



**2020 BIENNIAL REPORT TO THE LEGISLATURE ON THE
AB 118 AIR QUALITY IMPROVEMENT PROGRAM,
FISCAL YEARS 2018-19 and 2019-20**

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Executive Summary

This document provides the required biennial update on the implementation of the Air Quality Improvement Program (AQIP). Health and Safety Code Section 44274 requires the California Air Resources Board (CARB) to submit to the Legislature a report containing details of projects funded, expected benefits of projects in promoting clean fuels and vehicle technologies, the impact that projects have on reaching air quality goals, and recommendations for future actions.

In the early years of AQIP, CARB focused investments on technology advancing projects that support California's long-term air quality and climate change goals in addition to providing immediate emissions benefits. These projects included the Clean Vehicle Rebate Project (CVRP) which provides rebates to consumers who buy zero emission vehicles (ZEVs), truck and bus vouchers through the Hybrid Truck and Bus Voucher Incentive Project (HVIP), and advanced technology freight demonstrations. The flexibility allowed within AQIP allowed CARB to pilot concepts that became the core part of its incentive portfolio. In recent years, CVRP, HVIP and advanced technology freight demonstrations have been funded through the Low Carbon Transportation Program, and AQIP funds have primarily been directed to the Truck Loan Assistance Program. More details on these projects can be found in the Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds at: <http://www.caclimateinvestments.ca.gov>.

During this report's status update period covering fiscal year (FY) 2018-19 and 2019-20, 96 percent of AQIP-specific funds were directed to the Truck Loan Assistance Program. Four percent supported Diesel Particulate Filter Retrofit Replacements. Since AQIP's inception, the Truck Loan Assistance Program, which enables small fleets affected by the Truck and Bus Regulation to secure financing to upgrade older vehicles in their fleets, has provided funding for over 27,750 cleaner trucks. Diesel Particulate Filter Retrofit Replacements incentives have supported 71 projects including 26 new particulate matter (PM) filters and 45 diesel particulate filter conversions through June 30, 2020.

Status updates for projects that received AQIP funds prior to FY 2018-19, but were not yet complete before publication of the previous biennial report, are presented in the Appendix. This includes Low Nitrogen Oxide (NOx) Engine Incentives implemented through HVIP, and the Agriculture Equipment Trade-up Pilot in the San Joaquin Valley, which did not receive any AQIP funding during the status update period.

HVIP provides funding to support the transformation to zero-emission vehicles in the heavy-duty on-road market to achieve greenhouse gas reductions. It also provides incentives for low NOx engine replacements and new vehicle purchases. HVIP supported the purchase of over 537 low NOx engines. The Agricultural Equipment Trade-Up Pilot Project concept is a transaction in which the owner of equipment with a

Tier 0 (uncertified) or Tier 1 certified diesel engine agrees to scrap that equipment in exchange for a cleaner piece of equipment with a certified Tier 2 or Tier 3 engine at little or no out-of-pocket cost. The FY 2015-16 Trade-Up Pilot Project was completed in February 2018 and provided funding for 19 transactions, resulting in 38 tractor replacements. The FY 2016-17 Trade-Up Pilot Project was completed in April 2019 and provided funding for 48 more transactions, resulting in 96 tractor replacements.

Emission reduction benefits attributable to AQIP-specific funds between July 1, 2018 and June 30, 2020 are contained in this report. The deployment of vehicles from these funds has resulted in emission reductions of approximately 503 tons of NO_x and 0.75 tons of fine particulate matter (PM_{2.5}).

Though nearly all AQIP funding has been allocated to the Truck Loan Assistance Program in recent years, for FY 2020-21 CARB staff is not proposing an AQIP allocation through a public process for Board approval for the loan program because available funding from previous fiscal years is expected to meet demand. Staff recommends for Board consideration allocating the AQIP appropriation to HVIP since it is in critical need of additional funding, having been closed to new voucher requests since November 2019 after requests exceeded the total FY 2019-20 funding allocated to the program. HVIP plays a crucial role in advancing clean technologies. By encouraging the purchase of cleaner heavy-duty vehicles, HVIP not only reduces greenhouse gas emissions, but nitrogen oxides (NO_x) and diesel particulate matter, while driving broader market transformation essential to meeting long-term goals. The Board will decide on staff's recommendation as part of the public process for producing the annual Funding Plan for LCT Investments and AQIP; details can be found at <https://www.arb.ca.gov/aqip/aqip.htm>.

I. Introduction

A. AQIP and Assembly Bill (AB) 118

AQIP is a voluntary incentive program administered by CARB to reduce smog and diesel particulate pollution, with concurrent reductions in greenhouse gas (GHG) emissions. AQIP was created under the *California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007* (AB 118, Núñez, Chapter 750, Statutes of 2007). Originally scheduled to sunset in 2015, the passage of AB 8 (Perea, Chapter 401, Statutes of 2013) extended the funding for AB 118 programs until January 1, 2024. For additional background on AB 118, please see the 2016 Biennial Report to the Legislature at: <https://ww2.arb.ca.gov/legislatively-mandated-reports>.

AQIP has invested approximately \$345 million in 10 project categories from program inception in FY 2008-09 through 2019-20. Specific funding categories have included financing for heavy-duty diesel trucks, incentives for clean cars, hybrid trucks, electric lawnmowers, zero emission agricultural work vehicles, and demonstration projects for cleaner marine and locomotive engines. All of the projects funded through AQIP have supported the expansion of advanced clean technologies in vehicles or equipment in the California marketplace.

During the status update period, AQIP invested a total of approximately \$76.6 million in two project categories. These project categories included the Truck Loan Assistance Program and Diesel Particulate Filter Retrofit Replacements. The emission benefits generated during the status update period from these four AQIP projects are illustrated in Table 1 and 2.

**Table 1: Statewide Criteria Pollutant and Precursor Emission Reductions
Attributable to AQIP in FY 2018-19 and FY 2019-20**

Funding Category	AQIP Funding (millions)	NOx ¹ (tons)	ROG ¹ (tons)	PM 2.5 ¹ (tons)
Truck Loan Assistance Program ²	\$73.6	503	55	-- ³
Truck Filter Replacements ⁴	\$3	--	--	0.75

¹Criteria pollutant emission reductions are calculated for exhaust emissions only. Reactive Organic Gas (ROG).

²Emissions based on approximately 8,333 trucks for the Truck Loan Assistance Program.

³Particulate matter (PM) reductions are not included in the table as attributable to the Truck Loan Assistance Program because the In-Use Truck and Bus Regulation already requires PM reductions from trucks.

⁴Based on 71 projects completed through June 30, 2020

**Table 2: Cumulative Statewide Criteria Pollutant and Precursor Emission
Reductions Attributable to AQIP**

Funding Category	AQIP Funding (millions)	NOx ¹ (tons)	ROG ¹ (tons)	PM 2.5 ¹ (tons)
Truck Loan Assistance Program	\$190.6	16,651	584	-- ²
Truck Filter Replacements ³	\$3	--	--	0.75

¹Criteria pollutant emission reductions are calculated for exhaust emissions only. Reactive Organic Gas (ROG).

²Particulate matter (PM) reductions are not included in the table as attributable to the Truck Loan Assistance Program because the In-Use Truck and Bus Regulation already requires PM reductions from trucks.

³Based on 71 projects completed through June 30, 2020.

B. Implementation of AQIP

CARB adopted regulations that establish the administrative procedures for implementing AQIP. As required in Health and Safety Code (HSC) Section 44274(a), the Board adopted regulatory guidelines in 2009. Central to the guidelines is the requirement for a Board-approved annual funding plan developed with public input.

The funding plan is each year's blueprint for expending AQIP funds appropriated to CARB in the annual State Budget. The funding plan describes the projects CARB intends to fund, establishes funding targets for each project, and provides the justification for these decisions. The funding plan is updated and presented to the Board for its approval each year. CARB staff holds a series of workgroup meetings and public workshops during the development of each funding plan to solicit feedback

and recommendations. For funding plan details see:
<https://www.arb.ca.gov/aqip/aqip.htm>.

C. Funding Sources

Funding for AQIP comes primarily from the smog abatement fee assessed annually by the Department of Motor Vehicles (DMV) during a vehicle's first six registration years in lieu of a biennial smog inspection. Of the \$20 collected for each vehicle at the time of annual registration, \$4 is allocated to CARB for AQIP through the end of 2023 (HSC 44060.5). A small portion of AQIP funding comes from two additional sources: an initial registration fee for new watercraft and a special equipment identification plate fee for certain types of equipment. The fees identified above generate approximately \$25-\$30 million on an annual basis.

In addition to the fees above, AQIP has received \$108 million in additional funding from other sources since program inception to support the growing demand of AQIP projects. For details on the other funding please see the 2016 Biennial Report to the Legislature at: <https://ww2.arb.ca.gov/legislatively-mandated-reports>.

Beginning in FY 2013-14, funds from the Greenhouse Gas Reduction Fund (GGRF) were appropriated by the Legislature for Low Carbon Transportation (LCT) investments in HVIP and Low NOx Engines and CVRP. Since then, per the FY 2019-20 Funding Plan, Low Carbon Transportation appropriations in these programs have totaled \$1 billion. Nearly all AQIP funds were then directed to the Truck Loan Assistance Program for helping small business truckers affected by the In-Use Truck and Bus Regulation to secure financing for clean trucks.

D. Reporting Requirements

There are three separate reporting requirements for AQIP.

First, HSC Section 44274(d) requires CARB to submit a biennial report to the Legislature on the implementation of AQIP. The report is required to include a list of funded projects, the benefits of these projects, and recommendations for future actions.

Second, CARB's regulation for implementing AQIP requires CARB staff to report to the Board biennially on progress in implementing the program. The regulation provides that this report may be combined with the required report to the Legislature. (Title 13, Chapter 8.2, California Code of Regulations Section 2358.)

Third, HSC Section 44274.7(f) requires CARB to report to the Legislature annually on the implementation of the Truck Loan Assistance Program established in the FY 2008-09 State Budget with AQIP funds.

This report is intended to fulfill all of these requirements. Project status update information provided in this report covers current AQIP projects funded in FY 2018-19 and 2019-20. A list of past projects is also included in Appendix A.

II. AQIP Projects Funded in FY 2018-19 and 2019-20

Overview

AQIP projects support the demonstration and deployment of near-zero and zero emission vehicles and equipment, and other advanced technologies that provide emission reductions and are critical to meeting California’s longer-term air quality and climate change goals. Two categories, the Truck Loan Assistance Program, Truck Filter Replacements, received AQIP funding during the status update period of FY 2018-19 and 2019-20.

Table 3 provides a summary of the funding from AQIP provided to the above categories starting from inception in FY 2008-09 through FY 2019-20 along with key project outcomes. This is followed by an overview of individual projects with project benefits, current status (as of June 30, 2020), and future direction. Emission benefits shown in this report have only been calculated for monies attributable to AQIP funding.

Table 3: AQIP Project Funding (millions) by Fiscal Year¹

<i>Project Category</i>	<i>08-09</i>	<i>12-13</i>	<i>13-14</i>	<i>14-15</i>	<i>15-16</i>	<i>16-17</i>	<i>17-18</i>	<i>18-19*</i>	<i>19-20*</i>	<i>Cumulative through 6/30/2020</i>	<i>Comments</i>
Truck Loan Assistance Program ²	\$30	\$4	\$10	\$10	\$18	\$25	\$20	\$25.6	\$48	\$190.6	-Launched April 2009 -27,000 loans issued as of 6/30/2020
Diesel Particulate Filter Retrofit Replacements	--	--	--	--	--	--	--	\$3	--	\$3	-Launched in 2019 -71 projects completed as of 6/30/2020

¹There were no funds in FY 09-10, FY 10-11, and FY 11-12 so these years are omitted

²Funding allocated to the loan program from others sources: \$15 million in CARB funds in FY 17-18.

\$10 million in FY 13-14 from the Vehicle Inspection and Repair Fund

*Status Update period FY18-19 and FY 19-20

A. Truck Loan Assistance Program

Overview

Launched in 2009, the Truck Loan Assistance Program utilizes AQIP funds to help small-business fleet owners affected by CARB's In-Use Truck and Bus Regulation to secure financing for upgrading their fleets with newer trucks or with diesel exhaust retrofits. This program is an on-going and successful incentive option that leverages public funding with private investments from participating lending institutions.

Implemented in partnership with the California Pollution Control Financing Authority (CPCFA) through its California Capital Access Program, the Truck Loan Assistance Program creates financing opportunities for truck owners who fall below conventional lending criteria and are unable to qualify for traditional financing. The program is available for small fleets with 10 or fewer trucks at the time of application. In the current program, AQIP funds are set aside (based on a percentage of each enrolled loan amount) in each participating lender's loan loss reserve account to cover potential losses resulting from loan defaults. The interest rate is capped at 20 percent. However, the average interest rate for issued loans is about 13 percent.

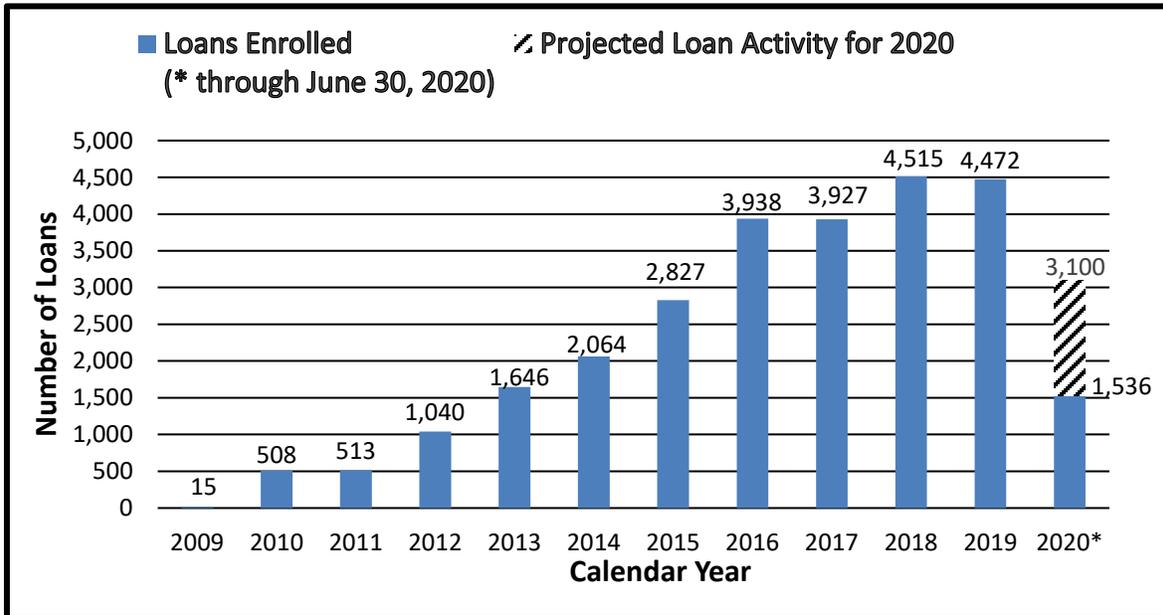
Project Benefits

This program primarily reduces criteria and toxic air contaminant emissions by helping small business truckers secure financing to purchase newer trucks or retrofits to comply with the In-Use Truck and Bus Regulation. The cleaner trucks reduce health risks from exposure to diesel PM (a toxic air contaminant), particularly in disadvantaged communities where exposure can be substantial. Cleaner trucks also emit less NO_x. Reducing NO_x emissions from diesel engines are important because they can undergo chemical reaction in the atmosphere leading to formation of PM_{2.5} and ozone.

Project Status as of June 30, 2020

Approximately \$125.2 million allocated to the project has been leveraged to provide nearly \$1.8 billion in financing for the purchase of over 29,000 cleaner trucks, exhaust retrofits, and trailers. Demand by truck owners had been increasing over most years of the program and had remained steady in recent years, as shown in Figure 1.

Figure 1: Loan Activity by Calendar Year



CARB allocated \$25.6 million in FY 2018-19, and allocated \$48 million for the program for FY 2019-20. The allocation of \$48 million was much higher than the typical annual AQIP budget of around \$28 million. The funding level was increased to ensure that the program would remain fully funded despite concerns from forecasted funding shortfalls due to impacts of Department of Motor Vehicles automatic compliance verification of the Truck and Bus Regulation starting in 2020 (SB 1, Beall, Chapter 5, Statutes of 2017).

CARB contribution rates for lender loan loss reserve accounts were increased effective March 2, 2020. This was in response to rising risks for lenders in the program, so they could continue or increase their participation providing loan assistance to small business truckers by enrolling more loans. Documentation provided by lenders in the fall of 2019 showed that the transportation sector was facing a recession. The CARB contribution rate for lenders with loan loss reserve accounts of \$500,000 or more was increased to 10 percent of the enrolled loan balance. For lenders with contributions to loan loss reserve accounts less than \$500,000 the contribution rate remained at 14 percent. This change in contribution rates is a return to the two contribution rate tiers that existed prior to the last modification in January 2016. The previous contribution rate structure had three tiers of four, seven, and 14 percent at loan loss reserve amounts of over \$1.5 million, \$500,000 to \$1.5 million and under \$500,000 respectively.

Starting in FY 2019-20, retrofits and 2007 to 2009 model year engines became ineligible for the Truck Loan Assistance Program. Most vehicles equipped with engines retrofitted with diesel particulate filters required an update to a 2010 or newer model year engine by 2020, so retrofits no longer became feasible. Most 2007

to 2009 model year engines will also require an engine upgrade by 2023. The term of a loan may be five years or more so it would not be practical to finance into 2023 or later if the financed vehicle will become non-compliant.

Incremental recapture procedures have been implemented by CARB and CPCFA since 2017. This mechanism redirects older contributions back to the Truck Loan Assistance Program to support future enrollments and makes the program more self-sustaining by reinvesting funds from matured loans. Based on loan activity through June 30, 2019, a total of approximately \$8 million in recaptured funds have been redeposited into the program account as of June 30, 2020. The quantity of recaptured funds from matured loans is determined after the conclusion of each fiscal year.

Table 4 provides a summary of loans, funding, and financing provided and Table 5 shows the vehicles and equipment financed to date. About 46 percent of enrolled loans have been issued to owner operators with one truck, and about 96 percent of enrolled loans have been issued to fleet owners with 10 or fewer employees. The Truck Loan Assistance Program is not subject to disadvantaged community investment requirements. However, it is worth noting almost half of the Truck Loan Assistance Program funding has been spent within and benefiting individuals living in disadvantaged and low-income communities.

Table 4: Truck Loan Assistance Program Loans, Funding and Financing.

Number of Loans Issued	State Funding (million)	Total Amount Financed (billion)
27,013	\$125.2	\$1.8

Based on data through June 30, 2020.

Table 5: Truck Loan Assistance Program –Vehicles and Equipment Financed

Project Type	Number of Projects Financed¹
Truck Purchases	27,750
Exhaust Retrofits	620
Trailers	688

Based on data through June 30, 2020.

¹Total number of loans issued does not equal the number of projects financed because some loans included multiple projects.

Figure 2 on the next page shows the number of truck loans issued within each air district through June 2020. The program has broad statewide appeal, including rural regions.

Figure 2: Truck Loans in California by Air District



Through June 30, 2020

Emission Benefits

AQIP funds have been used to finance the retrofit of trucks with CARB-verified diesel emission control devices or the replacement of trucks with model year 2007 or newer engines. Emission reductions are achieved because the retrofitted trucks and the air pollution controls installed by manufacturers on new engines have lower emissions. PM reductions are not included in the table below because the In-Use Truck and Bus Regulation already requires PM reductions from trucks. Table 6 shows emission benefits of the Truck Loan Assistance Program based on 27,750 cleaner trucks supported by this program through FY 2019-2020.

Table 6: Statewide Truck Loan Assistance Program Criteria Pollutant and Precursor Emission Reductions

Time Period	Estimated trucks funded	NOx ¹ (tons)	ROG ¹ (tons)
FY 2018-19 and 19-20	8,333	503	55
Cumulative ²	27,750	16,651	584

¹ Emission reductions are calculated for exhaust, or "tailpipe" emissions only.

² Cumulative through June 30, 2020

Future Direction

CARB staff is not recommending for Board consideration additional funding for the Truck Loan Assistance Program for FY 2020-21 because the available funding from previous fiscal years is expected to meet the demand. Program need and popularity is expected to be steady in the coming years. Factors such as Department of Motor Vehicles (DMV) automatic compliance verification, which began in 2020 and will only allow clean trucks in compliance with CARB's Truck and Bus Regulation to be registered by the DMV, and upcoming equipment replacement deadlines in the Truck and Bus Regulation, are expected to continue demand for the program. The Board will decide on staff's recommendation as part of the public process for producing the annual Funding Plan for LCT Investments and AQIP.

For many small fleets, this loan program may offer the only viable option to achieve compliance. CARB remains committed to meeting demand, as having loan assistance unavailable for even a short period erodes the confidence lenders have in providing the necessary financing to purchase trucks to meet the compliance requirements of the In-Use Truck and Bus Regulation.

The Truck Loan Assistance program has shown a successful way to leverage public funds into private financing, having leveraged \$125.2 million in contributions into over \$1.8 billion in private financing. CARB staff is working with CPCFA and participating lenders to use the leverage of the program to support the financing of zero-emission trucks in the future, supporting California's goals to further reduce harmful emissions and petroleum usage, achieve carbon neutrality, and deploy zero-emission vehicles.

B. Truck Filter Replacements

Overview

The Diesel Filter Replacement Projects provides \$3 million in FY 18-19 AQIP funding for the upgrade or replacement of recalled Cleaire Longmile diesel particulate filters to reduce toxic diesel PM emission.

Background

In 2012, Cleaire Advanced Emission Controls, Incorporated (Cleaire) voluntarily recalled its LongMile verified diesel emission control system (PM filter). During the recall, Cleaire replaced the LongMile with either a certified silicon carbide core, a Cleaire Muffler Module (CMM), or removed the entire system. However, several months later, Cleaire ceased operation and their assets were acquired by ESW CleanTech, a manufacturer of verified diesel emissions control strategies. ESW CleanTech has provided product support of the Cleaire product line since the closure.

In 2015 through 2017, the Sacramento Metropolitan Air Quality Management District and ESW CleanTech entered into a Grant Agreement to provide replacement filter funding of up to \$6.3 million for substrates through the Proposition 1B Goods Movement Emission Reduction Program. These replacements ensured reductions of particulate matter consistent with the original system operations prior to the recall. However, some fleets could not qualify for Proposition 1B funding or could not meet required temperature or engine family criteria.

The Diesel Filter Replacement Program targets the remaining vehicles to support filter substrate replacements for existing heavy-duty vehicles equipped with a certified CMM. The proposed AQIP funds for truck filter replacements reduce uncontrolled criteria and toxic air contaminant emissions by helping replace recalled filters. The project covers the costs of the substrate, new systems where needed, parts, and installation labor up to an authorized limit.

Administration

The Diesel Filter Replacement Program is administered and implemented through a partnership between CARB, ESW Cleantech as the contractor, and the Western States Trucking Association (WSTA) as the Grantee. WSTA was selected via a competitive CARB grant solicitation in early 2019. CARB held a public workshop in conjunction with the Grantee on July 23, 2019 with potential funding recipients to discuss the requirements and eligibility criteria for potential projects. The Grantee is responsible to verify all the project eligibility requirements have been met by the applicants, and

to distribute funding to the contractor after the supporting documentation and required items are submitted.

To protect fleets, the program prohibits the contractor from entering into a separate agreement with program participants to cover additional parts and labor not covered by the Diesel Filter Replacement Program unless approved by WSTA and CARB. The contractor must also educate fleets on proper use and maintenance of the upgraded diesel PM filter.

The Implementation Manual for the FY 2018-19 Diesel Filter Replacement Program (Implementation Manual) was finalized in October 2019 and provides the necessary definitions, explanations, and processes associated with the minimum requirements.

Application Priority & Process

The public workshop process informed a two-phase prioritization concept with the intent to ensure program funds are distributed across multiple fleet owners and that the State investment will provide lasting emissions benefits. Emissions reductions must be surplus to regulatory requirements per AQIP Guidelines, and participating fleets must be compliant with CARB diesel regulations. Eligible vehicles may not have any DMV Vehicle Identification Number (VIN) Stops or registration holds through CARB Enforcement actions. Following previous projects, vehicles must remain in California operation for at least two years post upgrade.

Vehicles eligible for Phase 1 must be registered, operating and have no regulatory replacement deadlines prior to January 1, 2023. A maximum of five projects per fleet owner may be approved - either filter upgrades called conversions, PM filter replacements or a combination for each round. Conversion projects are prioritized and completed first. Once all applications and vehicles are analyzed with funding reserved then Full Diesel Particulate Filter (DPF) System replacement may begin.

Once all fleets have had the opportunity to fund five projects then an additional round of five projects per fleet owner may be approved following a priority process. Rounds of five projects per fleet continue until all eligible projects are completed or funds exhausted.

Phase 2 includes applications received after the Phase 1 deadline and are considered following the same priority and round process as Phase 1. Once all applications are considered, vehicles with January 1, 2022 and later replacement dates may also participate.

Project Benefits

The Project is expected to cover 270 to 500 substrate replacements or about 150 new diesel particulate filter systems based on results from the Proposition 1B project. Substrate replacement costs vary according to the temperature duty cycle and horsepower of the engine, with higher costs for higher horsepower engines. For new diesel particulate systems staff used an average of \$20,000 per system. In the FY18-19 Funding Plan, staff estimate that 1,061 CMMs need replacement and, based on duty cycle requirements from the Proposition 1B project, approximately 38 percent of the CMMs will need new DPFs instead of a substrate replacement. The expected \$3 million allocation will fund an estimated 5.33 tons of PM2.5 emissions reductions. Because PM filters only control PM, no other criteria or GHG emissions reductions are expected.

Program Status as of June 30, 2020

The Phase 1 application period closed in December 2019 after a 45-day submission period. Applications returned after the deadline were considered in Phase 2 funding. As of June 30, 2020, Phase 1 project installations are continuing and Phase 2 is starting. Installations are proceeding with a December 2020 goal to complete all projects and achieve program closeout by June 30, 2021. However, current restrictions due to the pandemic have caused delays.

CARB mailed applications to eligible fleets in October 2019 and sent a follow up letter in May 2020. The contractor has also reached out to fleets multiple times. Many fleets have retired the impacted vehicles for various reasons. Based on program outreach the contractor has identified 121 fleets remaining that were the original purchasers that may still own Longmile filters. Applications have been received for 49 fleets. The contractor estimates a total remaining population of 505 vehicles and has confirmed 214 vehicles still in operation.

Since inception, the Diesel Filter Replacement Project (DFRP) incentives have supported 45 conversions and 26 new PM filters for a total of 71 projects completed through June 30, 2020. Invoices are still under review and estimated expenditures total \$939,717 for project expenses and \$86,414 for administrative expenses and program setup for a total of \$1,026,131 through June 30, 2020.

Emission Benefits

Table 7 identifies the emission benefits from the DFRP Incentives over the life of funded projects based on AQIP funded monies.

Table 7: Statewide Truck Filter Replacement Criteria Pollutant Emission Reductions Attributable to AQIP¹

Time Period	NOx (tons)	ROG (tons)	PM 2.5 (tons)	CO ₂ (MTCO ₂ e)
Program Cumulative ¹	--	--	0.75	--

¹71 of 505 vehicles proportions from original 5.33 tons estimate.

Future Direction

Diesel filter replacement funding applications opened in October 2019 and installations are proceeding with a December 2020 goal to complete all projects with a grant closeout by the June 30, 2021 end of fiscal year. However, due to complications due to the current pandemic, many fleet operations have been disrupted, which limits contractor access and hinders vehicle datalogging work. Subsequently, several projects may be delayed beyond the projected end date.

III. Recommendations for Future Action

In recent years, AQIP's emphasis has been on providing financing assistance to small-business fleet owners for upgrading their heavy-duty trucks through the Truck Loan Assistance Program. However, funding allocated in previous fiscal years is expected to be sufficient to meet program demand. Staff is not recommending, through a public process for Board consideration, AQIP funding for the Truck Loan Assistance Program for FY 2020-2021.

AQIP has provided funding for the Truck Loan Assistance Program, HVIP and Low NOx engine incentives, demonstrations for advanced emission reduction vehicle technologies, and CVRP since 2009. The availability of Low Carbon Transportation appropriations since FY 2013-14 has allowed the HVIP and Low NOx engine incentives and CVRP programs to be primarily funded from this source since demand for these programs exceeded AQIP's budget. However, the Low Carbon Transportation appropriation for FY 2020-21 was delayed.

After evaluating anticipated project demand, reviewing long-term investment strategies released in previous funding plans, considering other available funding sources, and taking into account stakeholder input, staff recommends, through a public process for Board consideration, allocating the FY 2020-21 AQIP appropriation to HVIP. This early commercial clean truck and bus purchase incentive project is in critical need of additional funding, having been closed to new voucher requests since November 2019 after requests exceeded the total FY 2019-20 funding allocated to the program. HVIP plays a crucial role in advancing clean technologies and preparing the market for regulations, including Advanced Clean Trucks. By encouraging the purchase of cleaner heavy-duty vehicles, HVIP not only reduces greenhouse gas emissions, but nitrogen oxides (NOx) and diesel particulate matter, while driving broader market transformation essential to meeting long-term goals. The Board will decide on staff's recommendation as part of the public process for producing the annual Funding Plan for LCT Investments and AQIP; details can be found at <https://www.arb.ca.gov/aqip/aqip.htm>.

The technology-advancing projects funded through AQIP marked an important step in bringing the next generation of vehicles such as hybrid-electric trucks and ZEVs to California's roadways today. AQIP investments have helped start the fundamental transformation of the California fleet to zero and near-zero emission vehicles that will be needed to meet California's post-2020 SIP commitments, 2030, and 2050 climate change goals. These investments also help position the State for green job growth.

Appendix A: Projects Receiving AQIP Funding Prior to FY 2018-19

In the early years of AQIP, CARB focused investments on technology advancing projects that support California’s long-term air quality and climate change goals in addition to providing immediate emissions benefits. These projects included the Clean Vehicle Rebate Project (CVRP) which provides rebates to consumers who buy zero emission vehicles (ZEVs), truck and bus vouchers through HVIP, and advanced technology freight demonstrations. The flexibility allowed within AQIP allowed CARB to pilot concepts that became the core part of its incentive portfolio. In recent years, CVRP, HVIP and advanced technology freight demonstrations have been funded through the Low Carbon Transportation Program.

Seven project categories received a total of \$151.4 million in AQIP funding between FY 2009-10 and FY 2017-18. These projects are complete and did not receive additional AQIP funding during the status update period of FY 2018-19 and 2019-20. Table 8 provides a summary of the funding provided to these project categories, and they are described in detail the 2016 and the 2018 Biennial Reports to the Legislature, available at: <https://ww2.arb.ca.gov/legislatively-mandated-reports>.

**Table 8: Summary of AQIP Projects by Fiscal Year
(Prior to FY 2018-19)**

<i>Project Category</i>	<i>Total Amount in Millions</i>
Clean Vehicle Rebate Project	\$67
Agriculture Equipment Trade-Up	\$3.5
Hybrid Truck and Bus Voucher Incentive Project and Low NOx	\$70
Advanced Technology Demonstrations	\$6.2
Lawn & Garden Equipment Replacement	\$2.6
Hybrid Off-Road Equipment Pilot	\$2
Zero-Emission Agricultural Utility Terrain Vehicle Rebates	\$0.1

This Appendix includes a detailed status update for both the HVIP - Low NOx Engine Incentives Project, and the Agriculture Equipment Trade-up Pilot in the San Joaquin Valley, which did not receive any AQIP funding during the status update period, but utilized AQIP funds allocated previous to FY 2018-19 and were not complete before publication of the last AQIP biennial report.

1. Clean Truck and Bus Vouchers (HVIP)

Overview

The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) is the cornerstone of CARB's advanced technology heavy-duty incentives, providing funding since 2010 to support the transformation to zero-emission vehicles in the heavy-duty on-road market, as well as supporting investments in other emerging technology to achieve substantial greenhouse gas reductions and help meet health-based ambient air quality standards. Voucher incentives complement other programs in CARB's heavy-duty funding portfolio by providing a streamlined, first-come, first-served application process without requiring scrapping of an existing vehicle. HVIP provides vouchers to participating dealers to reduce the incremental cost of eligible vehicles at the point-of-sale.

This streamlined approach, with eligible vehicles and preset voucher amounts, has proven popular with vehicle dealers, manufacturers, and California fleets. Record voucher requests in 2018 and 2019 — driven largely by a surge in demand for zero-emission buses and trucks — exhausted all available funds and forced the project to close for new voucher requests in November 2019. CARB hopes to reopen the program, with Board approval, in FY 2020-21.

HVIP typically receives funding through Low Carbon Transportation Investments, details on which are on the webpage <https://ww2.arb.ca.gov/our-work/programs/low-carbon-transportation-investments-and-air-quality-improvement-program/low-1>. However, a small portion of HVIP's funding in the last five years has come from AQIP. See <https://ww2.arb.ca.gov/legislatively-mandated-reports> for more details.

CARB's optional low NO_x standards allow manufacturers the ability to certify heavy-duty vehicle engines to NO_x emission levels that are up to 90 percent lower than today's mandatory diesel emission standards. In FY 2015-16, the Cummins Westport 8.9-liter low NO_x engine became commercially available and the release of the 11.9-liter Cummins Westport low NO_x engine in early 2018 brought low NO_x technology to Class 8 trucks.

HVIP provided incentives for the Cummins Westport 11.9-liter low NO_x engine to support repowers (also known as engine replacements) and new vehicle purchases. For FY 2019-20, HVIP offered up to \$45,000 for new vehicles and up to \$52,000 for repowers. HVIP incentives for the 8.9-liter engine ended in FY 2019-20.

Project Benefits

HVIP incentives drive manufacturing production and fleet acceptance of advanced heavy-duty vehicle technologies that California must deploy to meet its long-term air

quality and climate goals. Low NOx incentives, including those supported with AQIP funding, have been successful not just deploying low NOx engines for criterial pollutant emissions reductions, but building supply volumes, establishing customer confidence, and solidifying mature markets for the engines.

Program Status as of June 30, 2020

HVIP has supported the purchase of a total of 2,844 low NOx engines by California fleets through June 30, 2020, from both AQIP and GGRF funding. HVIP received AQIP funds for low NOx engines in two fiscal years. In FY 2015-16, the Board approved \$2 million from AQIP, which incentivized 218 low NOx engines. At the December 2017 Board meeting, the Board approved \$8 million from FY 2017-18 AQIP funding to incentivize the purchase of low NOx engines for small fleets having three or fewer vehicles. A year later, there had been no voucher requests. In response, the Board expanded the small fleet definition to include fleets of 10 or fewer vehicles, which parallels the small fleet requirement for the Truck Loan Assistance Program. The funds were finally expended in January 2020 after incentivizing the purchase of 289 8.9-liter engines and 30 11.9-liter engines. With the closeout of that FY 2017-18 AQIP allocation, there are no AQIP funds remaining in HVIP.

The HVIP webpage, at <http://www.californiahvip.org/>, provides an interactive data tool for funded vehicles, real-time accounting of voucher funds remaining, and other project information.

Emission Benefits

HVIP low NOx vouchers have been funded through a combination of AQIP and Low Carbon Transportation funds beginning in FY 2015-16. However, funding for the two incentive types were combined, on a first-come, first-served basis, and for all eligible technologies, and funded by Low Carbon Transportation starting in FY 2017-18. Table 9 identifies the emission benefits from low NOx vouchers over the life of funded projects based on vouchers funded only by AQIP monies using updated quantification methodology found in the FY 2019-20 Funding Plan.¹

¹ California Air Resources Board. *Fiscal Year 2019-20 Funding Plan for Clean Transportation Incentives. Appendix A: Emission Reductions Quantification Methodology.* September 2019. <https://ww2.arb.ca.gov/sites/default/files/2019-09/fy1920fundingplan-appa.pdf>

Table 9: Statewide Criteria Pollutant Emission Reductions Attributable to AQIP-Funded HVIP Low NOx Vouchers

	NOx (tons)	ROG (tons)	PM 2.5 (tons)
HVIP Cumulative ¹	503	0	0

¹Based on 537 engines funded.

Future Direction

HVIP received its last AQIP allocation in FY 2017-18, and those funds are expended. The FY 2020-21 Funding Plan for Clean Transportation Incentives will propose an AQIP allocation of approximately \$25 million through a public process for Board approval.

2. Agricultural Equipment Trade-Up Pilot Project in the San Joaquin Valley

Overview

The Agricultural Equipment Trade-Up Pilot Project in the San Joaquin Valley (Trade-Up Pilot Project) provides CARB an opportunity to evaluate the feasibility of a new incentive model for mobile agricultural equipment intended for owners of high-emitting equipment. These owners have traditionally not been well served by existing incentive programs that only provide funding for new equipment purchases. The trade-up concept is a two-step transaction in which the owner of equipment with a Tier 0 (uncertified) or Tier 1 certified diesel engine agrees to scrap that equipment in exchange for a previously used and reconditioned piece of equipment with a certified Tier 2 or Tier 3 engine at little or no out-of-pocket cost. This used equipment comes from another owner that relinquishes it for an incentive to purchase brand new equipment that employs the cleanest engine technology (Tier 4 Interim or Tier 4 Final certification).

This project concept was introduced in FY 2015-16 with \$500,000 of AQIP funding and an additional \$3 million was allocated in FY 2016-17 to build upon the project.

Project Benefits

Emissions from mobile off-road agricultural equipment are among a number of significant sources of air pollution in the San Joaquin Valley. Incentive programs and regulations are already reducing emissions from a wide variety of diesel engines in the region; however, a continuing transition to the cleanest technologies is needed to meet federal ozone standards in 2023 and 2032. Targeting this investment in the San Joaquin Valley aids in accelerating needed adoption of cleaner diesel engine technologies in mobile agricultural equipment and in reducing the legacy fleet of high-emitting equipment in this heavily agricultural, non-attainment air basin.

Project Status as of June 30, 2020

CARB selected the San Joaquin Valley APCD, via competitive solicitations, to administer this project using FY 2015-16 and 2016-17 funds. This project was initially launched in June 2016 and was completed in April 2019. Project goals included assessing the feasibility of this new project category, evaluating the near-term and potential long-term cost-effectiveness of a large-scale program in the San Joaquin Valley, developing a project implementation plan that would include methodology to quantify potential emission reductions and requirements needed to enable emission reductions resulting from trade-up transactions to be creditable under the State

Implementation Plan (SIP)², implementing procedures to facilitate multi-step trade-up transactions, and assessing the owner/user experience and acceptance of incentivized equipment.

The FY 2015-16 Trade-Up Pilot Project was completed in February 2018 and provided funding for 19 transactions, resulting in 38 tractor replacements. Continuing this project with funding from the following fiscal year, the FY 2016-17 Trade-Up Pilot Project was completed in April 2019 and provided funding for 48 more transactions, resulting in 96 tractor replacements.

Emission Benefits

The main project goals for the FY 2015-16 Trade-Up Pilot Project were to develop and implement the trade-up incentive concept and evaluate the feasibility of a larger scale program. Emission reduction quantification methodology was developed and benefits were calculated as part of the FY 2016-17 Trade-Up Pilot Project. Table 10 below shows the emission reduction benefits from Trade-Up projects over the life of the projects funded with FY 2016-17 funding.

Table 10: Trade-Up Pilot Project Emission Reductions

Time Period	# of Equipment Replaced	NOx (tons)	ROG (tons)	PM 2.5 (tons)
Cumulative (FY 2015-16 and 2016-17)	134	106	11.5	6.70

Note: emission reductions are based on the 96 tractors replaced with FY 2016-17 funding.

Future Direction

CARB received funding specifically for agricultural vehicles and equipment in subsequent fiscal years and developed the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) Program (<https://ww2.arb.ca.gov/our-work/programs/farmer-program>). Funding for the Trade-Up Pilot Project is continuing under the FARMER Program and CARB reports on the results of the program on the FARMER Program website and in California Climate Investments Annual Reports.

² The State Implementation Plan (SIP) is California’s blueprint to meet the federally mandated National Ambient Air Quality Standards as required by the Clean Air Act