Appendix E

INCENTIVE-BASED STRATEGY

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Appendix E: Incentive-Based Strategy

The San Joaquin Valley Air Pollution Control District (District) has increasingly relied on its advocacy efforts to secure state and federal funding sources, and locally generated funding to implement incentive programs that have become a crucial component of the District's overall strategy for achieving the emissions reductions necessary to bring the Valley into attainment. These programs provide an effective way to accelerate emissions reductions and encourage technology advancement, particularly from mobile sources, a sector not directly under the District's regulatory jurisdiction. Given that over 80% of Nitrogen Oxide (NOx) emissions in the San Joaquin Valley (Valley) come from mobile sources, these successful voluntary incentive grant programs help the Valley achieve highly cost-effective emissions reductions that are surplus of the regulatory emissions reductions.

This Appendix will review the District's existing longstanding and successful incentive programs.

Over the past 15 years,[1] the District has provided incentive funding to purchase, replace, or retrofit thousands of pieces of equipment, including:[2]

- 1,660 agricultural irrigation pump engines
- 12,800 agricultural equipment replacements
- 4,680 alternatives to agricultural burning projects
- 350 off-road equipment repowers
- 6,500 heavy-duty trucks
- 1,800 school bus retrofits
- 600 school bus replacements
- 10,400 lawnmower replacements
- 30,300 fireplace change-outs
- 525 electric vehicle charging station projects
- 52 locomotive replacements/retrofits
- 36,500 new alternative fuel light duty vehicles, public & private
- 6,250 vehicle retirements (car crushing)
- 96,080 vehicle emissions repairs
- 15 bicycle infrastructure projects (bike paths)

The District's incentive programs continue to be a model for other agencies throughout the state. Recent audits noted the District's efficient and effective use of incentive grant funds in reducing air pollution.

[1] Significant additional pieces of equipment funded over last several decades.
[2] Data covers projects executed May 13, 2009, through May 13, 2024

E.1 OVERVIEW OF DISTRICT'S INCENTIVE PROGRAM

The District operates one of the largest and most well-respected voluntary incentive programs. Through strong advocacy at the state and federal levels, the District has increased its funding levels over the past decade and has appropriated $650 million in incentive funding in the 2023-2024 District Budget. Since the District's inception in 1992, considerable funding has been invested into thousands of clean-air projects throughout the Valley. These projects have achieved significant emissions reductions with corresponding air quality and health benefits.

The District typically requires match funding of 30% to 70% from grant recipients. To date, grant recipients have provided over $3.8 billion in matching funds, with a combined District and grant recipient funding investment of more than $6.5 billion.

Table E-1 Summary of Grant Expenditures and Results

District Incentive Funding ($)	Grant Recipient Match Funding ($)	Emissions Reductions (tons)	Cost-Effectiveness ($/ton)
$2,698,818,000	$3,894,980,000	280,730	$9,613

E.2 SIP CREDITABILITY FOR INCENTIVE-BASED EMISSIONS REDUCTIONS

Historically, states and local air agencies have not been able to obtain credit in state implementation plans (SIPs) for incentive-based emissions reductions. When provided SIP credit, incentive-based emissions reductions can be used alongside regulatory-based emissions reductions to meet federal Clean Air Act (CAA) requirements, such as demonstrating attainment with federal air quality standards at a future date. Given the substantial investment from the public and private sectors in replacing equipment under these voluntary incentives, establishing a general framework to receive SIP credit for these emissions reductions was critical. Recognizing the importance of this issue, the U.S. Environmental Protection Agency (EPA), California Air Resources Board (CARB), and the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) worked together with the District to create a Statement of Principles (Memorandum of Understanding, or MOU). Signed in December 2010, this MOU established a general framework for ensuring that reductions in air emissions resulting from voluntary incentives to replace off-road agricultural equipment received credit in the SIP. The MOU states that the District, USDA-NRCS, CARB and EPA would work collaboratively to develop a mechanism to provide SIP credit for emissions from incentive programs that are surplus, quantifiable, enforceable, and permanent. Continuing these efforts, in July 2012, EPA and USDA agreed to implement this concept to ensure that emissions reductions from incentive programs were given proper credit in the SIP context.

As a result of these collaborative efforts, the District adopted Rule 9610 (State Implementation Plan Credit for Emission Reductions Generated through Incentive Programs) on June 20, 2013. District Rule 9610 establishes the administrative mechanism through which SIP credit may be quantified for emissions reduced in the Valley through incentives. EPA approved District Rule 9610 on April 9, 2015.

As with prohibitory rules, EPA guidance requires that emissions reductions achieved through voluntary incentive programs be surplus, quantifiable, permanent, and enforceable in order for those reductions to receive SIP credit. Additionally, EPA guidance requires extensive documentation of emissions reductions proposed for SIP credit with ongoing follow-up and tracking of the emissions reductions.

The District designs incentive programs to meet the SIP-creditability criteria. In order to be surplus, emissions reductions from voluntary incentive programs must provide emission reductions ahead or beyond any local, state, or federal regulations. Quantifiable emissions reductions are calculated using publicly developed methodologies. To ensure enforceable and permanent emissions reductions, programs require mechanisms such as legally binding agreements with program participants and physical inspections to verify the completion of projects. Furthermore, all criteria and reporting mechanisms are transparent to the public.

E.3 INCENTIVE FUNDING SOURCES

The District is engaged at every level of state and federal government to craft policy and funding targets that account for the Valley's unique challenges and need to accelerate emissions reductions, particularly from sources not under the District's regulatory authority. Therefore, the District works closely with the Valley's legislative delegation to ensure representation of the Valley's needs in discussions of where to focus funding throughout the state and the region as a whole. In addition, the District focuses on how to allocate the limited funding received for its incentive programs effectively.

In addition to aggressively pursuing funding from state funding sources such as the Carl Moyer Program, the District has been very successful in securing grants from the highly-competitive federal Diesel Emissions Reductions Act (DERA) and the state Assembly Bill (AB) 118 Air Quality Improvement Program (AQIP). Currently, the District actively engages with CARB, the California Energy Commission (CEC) and other state agencies to ensure representation of the Valley in project selections from the Greenhouse Gas (GHG) Reduction Fund.

Recent state and federal budget and funding actions have created unprecedented opportunities for the San Joaquin Valley to receive much needed investments to reduce emissions from mobile sources. At the state level, the 2023-2024 budget, building on prior years, allocates a total of approximately $52.3 billion for climate related investments over six years. At the federal level, recent authorizations under the Infrastructure Investment Jobs Act (IIJA) and Inflation Reduction Act (IRA) provide wide-ranging funding for a variety of important clean technology and infrastructure programs. Notably, IRA includes an estimated $369 billion in funding for climate and energy-related programs, and many billions of additional funding for sustainable agriculture and programs of importance to the Valley. Given the Valley's air quality challenges and significant number of disadvantaged communities, it will be imperative that the state, EPA, and other federal agencies prioritize and integrate new funding opportunities with SIPs for Extreme ozone nonattainment and Serious PM2.5 nonattainment areas.

E.4 INCENTIVE STRATEGY

Each of the funding sources administered by the District includes different guidelines and statutory requirements for using the funds. Beyond the specific guidelines of each funding source, the District considers the following common factors when deciding how and where to spend incentive funds:

- **Cost Effectiveness:** An important factor when considering where to invest District funds is determining which types of projects and programs will give the District the greatest return on its investment. This is typically represented in dollars per ton of emissions reduced. While cost-effectiveness is a primary factor, the District also considers projects that may not have the highest cost-effectiveness, but that provide other benefits, such as the advancement of new technology or community involvement.

- **Inventory of Available Projects:** This factor is critical in all District incentive programs. To date, the District has been extremely successful in designing incentive programs that have broad appeal and applicability across multiple industries. Over the past 10 years, this level of interest has resulted in a substantial number of projects waiting for funding. The District will continue to work with applicants to ensure expeditious funding of eligible projects.

- **Required Expenditure Timeframes:** Each funding source that the District administers generally requires obligation and expenditure by certain deadlines. These deadlines greatly impact funding priorities and choice of projects. The District may prioritize a funding category over others because of the timeframe associated with a particular funding source. For instance, priority may be given to certain projects that can reasonably be expected to finish prior to the deadline for that specific fund over other projects of equal relevance or cost-effectiveness, but with longer expected completion times. Again, the flexibility of this option works in concert with the dynamic nature of the incentive programs, projects, expenditure deadlines.

- **Upcoming Regulatory Deadlines:** To ensure that incentive programs obtain the maximum SIP-creditable emissions reductions, the District performs a thorough analysis of all local, state, and federal regulations relating to the target categories. In addition, the District works proactively with the regulating agencies during the rule development process to understand the potential impacts of that rule on incentive projects and to ensure that opportunities for early incentive funding are maximized. These analyses determine which types of projects can be funded, for how long projects can be funded, which also impacts the potential cost-effectiveness of certain projects.

- **Health Benefits:** In addition to emissions reductions needed to attain air quality standards, the District also seeks incentive projects that provide direct health benefits to Valley residents. For instance, the District's Lower-Emission School

Bus Program focuses primarily on the localized toxic risk involved in children's exposure to diesel particulates. While not the largest source of regional particulate pollution, replacing or retrofitting aging school buses has an enormous impact on the toxic risk of school transportation.

- **Environmental Justice:** The District places a strong emphasis in providing funding in a manner that benefits environmental justice communities. The District has worked cooperatively with the Environmental Justice Advisory Group to understand the Valley's environmental justice issues and to craft programs that reduce emissions in these areas.

- **Community Involvement and Benefits:** The District develops and administers programs with an emphasis on community involvement. Some examples of these are the Clean-Green-Yard-Machine program, Drive Clean! Rebate program, Burn Cleaner program, Transit Pass Subsidy program, and the Polluting-Automobile Scrap and Salvage program.

E.5 CURRENT INCENTIVE PROGRAMS

E.5.1 Heavy Duty Trucks

The heavy-duty trucks category is composed of light-heavy-duty to heavy-heavy-duty diesel trucks with a gross vehicle weight rating (GVWR) of 14,001 pounds and greater. Light-heavy-duty trucks have a GVWR of 14,001 to 19,500 pounds, medium-heavy-duty trucks have a GVWR of 19,501 to 33,000 pounds, and heavy-heavy-duty trucks have a GVWR greater than 33,001 pounds. Emission reductions in the heavy-duty truck fleet must be achieved through accelerated fleet turnover to the cleanest engines meeting ultra-low NOx emissions levels, which are 90% cleaner than engines currently required.

While CARB rulemaking efforts like CARB's Truck and Bus Regulation, and past funding programs like Prop 1B, are helping transition California fleets to clean engines meeting the 2010 0.2 grams per brake horsepower-hour (bhp-hr) NOx standard, these efforts are not enough to bring the Valley into attainment with the federal PM2.5 standards by the mandated deadlines. In an effort to encourage the transition to near-zero technologies and achieve reductions faster, CARB established optional ultra-low NOx standards of 0.1, 0.05, and 0.02 g/bhp-hr, which are up to 90% lower than the current heavy-duty truck standard. These optional standards have pushed progressive engine manufacturers to explore and develop new engine technologies. As such, engines that meet the optional ultra-low NOx standards for various classes of heavy-duty trucks are already available.

The zero-emission technologies for heavy-duty trucks, such as battery electric vehicles, have limited range and are only currently available for short-range duty cycles, such as refuse, last-mile delivery trucks, and drayage. However, development and demonstration are ongoing for longer-range zero-emission options, including hydrogen fuel cells as range-extenders for battery electric vehicles.

Aside from battery electric or fuel cell electric vehicles, natural gas and propane engines are currently the only fuel-type certified to meet the 0.02 g/bhp-hr ultra-low NOx emissions standards and is currently the only available option for long-range heavy-duty applications. As such, the District must continue to work with EPA, CARB, and industry to establish the appropriate natural gas fueling network to support the proposed fleet turnover.

Despite lack of direct regulatory authority, the District has helped increase the effectiveness of state and federal heavy-duty on-road emissions regulations through the administration of established state incentives programs and the adoption of local programs. Continuing to transition the heavy-duty truck fleet over to zero and near-zero emissions technologies is a critical component of District's control strategy. The District aims to accelerate the turnover of trucks to newer, cleaner vehicles, primarily focusing on the ultra-low NOx engines certified to 0.02 g/bhp-hr.

The District has administered numerous incentive programs over the years, using federal, state, and locally generated funds to replace older on-road heavy-duty trucks with the cleanest available technologies.

Proposition 1B (Prop 1B): The Prop 1B Goods Movement Emission Reduction Program was the single largest source of funding for the District's heavy-duty on-road incentive program. Prop 1B used bond funds for a variety of state transportation priorities, including the replacement of heavy-duty trucks, transportation refrigeration units, and locomotives used in the goods movement corridors. The District aggressively pursued its share of Proposition 1B funding, and the Valley has received over $250 million over the life of the program, replacing 2,900 trucks.

Truck Replacement Program (TRP): The Governing Board authorized the creation of the District's Truck Voucher Program in 2012. This program was created to ensure that Valley truck fleets had opportunities to replace their older, high-polluting trucks well in advance of the Statewide Truck and Bus Regulation deadlines. The program is primarily focused on providing funding for truck replacements for small businesses that do not generally qualify for funding under the Proposition 1B or other programs. District verification of all information submitted, as well as physical inspections of new and old vehicles, help ensure that the integrity of the program is maintained throughout the process.

In March of 2018, the Governing Board approved enhancements to the Truck Voucher Program to incorporate requirements of new state funding and ensure cost-effectiveness and SIP creditability of the resulting emission reductions. In addition, the District added new funding options to encourage Valley fleets to adopt zero and near-zero emission truck technology. The enhancements approved by the Board included rebranding the program under one name, simply the Truck Replacement Program, in order to be more intuitive and inclusive of all District truck programs.

In April of 2022, in response to the regulatory compliance requirement deadline, the District adopted additional enhancements to the program to fully align with the State's

recently updated Carl Moyer Program Guidelines. These updates included necessary flexibility to fund truck replacement projects moving forward including enhanced incentives for near-zero and zero emission new trucks as well as the following model year eligibility and funding cap increases:

- Updated existing vehicle engine model year eligibility requirements:
  - Engine model year must be six or more years of age (for example, replace a 2017 model year engine in 2023)
- Increased state funding caps:
  - Up to $160,000 for near-zero low NOx standard (0.02 g/bhp-hr)
  - Up to $410,000 for zero-emission technology
  - Funding amounts vary based on fleet size (small fleets receive higher percentage), cost-effectiveness, and use
- Increased Cost Effectiveness limits:
  - Up to $209,000 for near-zero low NOx standard (0.02 g/bhp-hr)
  - Up to $522,000 for zero emission technology

The District has funded the replacement of over 5,200 heavy-duty trucks, with more applications coming in every day. The program is very popular with Valley based heavy-duty truck dealers because the program operates very efficiently.

E.5.2 Passenger Cars, Light-Duty Vehicles, Medium-Duty Vehicles

This category includes classes of vehicles used primarily for personal transportation. When the light-duty truck and medium-duty vehicle categories were first established, the majority of vehicles in the medium-duty vehicle category were primarily used for work purposes. The popularity and high sales volumes of full size pick-up trucks and SUVs have altered the light- and medium-duty truck use patterns. It is now common for trucks and SUVs to be used primarily for personal transportation.[3]

Passenger cars are vehicles designed primarily for transportation of persons and having a capacity of twelve or less. Light-duty trucks are trucks with a GVWR less than 5,750 lbs. Medium-duty vehicles have a GVWR between 5,751 lbs. and 8,500 lbs.

California has the Nation's longest history of passenger car emissions standards and an accompanying inspection and maintenance program. Continued reductions in emissions from this category while the overall size of the fleet is increasing relies on vehicle turn-over, proper maintenance of legacy vehicles, and continual improvement of new vehicle emissions. The District has operated programs to address each of these needs.

Despite lack of direct regulatory authority, the District has helped increase the effectiveness of state and federal light-duty on-road vehicle regulations through the

[3] CARB. (1999). *"Lev II" And "Cap 2000" Amendments To The California Exhaust And Evaporative Emission Standards And Test Procedures For Passenger Cars, Light-Duty Trucks And Medium-Duty Vehicles, And To The Evaporative Emission Requirements For Heavy-Duty Vehicles: Final Statement Of Reasons.* Retrieved from: http://www.arb.ca.gov/msprog/levprog/levii/pstfrpt.pdf

administration of established state incentives programs and state leading innovation in the adoption of local programs.

Tune In Tune Up: Since 2010, the District has partnered with Valley Clean Air Now (Valley CAN) to administer the Tune In Tune Up vehicle repair program. Initial funding for Tune In Tune Up came from the state's Reformulated Gasoline Settlement Fund and resulted in the repair of more than 2,900 vehicles. Because of the success of this initial effort and benefits to the residents of the Valley, the District has budgeted additional funding for the program hosting a total of 326 events consisting of in-person and virtual events, repairing over 96,080 vehicles, using $53,544,000 of locally generated incentive funds.

With a focus on outreach to low income communities, this award-winning program provides Valley residents with the opportunity and necessary funding to make emissions-related repairs to their vehicles, significantly reducing emissions throughout the Valley, particularly in disadvantaged communities. In partnership with Valley CAN, this program has grown to become the most effective, targeted vehicle repair program in the state. In addition to the significant emissions benefits of the program, the Tune In Tune Up program has produced extremely valuable data regarding the true nature and extent of high-polluting, largely unregistered vehicles in the Valley, particularly amongst the Valley's low income population.

Through this partnership with Valley CAN, the District has provided much-needed funding for vehicle repairs with the vast majority of these vehicles operating within the Valley's disadvantaged communities. An additional benefit of this program is follow-up with owners of vehicles that are unregistered due to smog-related issues to help ensure that their vehicles are re-registered after repair.

Enhanced Fleet Modernization Program (EFMP) and Clean Cars 4 All (CC4A): In recognition that not all vehicles that participate in the Tune In Tune Up weekend events are good candidates for repair, the District developed a first-of-its-kind vehicle replacement pilot program, implemented in partnership with Valley CAN. This program identified vehicles at weekend events which were not good candidates for repair and provided additional funding to retire and replace those vehicles with cleaner, more efficient vehicles. Based on the initial success, this pilot program served as a model for developing the statewide EFMP and CC4A programs.

Since 2015, the District has incorporated a vehicle replacement component into the Tune In Tune Up weekend events. The EFMP and CC4A programs currently provide between $7,000 to a maximum of $12,000 per vehicle to replace older, high emitting vehicles. The incentive is limited to low-income participants and the amount is based on the type of replacement vehicle purchased and the participant's home address. The highest incentive is given to participants who reside within disadvantaged community census tracts that choose the cleanest available vehicles (generally battery-electric).

These programs are funded through CARB's AB 118 program and Greenhouse Gas Reduction Fund (GGRF), more commonly referred to as the Cap and Trade Program.

To date, the District and Valley CAN have replaced more than 6,400 vehicles with newer, cleaner vehicles with approximately 90% of the participants meeting the program's definition of low income and 76% of the vehicles residing within the Valley's disadvantaged communities.

Drive Clean! Rebate Program: Today's market provides consumers with a wide variety of clean-air vehicle options. This program provides rebates to Valley residents and businesses for the purchase or lease of new, clean-air vehicles. The Valley has traditionally lagged other areas of the state in electric vehicle use and ownership. This is evidenced by the low participation of Valley residents in statewide incentive programs for electric and other advanced passenger vehicle technology. Only about 3% of participants in the statewide Clean Vehicle Rebate Program have been from the San Joaquin Valley. This program has further encouraged Valley residents to drive these cleaner alternatives. Since the launch of the Drive Clean! Rebate Program in March 2012, the District has issued over 33,640 rebates, totaling more than $95.4 million in grant funding.

Public Benefits Grants Program, New Alternative Fuel Vehicle Purchase component: The Public Benefit Grants Program was developed to help address the needs and challenges faced by Valley public agencies in their efforts to secure funding for clean-air projects. The program was designed to provide necessary flexibility and leveraging to ensure the success of these projects. The New Alternative Fuel Vehicle Purchase component provides funding for the purchase of new, light-duty alternative fuel vehicles including, electric and plug-in hybrids. Since the launch of the program in 2011, over $56 million has been awarded for the purchase of clean alternative fuel vehicles such as zero-emission motorcycles, full battery-electric and plug-in hybrid electric vehicles.

E.5.3 Mobile Agricultural Equipment

This category includes off-road agricultural equipment such as tractors, backhoes, wheel loaders, and other off-road farming vehicles that are widely used in the Valley. Off-road agricultural equipment replacements and repowers play a crucial role in reducing emissions, and significant emission reductions have already been achieved through accelerated fleet turnover to the cleanest available Tier 4 technologies.

Although the increasingly stringent new engine standards for off-road equipment will reduce emissions from mobile agricultural equipment over time, most existing off-road agricultural equipment operates for several decades before being retired due to their durability and relatively low cost to maintain. Furthermore, the useful life of a tractor in the Valley is much longer than other parts of the country due to the Valley's hot, dry summers and mild, wet winters.

While most of the equipment in this category are tractors, a significant portion consists of harvesters, loaders, sprayers, conditioners, balers, cotton pickers and other specialized equipment types. Some types of non-tractor mobile agricultural equipment have unique and specific roles within an operation based on the commodity produced

and usually require specialized functions of the equipment. Non-tractors often have specialized roles that are specific to certain functions and limit their usefulness for multiple operations, causing non-tractors to be significantly more expensive than tractors. The large cost deters operators from replacing and purchasing specialized equipment which leads to less turnover of older, more polluting equipment within the specialized mobile agricultural equipment population.

In 2012, CARB staff began to develop the framework for mobile agricultural equipment to become eligible to receive SIP credit. That process included in-depth research of the unique economical and operational characteristics of mobile agricultural equipment in the agricultural industry, which included reviewing and analyzing the cost and availability of Tier 4 technologies for mobile agricultural equipment. It was determined that a two-step regulatory process that ensures SIP credit for voluntary incentive program mobile agricultural projects in the near-term and a longer-term effort to accelerate use of Tier 4 equipment would better serve to maximize the air quality benefits over time while also meeting SIP goals. As a result, in October 2013, CARB adopted their Regulation for State Implementation Plan Credit from Mobile Agricultural Equipment that relies on voluntary incentive measures to achieve reductions from this essential category.

Despite lack of direct regulatory authority over mobile agricultural equipment, the District has helped accelerate emission reductions from this category ahead of state regulation through the administration of established state incentives programs and the adoption of local programs. The District's successes in its partnerships with Valley growers, USDA-NRCS and CARB to replace tractors through voluntary incentives is a great example of how effective incentive-based strategies can lead to more emission reductions in an expeditious fashion.

Tractor Replacement Program: Since 2009, the District and the USDA-NRCS have implemented and provided funding for a voluntary incentive program that has replaced more than 13,150 agricultural tractors for Valley farmers. Funding for this program includes Federal AQIP, Federal Targeted Airshed Grants, Diesel Emissions Reduction Act, motor vehicle fees, ISR fees, Voluntary Emission Reduction Agreements, the Carl Moyer Program, the FARMER program, and the Community Air Protection program.

Small Farmer Certified Pre-Owned Agricultural Equipment Pilot Program: There are still many old, high polluting tractors used in the San Joaquin Valley by small farmers for whom the cost of the new tractor is not feasible even with the District's current incentive program. The District launched the first-of-its-kind Small Farmer Certified Pre-Owned Agricultural Equipment Pilot Program in the summer of 2022. When coupled with an expanded agricultural equipment replacement program, this program has the potential to achieve significant additional cost-effective emissions reductions.

Electrified Dairy Feed Mixing Program: The District completed a highly successful demonstration of an electrified feed mixing system as a part of the Technology Advancement Program. Informed by that project's success, the District developed this

new pilot incentive program to target the installation of electric feed mixing equipment and further reduce diesel emissions from tractors and other mobile equipment and vehicles at Valley dairies and other confined animal feeding operations (CAFOs). The primary emission reductions from this program derive from the elimination of existing agricultural tractors that mix and deliver feed, the elimination or reduction in usage of on-road trucks used to deliver feed, and reduction in usage of any remaining off-road equipment used in the feeding process. Further emission reductions and cost-savings to Valley dairies and CAFO's will be achieved through increased efficiencies of the new systems that result in an overall reduction in feed mixing equipment usage. Since launching the program in January 2018, the program has funded over $23.8 million for the transition to electrified feed systems and has received an additional $17 million in incentive funding application requests from Valley dairies pursuing transition to electrification and much cleaner feed systems.

E.5.4 Locomotives

The emissions from goods movement are a significant source of diesel particulate matter (PM) in the Valley and the state, and many of the larger cities in the Valley are home to locomotive rail yards. Locomotives, in particular, present a considerable health risk from diesel PM emissions. Residential areas located near rail yards have shown a significant increase in cancer risk and can equal or exceed the regional background or regional health risk levels.

Locomotives are divided into three groups: interstate line-haul locomotives, medium-horsepower locomotives that are used primarily in California or regional service, and switcher locomotives. This component also includes emissions from other off-road equipment used at rail yards, including cranes, yard tractors, and material handling equipment such as forklifts.

Interstate line-haul locomotives are generally newer (built 1995 and later), higher horsepower (greater than 4,000 hp) locomotives that operate over long distances and in many states. Medium Horsepower (MHP) Locomotives are typically older locomotives that may have once served in interstate line haul service but are now used in regional service. Switcher (Yard) Locomotives are typically used to push railcars together to form trains within rail yards, but can also be used to power local and regional service trains.[4]

Heavy-Duty Engine Program, Locomotive Component: This program component awards up to 85% grant funding for newer, cleaner diesel locomotive engines and locomotive replacements. The locomotive component of the Proposition 1B Program funded up to 80% for the replacement of an uncontrolled, Tier 0 through Tier 2 locomotive with a new locomotive that meets or exceeds Tier 4 standards (1.30 g/b-bhp-hr NOx and 0.03 g/bhp-hr PM). Eligible projects are funded with local, state, and federal sources, including but not limited to the Carl Moyer Program, the Federal Diesel

[4] California Air Resources Board [CARB]. (2009). Recommendations to Implement Further Locomotive and Railyard Emission Reductions. Retrieved from http://www.arb.ca.gov/railyard/ted/drftrec090909.pdf

Air Shed Grant, and DERA funding. Over the past 15 years, the District has funded idle reduction technology, repower and replacement of 52 locomotives, with more projects currently in the queue.

The District funds locomotive repower or replacement projects by entering into an agreement with the applicant to replace the old, dirty locomotive with newer, cleaner technology. During the pre-inspections, all necessary locomotive engine information is verified by District inspectors and documented in digital photographs. Upon verification of all information, the District enters into an agreement with the recipient for the project. Once the replacement switcher locomotive engine has been purchased and the original engine has been dismantled, the recipient will complete and return the claim-for-payment packet, and a post-inspection is performed, prior to payment, to verify the new information. Monitoring and reporting continue for the duration of the agreement to ensure the emissions reductions from the project are real and quantifiable.

Proposition 1B Locomotive: The District has funded the replacement of 22 locomotives totaling $37.8 million in funding through the Proposition 1B program. These projects achieve 136.5 tons of PM and 3,009 tons of NOx emissions over the life of the projects.

E.5.5 School Bus Replacement and Retrofit

This category includes diesel-fueled buses, including those from public school districts and other qualifying agencies that service public schools, with a GVWR over 14,000 pounds. The number of buses that are in this source category is relatively small compared to the number of heavy-duty trucks also meeting the 14,001 or more GVWR catagory and covered by the State Truck and Bus Regulation. School bus replacements and retrofits play a vital role in reducing school children's exposure to both cancer-causing and smog-forming pollution.

The School Bus Replacement and Retrofit programs provide grant funding for new, safer school buses and air pollution control equipment (retrofit devices) on buses that are already on the road. Public school districts in California that own their buses are eligible to receive funding. Eligible projects are funded with local, state, and federal funds including DERA funding and state and local mitigation fees.

Over the life of the program, the District has provided funding to retrofit 784 school buses and replace 619 school buses. New buses purchased to replace older buses may be fueled with diesel or an alternative fuel, such as compressed natural gas (CNG) or electricity, provided that the required emissions standards specified in the current guidelines for the Lower-Emission School Bus Program are met. Funds are also available for replacing on-board CNG tanks on older school buses and for updating deteriorating natural gas fueling infrastructure. Commercially available zero-emission electric school buses are eligible for additional funding through the state's Hybrid Voucher Incentive Program (HVIP).

Eligible school buses are selected based on specific program requirements, including replacing the oldest models first. After determining eligibility, school districts are awarded contracts that provide a reasonable time period for project completion. A claim must also be submitted before funds can be reimbursed.

E.5.6 Alternative Fuel Infrastructure

The impact of emissions generated from cars and trucks on the Valley's air quality is significant. More than 80% of the NOx emissions inventory in the Valley is attributed to mobile sources. The Valley's topography, climate, geography and the presence of two major transportation corridors connecting northern and southern California all contribute to the region's problem. Due to the significant source of vehicle emissions, the District has developed and implemented a broad, multi-faceted portfolio of innovative strategies and policies to reduce emissions from cars, trucks, buses and other heavy-duty vehicles. As part of its strategy, the District has created several successful programs incentivizing clean vehicles. However, the District also recognizes that clean vehicle technology cannot be viable without the necessary fueling infrastructure that would not only allow such technology to be accepted by Valley residents and businesses, but also thrive in the region. For this reason, the District has developed incentive programs for the purchase and installation of alternative fueling infrastructure to support clean vehicle technology.

Charge Up! Program: This program provides funding for the purchase and installation of electric vehicle (EV) chargers. Although EV charging infrastructure has steadily improved in the San Joaquin Valley, the continued deployment of such infrastructure is still needed as an increasing number of residents have adopted EV technology. The Charge Up program was recently enhanced to adapt to ever changing trends in the market and needs of current and potential EV owners. Workplace charging was incorporated as many consumers considered purchasing an EV because of the ability to charge at their place of employment. In addition, changing the program to a voucher-based system has helped streamline the process for Valley agencies and businesses to leverage additional funding provided by the state and utility companies. With the ability to stack incentive funds from multiple sources, many program participants have significantly reduced out-of-pocket costs and found the investment of installing EV chargers worthwhile. Since the launch of the program in June 2015, the District has awarded more than $8.6 million in incentives for the siting and installation of 460 level 2 and level 3 electric vehicle chargers.

Clean Vehicle Fueling Infrastructure Program: Through the Clean Vehicle Fueling Infrastructure Program, public or private entities can receive funding for the installation of new alternative fueling infrastructure, conversion of an existing station, or expansion of existing infrastructure to support their vehicle deployment goals. This program originally provided funding to construct natural gas stations, hydrogen fuel stations and battery charging stations for heavy-duty vehicles. Under this program, the District has awarded nearly $50 million in incentives for the siting and installation of hydrogen fueling stations and battery charging stations. In January 2023, the District updated the program to only allow for hydrogen fueling and battery charging stations.

Zero-Emission School Bus Infrastructure Program: The Zero-Emission School Bus Infrastructure Program provides funding for the construction of new private use battery charging stations for zero-emission school buses. Under this program, school districts and private transportation providers serving school districts within designated disadvantaged or low-income communities can receive funding for up to 100% of eligible costs for the purchase and installation of charging infrastructure. Applicants may also receive funding to accommodate future electric school bus deployment. The District has awarded over $4.9 million towards these projects. The Zero-Emission school bus program was recently combined with the Clean Vehicle Fueling Infrastructure program and school bus infrastructure projects can now receive funding from that program.

E.5.7 Community-Based Incentive Programs

The District offers several programs that provide incentives for specific projects that focus getting the community involved in achieving emissions reductions through clean air projects and practices. These programs fall into two major categories: programs that reduce local vehicle miles traveled (VMT) and programs that reduce residential-generated emissions. For programs that reduce vehicle emissions, funds are allocated to support cost-effective projects that have the greatest motor vehicle emissions reductions, resulting in long-term impacts on air pollution problems in the Valley. In addition to vehicle emissions, the District recognizes that focus should also be placed on reducing emissions that are generated from sources at the residential level that directly affect neighborhoods as much as vehicles. All projects under these programs must have a direct air quality benefit in the Valley.

These programs provide funding to help reduce emissions generated at the community level. The importance of these community-based programs cannot be underestimated as they help change the nature of how individuals within each community commutes, conducts business, and resides in the Valley. These programs succeed in incentivizing and supporting changes in individual behavior in ways that help reduce air pollution with the prospects that shifting behavior and habits will transform the community at-large.

Clean Air Rooms: To help mitigate the effects of wildfire smoke on Valley residents, and in particular the District's most vulnerable populations, the District launched the Clean Air Rooms Pilot Program in June of 2022 and in June of 2023 transitioned to a standard program. This program provided residential air filtration units to residents of the Valley's disadvantaged communities. The goal of this program was to partner with local Valley businesses and organizations to distribute in-home air filtration units to residents of disadvantaged communities free of charge. To date, the program has funded 15,700 clean air filtration devices to residents in designated disadvantaged communities throughout the San Joaquin Valley.

AB836 Wildfire Smoke Clean Air Centers: In an effort to address the growing concern of wildfire and other smoke events and the severe impacts these events have on the most vulnerable populations, AB 836 (Wicks, Chapter 393, Statutes of 2019) was

adopted. This bill established the foundation for CARB to develop The Wildfire Smoke Clean Air Centers for Vulnerable Populations Incentive Pilot Program (Clean Air Centers Pilot Program) guidelines which provides funding to upgrade ventilation systems and to provide portable air cleaners to create a network of clean air centers to provide vulnerable populations a respite from wildfires and other smoke events. The guidelines established by CARB provide the District with the discretion and flexibility to create clean air centers at schools, community centers, senior centers, sport centers, libraries and other publically accessible buildings that would most effectively protect our vulnerable populations during wildfire smoke events. In April of 2022, the District launched the Clean Air Centers Pilot Program. To date, $699,000 has been awarded to private businesses and public agencies to purchase and deploy air filtration devices at their facility to create clean air centers during times of extreme smoke events.

Bicycle Infrastructure: This program provides funding for bicycle infrastructure projects, including Class I (Bicycle Path Construction), Class II (Bicycle Lane Striping), and Class III (Bicycle Route) projects. The program provides funding to assist with the development or expansion of a comprehensive bicycle-transportation network which will provide a viable transportation option for travel to school, work and commercial sites. Since the start of the program, almost 1.5 million dollars has been awarded for bicycle infrastructure projects throughout the Valley.

Alternative-Fuel Mechanics Training: This program provides funding to develop and advance the education of personnel from qualifying agencies that are using alternative fuel or are transitioning to alternative fuels on the mechanics, safe operation and maintenance of alternative fuel vehicles and infrastructure. As clean new vehicle technology adoption has been dramatically increasing, there has been a reciprocal need for personnel training. The District has awarded over $150,000 towards these projects.

E-Mobility: This program provides funding for the development or expansion of telecommunications services and electronic technology applications to directly replace vehicle travel by the general public. Funding is available for eligible projects such as video teleconferencing, internet business transactions, and telework sites. The District has awarded over $1 million towards these projects.

Public Transportation Subsidy and Park & Ride: This program provides funding for the construction of Park & Ride lots to promote ridesharing and public transportation subsidies to encourage new ridership. Over $1.4 million dollars has been awarded to subsidize and encourage the growth of these ridesharing activities.

Clean Green Yard Machines Residential: The Clean Green Yard Machines Residential Program (Residential CGYM) provides Valley residents with two options to participate and receive a rebate. One option is to replace participants' old gas- or diesel-powered lawn mowers with new eligible electric lawn mowers. Under this option, the participant is required to submit their old lawn mower to a participating dismantling/recycling facility for permanent destruction. The second option is for the purchase of new electric lawn care equipment without having to replace old equipment. This option has an expanded eligible equipment list including edgers, string and hedge

trimmers, chainsaws and pole saws. Under this Program, the District has awarded over $2.7 million for over 15,000 pieces of lawn and garden equipment (as of March 31, 2024).

Zero-Emission Landscaping Equipment Voucher Program. In May 2023, the Clean Green Yard Machines Commercial Voucher Program (Commercial CGYM) was redesigned and enhanced to become the District's new Zero-Emission Landscaping Equipment (ZELE) Voucher Program. This Program provides incentives for San Joaquin Valley landscapers, public agencies, and businesses that perform their own landscape maintenance, to replace their old gas- or diesel-powered landscape equipment with new electric options. Incentive levels vary depending on the type of eligible landscaping equipment that will be purchased by the applicant. To achieve emissions reductions, this Program requires existing old gas- or diesel-powered equipment be destroyed at a participating dismantling facility. Since the launch of the ZELE Voucher Program, the District has awarded 924 vouchers for a total of over $2.3 million in funding (as of March 31, 2024).

Public Benefits Grants Program, Community Improvement Projects that Reduce Vehicle Use and Emissions Component: This component provides funding for specific land use and community development projects that are eligible under the Cap and Trade funded Affordable Housing and Sustainable Communities Program and other state and federal funding opportunities. Projects awarded from this program promote a reduction in VMT and associated emissions through enhanced walkability and increased use of zero emission transportation alternatives. The funding provided under this component is intended to be used as match to give Valley projects a competitive advantage, especially in statewide and national solicitations. Projects submitted through this program are awarded on a first-come, first-serve basis pending eligibility. Under the program, 5 projects have been awarded for over $4.8 million.

The District continuously reviews areas where emission reductions can be achieved, especially on the community level where poor air quality has a direct impact on the residents of the San Joaquin Valley.

E.5.8 Agricultural Irrigation Pump Engine Replacement Incentive Measure

Substantial emission reductions from internal combustion (IC) agricultural irrigation pump engines in the Valley have been achieved through a combination of regulatory efforts and incentive actions. District Rule 4702 has effectively reduced emissions from agricultural irrigation pump engines by 84% since the 2005 amendments to the rule, with substantial investments being made by the affected sources to comply. Rule 4702 applies to any IC engine rated at 25 brake horsepower (bhp) or greater. The purpose of this rule is to limit NOx, carbon monoxide (CO), volatile organic compounds (VOC), and oxides of sulfur (SOx) emissions from units rated at or greater than 50 bhp that are subject to this rule. In the continuous effort to improve air quality in the Valley, the District has adopted numerous amendments to Rule 4702 that have resulted in significant reductions of NOx and PM emissions. The rule was further strengthened in August 2011 when rule amendments implemented more stringent NOx limits, as low as

11 parts per million (ppm), for non-agricultural operation spark-ignited engines. Despite the significant reductions to date, attainment of the 2012 PM2.5 standard requires further emissions reductions in the Valley.

The District currently provides 85% of eligible costs in funding for farmers looking to replace older, dirtier diesel engines with low-emission Tier 4 engines or zero-emission electric motors. Agriculture accounts for a majority of the local economy, and this program not only provides for significant emissions reductions from agricultural operations, but provides economic relief to Valley farmers, ranchers, and dairy operators. Eligible projects are funded with local, state, and federal sources, including but not limited to District Indirect Source Review mitigation fees, Carl Moyer Program funding, AB 923 funding, Federal Designated Funding, and Federal Diesel Air Shed Grant funding. In the past, collaboration with the California Public Utilities Commission (CPUC) and local utilities has allowed for additional incentives on electric line extensions and special rate schedules, enhancing participation in the District's replacement program.

Over the past 15 years, the District has funded the replacement of over 1,660 agricultural pump engines, with more projects currently in the queue. Over 1,300 of these replacements involved replacing older diesel engines with electric motors.

E.5.9 Ag Burn Alternatives Grant Program

To support the Valley's ongoing phase-out of agricultural open burning, in 2018, the District's Governing Board authorized the creation of the Ag Burn Alternatives Grant Program.[5] This program provides financial incentives to commercial agricultural operations located within the District boundaries to utilize an alternative practice for the disposition of agricultural material from orchard and vineyard removals as an alternative to open burning. Alternative measures include, but are not limited to, soil incorporation of chipped material, on-site land application on agricultural land, off-site beneficial re-use (mulch, composting, land application near roadways for dust suppression, and other District approved beneficial re-use of the chipped material). Since 2018, the District Governing Board has allocated over $65,000,000 in local and State funding to this program.

On August 19, 2021, the District accepted $178,200,000 in additional state funding to be used in the District's Ag Burn Alternatives Grant Program.[6] To ensure adequate capacity to accommodate the increase in agricultural chipping throughout the Valley in the coming years, particularly for smaller agricultural operations, the District allocated $30,000,000 of the new state funding to expand the Ag Burn Alternatives Grant Program to include a new program option that provides incentives for the purchase of new chipping/grinding equipment. This funding is the result of significant advocacy from

[5] District Ag Burn Alternatives Grant Program. Retrieved from: https://ww2.valleyair.org/grants/ag-burn-alternatives-grant-program/

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

the District and Valley agricultural stakeholders and is designated to assist the District in developing new alternative practices, increase fleet capacity for chipping in the Valley, and offset the significant incremental cost of implementing new alternatives to open burning.

The District's agricultural open burning phase-out strategy, along with the Ag Burn Alternatives Grant Program are working effectively to reduce emissions from agricultural open burning. New alternatives to open burning have emerged and are being implemented and Valley growers are utilizing the incentive program at a high rate. As a result, the current funding expenditure rate continues to increase. The initial allocation of State funding was expected to last until the end of 2024, however, it was exhausted approximately 11 months ahead of schedule. The early exhaustion of funds resulted in the District allocating additional local and state funds to the program.

Overall, the program has resulted in the deployment of alternative practices at over 251,500 acres, for over 6,800,000 tons of agricultural materials, resulting in the reduction of 13,299 tons of NOx, 24,705 tons of PM, and 21,013 tons of reactive organic gases (ROG) emissions.

E.5.10 Residential Wood Combustion

The District currently operates the Fireplace & Woodstove Change-Out Program (formerly known as the Burn Cleaner Program) to reduce emissions from residential wood burning. The Program helps Valley residents replace their current high-polluting wood-burning devices and open hearth fireplaces with cleaner alternatives such as natural gas or EPA certified wood/pellet devices, and electric heat pumps. Through this Program, residents reduce directly emitted PM2.5 emissions in areas and times where those reductions are needed most. Given the potentially high cost of these new devices, this Program provides a reduced upfront cost to low-income qualified applicants to encourage their participation by applying the incentive at point of purchase. The Program is part of the multi-faceted approach to reduce residential wood smoke emissions through the District's Residential Wood Smoke Reduction Program, which is implemented each winter season from November 1 to the end of February. In 2022, the District Governing Board approved the latest enhancements to the Program, which includes increased incentives for the installation of natural gas or electric devices to offset rising prices of device and labor costs due to inflation. In addition to increased incentives, a new component for fireplace decommissioning only was incorporated into the Program.

The Program has replaced over 30,000 wood burning devices with EPA-certified devices, clean-burning natural gas or electric heat pumps to date.[7] The District encourages Valley residents to transition from older, higher polluting, wood burning fireplaces to cleaner alternatives by decreasing the number of allowable burn days for these types of devices while also increasing the number of burn days allowed for

[7] As of March 20, 2024

registered clean wood burning devices through the District Rule 4901 tiered episodic wood burning curtailment program.

E.5.11 Commercial Charbroiling

In addition to regulatory requirements of District Rule 4692 (Commercial Charbroiling), the District created the Restaurant Charbroiler Technology Partnership (RCTP) program with the goal of reducing PM2.5 emissions from underfired commercial charbroilers. The program was initially allocated with $750,000 of incentive funding to fully cover all emissions control device installation costs as well as two years of device maintenance. RCTP initially struggled to find restaurants interested in participating in the program despite the program's willingness to cover all associated costs. Despite the District's efforts in promoting available funding under the RCTP program, the District has faced difficulty in finding restaurants willing to partner with the District to demonstrate new technologies. To date, only one restaurant, the Habit Burger Grill, has successfully completed two years of demonstration of a Molitron wet scrubber in their Stockton restaurant. Initially, the project experienced hood fan sizing issues, resulting in the restaurant being smoked out and forced to close temporarily. The Habit Burger Grill has subsequently installed these control devices on additional new restaurants, with some of these installations in the Valley.

In 2019, the District made an even larger concerted effort to conduct outreach to restaurants in the San Joaquin Valley regarding incentives available through RCTP. Through this outreach effort, the District received only 15 RCTP interest cards out of the over 4,200 restaurants that were contacted to comply with the 2018 Rule 4692 reporting and registration requirements. After discussing RCTP with these restaurants in more detail, none of these restaurants considered moving forward after this additional outreach.

In addition, the District tailored its approach and made direct contact with five prominent Valley restaurants, which resulted in a great deal of interest to evaluate the feasibility of installing the underfired emission control technology on their existing operations, with the understanding that all costs of the technology and two year maintenance would be covered through the RCTP program. District staff conducted multiple site visits to these operations, working with the restaurant owner/operator, engineering consultants, and technology vendors. Initial control system designs, quotes from vendors, and installation quotes from contractors were obtained and the feasibility of the technologies were fully assessed for each of the restaurants. However, after conducting a lengthy detailed analysis, none of the restaurants moved forward with the demonstration due to feasibility issues related to the installation of the control devices and local permitting challenges, and concerns about the cost of maintenance after the funded two-year demonstration period concluded under RCTP.

In recognition of the costs and technological challenges of pollution control devices for commercial charbroilers, the District Governing Board adopted a multipronged strategy to promote emission reductions from this category, while minimizing the impact on restaurants during the COVID-19 pandemic. This strategy, approved by the Governing

Board in December 2020, will require significant effort by the District through creating enhancements to the RCTP program, developing and providing guidance to local agencies for the development of ordinances, providing education to local agencies on the health impact of commercial cooking emissions, working with CARB as they consider developing a statewide Suggested Control Measure, working with CARB/EPA in making improvements to the emissions inventory for commercial underfired charbroiling, and formalizing the restaurant workgroup to stay in touch with current industry conditions and to continue to develop and deploy underfired charbroiler technology. In addition to this strategy, the District recently formed a Charbroiler Collaborative Workgroup with Bay Area Air Quality Management District, South Coast Air Quality Management District, San Diego County Air Pollution Control District, and CARB, aimed at conducting additional research and overcoming barriers for charbroiling control technology. Work through the collaborative is ongoing.

E.5.12 Low-Dust Nut Harvester Grant Program

The Valley is one of the largest agriculture producing regions in the nation and the sole producer of 99% of the U.S. almond and walnut supply. In 2022, almonds were California's #1 crop by acreage with 7,600 farms containing 1,342,920 bearing acres, resulting in many Valley residents being exposed to PM emissions from harvesting operations. In an effort to reduce exposure to localized sources of PM, the District developed the Low-Dust Nut Harvester Replacement Program as a way to advance the deployment of low-dust nut harvesting equipment in the Valley and to reduce localized community impacts from this source category.

Studies, conducted in partnership with the District, USDA-NRCS, and agricultural stakeholders and overseen by the San Joaquin Valleywide Air Pollution Study Agency have demonstrated that low-dust harvesting technology can be effective at reducing localized PM emissions associated with harvesting activities. Studies indicate that low-dust harvesting technology can reduce localized PM emissions by more than 40%, and in some cases up to nearly 80%. Additionally, working with agricultural stakeholders, a scientific survey was conducted that concluded that a significant portion of nut crop growers and custom harvesters were interested in demonstrating new lower-emitting harvest technologies if provided with meaningful financial incentives.

These findings were used to develop the District's Low-Dust Nut Harvester Replacement Program. Since 2018, the District has been operating this first-of-its-kind voluntary incentive program to replace conventional nut harvesting equipment with new, low-dust equipment. The Low-Dust Nut Harvester Replacement Program initially started as a pilot program, however; due to its success, was converted to a full program in late 2020. The program builds upon more than a decade of significant investment made in the San Joaquin Valley to develop low-dust nut harvesting technologies and to understand the potential benefits in reducing PM emissions from the use of these new technologies. To date, the program has successfully obligated over $20.7 million to replace 241 pieces of nut-harvesting equipment with low-dust nut harvesting equipment, which has resulted in the reduction of more than 1,400 tons of PM2.5.

E.6 TECHNOLOGY ADVANCEMENT

Despite major reductions in emissions and corresponding improvements in air quality, the Valley continues to face difficult challenges in meeting the federal ambient air quality standards. Achieving attainment of EPA's increasingly stringent ambient air quality standards will require the development and implementation of transformative zero/near-zero emissions technology over the coming decades.

On March 18, 2010, the District's Governing Board approved the District's Technology Advancement Program (TAP), a strategic and comprehensive program to identify, solicit, and support technology advancement opportunities. The program's primary goal has been to advance technology and accelerate the deployment of innovative clean air technologies that can bring about emission reductions as rapidly as practicable. To date, the District has undergone four rounds of Request for Proposals (RFPs) resulting in the successful demonstration of numerous innovative technologies.

To encourage the development of technologies in source categories critical to the Valley's attainment goals, the District's Governing Board established technology focus areas on alternatives to open burning, renewable energy, waste solutions, and mobile sources. To date, the District has completed four TAP competitive funding RFPs, receiving over 135 proposals for clean technology demonstration projects through these RFPs. In total, the District's Governing Board has approved 35 of the proposed projects for total funding of over $12 million, with successful demonstrations of zero-emissions yard trucks, electric composting, ultra-low NOx biogas engines, and other technologies.

E.7 PILOT PROJECTS

The District has long advocated for developing, demonstrating, and deploying the cleanest feasible technologies to assist in meeting the region's air quality, including supporting battery electric, hydrogen, and other technologies that have developed rapidly in recent years. In keeping with the District Governing Board's priority to bring federal and state funding resources to the Valley to support the District's clean air goals, the District has submitted multiple applications to various state and federal funding opportunities. Provided below are summaries of projects that have been awarded to the District in pursuit of important advance clean air technologies for deployment in the Valley.

E.7.1 OK Produce Zero-Emission Heavy-Duty Truck Demonstration Project

Through a competitive joint solicitation with CEC and CARB, the District was awarded $24,874,197 to support large-scale deployments of on-road, zero-emission Class 8 regional haul trucks as well as the necessary zero-emission vehicle fueling infrastructure needed for service operation. The District has partnered with OK Produce, a local delivery goods company, to demonstrate the ability of their fleet to transition from fossil-fuel to zero-emission goods delivery at their facility in Fresno, CA by deploying 50 Class 8 Volvo battery electric, zero-emission vehicles (ZEVs); deploy at least 24 dual-port direct current fast chargers (DCFC), on-site renewable energy generation, and a battery energy storage solution (BESS) to support the ZEVs. This Project will have a transformative impact environmentally on historically disadvantaged regions throughout the Valley, specifically the AB 617 designated community of South Central Fresno, California. The large-scale transition of OK Produce's fleet to zero-emission vehicles in this region will set an important precedent for other fleets throughout the nation could emulate. This project will help further reduce emissions within the community through the commercialization and deployment of electric trucks with supporting charging infrastructure. The project is further supported through the District's Truck Replacement Program, which will contribute additional match funding in the amount of $7,764,097.27 towards the cost of each Volvo electric truck and ensure permanent dismantling of the old diesel trucks.

E.7.2 South-Central Fresno Pepsi Delivery Truck Electrification Project

The South-Central Fresno Pepsi Delivery Truck Electrification Project is another awarded project to the District in response to a joint solicitation with CEC and CARB. The District partnered with PepsiCo, Inc. with the goal to advance the zero-emission Class 8 on-road technology and understanding of fleet dynamics when deploying many zero-emission trucks and supporting infrastructure. The project will support the deployment of 50 Class 8 Tesla battery electric semi-trucks, 8 DCFCs, electric vehicle supply equipment (EVSE) charging stations, and 2 BESSs. The CEC agreement, which totals to $9,103,710 including match, will fund the installation of the EVSE and BESS at the PepsiCo, Inc. Bottling Group, LLC (BGLLC) faculty in Fresno, CA. The deployment of the 50 Class 8 BET by New Bern Transport Corporation will be funded by the CARB agreement which totals to $17,200,000 including match. This project will be the largest collaborative deployment for PepsiCo, Inc. to date and will have a transformative environmental impact which includes an improvement to the localized air quality as well as the reduction of greenhouse gases to the AB 617 designated community of South Central Fresno.

E.7.3 Frito-Lay Zero-Emission and Near Zero-Emission Freight Facility Project

The Frito-Lay Zero-Emission and Near Zero-Emission Freight Facility Project was a partnership between the District and Frito-Lay, a division of PepsiCo, Inc., in solicitation with CARB, to implement an industry leading showcase for environmentally sustainable manufacturing, warehousing, and distribution which transformed the 500,000 square-

foot manufacturing site located in Modesto, CA. The awarded $30,832,500 investment saw the Frito-Lay Facility replace all diesel-powered freight vehicles and equipment with zero-emission and near zero-emission technologies. The transformative changes to the Frito-Lay Facility included the deployment of 15 Tesla battery electric semi-trucks (BET), 6 Peterbilt battery electric box trucks, 3 Build Your Dreams battery electric yard trucks, 12 Crown battery electric forklifts, 38 Volvo compressed natural gas (CNG) trucks, as well as a CNG refueling system, 1 megawatt solar carport with energy storage, and the Tesla and ChargePoint charging infrastructure and energy storage system. This project resulted in a reduction of over 400,000 kg CO2 emissions annually, directly impacting the local community of Modesto. This project is nearing its completion with all the vehicles, equipment, and infrastructure currently being in use at the Frito-Lay Facility and serves as an example to showcase that environmentally sustainable manufacturing, warehousing, and distribution is attainable.

E.7.4 San Joaquin Valley I-5 Electric Freight Corridor (Valley EFC) Project

The District was awarded $56,008,096 in funding from the Federal Highway Administration (FHWA) to develop charging infrastructure at two critical locations for medium and heavy-duty electric vehicle (MHDEV) charging along the I-5 corridor in need of refueling infrastructure for passenger and MHDEVs. The District is partnering with WattEV, a charging infrastructure developer and pioneer of the innovative Truck-as-a-Service (TaaS) model to provide a comprehensive solution to convert fleets from diesel to zero-emission battery-electric vehicles. WattEV will provide $19,222,620 for match share towards the project cost. The two sites that make up the Valley EFC project, Taft in Kern County and Gustine in Merced County, will become the future destination to a combined 90 passenger vehicle CCS 240kW chargers, 85 commercial vehicle CCS 240kW chargers, and 17 commercial vehicle MCS 1200kW chargers. These CCS and MCS chargers, at full capacity, can provide charging to up to 42,768 trucks annually, enabling an ecosystem for consistent and reliable charging in the pursuit of a zero-emission (ZE) transportation future. This project is expected to reduce nearly 32,000 tons of greenhouse gasses (GHGs) and 55 tons of smog-forming oxides of nitrogen (NOx).

E.7.5 Flexible Solutions for Freight Facilities Project

The District was awarded $24,874,197 for the CARB funded Flexible Solutions for Freight Facilities is a project to demonstrate zero and near-zero emission technologies on locomotives and around rail yards. Wabtec designed, manufactured, and commissioned a single Battery Electric Locomotive (BEL) that was used within a diesel consist [multiple locomotives providing tractive effort] running between Stockton to Barstow, California in commercial operations. The BEL improved the fuel efficiency of the entire consist an average of 12% while simultaneously reducing the consist's criteria pollutant and greenhouse gas emissions when compared to a conventional diesel consist. The project gave BNSF and Wabtec the opportunity to evaluate operational options for maximizing the utility of the BEL.

In addition, zero and near-zero emission equipment was demonstrated at BNSF's intermodal yards in Stockton and San Bernardino. The Stockton and San Bernardino facilities each demonstrated a Mi-Jack hybrid-electric rubber-tire gantry (RTG) crane that features an advanced battery system that achieved a greater than 70% fuel efficiency improvement. The San Bernardino facility also deployed a full-electric side loader built by Taylor Machine Works, Inc. and distributed by Mi-Jack. The project finished with an on-road zero-emission demonstration featuring BYD's Class 8 drayage truck solution, which was used for short-haul drayage operations in San Bernardino. The project also included electrical infrastructure upgrades and electric vehicle supply equipment (EVSE) to charge the series of zero and near-zero pieces of equipment and vehicles.

E.7.6 San Joaquin Valley Transit Electrification Project

The District was awarded $13,414,215 for the CARB funded The San Joaquin Valley Transit Electrification Project which provided zero-emission transit buses and supporting charging infrastructure to four Valley transit agencies. The upfront cost of battery electric buses has been a deterrent to greater deployment here in the Valley as well with many of the region's transit agencies having very little capital to make the investment to new technologies. The Project deployed with a substantial number of buses to help bring down upfront cost, to demonstrate Proterra's bus technology's ability to satisfy the range anxiety Valley transit agencies may have, and validate that with our different challenges the Valley could also be a region where zero-emission vehicles flourish.

As validation for this forecast, the City of Modesto Transit (Modesto Transit), City of Visalia Transit (Visalia Transit), Fresno County Rural Transit Agency (FCRTA), Proterra, San Joaquin Regional Transit District (San Joaquin RTD), using funding from CARB and in collaboration with the District, has led the San Joaquin Valley Transit Electrification Project to deploy fifteen (15) 40 foot Proterra electric transit buses operating in the cities of Modesto, Stockton, Visalia and in multiple communities throughout Fresno County with each transit agency providing a non-electric, existing transit bus to compare as a baseline vehicle.

E.7.7 San Joaquin Valley Zero-Emission Cargo Handling Demonstration Project

The District was awarded $772,555 for the CARB funded The San Joaquin Valley Zero-Emission Cargo Handling Demonstration Project was designed to assist with the acceleration of commercialized off-road zero-emission technologies by demonstrating two prototype state-of-the-art battery electric heavy-duty forklifts at the Port of Stockton. This demonstration benefited an AB 617 identified community and adjacent disadvantaged communities by significantly reducing greenhouse gas emissions, criteria pollutants, and toxic diesel emissions. The San Joaquin Valley Zero-Emission Cargo Handling Demonstration Project consists of the District as the grant administrator, DANNAR as the technology provider, ChargePoint as a project partner providing electric charging infrastructure, and carbonBLU as the third-party designated

data collector. The Port demonstrated the two DANNAR units at their facility. Both units have forklift capabilities, but each unit also carries one additional feature. One of the units had a scissor lift attachment and the other unit has a cargo truck bed.

E.7.8 The Green On-Road Linen Delivery Project

The Green On-Road Linen Delivery Project was a collaborative effort between AmeriPride Linen Delivery Services (later acquired by Aramark), the District, Motiv Power Systems (Motiv), and CALSTART to deploy twenty-one (21) zero emission Class 6 battery electric (BEV) walk-in vans along with supporting infrastructure at four locations in the San Joaquin Valley to provide linen delivery services. The commercial pilot project involved AmeriPride locations in Stockton, Merced, Fresno and Bakersfield; all within disadvantaged communities in those cities. The vehicle powertrains were built by Motiv with the body work completed by Utilimaster with funding from a $7,125,515 grant from the California Climate Investments initiative through CARB. Additional cash match was provided by AmeriPride Linen services.

E.7.9 USPS Zero-Emission Delivery Truck Pilot Commercial Deployment Project

The District was awarded $4,555,670 from CARB funding for a pilot project in Fresno and Stockton led by the USPS, in partnership with CALSTART, Efficient Drivetrains, Inc. (EDI), which was acquired by Cummins Inc. in July 2018, Motiv Power Systems (Motiv), Morgan Olson, and Black and Veatch (B&V), to demonstrate the commercial viability of electric- powered parcel delivery trucks to replace the diesel-powered units in the USPS fleet. The project involved deployment of fifteen (15) zero-emissions parcel delivery trucks and fifteen (15) charging stations at USPS locations in Stockton (5) and Fresno (10). The project was designed to prove the efficacy of electric-powered delivery vans for mail and parcel delivery duty cycles.

The project plan called for the all-electric vans to be used in the same way as their diesel-powered counterparts, covering distances of up to 70 miles per day. The goal was to demonstrate that these vehicles are just as reliable and easy to operate as the vehicles they were replacing. The project also considered other potential costs unique to electric vehicles, such as any electrical upgrades needed to support the installation of electric vehicle charging equipment. The project scope included an evaluation of how charging the trucks affects utility demand charges, the potential benefit of on-site solar and energy storage, and examined ways to reduce electricity costs by optimizing charging schedules.

E.7.10 Valley Air ZEV Mobility Pilot Project

CARB awarded the District a total of $749,800 for the transformative implementation of advanced clean car sharing and mobility options in census tracts that are within the top 19% of disadvantaged communities. The project includes a match funding of over 60% of the total project cost for $1,160,300. This project is in partnership with Green

Commuter, as the primary subcontractor and technology provider, and CALSTART, as the evaluation coordinator.

With funding from CARB, the Valley Air ZEV Mobility Pilot Project deployed nine electric vehicles, consisting of six Chevrolet Bolts and three Tesla Model Xs, and installed 26 Level two and four level three charging stations. The charging stations are located in three areas throughout Merced and Fresno Counties, specifically in Delhi, Atwater, and Cantua Creek. The charging stations and electric vehicles provided the Cantua Creek and Delhi communities with much needed access to car sharing and vanpooling services and addressed the need for equitable access to electric vehicles and charging infrastructure within the geographic area.

E.7.11 Ecosystem of Shared Mobility Services in the San Joaquin Valley

The District was funded $3,119,000 by CARB for the implementation of the Ecosystems project by partnering and/or subcontracting with several local entities including, but not limited to: Sigala Inc.; UC Davis, Institute of Transportation Studies; Shared-Use Mobility Center (SUMC); Self-Help Enterprises, and MOVE. Funding for the Ecosystem pilot project provided by a grant from the California Air Resources Board (CARB) through the Car Sharing and Mobility Option Pilot Project solicitation. Research for the project was also supported by funding through the University of California via the Public Transportation Account and the Road Repair and Accountability Act of 2017 (Senate Bill 1) and the National Center for Sustainable Transportation, supported by the U.S. Department of Transportation (USDOT) and the California Department of Transportation (Caltrans) through the University Transportation Centers program. MioCar deployed 27 vehicles with supporting electric vehicle charging infrastructure in multiple areas of the Valley providing disadvantaged communities the opportunity to utilize a new clean air program.

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