amended in 2010, and again in March 2022, to establish expanded and more stringent in-use requirements to cover more vessel categories and mandate accelerated deployment of zero-emission and advanced technologies in vessel categories where technology feasibility has been demonstrated.

To control emissions from personal watercraft, CARB staff is also exploring development of Spark-Ignition Marine Engine Standards, as described in the 2022 State SIP Strategy. For this measure, CARB would develop and propose catalyst-based standards for outboard and personal watercraft engines greater than or equal to 40 kW in power that will gradually reduce emission standards to approximately 70 percent below current levels, and consider actions that would require a percentage of outboard and personal watercraft vessels to be propelled by zero-emission technologies for certain applications.

### ***D.1.3.6 Large Spark-Ignition (LSI) Engines and Forklifts***

Forklift fleets are subject to in-use fleet requirements either under the LSI fleet regulation, if fueled by gasoline or propane, or under the off-road diesel fleet regulation, if fueled by diesel. Both regulations require fleets to retire, repower, or replace higher-emitting equipment in order to maintain fleet average standards.

Large spark-ignition engines, which are defined as spark-ignition (i.e., Otto-cycle) engines greater than 25 horsepower, are used in a variety of equipment, including, but not limited to, forklifts, airport ground support equipment (GSE), sweeper/scrubbers, industrial tow tractors, generator sets, and irrigation pumps. LSI equipment is found in approximately 2,000 fleets throughout the state operating at warehouses and distribution centers, seaports, airports, railyards, manufacturing plants, and many other commercial and industrial facilities.

CARB first adopted emission standards for off-road LSI engines in 1998. The original LSI regulation required engine manufacturers to certify new LSI engines to a 3.0 gram per brake horsepower-hour (g/bhp-hr) standard that, by 2004, represented a 75 percent reduction in emissions compared with uncontrolled LSI. Building on this success, in 2002, U.S. EPA subsequently harmonized the national standard with California's standard, starting with the 2004 model year and adopted a more stringent 2.0 g/bhp-hr standard for 2007 and subsequent model year engines. The federal program demonstrated that additional reductions from new engines were technically feasible and cost-effective. In the 2003 State Implementation Plan for Ozone (2003 SIP), California committed to two additional LSI measures—one for the development of more stringent new engine standards and another for the development of in-use fleet requirements.

CARB adopted these two LSI measures in a 2006 rulemaking, which harmonized California's standard with U.S. EPA's 2.0 g/bhp-hr standard starting with the 2007 model year, set forth a more stringent 0.6 g/bhp-hr California standard starting with the 2010 model year, and established in-use LSI fleet requirements. The 0.6 g/bhp-hr standard represents a 95 percent emission reduction versus uncontrolled LSI engines and is still in effect today.

The in-use element of the 2006 rulemaking, adopted as the Large Spark-Ignition Engine Fleet Requirements Regulation (LSI Fleet Regulation), which was eventually amended in 2010 and 2016, requires fleet operators with four or more LSI forklifts to meet fleet average emission standards. The 2006 LSI rulemaking and 2010 amendments required specific hydrocarbon + NO<sub>x</sub> fleet average emission level standards that became increasingly more stringent over time. The focus of the 2016 amendments was to collect data from fleet operators in order to inform the development of requirements that would support the broad-scale deployment of Zero-Emission equipment in LSI applications. The 2016 amendments also required fleet operators to report key compliance information to CARB, and extended to 2023 requirements from the prior LSI Fleet Regulations that were otherwise due to sunset in 2016.

#### ***D.1.3.7 Cargo Handling Equipment (CHE)***

Cargo handling equipment (CHE) include yard trucks (hostlers), rubber-tired gantry cranes, container handlers, forklifts, dozers, and other types. The Cargo Handling Equipment (CHE) Regulation established requirements for in-use and newly purchased diesel-powered equipment at ports and intermodal rail yards. CARB adopted the CHE in 2005, which established best available control technology (BACT) for new and in-use

mobile CHE that operate at California's ports and intermodal rail yards through accelerated turnover of older equipment through retrofits and/or replacement to cleaner on- or off-road engines. Since 2006, the CHE Regulation has resulted in reductions of diesel PM and NOx at ports and intermodal rail yards throughout California.

### **D.1.3.8 Incentive Programs**

There are many different incentive programs focusing on off-road mobile sources that increase the penetration of cleaner technologies into the market. The incentive programs encourage the purchase of cleaner off-road combustion engines and equipment, and zero-emission technologies. CARB is expanding incentives for zero-emission off-road equipment through targeted demonstration and pilot project categories in the off-road sector, and increased funding.

- a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

As mentioned earlier, \$873 million was allocated in the FY 2020-2021 budget for off-road equipment and on-road heavy-duty trucks under the Clean Transportation Incentives programs. In the off-road sector, major programs include the Clean Off-Road Equipment Voucher Incentive Project (CORE), and Demonstration and Pilot Programs. Off-road equipment categories that are prioritized for funding include agricultural and construction equipment, small off-road engines (SORE) such as lawn and garden equipment, heavier cargo handling equipment (CHE), and ZE applications at railyards, marine ports, freight facilities, and along freight corridors.

#### *i. Clean Off-Road Equipment Voucher Incentive Project*

The Clean Off-Road Equipment Voucher Incentive Project (CORE) is a voucher project similar to HVIP, but for advanced technology off-road equipment. CORE is intended to accelerate deployment of advanced technology in the off-road sector by providing a streamlined way for fleets to access funding that helps offset the incremental cost of such technology. CORE targets commercial-ready products that have not yet achieved a significant market foothold. By promoting the purchase of clean technology over internal combustion options, the project is expected to reduce emissions, particularly in areas that are most impacted, help build confidence in zero-emission technology in support of CARB strategies and subsequent regulatory efforts where possible, and provide other sector-wide benefits, such as technology transferability, reductions in advanced-technology component costs, and larger infrastructure investments. CORE provides vouchers to California purchasers and lessees of zero-emission off-road equipment on a first-come, first-served basis, with increased incentives for equipment located in disadvantaged communities.

CARB launched CORE at the end of 2019 through a one-time \$40 million allocation in the fiscal year 2017-18 Funding Plan to support zero-emission freight equipment through CORE. Since that time, CORE has been allocated significant additional funds,

including \$194.95 million from the FY 2021-22 budget. This allocation includes \$30 million of dedicated funds appropriated by the Legislature in SB 170 to provide incentives for professional landscaping services in California operated by small businesses or sole proprietors to purchase zero-emission small off-road equipment.

*ii. Demonstration and Pilot Projects*

As mentioned earlier, in FY 2021-22, \$80 million was allocated for off-road and on-road heavy-duty advanced technology demonstration and pilot projects. CARB is focusing funding on off-road demonstration and pilot projects that include heavier cargo handling equipment (CHE), clean equipment in rail, marine, and ports applications, and zero-emission equipment along freight facilities/corridors.

For the *Port of LA Multi-Source Facility Demonstration Project*, the Los Angeles Harbor Department (Port of LA) was awarded \$14.5 million to operate multiple near zero- or zero-emission technologies to move goods from ships through the Green Omni Terminal. This project is demonstrating the viability of electrified CHE, forklifts, and a ships at-berth vessel emissions control system. The *Zero-Emission Freight "Shore to Shore" Project* will use \$41.1 million to fund electric yard tractors, hydrogen fuel cell Class 8 on-road trucks, and a large capacity hydrogen fueling station in Ontario, CA. Additional zero- and near zero-emission freight facility projects include a \$5.8 million *Zero-Emission for California Ports* project at the Port of LA, which will fund hybrid fuel cell and electric yard trucks, as well as hydrogen fueling stations. Further, the San Joaquin Valley's *Net-Zero Farming and Freight Facility Demonstration Project* is funding battery electric trucks equipped with all-electric transport refrigeration units (eTRUs) to facilitate clean freight transport, and transportation of agricultural produce between packing and warehouse facilities.

b) Funding Agricultural Replacement Measures for Emission Reductions (FARMER)

California's agricultural industry consists of approximately 77,500 farms and ranches, providing over 400 different commodities, making agriculture one of the State's most diverse industries. In recognition of the strong need and this industry's dedication to reducing their emissions, the Legislature has allocated over \$323 million towards the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) Program since 2017. The program provides funding through local air districts for incentivizing the introduction of lower-emissions agricultural harvesting equipment, heavy-duty trucks, agricultural pump engines, tractors, and other equipment used in agricultural operations. Since October 2019, the FARMER Program also includes a project category for demonstration projects and modifications to the zero-emission agricultural utility terrain vehicle (UTV), heavy-duty agricultural truck, and off-road mobile agricultural equipment trade-up pilot project categories. As of September 30, 2021, the FARMER Program has spent \$289.7 million on over 6,600 pieces of agricultural equipment and will reduce 1,120 tons of PM2.5 and 18,700 tons of NOx over the lifetime of the projects, Statewide.

c) Moyer Program

In addition to funding on-road incentives, the Moyer Program provides monetary grants to reduce emissions from off-road equipment such as construction and agricultural equipment, marine vessels and locomotives, forklifts, TRUs, and airport ground support equipment.

d) Goods Movement Emission Reduction Program (Prop 1B)

As discussed earlier, Proposition 1B was a \$1 billion partnership between CARB and local agencies, air districts, and seaports to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. Over the course of six years, the program has upgraded ships at-berth, cargo handling equipment, locomotives, TRUs, and harbor craft.

#### **D.1.4 Conclusion**

In conclusion, CARB has implemented the most comprehensive mobile source emissions control program in the nation. CARB's mobile source control program is robust and targets all sources of emissions through a four-pronged approach. First, increasingly stringent emissions standards drive the use of the cleanest available engines and equipment, and minimize emissions from new vehicles and equipment. Second, to speed the turnover of older, dirtier engines and equipment to cleaner new equipment, in-use programs target emissions from the existing fleet by requiring vehicle and fleet owners to transition legacy fleets and vehicles to the cleanest vehicles and emissions control technologies. Third, incentive programs help fleet owners to replace older, dirtier vehicles and equipment with the cleanest technologies, while also facilitating the development of the next generation of clean technologies that are needed to meet future air quality targets. Finally, cleaner fuels minimize emissions from all combustion engines being used across the State.

This multi-faceted approach has not only spurred the development and use of increasingly cleaner technologies and fuels, it has also provided significant emission reductions across all mobile source sectors that go far beyond national programs or programs in other states.

## D.2 DISTRICT INNOVATIVE MOBILE SOURCE STRATEGIES

Although the District does not have direct regulatory authority over mobile source emissions standards, the District collaborates with its interagency partners and uses innovative approaches to reduce mobile source emissions. In addition to operating amongst the largest and comprehensive incentive grant programs in the nation (detailed in Appendix E), the District has adopted innovative regulations such as District Rule 9510 (Indirect Source Review) and District Rule 9410 (Employer Based Trip Reduction) to reduce emissions from mobile sources utilizing specific authorities provided under state and federal law. In addition to these measures, the District continues to evaluate additional opportunities to further reduce emissions from mobile sources.

### D.2.1 Rule 9510 Indirect Source Review

Rule 9510 (Indirect Source Review, or ISR), adopted in 2005 and subsequently amended in 2017, is the first and only rule of its kind in the State of California and throughout the nation. The purpose of this rule is to reduce growth in both NO<sub>x</sub> and PM<sub>10</sub> emissions from mobile and area sources associated with construction and operation of new development projects in the Valley by encouraging clean air designs to be incorporated into the development project.

To address the rule requirements and achieve emissions reductions at the project site and within local communities, developers incorporate clean air measures into their project designs to reduce emissions impacts at project locations. Some examples include: use of clean, newer model-year off-road construction equipment, zero emission and or near-zero emission heavy duty on-road truck and van fleets, zero emission on-site equipment, installation of electric vehicle charging infrastructure, solar power, installation of bike paths and sidewalks, and high-efficiency buildings.



If on-site clean air measures implemented by a developer do not achieve the emission reductions mandated by the ISR rule, the developer must pay an off-site mitigation fee for balance of the emission reductions required for the project. One hundred percent of off-site mitigation fees are used by the District to fund emission reduction projects through its incentive grant programs.

In addition to reducing the development project's impact on air quality through compliance with the District's Indirect Source Review rule, a developer can further



reduce the project's impact on air quality by entering into a "Voluntary Emission Reduction Agreement" (VERA) with the District to address the mitigation requirements under the California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA). Under a VERA, the developer may fully mitigate project emission impacts by providing funds to the District, which are then used by the District to administer emission reduction projects.

To date, in addition to avoiding over 19,000 tons of NO<sub>x</sub> and PM<sub>10</sub> emissions from new development through the incorporation of on-site mitigation and clean-air design measures into projects subject to the ISR rule, the District has achieved over 17,000 tons of reductions in NO<sub>x</sub> and PM<sub>10</sub> emissions through the investment of over \$140 million dollars in ISR and VERA funds through its emission reduction grants and incentives programs.

The District's rule is recognized as the benchmark, or best available control, for regulating these indirect sources of emissions. State and federal laws establish the District's authority regulating indirect sources.<sup>2</sup> These complex legal requirements were well documented and litigated as the District spent over five years successfully defending its existing rule through the highest courts at the state and federal levels.

In May 2021, the South Coast Air Quality Management District (SCAQMD) replicated the District's success in the development of their own ISR rule, utilizing the District's experience and regulatory language to help guide their efforts. SCAQMD Rule 2305 applies to both the operators and owners of new and existing warehouses greater than or equal to 100,000 square feet in size, and targets exhaust emission from mobile sources. Implementation of this rule will require warehouses to be phased in over a 3-year period based on their size.

The general approach of the SCAQMD ISR rule is similar to the District's ISR rule in that it requires clean air project design elements to reduce NO<sub>x</sub> and particulate emissions, and payment of a mitigation fee, if necessary, to achieve remaining rule requirements. It differs in that it applies to operational mobile source emissions from existing and new warehouses only, whereas, the District's ISR rule applies to both construction and operational mobile and area source emissions from various new residential, commercial, industrial, transportation, and other development projects, including warehouses. As was the case with the District's ISR rule, SCAQMD ISR rule is being challenged and is currently under litigation due to a lawsuit filed in 2021 by the California Trucking Association. The District is currently monitoring this case and will evaluate the outcomes and potential opportunities as future enhancements to the District's ISR rule are considered.

### **D.2.2 Rule 9410 Employer Based Trip Reduction**

Although the District does not have authority to regulate tailpipe emissions, the District is authorized by state and federal law to adopt regulatory approaches to promote the

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<sup>2</sup> California Health and Safety Code section 40604 and CAA section 110(a)(5)(A)(i)

reduction of vehicle miles traveled.<sup>3</sup> Rule 9410 (Employer Based Trip Reduction, or eTRIP) was adopted by the District Governing Board on December 17, 2009. The goal of eTRIP is to reduce single-occupancy-vehicle work commutes by requiring the Valley's larger employers to select and implement workplace measures that make it easier for their employees to choose ridesharing and alternative transportation. The eTRIP Rule can apply to worksites in incorporated cities with a population of at least 10,000 people OR worksites where at least 50% of all employees work at least 2,040 hours per year. Out of the worksites that meet these criteria, the eTRIP Rule applies to employers with at least 100 eligible employees at a worksite. For the eTRIP Rule, a worksite includes any satellite buildings within one mile of a central location.

Employers subject to the Rule must establish an Employer Trip Reduction Implementation Plan to encourage employees to reduce single-occupancy vehicle trips, thus reducing pollutant emissions associated with work commutes. Because of the diversity of employers covered by eTRIP, the rule was built with a flexible, menu-based approach. Using eTRIP, employers choose from a list of measures, each contributing to a workplace that encourages employees to reduce their dependence on single-occupancy vehicles. Each measure has a point value, and Employer Trip Reduction Implementation Plans must reach specified point targets for each strategy over a phased-in compliance schedule (2010–2015).

### **D.2.3 Clean Landscaping Equipment and Practices**

The District has long supported efforts to address emissions from the use of landscaping equipment, including through the deployment of clean zero-emissions equipment under the Clean Green Yard Machines (CGYM) program, which provides funding for the replacement of old gas-powered lawn and garden equipment with new electric equipment. The Residential CGYM program, launched in 2001, has replaced over 7,400 lawn mowers with over \$1.5 million in funding. In May 2019, the District launched the Commercial CGYM program, which provides incentive funding for the replacement of gas powered landscape maintenance equipment, with battery operated zero emission technology. Additionally, the Commercial CGYM program provides incentive funds for up to two batteries and one charger to ensure that the equipment is capable of operating for a full day of work. In support of the District's efforts, the District has been awarded \$6 million in state funding to be utilized by the District to continue deployment of clean landscaping equipment.

The District does not currently have any prohibitory rules specifically addressing lawn care emissions, though the ISR rule does account for lawn care emissions in the model that calculates emissions increases from new developments. Providing electric lawn equipment and incorporating convenient electric charging stations and outlets on the property are currently recognized on-site mitigation measures for meeting ISR requirements.

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<sup>3</sup> California Health and Safety Code sections 40612(a)(2) and 40601(d), and CAA sections 182(d)(1)(B) and 182(e)

## State and Federal Regulations

Existing CARB and EPA emission standards for small off-road engines (SORE), which primarily includes lawn and garden equipment, have led to substantial emission reductions in California. Since 2000, emissions of pollutants that contribute to ozone and PM<sub>2.5</sub> formation from SORE have decreased by 50 percent. Even so, in California, SORE emit more NO<sub>x</sub> and reactive organic gases (ROG) than light-duty passenger cars, both in summer and annually.<sup>4</sup>

In September 2020, Governor Gavin Newsom issued Executive Order (EO) N-79-20, which set a goal to transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible. Additionally, the Governor approved Assembly Bill (AB) 1346 in October of 2021, which required CARB to adopt cost-effective and technologically feasible regulations by July 1, 2022, to prohibit engine exhaust and evaporative emissions from new small off-road engines, applicable to engines produced on or after January 1, 2024, or as soon as feasible.

CARB's SORE rule, adopted in 1990 and amended several times, establishes tiered exhaust and evaporative emission standards for small off-road engines rated at or below 25 horsepower. In December of 2021, CARB adopted amendments to the SORE regulation to require most newly manufactured SORE engines be zero-emission starting in 2024, which will help achieve further emission reductions from lawn and garden equipment.<sup>5</sup> Deployment of zero-emission equipment is key to meeting the expected emission reductions in CARB's 2016 State SIP Strategy, the goals of EO N-79-20, and the requirements of AB1346.

CARB's amended rule sets SORE emission standards to zero in two phases. First, for model year (MY) 2024 and all subsequent model years, exhaust and evaporative emission standards are zero. These emission standards of zero apply for engines used in all equipment types produced for sale or lease for operation in California, except generators. Generator emission standards will be more stringent than the existing emission standards starting in MY 2024, but will not be zero. CARB will implement the second phase starting in MY 2028, when the emission standards for generators will be zero. These amendments update emission standards for new SORE in California and do not affect equipment already in use.

To support the deployment of zero-emission SORE, CARB has made funding available for landscape professionals to purchase discounted zero-emission lawn mowers, blowers, and other equipment through their Clean Off-Road Equipment Voucher Incentive Project (CORE). The CORE program, administered by CALSTART, has more

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<sup>4</sup> CARB. *Staff Report: Initial Statement of Reasons for the Proposed Amendments to the Small Off-Road Engine Regulations: Transition to Zero Emissions*. October 12, 2021. Retrieved from <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/sore21/isor.pdf>

<sup>5</sup> CARB. CARB approves updated regulations requiring most new small off-road engines be zero emission by 2024. December 9, 2021. Retrieved from: <https://ww2.arb.ca.gov/news/carb-approves-updated-regulations-requiring-most-new-small-road-engines-be-zero-emission-2024>

than \$27 million of voucher funds allocated for professional landscape services operated by small businesses or sole proprietors as of November 2022.

### ***Emission Reduction Opportunities***

In light of new opportunities, the District will work with landscaping services and local jurisdictions to pursue options for accelerating the deployment of newly available commercial zero-emissions equipment, promoting landscaper training and green certification programs, and promoting best practices to reduce exposure through episodic and zoning recommendations (e.g. limiting leaf blower use around children during school hours, “green zones”). See Chapter 3.

- ***Accelerated Deployment of New Commercial Zero-Emission Equipment:*** In recent years, there has been a significant increase in the availability of zero emission lawn and garden equipment, for both residential and professional use. The level of performance, number of brands, and number of equipment options have increased greatly and continue to do so today. Battery and electric motor technology has advanced rapidly in recent years, while costs have declined. New technologies, such as brushless electric motors, have led to a significant increase in the efficiency of equipment. Using zero emission equipment is technologically feasible in many cases, and can offer significant cost-savings to professional users. The District will evaluate opportunities to accelerate the deployment of this equipment through significantly expanded funding opportunities and strong outreach efforts in partnership with local organizations, cities, counties, and other Valley partners.
- ***Landscaper Training and Green Certification Programs:*** The District will evaluate opportunities to promote and potentially provide training and hands-on exposure to landscapers on the operation of zero-emission equipment, to ensure proper use and promote safe and efficient practices, and promote green certification programs.
- ***Promotion of Best Management Practices to Reduce Exposure:*** Another potential control strategy would be to assist in the development and promotion of Best Management Practices (BMPs) for the use of lawn and garden equipment in residential, commercial, educational, and other settings. This BMP option would focus on developing guidance, outreach materials, and recommendations for conducting landscaping operations as cleanly as possible through the use of zero-emissions equipment and enhanced practices. Through this effort, the District will evaluate potential recommendations for episodic control during high-pollution days, or zoning, such as promoting “zones,” where gas equipment would be prohibited or limited in designated zones, such as those close to schools, parks, etc. This approach, known as “greenzoning,” could potentially be included as a part of the Healthy Air Living outreach program to individual businesses, schools, cities, and counties.

## D.3 TRANSPORTATION CONFORMITY

*[This section provided by California Air Resources Board]*

### D.3.1 Introduction

The California Air Resources Board (CARB) has prepared the motor vehicle emissions budget (MVEB)<sup>6</sup> for the 70 parts per billion (ppb) 8-hr ozone National Ambient Air Quality Standard (NAAQS). The MVEB is the maximum allowable emissions from motor vehicles within an air basin and is used for determining whether transportation plans and projects conform to the applicable State Implementation Plan (SIP).

Transportation conformity is the federal regulatory procedure for linking and coordinating the transportation and air quality planning processes through MVEB established in the SIP. Under section 176(c) of the Clean Air Act (Act), federal agencies may not approve or fund transportation plans and projects unless they are consistent with the regional SIP. In addition, conformity with the SIP requires that transportation activities do not (1) cause or contribute to new air quality violations, (2) increase the frequency or severity of any existing violation, or (3) delay timely attainment of NAAQS. Therefore, quantifying on-road motor vehicle emissions and comparing those emissions with a budget established in the SIP determine transportation conformity between air quality and transportation planning.

The MVEBs are set for each criteria pollutant or its precursors for each milestone year and the attainment year of the SIP. Subsequent transportation plans and programs produced by transportation planning agencies must conform to the budgets by demonstrating that the emissions from the proposed plan, program, or project do not exceed the MVEBs established in the applicable SIP. The MVEBs established in this SIP apply as a “ceiling” or limit on transportation emissions for the eight San Joaquin Valley metropolitan planning organizations (MPO)<sup>7</sup> for the years in which they are defined and for all subsequent years until another year for which a different budget is specified, or until a SIP revision modifies the budget. For the San Joaquin Valley Air Pollution Control District’s (District) 70 ppb 8-hr ozone SIP, the milestone years and the attainment year of the SIP (also referred to as the plan analysis years) are 2023, 2026, 2029, 2032, 2035, and 2037.

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<sup>6</sup> Federal transportation conformity regulations are found in 40 CFR Part 51, subpart T – Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 23 U.S.C. of the Federal Transit Laws. Part 93, subpart A of this chapter was revised by the EPA in the August 15, 1997 Federal Register.

<sup>7</sup> This includes the Fresno Council of Governments (FCOG), Kern Council of Governments (KCOG) [SJV portion of KCOG], Kings County Association of Governments (KCAG), Madera County Transportation Commission (MCTC), Merced County Association of Governments (MCAG), San Joaquin Council of Governments (SJCOG), Stanislaus Council of Governments (StanCOG), and Tulare County Association of Governments (TCAG).

### D.3.2 Methodology

The MVEB for 70 ppb ozone SIP is established based on guidance from the U.S. EPA on the motor vehicle emission categories and precursors that must be considered in transportation conformity determinations as found in the transportation conformity regulation and final rules as described below.

The MVEB must be clearly identified and precisely quantified, and consistent with applicable CAA requirements for reasonable further progress and attainment toward meeting NAAQS. Further, it should be consistent with the emission inventory and control measures in the SIP.

The 70 ppb 8-hr ozone SIP establishes budgets for Reactive Organic Gases (ROG) and Nitrogen Oxide (NOx) emission precursors using emission rates from California's motor vehicle emission model, EMFAC2017 (V.1.0.3)<sup>8</sup>, using activity data (vehicle miles traveled [VMT] and speed distributions) from the eight SJV MPOs from their 2019 Federal State Transportation Improvement Program (FSTIP) amendment.<sup>9</sup>

On August 15, 2019, the U.S. EPA approved EMFAC2017 for use in SIPs and to demonstrate transportation conformity.<sup>10</sup> The EMFAC model estimates emissions from two combustion processes (start and running) and four evaporative processes (hot soak, running loss, diurnal, and resting loss). In addition, the emissions output from the EMFAC2017 model was adjusted to account for the impacts of recently adopted regulations and regulations currently under development that are not reflected in the EMFAC2017 model using off-model adjustments.<sup>11</sup> The regulations incorporated in this way are the Heavy-Duty (HD) Warranty Phase 1, Innovative Clean Transit (ICT), Amendments to the Heavy-Duty Vehicle Inspection Program (HDVIP), Periodic Smoke Inspection Program (PSIP), Advanced Clean Trucks (ACT), Heavy-Duty (HD) Omnibus, Advanced Clean Cars II (ACC II), and Advanced Clean Fleets (ACF).

The MVEB for this SIP was developed to be consistent with the on-road emissions inventory<sup>12</sup> and attainment demonstration, using the following method:

- 1) Used the EMFAC2017 model to produce an initial/preliminary calculation of the on-road motor vehicle emissions totals (average summer day) for the appropriate pollutants (ROG and NOx) using 2019 FSTIP activity data.
- 2) Applied the off-model adjustments to account for recently adopted regulations.

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<sup>8</sup> More information on data sources can be found in the EMFAC technical support documentation at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-documentation>

<sup>9</sup> 2019 Federal Statewide Transportation Improvement Program (FSTIP) (ca.gov)

<sup>10</sup> U.S. EPA approval of EMFAC2017 can be found at 84 FR 41717 <https://www.federalregister.gov/d/2019-17476>

<sup>11</sup> Off-Model Adjustment Factors to Account for Recently Adopted Regulations in EMFAC2017 Model

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory>

<sup>12</sup> More information about the on-road motor vehicle emissions inventory can be found in Appendix B of the plan.

- 3) Expected emission reductions from ACC II and ACF were subtracted to be consistent with the on-road control measures committed in the 2022 State SIP Strategy for the San Joaquin Valley region.<sup>13</sup>
- 4) Rounded the totals for both ROG and NOx to the nearest tenth ton.

### **D.3.3 Motor Vehicle Emissions Budgets**

The MVEB in Table D-1 was established according to the methodology outlined above and in consultation<sup>14</sup> with the eight SJV MPOs, the air district, U.S. EPA, Federal Highway Administration (FHWA), and Federal Transit Administration (FTA). The MVEB is consistent with the emission inventories and control measures in the 70 ppb 8-hr ozone SIP. These budgets will be effective once U.S. EPA determines it is adequate.

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<sup>13</sup> 2022 State Strategy for the State Implementation Plan <https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy>

<sup>14</sup> To satisfy the requirements established in 40 CFR Part 93, Section 118(e)(4)(ii).

Table D-1 contains the Summary MVEB for the eight San Joaquin Valley MPO regions. This includes ozone precursor pollutants of ROG and NOx emissions for milestone and attainment years using the EMFAC2017 model and 2019 FSTIP activity data.

**Table D-1 Summary MVEB for the 70 ppb Ozone Standard (Summer Season) for each MPO within the SJV Region (tons per day)**

MVEB (tpd)	2023		2026		2029		2032		2035		2037	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
<b>Fresno (FCOG)</b>	5.3	11.6	4.8	8.0	4.3	6.5	3.9	5.7	3.6	5.1	3.0	3.0
<b>Kern (KCOG)</b>	3.9	13.5	3.9	8.8	3.7	7.3	3.4	6.4	3.2	5.9	2.7	4.0
<b>Kings (KCAG)</b>	0.8	2.5	0.8	1.6	0.7	1.3	0.7	1.2	0.6	1.1	0.6	0.8
<b>Madera (MCTC)</b>	1.1	2.5	0.9	1.6	0.8	1.3	0.7	1.1	0.7	1.0	0.6	0.6
<b>Merced (MCAG)</b>	1.6	5.5	1.4	3.5	1.3	2.8	1.1	2.4	1.0	2.2	0.8	1.5
<b>San Joaquin (SJCOG)</b>	3.6	7.0	3.2	4.8	2.9	3.9	2.6	3.3	2.4	2.9	2.0	1.5
<b>Stanislaus (StanCOG)</b>	2.4	4.5	2.2	3.2	2.0	2.6	1.7	2.2	1.6	2.0	1.3	1.0
<b>Tulare (TCAG)</b>	2.3	4.2	2.0	2.9	1.8	2.3	1.6	1.9	1.4	1.7	1.2	0.8

Tables D-2 through D-7 contain detailed MVEBs for each milestone and attainment year for the eight San Joaquin Valley MPO regions. In addition, it provides emissions from the EMFAC 2017 model, recently adopted regulations, and regulations currently under development using off-model adjustments for both ROG and NOx emissions. The final MVEBs were rounded upwards to the nearest tenth.



Table D-2 MVEB for the 70 ppb Ozone Standard (Summer Season) for 2023

Emissions (Tons/Day)	Fresno		Kern		Kings		Madera		Merced		San Joaquin		Stanislaus		Tulare	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
Vehicular Exhaust	5.3	12.2	4.2	14.4	0.8	2.6	1.0	2.6	1.6	5.9	3.6	7.3	2.4	4.7	2.3	4.3
Reductions from recently adopted regulations using off-model adjustment <sup>a</sup>	0.00	0.66	0.00	0.93	0.00	0.17	0.00	0.15	0.00	0.38	0.00	0.36	0.00	0.21	0.00	0.19
Reductions from regulations under development using off-model adjustment <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total <sup>c</sup>	5.27	11.6	4.23	13.5	0.83	2.44	1.03	2.48	1.56	5.47	3.57	6.94	2.38	4.50	2.30	4.16
<b>Motor Vehicle Emission Budget<sup>d</sup></b>	5.3	11.6	4.3	13.5	0.9	2.5	1.1	2.5	1.6	5.5	3.6	7	2.4	4.5	2.3	4.2

<sup>a</sup> This reflects the adjustment factor for HD Warranty Phase 1, ICT, HDVIP/PSIP, ACT, and HD Omnibus regulations.

<sup>b</sup> This reflects the on-road commitments for ACCII and ACF from the 2022 State SIP Strategy.

<sup>c</sup> Values from EMFAC2017 v1.03 may not add up due to rounding.

<sup>d</sup> Motor vehicle emission budgets calculated are rounded up to the nearest tenth of a tpd.

Source: EMFAC2017 v1.03

Table D-3 MVEB for the 70 ppb Ozone Standard (Summer Season) for 2026

Emissions (Tons/Day)	Fresno		Kern		Kings		Madera		Merced		San Joaquin		Stanislaus		Tulare	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
Vehicular Exhaust	4.7	11.9	3.9	14.3	0.8	2.6	0.9	2.4	1.3	5.7	3.1	6.8	2.1	4.4	2.0	3.9
Reductions from recently adopted regulations using off-model adjustment <sup>a</sup>	0.00	3.95	0.00	5.57	0.00	1.02	0.00	0.83	0.00	2.24	0.00	2.08	0.00	1.25	0.00	1.08
Reductions from developing regulations using off-model adjustment <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total <sup>c</sup>	4.72	7.92	3.88	8.76	0.76	1.58	0.86	1.57	1.35	3.45	3.13	4.71	2.10	3.16	1.98	2.83
<b>Motor Vehicle Emission Budget<sup>d</sup></b>	4.8	8	3.9	8.8	0.8	1.6	0.9	1.6	1.4	3.5	3.2	4.8	2.2	3.2	2	2.9

<sup>a</sup> This reflects the adjustment factor for HD Warranty Phase 1, ICT, HDVIP/PSIP, ACT, and HD Omnibus regulations.

<sup>b</sup> This reflects the on-road commitments for ACCII and ACF from the 2022 State SIP Strategy.

<sup>c</sup> Values from EMFAC2017 v1.03 may not add up due to rounding.

<sup>d</sup> Motor vehicle emission budgets calculated are rounded up to the nearest tenth of a tpd.

Source: EMFAC2017 v1.03

Table D-4 MVEB for the 70 ppb Ozone Standard (Summer Season) for 2029

Emissions (Tons/Day)	Fresno		Kern		Kings		Madera		Merced		San Joaquin		Stanislaus		Tulare	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
Vehicular Exhaust	4.3	11.5	3.6	14.2	0.7	2.6	0.8	2.3	1.2	5.5	2.9	6.4	1.9	4.2	1.8	3.6
Reductions from recently adopted regulations using off-model adjustment <sup>a</sup>	0.01	5.01	0.01	7.01	0.00	1.27	0.00	1.04	0.00	2.77	0.01	2.63	0.00	1.64	0.00	1.36
Reductions from developing regulations using off-model adjustment <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total <sup>c</sup>	4.28	6.47	3.63	7.20	0.70	1.29	0.76	1.26	1.20	2.77	2.85	3.81	1.90	2.59	1.76	2.25
<b>Motor Vehicle Emission Budget<sup>d</sup></b>	4.3	6.5	3.7	7.3	0.7	1.3	0.8	1.3	1.3	2.8	2.9	3.9	2	2.6	1.8	2.3

<sup>a</sup> This reflects the adjustment factor for HD Warranty Phase 1, ICT, HDVIP/PSIP, ACT, and HD Omnibus regulations.

<sup>b</sup> This reflects the on-road commitments for ACCII and ACF from the 2022 State SIP Strategy.

<sup>c</sup> Values from EMFAC2017 v1.03 may not add up due to rounding.

<sup>d</sup> Motor vehicle emission budgets calculated are rounded up to the nearest tenth of a tpd.

Source: EMFAC2017 v1.03

Table D-5 MVEB for the 70 ppb Ozone Standard (Summer Season) for 2032

Emissions (Tons/Day)	Fresno		Kern		Kings		Madera		Merced		San Joaquin		Stanislaus		Tulare	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
Vehicular Exhaust	3.9	11.3	3.4	14.3	0.7	2.6	0.7	2.3	1.1	5.4	2.6	6.2	1.7	4.1	1.6	3.4
Reductions from recently adopted regulations using off-model adjustment <sup>a</sup>	0.02	5.68	0.02	7.89	0.00	1.43	0.00	1.17	0.01	3.00	0.01	2.96	0.01	1.88	0.01	1.53
Reductions from developing regulations using off-model adjustment <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total <sup>c</sup>	3.87	5.61	3.37	6.37	0.65	1.15	0.69	1.09	1.05	2.36	2.60	3.27	1.70	2.19	1.56	1.87
<b>Motor Vehicle Emission Budget<sup>d</sup></b>	3.9	5.7	3.4	6.4	0.7	1.2	0.7	1.1	1.1	2.4	2.6	3.3	1.7	2.2	1.6	1.9

<sup>a</sup> This reflects the adjustment factor for HD Warranty Phase 1, ICT, HDVIP/PSIP, ACT, and HD Omnibus regulations.

<sup>b</sup> This reflects the on-road commitments for ACCII and ACF from the 2022 State SIP Strategy.

<sup>c</sup> Values from EMFAC2017 v1.03 may not add up due to rounding.

<sup>d</sup> Motor vehicle emission budgets calculated are rounded up to the nearest tenth of a tpd.

Source: EMFAC2017 v1.03

Table D-6 MVEB for the 70 ppb Ozone Standard (Summer Season) for 2035

Emissions (Tons/Day)	Fresno		Kern		Kings		Madera		Merced		San Joaquin		Stanislaus		Tulare	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
Vehicular Exhaust	3.6	11.3	3.2	14.4	0.6	2.6	0.6	2.3	0.9	5.3	2.4	6.1	1.5	4.0	1.4	3.3
Reductions from recently adopted regulations using off-model adjustment <sup>a</sup>	0.03	6.27	0.04	8.60	0.01	1.57	0.01	1.29	0.01	3.20	0.02	3.24	0.01	2.10	0.01	1.67
Reductions from developing regulations using off-model adjustment <sup>b</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total <sup>c</sup>	3.52	5.03	3.13	5.81	0.60	1.05	0.61	0.98	0.94	2.10	2.37	2.90	1.52	1.92	1.38	1.62
<b>Motor Vehicle Emission Budget<sup>d</sup></b>	3.6	5.1	3.2	5.9	0.6	1.1	0.7	1	1	2.2	2.4	2.9	1.6	2	1.4	1.7

<sup>a</sup> This reflects the adjustment factor for HD Warranty Phase 1, ICT, HDVIP/PSIP, ACT, and HD Omnibus regulations.

<sup>b</sup> This reflects the on-road commitments for ACCII and ACF from the 2022 State SIP Strategy.

<sup>c</sup> Values from EMFAC2017 v1.03 may not add up due to rounding.

<sup>d</sup> Motor vehicle emission budgets calculated are rounded up to the nearest tenth of a tpd.

Source: EMFAC2017 v1.03

Table D-7 MVEB for the 70 ppb Ozone Standard (Summer Season) for 2037

Emissions (Tons/Day)	Fresno		Kern		Kings		Madera		Merced		San Joaquin		Stanislaus		Tulare	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
Vehicular Exhaust	3.4	11.4	3.1	14.6	0.6	2.7	0.6	2.3	0.9	5.3	2.3	6.1	1.5	4.0	1.3	3.3
Reductions from recently adopted regulations using off-model adjustment <sup>a</sup>	0.04	6.63	0.04	9.03	0.01	1.65	0.01	1.36	0.01	3.32	0.02	3.41	0.02	2.23	0.01	1.75
Reductions from developing regulations using off-model adjustment <sup>b</sup>	0.40	1.83	0.36	1.65	0.07	0.31	0.07	0.33	0.12	0.54	0.28	1.29	0.17	0.80	0.16	0.71
Total <sup>c</sup>	2.96	2.94	2.66	3.93	0.50	0.70	0.51	0.60	0.77	1.45	1.98	1.44	1.27	0.99	1.13	0.79
<b>Motor Vehicle Emission Budget<sup>d</sup></b>	3	3	2.7	4	0.6	0.8	0.6	0.6	0.8	1.5	2	1.5	1.3	1	1.2	0.8

<sup>a</sup> This reflects the adjustment factor for HD Warranty Phase 1, ICT, HDVIP/PSIP, ACT, and HD Omnibus regulations.

<sup>b</sup> This reflects the on-road commitments for ACCII and ACF from the 2022 State SIP Strategy.

<sup>c</sup> Values from EMFAC2017 v1.03 may not add up due to rounding.

<sup>d</sup> Motor vehicle emission budgets calculated are rounded up to the nearest tenth of a tpd.

Source: EMFAC2017 v1.03

### D.3.4 Local Reasonably Available Control Measures (RACM)

*[This section provided by the Valley Metropolitan Planning Organizations]*

Transportation control measures (TCMs), as defined in Section §108(f)(1)(A) of the Clean Air Act, were also considered as part of the RACM analysis for this Plan to meet RFP requirements and demonstrate attainment as expeditiously as practicable. In the spring of 2022, SJV MPOs contracted with Trinity Consultants to conduct a local RACM analysis focusing on identifying new candidate TCMs for each of the eight agencies. As transportation planning agencies, the SJV MPOs are responsible for TCM implementation and transportation conformity regulations require that the MPOs show timely implementation of all measures committed to a SIP.

Currently, qualifying TCMs are already being implemented in the Valley through planning efforts such as the Congestion Mitigation and Air Quality (CMAQ) cost-effectiveness policy adopted in 2007 by the SJV MPOs. The CMAQ program provides funding for transportation projects or programs that contribute to attainment or maintenance of federal air quality standards. The SJV CMAQ policy includes distributing at least 20 percent of the CMAQ funds to projects that meet a cost-effectiveness threshold for emission reductions. This policy focuses on achieving the most cost-effective emissions reductions while maintaining flexibility to meet local needs. The policy feasibility and minimum cost-effectiveness standard were most recently revisited in 2021 for the 2022 Regional Transportation Plans (RTPs) and 2023 Federal Transportation Improvement Plans (FTIPs).<sup>15</sup>

Every four years, each SJV MPO is required by federal law to update its long-range RTP, which is the blueprint for the region's investments in transportation projects in the Valley. Senate Bill 375 (SB 375) requires that all California MPOs adopt a Sustainable Community Strategy (SCS) with each RTP to demonstrate how per capita greenhouse gas (GHG) emission targets can be achieved by each agency through sustainable transportation and land-use planning. Although the focus of an SCS is on GHG emission reductions, the strategies contained in the SCS also produce criteria pollutant co-benefits (not quantified for this Plan).

As part of the 2022 RTP/2023 FTIP development, the SJV MPOs made every effort to address improvements to the regional multimodal transportation system in the following areas:

- *Active transportation*
- *Transportation demand management (TDM) efforts like telecommuting and employer-based trip reduction requirements*
- *Transportation system management (TSM) and other traffic flow improvements*
- *Improved transit options and frequency*
- *Clean bus replacement*

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<sup>15</sup> The most recent Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) are available on the websites for each of the Valley Metropolitan Planning Organizations.

- *Electricity charging station citing efforts*
- *Rideshare and vanpooling programs*
- *Land use planning*

Despite these efforts, the RACM analysis found that a number of additional candidate measures should be considered for implementation. These TCMs were grouped into the following categories:

1. *Non-Motorized Use Facilities (All)*
  - a. Complete Streets/Transit Oriented Development. These projects focus on multi-modal ATP efforts near transit or that provide connectivity to other transit options.
  - b. Informational Campaigns aiming to promote bike/ped transportation options (except Kern)
2. *Traffic Flow Improvements (All)*
  - a. Educational Campaign on eco-driving
3. *Transit Improvements (Merced Only)*
  - a. Educational and marketing campaign to promote the Bus and YARTS service
4. *Reduce SOV Travel (StanCOG Only)*
  - a. Informational campaign to promote rideshare/vanpool/carpool options.

The local RACM analysis methodology and results are documented in the “Local Transportation Control Measure Review and Reasonably Available Control Measure Analysis for the San Joaquin Valley 2022 Ozone State Implementation Plan” technical memorandum dated June 25, 2022 by Trinity Consultants (Attachment A). The new TCMs identified as part of this RACM analysis for each MPO individually are listed in Tables D-8 through D-15 below.

The existing and newly identified TCMs strengthen SJV MPOs’ commitment to continue contributing to the region’s air quality attainment goals, as well as support statewide climate change efforts through SCS development and implementation.



**Table D-8 Fresno New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	California Ave between Fruit Ave and Mayor Ave/Tupman St; Install Class IV bicycle facilities, sidewalks, HAWK crossing, street lights along corridor, intersection reconfigurations.	LSTMP799	City of Fresno	2029
	Blackstone Ave between McKinley Ave to Shields Ave; Install Class IV bicycle facilities, traffic calming infrastructure, curb ramps and median nose recon, bus stop platforms, signing and striping.	LSTMP720	City of Fresno	2029
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through updates to FCOG website.	NA	FCOG	2024
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through updates to FCOG website.	NA	FCOG	2024
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through FCOG website update.	NA	FCOG	2024

**Table D-9 Kern New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	Downtown Bicycle Connectivity Project	KER161011	City of Bakersfield	2026
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings by updating CommuteKern.org website.	KER220501	KCOG	2024

**Table D-10 Kings New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	Construct sidewalks, ADA ramps, lighted crosswalks, and bike routes on Orange Ave and North Ave.	216-0000-0169	City of Corcoran	2023
	Construct sidewalks along various school routes, install high visibility crosswalks and ADA curb ramps.	216-0000-0169	City of Corcoran	2025
	Construct sidewalk and bicycle facility improvements on Whitley Ave. Provide connections to other bicycle paths and transit access.	216-0000-0169	City of Corcoran	2026
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through updates to KCAG website.	NA	KCAG	2024

TCM	Description	Project ID	Agency/City	Implementation Timeline
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through updates to KCAG website.	NA	KCAG	2024
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through KCAG website update.	NA	KCAG	2024

**Table D-11 Madera New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	Construct Bicycle and Pedestrian Path; Road 225; Willow Creek Drive to Road 228	MAD102059	Madera County	2028
	City of Madera; Bicycle/Pedestrian Facilities - Fresno River Trail Between North-South Trail Behind Montecito Park and Granada Drive	MAD202086	City of Madera	2028
	City of Madera; Pedestrian facilities around Washington School	MAD217036	City of Madera	2028
	Riverside Avenue, 8th Street, & Kings Avenue Pedestrian Improvements Project	MAD302058	City of Chowchilla	2028
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through updates to MCTC website.	NA	MCTC	2024

TCM	Description	Project ID	Agency/City	Implementation Timeline
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through updates to MCTC website.	NA	MCTC	2024
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through MCTC website update.	NA	MCTC	2024

**Table D-12 Merced New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	Livingston Phase 2 Max Foster Multiuse Path	205-0000-0317	City of Livingston	2024
	Gustine Pedestrian Improvements on 3rd Ave, East Ave, & South Ave	205-0000-0301	City of Gustine	2024
	Gustine Phase 3 Multiuse Path on Railroad, Meredith, & South Aves	205-0000-0316	City of Gustine	2025
	Merced Childs Ave Multiuse Path	205-0000-0319	City of Merced	2025
	Merced Pedestrian Improvements on McGregor, Woodward, Home, Windsor, and Parkwest	205-0000-0320	City of Merced	2026
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to MCAG website.	NA	MCAG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to MCAG website.	NA	MCAG	Ongoing

TCM	Description	Project ID	Agency/City	Implementation Timeline
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic MCAG website updates.	NA	MCAG	Ongoing
Public education, outreach & marketing for "The Bus"	Promotion of "The Bus" transit service, overseen by the Transit Joint Powers Authority of Merced County (TJPAMC), through public outreach, education, and marketing campaigns at various community events and online for the transit-dependent public.	NA	TJPAMC	Ongoing
Public education, outreach & marketing for YARTS	Promotion of the Yosemite Area Regional Transportation System (YARTS) service including public outreach, community events, and extensive marketing, such as through Amtrak or in surrounding regions with informative materials and tools to prospective Yosemite visitors.	NA	YARTS	Ongoing

Table D-13 San Joaquin New TCM Listing

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	Various multi-modal connectivity projects throughout San Joaquin County.	212-0000-0780	Various	Ongoing
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to SJCOG website.	NA	SJCOG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to SJCOG website.	NA	SJCOG	Ongoing

TCM	Description	Project ID	Agency/City	Implementation Timeline
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic SJCOG website updates.	NA	SJCOG	Ongoing

**Table D-14 Stanislaus New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	F St from Oakdale-Waterford Highway, Lateral Number Two Path (Proposed) to Dorsey St, Separated Bike Lane	RTP/SCS W20	City of Waterford	2025
	F St, from Bentley St to Hickman Rd, Separated Bike Lane	RTP/SCS W21	City of Waterford	2025
	The Robertson Road Elementary Safe Crossing and Active Transportation Connectivity Project	214-0000-0672	Stanislaus County	2026
	Waterford Safe Routes to School Project – Yosemite Blvd	214-0000-0672	City of Waterford	2026
	The Bret Harte Elementary Safe Crossing and Active Transportation Connectivity Project	214-0000-0672	Stanislaus County	2026
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to StanCOG website.	NA	StanCOG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to StanCOG website.	NA	StanCOG	Ongoing

TCM	Description	Project ID	Agency/City	Implementation Timeline
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic StanCOG website updates.	NA	StanCOG	Ongoing
Rideshare/Carpool Informational Campaign	Promote carpool and rideshare programs through information posted on StanCOG website linking to rideshare services available in the county.	NA	StanCOG	Ongoing

Table D-15 Tulare New TCM Listing

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	Development of an active transportation corridor (approximately 3.9 miles in length) to include solar lighting, water stations, wayfinding, benches, controlled lighted crossing systems.	215-0000-0726	City of Porterville	2032
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to TCAG website.	NA	TCAG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to TCAG website.	NA	TCAG	Ongoing
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic TCAG website updates.	NA	TCAG	Ongoing

#### D.4 VEHICLE MILES TRAVELED (VMT) OFFSETS

Within two years of nonattainment designations for an ozone standard, CAA Section 182(d)(1)(A) requires states to submit enforceable transportation control strategies and transportation control measures to offset any growth in emissions from growth in vehicle miles traveled (VMT) or numbers of vehicle trips (VMT emissions offset demonstration) for severe and extreme areas<sup>16</sup>.

On May 22, 2020, CARB staff published their 70 ppb Ozone SIP Submittal, consisting of the baseline emissions inventory and VMT emissions offset demonstrations for nonattainment areas for the 70 ppb 8-hour ozone standard, including the San Joaquin Valley<sup>17</sup>. The CARB Governing Board approved the 70 ppb Ozone SIP Submittal on June 25, 2020, and CARB subsequently submitted the document to U.S. EPA on July 27, 2020. CARB's 70 ppb Ozone SIP Submittal contains more information on the District's fulfillment of the CAA Section 182(d)(1)(A) requirements.

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<sup>16</sup> CAA §182(d)(1)(A). <https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapl-partD-subpart2-sec7511a.htm>

<sup>17</sup> California Air Resources Board. *70 ppb Ozone SIP Submittal*. Released May 22, 2020. Retrieved from: [https://ww3.arb.ca.gov/planning/sip/2017eivmt/ozone\\_sip\\_staff\\_report.pdf](https://ww3.arb.ca.gov/planning/sip/2017eivmt/ozone_sip_staff_report.pdf)



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## **Attachment A: Local Transportation Control Measure Review and Reasonably Available Control Measure Analysis for the San Joaquin Valley 2022 Ozone State Implementation Plan**

*[This Attachment provided by the Metropolitan Planning Organizations]*

**To:** San Joaquin Valley Metropolitan Planning Organization (MPO) Staff  
**From:** Alex Marcucci and Suriya Vallamsundar, Trinity Consultants  
**Date:** June 25, 2022  
**RE:** Local Transportation Control Measure Review and Reasonably Available Control Measure Analysis for the San Joaquin Valley 2022 Ozone State Implementation Plan

This memorandum presents the results and methodology for conducting local Reasonably Available Control Measure (RACM) analysis in support of the 2022 San Joaquin Valley (SJV) Ozone State Implementation Plan (SIP) for the 2015 8-hour ozone standard. In Spring of 2022, Trinity Consultants (Trinity) conducted a RACM analysis for the eight SJV Metropolitan Planning Organizations (MPOs) with a purpose to identify any additional transportation control measures (TCMs) in line with the requirements of the U.S. Environmental Protection Agency's (EPA's) Ozone Implementation Rule<sup>1</sup>. As regional transportation planning agencies, the SJV MPOs are responsible for TCM implementation and therefore are an important partner in conducting a RACM analysis during SIP development, given that any measure that is committed to in a SIP becomes federally enforceable upon EPA's approval of the plan and must be implemented (or correctly substituted) to maintain compliance with the federal requirements.

## Background

On October 1, 2015, EPA issued a final rule strengthening the primary and secondary 8-hour ozone National Ambient Air Quality Standards (NAAQS) to 70 parts per billion (ppb). The SJV is currently designated as extreme nonattainment for 2015 8-hour ozone standard. According to the Ozone Implementation Rule, a RACM assessment must demonstrate that the region "has adopted all reasonable measures (including RACT) to meet Reasonable Further Progress (RFP) requirements and to demonstrate attainment as expeditiously as practicable." The purpose of the RACM analysis is to determine whether any additional TCMs exist that would advance the attainment date for nonattainment areas. Fulfillment of the RACM requirement is dependent on the selection of candidate control measures, assessment of their applicability to the region, and expedience of their implementation<sup>2</sup>.

This RACM analysis focuses on TCMs or strategies that reduce travel and thereby achieve air quality benefits. Once TCMs are included in a SIP, SJV MPOs are legally bound to implement these measures in order to satisfy timely implementation demonstration (TID) requirements as part of the transportation planning process. If funds programmed for TCMs do not become available or if the schedule identified in a SIP cannot be met, the agency faces serious consequences, one of which could be a nonconforming regional transportation plan.

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<sup>1</sup> EPA, 2018. *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements. Final Rule. U.S. Environmental Protection Agency. Vol. 83. No. 234. December 6, 2018.*

<sup>2</sup> EPA, 1999. *Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas. Assessed at [https://www3.epa.gov/ttn/naaqs/aqmguides/collection/cp2/19991130\\_seitz\\_racm\\_guide\\_ozone.pdf](https://www3.epa.gov/ttn/naaqs/aqmguides/collection/cp2/19991130_seitz_racm_guide_ozone.pdf)*

The criteria for identifying TCM projects and the requirements for timely implementation of these projects are defined in the EPA's Transportation Conformity Rule, 40 CFR Part 93:

*A TCM is any measure that is specifically identified and committed to in the applicable implementation plan, including a substitute or additional TCM that is incorporated into the applicable SIP through the process established in CAA section 176(c)(8), that is either one of the types listed in CAA section 108, or any other measure for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. Notwithstanding the first sentence of this definition, vehicle technology-based, fuel-based, and maintenance-based measures which control the emissions from vehicles under fixed traffic conditions are not TCMs for the purposes of this subpart.*

More specifically, the measures must meet the following criteria:

- Technological feasibility
- Economic feasibility
- Assessment of widespread and long-term adverse impacts
- Determination if the control measure is absurd, unenforceable, or impracticable
- If the control measures can advance the attainment date by at least one year

The methodology presented in this memo is specific to TCMs for transportation sources in the San Joaquin Valley and focuses on the following measures identified in Section 108(f)(1)(A) of the CAA:

- (i) programs for improved public transit.*
- (ii) restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles.*
- (iii) employer-based transportation management plans, including incentives.*
- (iv) trip-reduction ordinances.*
- (v) traffic flow improvement programs that achieve emission reductions.*
- (vi) fringe and transportation corridor parking facilities serving multiple occupancy vehicle programs or transit service.*
- (vii) programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration particularly during periods of peak use.*
- (viii) programs for the provision of all forms of high occupancy, shared ride services.*
- (ix) programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place.*
- (x) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas.*
- (xi) programs to control extended idling of vehicles.*
- (xii) programs to reduce motor vehicle emissions, consistent with title II, which are caused by extreme cold start conditions.*
- (xiii) employer-sponsored programs to permit flexible work schedules.*
- (xiv) programs and ordinances to facilitate non-automobile travel, provision, and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity.*
- (xv) programs for new construction and major reconstructions of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest.*
- (xvi) program to encourage the voluntary removal from use and the marketplace of pre-1980 model year light-duty vehicles and pre-1980 model light-duty trucks.*

Control measures that have been implemented at the federal level, in other states, and in other local air districts should be considered. In addition, measures identified by EPA in any related guidance documents and measures that have been suggested during a public comment period must be considered. The TCMs may be voluntary or market-based programs, as long as they produce surplus, quantifiable, permanent, and enforceable emission reductions to be SIP-creditable. The TCM identified will need to be accompanied by information if the measures can be implemented and justification as to why measures would not be implemented based on technological, implementation authority, or economic grounds.

## RACM Analysis Methodology

To ensure that sufficient evidence is compiled to support the inclusion or exclusion of an individual TCM, a step-by-step methodology for the assessment of RACM is detailed below.

### Step 1: Identify measures currently implemented in the SJV

The first step consisted of developing a comprehensive listing of TCMs that are already being implemented in the eight SJV counties – Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. Several sources of data were explored to extract this information, such as the most recently approved and upcoming Regional Transportation Plan (RTP) and Federal Transportation Improvement Program (FTIP) project listings, Regional Active Transportation Plan (RATP), and existing TCM commitments for each MPO separately. In addition to county-specific projects, measures implemented at the Air Quality District and State levels in terms of rules, regulations, grants, incentives, and mitigation measures were also identified. Table 1 lists the data sources utilized for developing the comprehensive listing of current measures.

**Table 1. Data Sources for Current SJV TCMs**

<b>MPO</b>	<b>Description</b>	<b>Data Source</b>
<b>Fresno</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis
	Exempt Project List	2018/2022 RTP, Appendix B
<b>Kern</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis
	Exempt Project List	2018/2022 RTP, Appendix B
	State and Local Projects	2021/2023 FTIP, Appendix D
<b>Kings</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis
	Exempt Project List	2018/2022 RTP, Appendix B
	GHG Reduction Project List	2018 RTP/SCS, Appendix C
<b>Madera</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis
	Exempt Project List	2018/2022 RTP, Appendix B
	Regionally Significant Project List	2018/2022 RTP, Appendix B
	Priority Projects	2018/2022 RATP
<b>Merced</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis
	Exempt Project List	2018/2022 RTP, Appendix B
	Regionally Significant Project List	2018/2022 RTP, Appendix B
<b>San Joaquin</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis
	Exempt Project List	2018/2022 RTP, Appendix B
	Regionally Significant Project List	2018/2022 RTP, Appendix B
<b>Stanislaus</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis
	Capital Improvement Project List	2018/2022 RTP, Appendix K
	Exempt Project List	2018/2022 RTP, Appendix B
	NMTP Project List	MPO
<b>Tulare</b>	RACM/TID	2021/2023 FTIP, Conformity Analysis

MPO	Description	Data Source
	Regionally Significant Project List	2018/2022 RTP, Appendix B
	Exempt Project List	2018/2022 RTP, Appendix B
	Priority Projects	2018/2022 RATP
<b>Districtwide Measures</b>	Rules and Regulations	<a href="https://www.valleyair.org/rules/1ruleslist.htm#reg9">https://www.valleyair.org/rules/1ruleslist.htm#reg9</a>
	Grants and Incentives	<a href="https://www2.valleyair.org/grants/">https://www2.valleyair.org/grants/</a>
<b>Statewide Measures</b>	CARB Programs	<a href="https://www2.arb.ca.gov/our-work/programs">https://www2.arb.ca.gov/our-work/programs</a>

## Step 2: Develop a list of TCMs implemented in other nonattainment areas

Once existing TCMs were identified, the second step was to compile a list of all candidate TCMs that were implemented in other ozone nonattainment areas. For this analysis, the RACM review included relevant SIPs from ozone nonattainment areas for the 1997, 2008, and 2015 ozone standards. Due to the exhaustive nature of the TCMs implemented across the country, the focus of this step was on ozone nonattainment areas with most recent RACM assessments and most stringent ozone requirements. Table 2 shows the nonattainment areas, their designation, and the applicable SIPs reviewed for the SJV RACM analysis. A total of 230 TCMs were identified and further condensed to a total of 95 TCMs by utilizing only the measures that are significantly different in scope and emissions reduction potential. This master list formed the basis for the assessment of potential measures described in subsequent steps. It is important to note that some of the TCMs may be unique to the region where they are implemented and might not be feasible in the SJV. **Appendix A** contains the final TCM listing based on the SIP review for other areas.

**Table 2. Ozone Nonattainment Areas Reviewed for Candidate TCMs**

Region	Designation	Applicable SIP
Sacramento Area Council of Governments	Serious for 2008 Ozone Standards	2017 Sacramento Regional 2008 8-Hour Ozone Attainment and Further Progress Plan (inc. 2016 RACM Analysis)
San Diego Air Pollution Control District	Serious for 2008 Ozone Standards; Moderate for 2015 Ozone Standards	2020 Plan for Attaining the National Ozone Standards
Ventura County Air Pollution Control District	Serious for 2008 Ozone Standards	2016 Ventura Ozone SIP (inc. 2022 Ventura RACM Analysis)
South Coast Air Quality Management District (incl. Riverside and W. Mojave Desert)	Severe for 2008 Ozone Standards	2020 Air Quality Management Plan, South Coast Air Quality Management District (incl. 2016 RACM analysis)
Bay Area Air Quality Management District	Marginal for 2008 Ozone Standards	Final 2017 Clean Air Plan
Imperial County Air Pollution Control District	Moderate for 2008 Ozone Standards	2017 Imperial County State Implementation Plan for the 2008 8-hour Ozone Standard

The programs and regulations implemented in the SJV as a result of statewide or district-wide measures were also reviewed. The majority of these measures correspond to controlling extended idling of vehicles, encourage vehicle turnover, and employer-based trip reduction measures, etc. The District and Statewide programs are listed in Table 3 and Table 4, respectively.

**Table 3. San Joaquin Valley Air District Control Measures**

<b>Transportation Control Measure</b>	<b>Implemented in SJV</b>	<b>Source</b>
School Bus Fleets	Yes	SJV District Rules and Regulations
Employer Based Trip Reduction	Yes	SJV District Rules and Regulations
State Implementation Plan Credit for Emissions Reductions generated through Incentive Programs	Yes	SJV District Rules and Regulations
Indirect Source Review	Yes	SJV District Rules and Regulations
Rule 9410	Yes	SJV District Rules and Regulations
Emergency Vehicle Replacement Program	Yes	SJV Grants and Incentives
Clean Green Yard Machines: Commercial	Yes	SJV Grants and Incentives
Bike Paths	Yes	SJV Grants and Incentives
Alternate Fuel Mechanic Training	Yes	SJV Grants and Incentives
E-Mobility Commerce	Yes	SJV Grants and Incentives
Public Benefit	Yes	SJV Grants and Incentives
Charge Up	Yes	SJV Grants and Incentives
Electric School Bus Incentive Program	Yes	SJV Grants and Incentives
Plug in Electric Vehicle Resources Center	Yes	SJV Grants and Incentives
Public Transportation Subsidy and Park & Ride Lots	Yes	SJV Grants and Incentives
Heavy Duty Waste Haulers	Yes	SJV Grants and Incentives
Tune in Tune Up Car Repair Program	Yes	SJV Grants and Incentives
Drive Clean in the San Joaquin	Yes	SJV Grants and Incentives
Burn Cleaner	Yes	SJV Grants and Incentives
Vanpool Voucher	Yes	SJV Grants and Incentives
Clean Vehicle Fueling Infrastructure Program: Private Use	Yes	SJV Grants and Incentives
Clean Vehicle Fueling Infrastructure Program	Yes	SJV Grants and Incentives
Alternatives to Agricultural Open Burning Incentive Program	Yes	SJV Grants and Incentives
Low-Dust Nut Harvester Replacement Program	Yes	SJV Grants and Incentives
Farmer Ag Truck Replacement Program	Yes	SJV Grants and Incentives
Electrified Dairy Feed Mixing Program	Yes	SJV Grants and Incentives
Off-Road Replacement	Yes	SJV Grants and Incentives
Ag Pump Replacement	Yes	SJV Grants and Incentives
Hybrid Voucher Program	Yes	SJV Grants and Incentives
Agricultural Tractor Trade-Up Program	Yes	SJV Grants and Incentives
Tractor Replacement Program	Yes	SJV Grants and Incentives
Locomotives: Prop 1B	Yes	SJV Grants and Incentives
Off-Road Mobile Equipment Repowers	Yes	SJV Grants and Incentives
Trucks: Prop 1B	Yes	SJV Grants and Incentives
Truck Replacement	Yes	SJV Grants and Incentives
Public Transportation Subsidy and Park & Ride Lots	Yes	SJV Grants and Incentives
Zero-Emission Ag Utility Terrain Vehicle (UTV)	Yes	SJV Grants and Incentives
Locomotive Program	Yes	SJV Grants and Incentives
Restaurant Charbroiler Technology Partnership	Yes	SJV Grants and Incentives
Technology Advancement	Yes	SJV Grants and Incentives
Bicycle Infrastructure-Based Mitigation Measures (Provide bicycle enhancing infrastructure)	Yes	Mitigation Measures (Healthy Air Living)
Construction Equipment Mitigation Measures	Yes	Mitigation Measures (Healthy Air Living)
Control Measures for Construction Emissions of PM-10	Yes	Mitigation Measures (Healthy Air Living)
Other Operational Mitigation Measures (Implement NEV Network that corresponds to 'low speed vehicles' that are electric powered)	Yes	Mitigation Measures (Healthy Air Living)
Parking Operational Mitigation Measures: (a) Provide preferential parking, (b) Implement parking fees for single occupancy vehicle commuters, (c) Implement parking cash out program for employees	Yes	Mitigation Measures (Healthy Air Living)

<b>Transportation Control Measure</b>	<b>Implemented in SJV</b>	<b>Source</b>
Pedestrian Infrastructure-Based Mitigation Measures (Provide pedestrian Enhancing infrastructure)	Yes	Mitigation Measures (Healthy Air Living)
Rideshare Operational Mitigation Measures (Implement carpool/vanpool program)	Yes	Mitigation Measures (Healthy Air Living)
Services Operational Mitigation Measures: (a) Provide on-site shops and services for employees, (b) Provide on-site childcare, or contribute to offsite childcare within walking distance	Yes	Mitigation Measures (Healthy Air Living)
Shuttle Operational Mitigation Measures	Yes	Mitigation Measures (Healthy Air Living)
Transit Infrastructure-Based Mitigation Measures	Yes	Mitigation Measures (Healthy Air Living)
Transit Operational Mitigation Measures	Yes	Mitigation Measures (Healthy Air Living)
VMT Infrastructure-Based Mitigation Measures	Yes	Mitigation Measures (Healthy Air Living)



**Table 4. California Air Resources Board Control Measures**

<b>Transportation Control Measure</b>	<b>Implementing Agency</b>	<b>Implemented in SJV?</b>
Accessible Clean Transportation Options SB 350	ARB	Yes
Advanced Clean Cars (Low Emission Vehicle Standards IV LEV IV,), (Zero Emission Vehicle Regulation, ZEV)	ARB	Yes
Advanced Clean Fleets	ARB	Yes
Advanced Clean Trucks	ARB	Yes
Air Toxics Program	ARB	Yes
Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling	ARB	Yes
Alternative Diesel Fuels	ARB	Yes
Alternative Fuels	ARB	Yes
California Active Transportation Program	CTC	Yes
California Climate Investments	ARB	Yes
California Diesel Fuel Regulation	ARB	Yes
California Greenhouse Gas Emission Inventory Program	ARB	Yes
California Racing Vehicles	ARB	Yes
California Reformulated Gasoline	ARB	Yes
California's Parking Cash-out Law	ARB	Yes
Cargo Handling Equipment Regulation	ARB	Yes
Cargo Tank Vapor Recovery	ARB	Yes
Carl Moyer Program	ARB	Yes
Carpool Stickers	ARB	Yes
Clean Cars 4 All	ARB	Yes
Clean Miles Standard	ARB	Yes
Clean Off-Road Equipment Voucher Incentive Project	ARB	Yes
Clean Vehicle Rebate Project	ARB	Yes
Commercial Harbor Craft	ARB	Yes
Community Air Protection Incentives	ARB	Yes
Diesel Risk Reduction Plan	ARB	Yes
Drayage Truck Regulation	ARB	Yes
Electric Vehicle Supply Equipment (EVSE) Standards	ARB	Yes
Enhanced Fleet Modernization Program	ARB	Yes
FARMER Program	ARB	Yes
Fleet Rule for Transit Agencies	ARB	Yes
Freight Regulations Reporting System	ARB	Yes
Goods Movement Program/Proposition 1B	ARB/CTC	Yes
Greenhouse Gas Standards for Medium- and Heavy-Duty Engines and Vehicles	ARB	Yes
Heavy-Duty Diesel Inspection & Periodic Smoke Inspection Programs	ARB	Yes
Heavy-Duty Greenhouse Gas Certification Program	ARB	Yes
Heavy-Duty Greenhouse Gas Certification Program	ARB	Yes
Heavy-Duty Hybrid Electric Vehicle Certification Procedures	ARB	Yes
Heavy-Duty Low NOx	ARB	Yes
Heavy-Duty Vehicle Inspection Program	ARB/BAR	Yes
Hot Spots Analysis & Reporting Program	ARB	Yes
Hybrid Truck and Bus Voucher Incentive Program	ARB	Yes
Hydrogen Fueling Infrastructure	ARB	Yes
Idle Reduction Technologies for Sleeper Berth Trucks	ARB	Yes
Innovative Clean Transit	ARB	Yes
Innovative Technology Regulation	ARB	Yes
In-Use Off-Road Diesel Equipment Regulation	ARB	Yes
In-Use Off-Road Mobile Agricultural Equipment Regulation	ARB	Yes
Large Spark-Ignition (LSI) Engine Fleet Requirements Regulation	ARB	Yes
Low Carbon Transportation Investments and Air Quality Improvement Program	ARB	Yes
Low-Emission Vehicle Program	ARB	Yes
Lower-Emission School Bus Program	ARB	Yes

Transportation Control Measure	Implementing Agency	Implemented in SJV?
Minimizing Community Health Impacts from Freight	ARB	Yes
Mobile Source Emissions Research Program	ARB	Yes
OBD - On-Board Diagnostic Program	ARB	Yes
Ocean-Going Vessel Fuel Regulation	ARB	Yes
Ocean-Going Vessels At Berth Regulation	ARB	Yes
Off-Highway Recreational Vehicles	ARB	Yes
Off-Road Compression-Ignition Certification Program	ARB	Yes
Off-Road Large Spark-Ignition Equipment Regulation	ARB	Yes
On-Road Heavy-Duty Diesel Vehicles Regulation	ARB	Yes
On-Road Heavy-Duty Voucher Incentive Program	ARB	Yes
On-Road Light-Duty Vehicle Certification Program	ARB	Yes
On-Road Motorcycles	ARB	Yes
Optional Reduced NOx Standards for Heavy-duty Vehicles	ARB	Yes
Outboard Marine Tanks	ARB	Yes
Periodic Smoke Inspection Program	ARB/BAR	Yes
Plug-in Electric Vehicle Infrastructure	ARB	Yes
Portable Diesel Engines ATCM	ARB	Yes
Potential Amendments to the Diesel Engine Off-Road Emission Standards: Tier 5 Criteria Pollutants and CO2 Standards	ARB	Yes
Proposition 1B: Goods Movement Emission Reduction Program	ARB/SJV	Yes
Railyard Emission Reduction and Fuel Use Program	ARB	Yes
Reducing Rail Emissions in California	ARB	Yes
San Joaquin Valley Emission Reduction Credit Program Review	ARB	Yes
School Bus Idling ATCM	ARB	Yes
School Bus Retrofit Program	ARB/ SJV	Yes
School Buses	ARB/SJV	Yes
Small Off-Road Engines (SORE)	ARB	Yes
Solid Waste Collection Vehicle Rule	ARB	Yes
Spark-Ignition Marine Watercraft	ARB	Yes
Stationary Diesel ATCM	ARB	Yes
Sustainable Freight Transport	ARB	Yes
The California Sustainable Freight Action Plan	ARB	Yes
Tractor-Trailer Greenhouse Gas Regulations	ARB	Yes
Transport Refrigeration Unit	ARB	Yes
Transportation Refrigeration Unit ATCM	ARB	Yes
Truck and Bus Regulation	ARB	Yes
Truck Loan Assistance Program	ARB	Yes
Verification Procedure for In-Use Strategies to Control Emissions from Diesel Engines	ARB	Yes
Volkswagen Zero-Emission Vehicle (ZEV) Investment Commitment	ARB	Yes
Voluntary Accelerated Vehicle Retirement Program	ARB	Yes
Zero-Emission Airport Ground Support Equipment	ARB	Yes
Zero-Emission Airport Shuttle	ARB	Yes
Zero-Emission Forklifts	ARB	Yes
Zero-Emission Landscaping Equipment	ARB	Yes
Zero-Emission Powertrain Certification	ARB	Yes
Zero-Emission Transportation	ARB	Yes
Zero-Emission Vehicle Fleet	ARB	Yes
Zero-Emission Vehicle Program	ARB	Yes
Zero-Emission Airport Ground Support Equipment	ARB	Yes

### Step 3: Evaluate Implementation Feasibility of Measures

Once a master list of potential TCMs was compiled, the next step was to collect sufficient information on each candidate measure to determine its feasibility for each SJV MPO based on the following metrics:

- **Technological Feasibility:** Factors that were considered for evaluating the technological feasibility included the availability of necessary infrastructure, technology availability and commercialization potential, successful implementation in other areas, and local specific conditions such as traffic and meteorology that might impact the implementation of the measure. All TCM measures identified were deemed technologically feasible. Some measures, however, were determined to be not applicable, such as rail connectivity projects where a region does not have any rail.
- **Economic Feasibility:** Another key factor that was considered is economic feasibility or the cost-effectiveness of the measure. The Congestion Mitigation and Air Quality (CMAQ) program provide funding for transportation projects or programs that contribute to the attainment or maintenance of the NAAQS<sup>3</sup>. All SJV MPOs adopted policies in 2007 for distributing at least 20 percent of the CMAQ funds to projects that meet a cost-effectiveness threshold for emission reductions. Given that economic growth is a top priority in the SJV, measures that are not cost-effective or would impact economic activity in the region (e.g., business closures on high ozone days) were excluded from the TCM listing. Instead, other more practicable TCMs were chosen that would result in greater emission reductions.
- **Emission Reduction Potential/Advancing Attainment:** Other criteria for RACM selection was to determine whether candidate measures would advance attainment by a year when considered collectively. In other words, the total emission reductions from all potential measures should be sufficient enough to attain the 2015 8-hour ozone standard by a year earlier than the current attainment deadline of 2037. Given the SJV experience with quantifying emission reductions from TCM-like projects and strategies as part of the CMAQ Policy requirements, as well as California SB 375 analysis, a portion of TCMs identified would result in emission reductions that were either too small or impossible to quantify. Some examples include free bikes, reversible lanes, and clean fleets for government employees.
- **Enforceability:** Another important consideration is TCM enforceability. If a local transportation agency does not have the authority to implement and enforce a TCM, it cannot be included in a SIP and therefore would not constitute a RACM. This applies to idling reduction, vehicle scrappage, and accelerated vehicle retirement programs that are generally implemented at the state level and may not be included for the local RACM analysis. The development of HOV/HOT or bus-only lanes requires state authority and funding. Parking restrictions and pricing are managed by individual cities. Finally, any VMT tax-related measures are passed by the state or individual counties; SJV MPOs do not have taxation authority.
- **Feasibility in terms of environmental, economic, and social impacts:** This metric considers the broader environmental, economic, and social impacts of TCMs from an implementation standpoint, once the measure has been deemed to be both technologically and economically feasible. Each candidate TCM should be analyzed to assess its impacts on the region's environment, economy, and population/travel behavior beyond what has been determined in other metrics. In addition, issues such as public acceptability and environmental justice should also be evaluated.
- **Other Metrics:** In addition to the above metrics, the TCMs were evaluated in the context of local specific emissions reduction efforts to ensure these measures do not counteract these existing efforts. For example, considering California's Senate Bill 375 requirements, TCMs should also be

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<sup>3</sup> NAAQS: National Ambient Air Quality Standards

evaluated in the context of greenhouse gas (GHG) emission impacts to avoid adverse impacts on SJV's Sustainable Community Strategies (SCS) planning efforts.

The potential list of TCMs was evaluated in light of the metrics outlined above and only those measures that satisfy all the metrics were moved to the new TCM listing for each SJV MPO.

#### **Step 4: Identify the Reasonably Available Control Measures**

The final step consists of identifying TCMs for each SJV MPO based on the information in the steps above. **Appendix A** also shows TCMs that were excluded from RACM along with the justification for their disqualification based on the assessment of the metrics discussed in the previous step.

### **RACM Analysis Results**

Once the new TCMs were identified, Trinity coordinated with each SJV MPO individually to confirm the existing measures and the feasibility of the new TCMs recommended for SIP inclusion. The "new" TCM listings for each MPO are shown in **Appendix B**, along with the agencies responsible for their implementation and implementation timeline. Note that the "ongoing" timeline indicates that the MPO is committed to continuous delivery and implementation of the projects identified.

In general, all CAA Section 108(f)(1)(A) TCM categories are already being implemented in the SJV. This is the result of the most stringent air quality and conformity requirements due to SJV's extreme non-attainment status for both 2008 and 2015 ozone standards. In addition, the SJV MPOs comply with California's SB 375 and have adopted Sustainable Community Strategies (SCSs) that address per capita GHG emission reductions through sustainable transportation and land-use planning. While the focus of SB 375 is on GHG emissions, there are some co-benefits on the air quality side as well due to reductions in VMT and other policies such as partnering with the state and the Air District on electric vehicle deployment. These emission reduction co-benefits are not being quantified at this time.

The new TCMs identified during the RACM analysis can be grouped into the following main categories:

1. Non-Motorized Use Facilities (*All 8*)
  - a. Complete Streets/Transit Oriented Development. These projects focus on multi-modal ATP efforts near transit or that provide connectivity to other transit options.
  - b. Informational Campaigns aiming to promote bike/ped transportation options (*Kern already implements this through the CommuteKern.org website*)
2. Traffic Flow Improvements (*All 8*)
  - a. Educational campaign on eco-driving
3. Transit Improvements (*Merced Only*)
  - a. Educational and marketing campaign to promote the Bus and YARTS transit services.
4. Reduce single occupancy vehicle (SOV) Travel (*Stanislaus Only*)
  - a. Informational campaign to promote rideshare/vanpool/carpool options.

The RACM analysis highlights the Valley's commitment to its SCS strategies focusing on complete streets projects that promote non-motorized travel, deliver projects that connect multi-modal infrastructure options, and are centered around transit to discourage SOV travel. The other areas where SJV MPOs are planning to increase their efforts are informational and educational campaigns that promote bike and pedestrian travel, rideshare options, transit use, and eco-driving techniques that will provide health benefits, result in fuel savings, and help the region attain its air quality goals.

Once the 2022 SJV Ozone SIP receives final approval, the new TCMs identified as part of this RACM analysis will be included on the RACM/TID list for each MPO as part of future conformity analyses.

## Appendix A

**Table A1. SJV Transportation Control Measure RACM Analysis**

TCM #	TCM	Description	Analysis	Comments
<i><b>i. Improved Public Transit</b></i>				
1.1	Public transit facility improvements/operating assistance	Construct and/or improve bus or rail terminals, stations, and maintenance facilities	Existing	RTP/SCS
1.2	Expansion of public transportation services	Provide additional rail or bus service	Existing	RTP/SCS
1.3	Transit access to airports	Expand rail or bus services to airports	Existing where applicable	RTP/SCS
1.4	Free transit on specific days	Provide free alternative transportation on days during specific events or days with high-level ozone episodes	Not economically feasible	Similar emission reductions can be achieved with Complete Streets planning
1.5	Transit rehabilitation and retrofits	Rehabilitation of older vehicles or installation of retrofits on diesel-powered buses	Not Applicable	AFVs are required per CARB Zero Emission Transit Rule
1.6	Transit service improvement including parking management	Install park-and-ride facilities near transit stations, improve bicycle and pedestrian access, install lights and real-time information systems	Existing	RTP/SCS
1.7	Clean fuel buses	Purchase of alternative fuel buses	Existing/Statewide	CARB Zero Emission Transit Rule
1.8	Rail-to-bus/bus-to-rail transfers	Transit services at non-intermodal centers	Existing	RTP/SCS
1.9	Land use strategies to prioritize transit	Installing special lanes and signals to allow transit to get ahead in traffic, signal prioritization for transit, Shorter Distance from Buildings to Bus Stops	Existing	RTP/SCS
1.10	Transit Accessibility Programs	Provide transit vouchers to certain population groups (e.g., elderly, minorities, homeless) to reduce transit costs, paratransit, or provide transit means for certain population groups	Existing	RTP/SCS
1.11	Intermodal centers	Improve travel connection of various transportation modes	Existing	RTP/SCS

<b>TCM #</b>	<b>TCM</b>	<b>Description</b>	<b>Analysis</b>	<b>Comments</b>
1.12	Technology Improvements to Transit	Technological upgrades to improve transit ridership such as upgrades to passenger fare functionality, including mobile ticketing, hardware and software purchases/upgrades, and fare vending machines, real-time transit information systems.	No implementation authority	Managed by local Transit Agencies
1.13	Passenger Rail Improvements	Installation of additional platforms, double tracks, concrete ties, bridges, signal relocation.	Existing where applicable	RTP/SCS
<b><i>ii. Limit Access to Roads in Metro Area to Non-Vehicular Use</i></b>				
2.1	Establish Auto Free Zones and Pedestrian Malls	Self-explanatory	Would not advance attainment	Minimal air quality benefits given the lack of large urban centers in the SJV
2.2	Close roads for use of non-motorized traffic or special events for use by bikes and pedestrians when/where appropriate	Self-explanatory	Not economically feasible	Similar emission reductions can be achieved with Complete Streets planning
2.3	Bus and carpool lanes on arterials	Provide fixed lanes for buses and carpools on arterial streets	No implementation authority	Would require state agency authority and funds
2.4	Express toll lanes/HOT lanes	Construct toll lanes to reduce congestion	No implementation authority	Would require state agency authority and funds
<b><i>iii. Bicycle Facilities</i></b>				
3.1	Bike parking	Construct bike parking facilities	Existing	Active Transportation Plans
3.2	Free bikes	Provide free bikes to transit users	Would not advance attainment	This voluntary measure does not guarantee emission reductions. Consumers could sell bikes for profit
3.3	Bike racks	Install bike racks on buses, employers install bike racks at businesses	Existing	All new buses have bike racks
3.4	Bicycle facility improvements	Construct bike lanes, off-street bikeways, multi-use trails, route lighting, and street signage, bicycle storage	Existing	RTP/SCS
<b><i>iv. Control Extended Idling of Vehicles</i></b>				
4.1	Truckstop electrification	Self-explanatory	Existing/Statewide	CARB Advanced Clean Trucks
4.2	Programs to reduce idling of vehicles	Reduce idling at drive-throughs, parking lots, in traffic, at schools, and other locations, etc. Use of APUs or special battery engines to keep air conditioning and other vehicle systems when the vehicle is not in use.	Existing/Statewide	CARB ATCM

<b>TCM #</b>	<b>TCM</b>	<b>Description</b>	<b>Analysis</b>	<b>Comments</b>
4.3	Control extended idling of Buses and Trucks	Step-up enforcement of existing regulations to prevent extended vehicle idling.	Existing/Statewide	CARB ATCM
4.4	Programs to reduce idling of vehicles	Use of APUs or special battery engines to keep air conditioning and other vehicle systems when vehicle is not in use, car dealers to limit the starting of vehicles for sale on their lot(s) to once every two weeks etc.	Existing/Statewide	CARB ATCM
	<b><i>v. Reduce Extreme Cold-Start Emissions</i></b>			
	None			
	<b><i>vi. Employer-Sponsored Flexible Work Schedules</i></b>			
6.1	Compressed work weeks/flexible work schedules	Encourage employers to implement alternate work schedules to reduce travel.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
6.2	Telecommuting	Encourage employers to allow employees to work from home.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
	<b><i>vii. Planning and Development Efforts to Reduce SOV Travel</i></b>			
7.1	Shared mobility program	Implement a shared mobility program (e.g. bikes) and provide planning efforts for potential regional expansion of cleaner alternative modes.	Existing	RTP/SCS
7.2	Government Action Days	Declare specific days (such as spare the air day, ozone action day) when ozone/ pollutant levels reach episodic thresholds so that the public is informed and encouraged to scale back activities generating pollutants.	Existing/SJVAPCD/Statewide	Air Quality Information is available on District and CARB websites
7.3	Land Use Strategies	Grants, and technical assistance to help cities and nonprofit agencies to defined and implement land-use projects that support community plans to increase housing and density near transit centers and decrease urban sprawl and reduce overall travel, or promote environmentally sustainable land use in economically viable rural areas for landowners and local governments.	Existing	RTP/SCS
7.4	Implement taxation policies	Initiate legislation to put a vehicle tax on the household with two or more vehicles or increase state gas tax.	No implementation authority	The County has taxation authority
7.5	Display air quality data on billboards	Self-explanatory.	Existing/SJVAPCD	
7.6	Evaluation of the Air Quality Impacts of New Development	Evaluate the air quality impacts of new development and mitigate any adverse impacts or provide financial or other incentive to local cities that practice air quality sensitive development.	Existing/Statewide	CEQA requirement
	<b><i>viii. Construction/Reconstruction of Paths for Non-Motorized Use</i></b>			
8.1	Bicycle/pedestrian facilities	Construct sidewalks, curbs, gutters, landscaping, lighting for bike and pedestrian pathways, signage and stripping, bike and pedestrian bridges, and/or tunnels over major highways.	Existing	RTP/SCS



TCM #	TCM	Description	Analysis	Comments
8.2	Encouragement of Pedestrian Travel	Encourage the use of pedestrian travel as an alternative to automobile travel. Promotion of pedestrian travel could be included in air pollution public awareness efforts to remind people of this basic alternative.	New	Move to New TCM Listing* *- Existing for Kern; CommuteKern.org
8.3	Encouragement of Bicycle Travel	Promotion of bicycle travel to reduce automobile use and improve air quality. Potential action may include the development and distribution of educational materials regarding bicycle use and safety.	New	Move to New TCM Listing* *- Existing for Kern; CommuteKern.org
8.4	Safe Routes to School Programs	Encourage educational and encouragement programs for families and schools and support policies to improve pedestrian and bicycle safety.	Existing	RTP/SCS
8.5	Require inclusion of bicycle/pedestrian lanes on state and federally funded projects	Require bicycle/pedestrian lanes on all state and federally funded road projects or require the inclusion of paved shoulders adequate for bicycle/pedestrian use on state and federally funded roads that require reconstruction or widening.	No implementation authority	The COGs cannot implement this requirement.
8.6	Complete Streets/Transit Oriented Development	Install bicycle and pedestrian facilities, upgrade traffic control systems, urban design improvements, streetlights, first-and-last mile connection to transit.	New	Move to New TCM Listing
<b>ix. Pre-1980 Model-Year Vehicle Scrappage</b>				
9.1	Accelerate retirements of trucks/ buses	Replace high mileage trucks and buses	Existing/Statewide	CARB Zero Emission Transit Rule
9.2	Purchase and Install Electric Charging Station	Purchase and install regular or solar-powered electric charging stations for charging electric powered cleaner buses	Existing/SJVAPCD	RTP/SCS and District's Charge Up! Program
<b>x. Transit-Only or High Occupancy Vehicle Lanes</b>				
10.1	Express busways/dedicated bus lanes	Construct bus-only lanes	No implementation authority	Would require state agency authority and funds
10.2	HOV lanes	Measures to increase HOV lane usage. Measures may include constructing additional high occupancy vehicle (HOV) lanes, allowing use by alternative fuel vehicles, increased enforcement, increasing occupancy requirements, conversion of existing HOV lanes to bus-only lanes, and/or designation of any new carpool lanes as bus-only lanes; utilization of freeway shoulders for peak-period express bus use; commercial vehicle buy-in to HOV lanes; and appropriateness of HOV lanes for corridors that have considered congestion pricing or value pricing.	No implementation authority	Would require state agency authority and funds
<b>xi. Employer-Based Plans and Incentives</b>				
11.1	Satellite work centers	Employers open new remote offices near employees' residences	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410

<b>TCM #</b>	<b>TCM</b>	<b>Description</b>	<b>Analysis</b>	<b>Comments</b>
11.2	Employer Measures/Incentives	Encourage employers to give incentives to employees to move close to the worksite, encourage employers to purchase vans for employee commute travel, encourage employers to provide preferential parking for carpools and vanpools to reduce SOV trips or cash equivalent of the parking subsidy to employees who do not drive to work, subsidize the cost of transit, etc.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
11.3	Bike to Workday	Conduct a one-day bike-to-work event. Provide outreach activities, education on the bike-to-work option, and provide assistance in trying bike to work.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
11.4	Promote business closure on high ozone days	Self-explanatory	No implementation authority	Managed by the Air District
11.5	Tax Benefits	Income tax credit to telecommuters, or tax benefit to employees who ride their bikes to work	No implementation authority	The County has taxation authority
11.6	Commuter Solutions	The federal law that complements parking cash-out is called the Commuter Choice Program. It provides benefits that employers can offer to employees to commute to work by methods other than driving alone.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
11.7	Parking Cash-Out	State law requires certain employers who provide subsidized parking for their employees to offer a cash allowance instead of a parking space.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
11.8	Employer Rideshare Program Incentives	Employer-based rideshare incentives and introduction of strategies designed to reduce single-occupant vehicle trips. Examples include public awareness campaigns, Transportation Management Associations among employers, alternative work hours, and financial incentives for TCM participants as well as tax breaks for employers. Provide outreach and possible financial incentives to encourage local employers to provide transit passes or subsidies to encourage less individual vehicle travel.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
11.9	Implement Parking Charge Incentive Program	Evaluate the feasibility of an incentive program for cities and employers that convert free public parking spaces to paid spaces. Review existing parking policies as they relate to new development approvals.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
11.10	Off-days for ozone alerts like sick days	On ozone alert days, notify employees through email that there is an ozone alert. Employees are given a pre-specified number of days they can decide not to come in to work on ozone forecast days.	Not economically feasible	Would impact economic activity in the region and would not be socially and economically acceptable.
<b><i>xii. Trip-Reduction Ordinances</i></b>				
12.1	The state law prohibits mandatory employer-based trip reduction programs (California Health & Safety Code §40717.6).		Not Applicable	
<b><i>xiii. Traffic Flow Improvements</i></b>				

TCM #	TCM	Description	Analysis	Comments
13.1	Intelligent Transportation Systems	Install ITS on freeways and arterials to increase traffic operations efficiency	Existing	FTIP/RTP
13.2	Speed limit reduction	Reduce freeway speed limit to 55mph, set speed limit during ozone season, etc.	No implementation authority	Managed by Caltrans
13.3	Intersection Improvements	Installation of turn lanes, curbs, traffic signals, and realign skewed intersections to provide better traffic flow and safety.	Existing	FTIP/RTP
13.4	Eco-driving educational program	Education program to improve vehicle efficiency by improving driving habits	New	Move to New TCM Listing
13.5	Ramp-Metering	Self Explanatory.	Existing where applicable	FTIP/RTP
13.6	Land-use strategies	Self Explanatory.	Existing	RTP/SCS
13.7	Freeway Service Patrol	Emergency services to clean up motor accidents in a timely fashion.	No implementation authority	Managed by Caltrans
13.8	Traffic Signal Synchronization/Traffic Signal Improvements	Install synchronized traffic signals, adaptive traffic signals, median dividers, turn lanes, and grade separations	Existing	FTIP/RTP
13.9	Truck only lanes	Construct or convert lanes for use by heavy-duty trucks only	No implementation authority	Would require state agency authority and funds
13.10	Site-Specific Transportation Control Measures	Relieving freeway/arterial bottlenecks by traffic control improvements at congested intersections or other locations. Examples may include programming left-turn signals at certain intersections to lag, the green time for through traffic, constructing roundabouts and removing stop signs as appropriate, redesignating streets as one-way to improve traffic,	Existing	FTIP/RTP
13.11	Impact of construction activities on travel	The measure may include having contractors pay incentives when lanes are closed, prohibiting lane closures during peak hours, and limiting construction to weekends or nights. Consider scheduling arterial and highway maintenance to exclude ozone action days if the maintenance activities require lane reductions on heavily utilized arterials and highways.	No implementation authority	Managed by Caltrans
13.12	Real-time traffic information	Reduce travel on highly congested roadways by providing accessible information on congestion and travel.	No implementation authority	Managed by Caltrans
13.13	Reroute trucks on ozone action days	Self-explanatory.	Not economically feasible	Would impact economic activity in the region; no alternate truck routes exist.
13.14	Pavement Resurfacing and Rehabilitation	Resurface unpaved, dirt roads and seal roads as a particulate matter control measure	Existing	FTIP/RTP

<b>TCM #</b>	<b>TCM</b>	<b>Description</b>	<b>Analysis</b>	<b>Comments</b>
13.15	Rail grade separation	Adjust road surface heights in line with rail to improve traffic flow	Existing where applicable	
	<b><i>xiv. Fringe and Transportation Corridor Parking Facilities for Vanpools/Transit</i></b>			
14.1	Preferential parking for alternative transportation modes	Preferential parking options, provide parking facilities, and designs to encourage carpools, vanpools, nonmotorized modes, cleaner vehicles (electric vehicles), etc.	Existing	RTP/SCS
14.2	Provide parking near transit facilities	Self-explanatory	Existing	RTP/SCS
14.3	Park-and-ride facilities	Construct park-and-ride lots near transit centers and transfer stations	Existing where applicable	
	<b><i>xv. Limit or Restrict Vehicle Use in Downtown Areas</i></b>			
15.1	Removal of on-street parking	Self-explanatory	Not economically feasible	Similar emission reductions can be achieved with Complete Streets planning
15.2	Parking Fee Regulations	Parking fees can be increased in different forms such as the highest charges for parking in central business districts, increase fees for parking garages to deter vehicle use during high ozone level days, and charging city-owned parking garage pass holders a fee for more than one entrance and exit each day, etc.	No implementation authority	Parking fees are set by each jurisdiction
15.3	Sustainable development/land use strategies	Encourage land-use planning that promotes development near transit centers	Existing	RTP/SCS
15.4	Reversible lanes	Change direction of travel during special events or during congestion periods	Would not advance attainment	Minimal emission reductions from this episodic strategy
15.5	Off-Peak Goods movement	Require trucks to operate during off-peak hours, cleaner trucks involved in goods movement, upgrade to cleaner technologies through locomotive replacement or retrofit or installation of a locomotive emissions capture and control system, etc.	Not economically feasible	Would impact economic activity in the region
15.6	Auto restricted zones	No vehicles allowed in certain areas where high emissions and, congestion contribute to ozone problems. Measure includes restricting vehicle use in downtown areas, high-use areas and ticket any vehicles present unless they are low emitting, alternative fueled or electric, implement an ordinance to restrict truck travel during peak periods, etc.	Not economically feasible	Similar emission reductions can be achieved with Complete Streets planning
15.7	Adjust school hours so they do not coincide with peak traffic periods and ozone seasons	Measure to reduce travel during peak periods and ozone-contributing periods in the early morning.	No implementation authority	School hours are set by local the School Districts

<b>TCM #</b>	<b>TCM</b>	<b>Description</b>	<b>Analysis</b>	<b>Comments</b>
15.8	Encourage cities and counties to employ good development practices	Provide incentives to cities and counties that practice air quality-sensitive development (e.g., REAP).	Existing	REAP
15.9	VMT Tax	Charge VMT tax per mile for all vehicles registered or garaged in the region.	No implementation authority	The County has taxation authority
15.10	Smart Parking Detection System	Utilize mobile communication devices to access the parking availability at multiple sites.	No implementation authority	Parking logistics are managed by each jurisdiction/city
<b><i>xvi. High-Occupancy and Ridesharing Programs</i></b>				
16.1	Rideshare program	Provide rideshare service	Existing	
16.2	Transit voucher program	Provide transit vouchers to certain population groups (elderly, minorities, homeless) to reduce transit costs	Existing/SJVAPCD	REMOVE II
16.3	Vanpool program	Provide vanpool service for certain communities, emergency situations to transit riders, vanpool service from transit stations to parking lots. Purchase new vans.	Existing	Calvans, Dibs, KART, Commute Connections are vanpool providers in the SJV
16.4	Financial Incentives	Provide financial incentives or other benefits, such as free or subsidized bus passes and cash payments for not driving, in lieu of parking spaces for employees who do not drive to the workplace, cash incentives for carpoolers.	Existing/SJVAPCD	Employer Based Trip Reduction/Rule 9410
16.5	Subscription (Paratransit) Services	Van services to provide transportation for the elderly handicapped or other individuals who have no access to transportation.	Existing	ADA requirement
16.6	Rideshare/Carpool Promotion	Provide match-lists, route info, hours and contact information over the internet to assist individuals in joining or developing carpools, and using rideshare services	Existing	RTP/SCS <b>Move to New TCM List for StanCOG</b>
<b><i>Others</i></b>				
17.1	Divert trucks from nonattainment areas	Require pass-through trucks to choose routes away	No implementation authority	Managed by Caltrans and/or Air District
17.2	Programs to encourage goods movement by rail	Self-explanatory	Existing/Statewide	CARB
17.3	Buy parking lots and convert to land use	Self-explanatory	No implementation authority	Parking lots are managed by each jurisdiction/city
17.4	Clean Fleet Vehicles for Government Employees	Provide alternative fuel vehicles for government employees.	Would not advance attainment	Minimal emission reductions granted the volume of government vehicles in the county

**Appendix B**

**Table B1. Fresno New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	California Ave between Fruit Ave and Mayor Ave/Tupman St; Install Class IV bicycle facilities, sidewalks, HAWK crossing, street lights along corridor, intersection reconfigurations.	LSTMP799	City of Fresno	2029
	Blackstone Ave between McKinley Ave to Shields Ave; Install Class IV bicycle facilities, traffic calming infrastructure, curb ramps and median nose recon, bus stop platforms, signing and striping.	LSTMP720	City of Fresno	2029
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through updates to FCOG website.	NA	FCOG	2024
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through updates to FCOG website.	NA	FCOG	2024
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through FCOG website update.	NA	FCOG	2024

**Table B2. Kern New TCM Listing**

<b>TCM</b>	<b>Description</b>	<b>Project ID</b>	<b>Agency/City</b>	<b>Implementation Timeline</b>
Complete Streets and Transit Oriented Development	Downtown Bicycle Connectivity Project	KER161011	City of Bakersfield	2026
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings by updating CommuteKern.org website.	KER220501	KCOG	2024

**Table B3. Kings New TCM Listing**

<b>TCM</b>	<b>Description</b>	<b>Project ID</b>	<b>Agency/City</b>	<b>Implementation Timeline</b>
Complete Streets and Transit Oriented Development	Construct sidewalks, ADA ramps, lighted crosswalks, and bike routes on Orange Ave and North Ave.	216-0000-0169	City of Corcoran	2023
	Construct sidewalks along various school routes, install high visibility crosswalks and ADA curb ramps.	216-0000-0169	City of Corcoran	2025
	Construct sidewalk and bicycle facility improvements on Whitley Ave. Provide connections to other bicycle paths and transit access.	216-0000-0169	City of Corcoran	2026
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through updates to KCAG website.	NA	KCAG	2024
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through updates to KCAG website.	NA	KCAG	2024
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through KCAG website update.	NA	KCAG	2024



**Table B4. Madera New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	Construct Bicycle and Pedestrian Path; Road 225; Willow Creek Drive to Road 228	MAD102059	Madera County	2028
	City of Madera; Bicycle/Pedestrian Facilities - Fresno River Trail Between North-South Trail Behind Montecito Park and Granada Drive	MAD202086	City of Madera	2028
	City of Madera; Pedestrian facilities around Washington School	MAD217036	City of Madera	2028
	Riverside Avenue, 8th Street, & Kings Avenue Pedestrian Improvements Project	MAD302058	City of Chowchilla	2028
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through updates to MCTC website.	NA	MCTC	2024
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through updates to MCTC website.	NA	MCTC	2024
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through MCTC website update.	NA	MCTC	2024

**Table B5. Merced New TCM Listing**

<b>TCM</b>	<b>Description</b>	<b>Project ID</b>	<b>Agency/City</b>	<b>Implementation Timeline</b>
Complete Streets and Transit Oriented Development	Livingston Phase 2 Max Foster Multiuse Path	205-0000-0317	City of Livingston	2024
	Gustine Pedestrian Improvements on 3rd Ave, East Ave, & South Ave	205-0000-0301	City of Gustine	2024
	Gustine Phase 3 Multiuse Path on Railroad, Meredith, & South Aves	205-0000-0316	City of Gustine	2025
	Merced Childs Ave Multiuse Path	205-0000-0319	City of Merced	2025
	Merced Pedestrian Improvements on McGregor, Woodward, Home, Windsor, and Parkwest	205-0000-0320	City of Merced	2026
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to MCAG website.	NA	MCAG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to MCAG website.	NA	MCAG	Ongoing
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic MCAG website updates.	NA	MCAG	Ongoing
Public education, outreach & marketing for "The Bus"	Promotion of "The Bus" transit service, overseen by the Transit Joint Powers Authority of Merced County (TJPAMC), through public outreach, education, and marketing campaigns at various community events and online for the transit-dependent public.	NA	TJPAMC	Ongoing
Public education, outreach & marketing for YARTS	Promotion of the Yosemite Area Regional Transportation System (YARTS) service including public outreach, community events, and extensive marketing, such as through Amtrak or in surrounding regions with informative materials and tools to prospective Yosemite visitors.	NA	YARTS	Ongoing

**Table B6. San Joaquin New TCM Listing**

<b>TCM</b>	<b>Description</b>	<b>Project ID</b>	<b>Agency/City</b>	<b>Implementation Timeline</b>
Complete Streets and Transit Oriented Development	Various multi-modal connectivity projects throughout San Joaquin County.	212-0000-0780	Various	Ongoing
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to SJCOG website.	NA	SJCOG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to SJCOG website.	NA	SJCOG	Ongoing
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic SJCOG website updates.	NA	SJCOG	Ongoing

**Table B7. Stanislaus New TCM Listing**

TCM	Description	Project ID	Agency/City	Implementation Timeline
Complete Streets and Transit Oriented Development	F St from Oakdale-Waterford Highway, Lateral Number Two Path (Proposed) to Dorsey St, Separated Bike Lane	RTP/SCS W20	City of Waterford	2025
	F St, from Bentley St to Hickman Rd, Separated Bike Lane	RTP/SCS W21	City of Waterford	2025
	The Robertson Road Elementary Safe Crossing and Active Transportation Connectivity Project	214-0000-0672	Stanislaus County	2026
	Waterford Safe Routes to School Project – Yosemite Blvd	214-0000-0672	City of Waterford	2026
	The Bret Harte Elementary Safe Crossing and Active Transportation Connectivity Project	214-0000-0672	Stanislaus County	2026
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to StanCOG website.	NA	StanCOG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to StanCOG website.	NA	StanCOG	Ongoing
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic StanCOG website updates.	NA	StanCOG	Ongoing
Rideshare/Carpool Informational Campaign	Promote carpool ad rideshare programs through information posted on StanCOG website linking to rideshare services available in the county.	NA	StanCOG	Ongoing

**Table B8. Tulare New TCM Listing**

<b>TCM</b>	<b>Description</b>	<b>Project ID</b>	<b>Agency/City</b>	<b>Implementation Timeline</b>
Complete Streets and Transit Oriented Development	Development of an active transportation corridor (approximately 3.9 miles in length) to include solar lighting, water stations, wayfinding, benches, controlled lighted crossing systems.	215-0000-0726	City of Porterville	2032
Encouragement of Pedestrian Travel	Promote pedestrian travel by implementing an informational campaign on new pedestrian facilities, safety and air quality benefits through periodic updates to TCAG website.	NA	TCAG	Ongoing
Encouragement of Bicycle Travel	Promote bike travel by implementing an informational campaign on bicycle transportation opportunities, safety, and air quality benefits through periodic updates to TCAG website.	NA	TCAG	Ongoing
Eco-driving educational program	Include information on eco-driving and related air quality benefits and fuel savings through periodic TCAG website updates.	NA	TCAG	Ongoing

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