BIENNIAL REPORT TO THE LEGISLATURE ON THE AB 118 AIR QUALITY IMPROVEMENT PROGRAM THROUGH FISCAL YEAR 2013-14

This report can be viewed at: https://www.arb.ca.gov/mandrpts/mandrpts.htm. To order a hard copy of this report, please contact Ms. Erin Uchida at (916) 323-0002 or via email at euchida@arb.ca.gov.

Acronyms

AB	Assembly Bill
APCD	Air Pollution Control District
AQIP	Air Quality Improvement Program
AQMD	Air Quality Management District
CARB or Board	California Air Resources Board
ARFVTP	Alternative and Renewable Fuel and Vehicle Technology Program
BAR	Bureau of Automotive Repair
BEV	Battery Electric Vehicle
CVRP	Clean Vehicle Rebate Project
EFMP	Enhanced Fleet Modernization Program
FCEV	Fuel Cell Electric Vehicle
FY	Fiscal Year
GHG	Greenhouse Gas
GGRF	Greenhouse Gas Reduction Fund
HSC	Health and Safety Code
HVIP	Hybrid and Zero Emission Truck and Bus Voucher Incentive Project
$MTCO_2e$	Metric Tons of Carbon Dioxide Equivalent
MSRP	Manufacturer Suggested Retail Price
NOx	Oxides of Nitrogen
PHEV	Plug-in Hybrid Electric Vehicle
PM	Particulate Matter
SB	Senate Bill
SIP	State Implementation Plan
ZEV	Zero Emission Vehicle

TABLE OF CONTENTS

Executive Summary

The Air Quality Improvement Program (AQIP), administered by the California Air Resources Board (CARB or Board), is a voluntary, statewide incentive program created under Assembly Bill (AB) 118 (Núñez, Chapter 750, Statutes of 2007), the *California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007.* Through AQIP, CARB invests in clean vehicle and equipment projects that reduce criteria pollutant and toxic air emissions, often with concurrent climate change benefits. Funding for AQIP is provided through a dedicated revenue stream of smog abatement, vessel registration, and equipment identification plate fees, which provide $24 million to $30 million annually. Originally scheduled to sunset in 2015, the passage of AB 8 (Perea, Chapter 401, Statutes of 2013) extended the funding for AQIP and other AB 118 programs until January 1, 2024.

AQIP is one of three incentive programs created under AB 118. The other two programs include the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP), administered by the California Energy Commission, and the Enhanced Fleet Modernization Program (EFMP), administered by the Bureau of Automotive Repair (BAR). While AQIP focuses on clean vehicle and equipment deployment and demonstration, the Energy Commission's ARFVTP provides, among other things, critical support for fuels and fueling infrastructure. Through close coordination between CARB and the Energy Commission, these programs create a holistic suite of technology advancing investments. Additionally, EFMP is aimed at achieving immediate emission reductions through accelerated turnover of the existing light-duty vehicle fleet.

AQIP is structured to enable investments in technology-advancing projects that also provide immediate emission reductions. AQIP investments are an important first step in the fundamental transformation of the California vehicle fleet to one with widespread use of near-zero and zero emission vehicles. AQIP investments support technologies at one of two stages in the commercialization process: demonstration and initial commercial deployment. Technologies at the demonstration stage have completed the research and development phase, but are not yet commercially available. AQIP demonstration projects exhibit the feasibility of advanced technologies in real-world conditions and help to support the transition to initial deployment. Technologies in the initial deployment phase are commercially available, but at a higher cost than traditional technologies. AQIP investments help to reduce the higher initial cost of advanced technologies, reduce long-term costs by supporting better production economies of scale, and promote consumer acceptance of the technology.

AQIP's role and investment in supporting the demonstration and initial deployment of advanced transportation technologies are critical to meeting California's longer-term air quality and climate change goals. These include federal health-based ambient air quality standards for ozone by 2023 and 2031, as well as the fine particulate matter (PM2.5) ambient air quality standards, CARB's Zero Emission Vehicle Regulation, and the 2020 and 2050 greenhouse gas (GHG) reduction goals established in AB 32 and Executive Order S-3-05. Additionally, AQIP complements other CARB programs that

focus on near-term emission reductions from fully commercialized emission control technologies (e.g., the Carl Moyer Memorial Air Quality Standards Attainment Program) by supporting cleaner advanced technologies that are not yet commercially available. Projects funded by AQIP generate near-term emission benefits but, more importantly, help to advance the demonstration and deployment of advanced clean technologies, such as zero emission technologies, that are needed to meet California's long-term air quality and climate change goals. AQIP investments also help stimulate business growth in the State. Some of the vehicles and vehicle components funded under AQIP are developed and manufactured in California, and these vehicles and equipment are distributed through extensive local dealership networks. As more of these vehicles enter the California fleet, there will be increasing demand for a well-trained workforce to design, build, service, and maintain these new vehicles.

Each of the projects funded through AQIP has provided CARB with valuable experience to further enable the expansion of advanced clean technologies in the California marketplace. Demand for rebates under the Clean Vehicle Rebate Project (CVRP) has grown significantly since 2010, resulting in the placement of approximately 38,000 AQIP-funded advanced clean vehicles on California roads. AQIP has also provided funding for approximately 1,700 advanced technology trucks and buses through the Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP) and, perhaps more importantly, helped to identify key deployment barriers that CARB and other stakeholders are working to overcome. Also, Advanced Technology Demonstration Projects are helping to bring the next generation of vehicles and equipment to California. Finally, the Truck Loan Assistance Program is providing small-business fleet owners financing assistance to upgrade to newer trucks or diesel exhaust retrofits.

Approximately $290 million has been expended on AQIP programs from inception through FY 2013-2014. However, approximately $120 million of AQIP programming has been funded from non-AQIP sources, while $150 million came from designated AQIP sources. This report is limited to the emission reductions attributable to those AQIP-based dollars. Advanced technology vehicles funded by AQIP, through CVRP and HVIP, as of June 30, 2014, are responsible for reducing over 260 tons of oxides of nitrogen (NOx), 94 tons of particulate matter (PM) 2.5, and 2,607,500 metric tons of carbon dioxide equivalent ($MTCO_2e$) over a cumulative vehicle life.

As required in Health and Safety Code (HSC) Section 44274, CARB must report to the Legislature biennially on its implementation of AQIP and on the Truck Loan Assistance Program. This report is intended to meet those requirements, and will provide an overview of the projects, an update on program performance, and details regarding funding received and spent. Project status update information provided in this report covers past and current AQIP projects between April 24, 2009, the date AQIP's first funding plan was approved, and June 30, 2014, the end of fiscal year 2013-14.

Please note, a number of the programs included in this report no longer receive AQIP funding.

I. Introduction

A. Background on AB 118 and AQIP

The Air Quality Improvement Program (AQIP) is a voluntary, statewide incentive program created under AB 118 (Núñez, Chapter 750, Statutes of 2007), the *California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007*. Administered by the Air Resources Board (CARB or Board), the program provides funding between $24 million and $30 million annually to support the demonstration and deployment of advanced clean technology vehicles and equipment. AQIP focuses on improving air quality with concurrent reductions in greenhouse gas (GHG) emissions. AQIP provides funding, subject to annual appropriations from the Legislature, via smog abatement, equipment registration, and vessel registration fees. The AB 118 statute lists eight broad project types that are eligible for AQIP funding:

- On- and off-road equipment projects that are cost effective
- Projects to mitigate off-road gasoline exhaust and evaporative emissions
- Research on the air quality impact of alternative fuels
- University of California research to increase sustainable biofuels production and improve collection of biomass feedstock
- Lawn and garden equipment replacement
- Medium- and heavy-duty vehicle/equipment projects including lower emission school buses, electric or hybrid vehicles/equipment, and regional air quality programs in the most impacted parts of California
- Workforce training related to advanced technology to reduce air pollution
- Projects to identify and reduce emissions from high-emitting light-duty vehicles

AQIP is one of three incentives programs created under AB 118. Originally scheduled to sunset in 2015, the passage of AB 8 (Perea, Chapter 401, Statutes of 2013) extended the funding for AQIP and other AB 118 programs until January 1, 2024. The other programs include the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP), administered by the California Energy Commission, and the Enhanced Fleet Modernization Program (EFMP), administered by the Bureau of Automotive Repair (BAR).

Alternative and Renewable Fuel and Vehicle Technology Program

ARFVTP allocates roughly $100 million a year toward a broad array of projects. Together, ARFVTP and AQIP coordinate investments in alternative and renewable fuels, advanced technology vehicles and equipment, vehicle manufacturing, and fueling infrastructure. These combined investments help to build a strong manufacturing base, develop a skilled workforce, and reduce the State's reliance on petroleum-based fuels, while also placing a down payment on the technologies needed to meet long-term air quality and climate change emission reduction requirements. While AQIP focuses on clean vehicle and equipment deployment and demonstrations, the Energy Commission's ARFVTP focuses on electric and hydrogen infrastructure deployment,

clean truck technology development, and biofuels production, creating a holistic suite of technology advancing investments.

CARB and the Energy Commission have developed a strong partnership in implementing AB 118. For example, the Energy Commission has supported AQIP projects by augmenting funding for the deployment of advanced technology zero emission cars and medium- and heavy-duty trucks. CARB has also served as a member of the Energy Commission's Advisory Committee for the ARFVTP Investment Plan each year and participated on project review teams for demonstration projects. The Energy Commission has periodically updated the Board on the status of projects funded by the ARFVTP Investment Plan. Together, CARB and the Energy Commission engage stakeholders for input, evaluate and assess funding needs moving forward, and ensure that projects funded by both AQIP and ARFVTP complement each other.

More information about the Energy Commission's program can be found at: http://www.energy.ca.gov/altfuels/

Enhanced Fleet Modernization Program

EFMP provides approximately $30 million annually to accelerate the turnover of the existing light-duty fleet. CARB developed the program in conjunction with BAR in 2009, and adopted amendments to the program in June 2014. The program consists of two elements: A retirement-only component administered by BAR in conjunction with the Consumer Assistance Program, and a retire and replace program administered by the San Joaquin Valley Air Pollution Control District (APCD) and South Coast Air Quality Management District (AQMD). CARB, BAR, and the air districts coordinate closely on the implementation of this program to ensure the incentives provided by the program are targeted to low-to-moderate income motorists and that much needed near-term emission reductions from the on-road light-duty fleet are realized. In addition, BAR has also provided support to AQIP by providing funds from the Vehicle Inspection and Retirement Fund to support growing project demand.

More information about BAR's program can be found at: http://www.smogcheck.ca.gov/.

B. The Purpose and Goals of AQIP

In order to meet California's post-2020 federally mandated air quality standards and State climate change goals, CARB must pursue an aggressive suite of control measures that includes incentives. The South Coast and San Joaquin Valley air basins are the only two extreme nonattainment ozone areas in the nation, and the magnitude of emission reductions needed is considerable. Therefore, the Federal Clean Air Act includes a provision that allows State Implementation Plans (SIPs) for areas with the worst air quality to rely on advanced, yet to be developed, technologies. The federally approved SIPs for these two regions rely on a mix of currently available technologies and the development of advanced technologies in order to attain the 80 parts per billion

8-hour ozone national air quality standard by 2023. In addition, the standard was lowered in 2008 to 75 parts per billion and must be attained in the extreme nonattainment ozone areas by 2032. Meeting the federal air quality standards will require both the South Coast and the San Joaquin Valley to reduce their oxides of nitrogen (NOx) emissions by around 80 percent from 2010 levels by 2023 and by almost 90 percent by 2032. Attainment in the two areas to meet the two scheduled milestones will require the extensive use of near-zero and zero emission technologies.

These same technologies will also be needed in order to meet the goal of reducing GHG emissions to 80 percent below 1990 levels by 2050 (Executive Order S-3-05). Critical to this is that near-zero and zero emission vehicles will need to make up a significant fraction of California's vehicle fleet, where 40 percent of California's transportation fuel is electricity or hydrogen in 2050.[1] In January 2012, CARB made progress toward this goal with the approval of the Zero Emission Vehicle (ZEV) Regulation Amendments, which are projected to result in 1 out of every 7 new cars purchased in 2025 being a zero emission or plug-in hybrid electric vehicle. This was followed by the Governor's Executive Order B-16-2012 that establishes a 2050 target for GHG emission reductions from the transportation sector equaling 80 percent less than 1990 levels. The Executive Order also directed State agencies to establish benchmarks for expanding the ZEV market share to over 1.5 million ZEVs in California, provide easy access to infrastructure, and to displace at least 1.5 billion gallons of petroleum by 2025.

AQIP investments are an important early step in supporting this transformation and provide a down payment on the technologies that are critical in helping California meet its air quality goals. AQIP projects provide both immediate emission reductions from the vehicles directly funded and, more importantly, supplementary long-term benefits from accelerating the deployment and development of advanced clean technologies, such as: (1) reducing production costs of advanced technology vehicles by spurring higher, more efficient production volumes, (2) accelerating development of new, advanced vehicles and manufacturing advancements, and (3) accelerating consumer acceptance of new unfamiliar vehicle technologies. These longer-term program benefits accrue primarily from overcoming deployment barriers and accelerating technology transfer to other sectors. Additionally, AQIP investments in advanced technology vehicles have been complimented by Energy Commission investments in infrastructure to ensure that necessary fueling networks are developed, thus reinforcing California's ongoing commitment to clean technologies. AQIP investments also help stimulate business and job growth in the State. Some of the vehicles and vehicle components funded under AQIP are developed and manufactured in California, and are distributed through extensive local dealership networks. In addition, AQIP Advanced Technology Demonstration projects have provided funding to small-business vehicle technology developers to demonstrate and commercialize the next generation of clean vehicles to California. As more advanced technology vehicles enter the California fleet, there will be increasing demand for a well-trained workforce to design, build, service, and maintain these new vehicles.

[1] http://www.energy.ca.gov/2007publications/CEC-600-2007-011/CEC-600-2007-011-CMF.PDF

AQIP expands CARB's portfolio of air quality incentives, providing the opportunity to fund projects not covered by CARB's other incentive programs, including the Carl Moyer Memorial Air Quality Standards Attainment Program, the Goods Movement Emission Reduction Program, and the Lower-Emission School Bus Program. These other programs augment regulatory programs by: (1) paying for the incremental cost, which is the consumer's cost above similar conventional technology, of cleaner vehicles, engines, and equipment, and (2) focusing on near-term emission reductions from fully commercialized and widely available emission control technologies. AB 118 provides CARB with broader flexibility for implementing AQIP, and with it, the ability to focus on longer-term air quality goals.

C. Implementation of AQIP

CARB adopted regulations that establish the administrative procedures for implementing AQIP in order to ensure that the program is administered efficiently, with transparency and public input. As required in HSC Section 44274(a), the Board adopted regulatory guidelines in 2009 that define the overall administrative requirements, policies, and procedures for program implementation based on the framework established in statute. Central to the guidelines is the requirement for a Board-approved annual funding plan developed with public input.

Funding Plan

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. Each funding plan is also released 30 days prior to Board consideration to garner public comments on the plan itself.

The process of developing the funding plan also serves as a mechanism for CARB to evaluate AQIP projects each year. As a result, during the development of each year's funding plan, staff perform the following tasks:

- Evaluate the projects funded under previous funding plans and consider whether the projects are over-subscribed or under-subscribed, whether continued funding should be proposed, and if so, whether modifications to project requirements are needed
- Reexamine the project categories not funded in previous funding plans and consider whether additional categories should be proposed for funding the following year
- Ensure new project categories comply with HSC Section 44274(c), which requires that the program be limited to competitive grants, revolving loans, loan

guarantees, loans, and other appropriate funding measures for applicable projects that further the purposes of the program
- Reexamine opportunities to coordinate with other incentive programs such as the Energy Commission's AB118 program or federal incentive programs

The passage of AB 8 also refined the methodology CARB uses to evaluate and select AQIP projects for funding beginning in fiscal year (FY) 2014-15. AB 8 introduced the following evaluation criteria.

- The state board shall provide preference in awarding funding to those projects with higher benefit-cost scores that maximize the purposes and goals of the Air Quality Improvement Program[2]
- "Benefit-cost score" means the reasonably expected or potential criteria pollutant emission reductions achieved per dollar awarded by the board for the project[3]
- The state board also may give additional preference based on the following criteria, as applicable, in funding awards to projects:[4]

    1. Proposed or potential reduction of criteria or toxic air pollutants
    2. Contribution to regional air quality improvement
    3. Ability to promote the use of clean alternative fuels and vehicle technologies as determined by the state board, in coordination with the commission
    4. Ability to achieve climate change benefits in addition to criteria pollutant or air toxic emissions reductions
    5. Ability to support market transformation of California's vehicle or equipment fleet to utilize low carbon or zero emission technologies
    6. Ability to leverage private capital investments

The refined project evaluation criteria were utilized in assigning preference for AQIP funding to projects for FY 2014-15. Additional information on the new evaluation criteria is available in Appendix A[5] of the FY 2014-15 Funding Plan.

Air Quality Guidelines

The Board also adopted AB 118 Air Quality Guidelines as required in HSC Section 44271(b). This regulation, also known as the "anti-backsliding guidelines," ensures that the CARB and the Energy Commission AB 118 programs complement California's existing air quality programs by maintaining or improving upon emission benefits in the SIP and California's clean fuels regulations.

[2] Health & Safety Code Section 44274(b)
[3] Health & Safety Code Section 44270.3(e)(1)
[4] Health & Safety Code Section 44274(b)
[5] http://www.arb.ca.gov/msprog/aqip/fundplan/fy1415_funding_plan_aqip_ggrf_appendix_a_final.pdf

D. Funding Sources

Funding for AQIP comes primarily from the Smog Abatement Fee, which is assessed annually for a vehicle's first six registration years in lieu of providing a biennial smog certification. Of the $20 collected for each vehicle at the time of annual registration, $4 is allocated to CARB for AQIP. In addition, a small portion of AQIP funding comes from two additional sources: a $10 or $20 initial registration fee for new vessels, dependent upon the year in which the new registration is filed, and $2.50 for annual special equipment identification plate fees. The fees identified above generate approximately $2 million to $2.5 million each month for AQIP, which translates to $24-$30 million annually.

In addition to the fees above, AQIP has received augmentations in recent years to support the growing demand of AQIP projects. In total, AQIP has received $19 million from the Energy Commission for the Clean Vehicle Rebate Project (CVRP) and $4 million for the Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP). These direct investments are further complemented by the Energy Commission's investments to support fueling infrastructure for both electric vehicle charging stations and hydrogen fueling stations as part of ARFVTP. For FY 2013-14, the Legislature also supported AQIP by passing Senate Bill (SB) 359 (Corbett, Chapter 415, Statutes of 2013) and AB 101 (Budget, Chapter 354, Statutes of 2013). Funding from these two bills provided an additional infusion of $54.55 million into AQIP to help extend critical funding to successful deployment projects. The Legislature also provided further support for CVRP by providing an additional $30 million in funding, approved by SB 852 (Leno, Chapter 25, Statutes of 2014) and SB 862 (Budget and Fiscal Review, Chapter 36, Statutes of 2014), to address a significant growth in rebate demand in FY 2013-14.

While the focus of this report is on AQIP, actual revenues available to projects have been insufficient to keep up with increasing demand. Passed by the Legislature and signed by Governor Brown[6] in 2012, the establishment of the Greenhouse Gas Reduction Fund (GGRF) provides a significant new source of funding to support low-carbon transportation technologies with proceeds generated by CARB's Cap-and-Trade program. The legislation established broad categories of GHG emissions-reducing projects that may be funded with these proceeds. For FY 2014-15, a total of $850 million in Cap-and-Trade auction proceeds was approved and $200 million was allocated to CARB for Low Carbon Transportation Investments, with a priority for disadvantaged communities.

The Low Carbon Transportation Investments support clean transportation technologies that meet the same goals as AQIP, and CARB is implementing the two funding sources in a coordinated manner. Accordingly, the $200 million available to CARB is implemented through the administrative framework established by AQIP. As a result, GGRF funding was also directed to existing AQIP projects, CVRP and HVIP, to respond

[6] AB 1532 (Pérez, Chapter 807, Statutes of 2012), SB 535 (de León, Chapter 830, Statutes of 2012), and SB 1018 (Budget and Fiscal Review, Chapter 39, Statutes of 2012)

to increasing demand for these incentive programs. Additional information on the $200 million allocation for low-carbon transportation can be found in the FY 2014-15 Funding Plan.[7] As this is a new source of funding, information on the new projects proposed and supported by GGRF is not included in this report. The new projects are still in the process of being developed by CARB and will be covered more extensively in subsequent reports.

E. Report 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 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 past and current AQIP projects between April 24, 2009, the date AQIP's first funding plan was approved, and June 30, 2014, the end of FY 2013-14. Project updates on progress after June 30, 2014 will be covered in the next biennial report.

[7] https://www.arb.ca.gov/msprog/aqip/fundplan/final_fy1415_aqip_ggrf_fundingplan.pdf

II. Status Update on AQIP Projects

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. AQIP has funded projects in seven categories between program launch through FY 2013-14:

- CVRP
- HVIP
- Truck Loan Assistance Program
- Advanced Technology Demonstrations
- Lawn and Garden Replacement
- Hybrid Off-Road Equipment Pilot
- Zero Emission Agricultural Utility Terrain Vehicle Rebates

Table 1 lists the project categories, funding levels (including funds received from other agencies and transfers between AQIP projects), and project status.

Table 1. Status of AQIP Projects (FY 2008-09 to FY 2013-14)

Project Category	Fiscal Years						Project Status
	08-09	09-10	10-11	11-12	12-13	13-14	
Ongoing AQIP Projects (in millions (M))							
CVRP	--	$4.1	$7[1]	$16.2[2]	$36.5[3]	$89.55[4]	Launched March 2010. Total allocation of $140M spent as of June 30, 2014; over 67,000 rebates issued; implementation ongoing.
	[1] Includes $2 million in funding from the Energy Commission. [2] Includes $500,000 in funds redirected from the FY 2011-12 locomotive demonstration and $700,000 in funds redirected from the FY 2009-10 Agricultural Utility Terrain Vehicle Rebates project. [3] Includes $3 million in funds redirected from the FY 2008-09 Truck Loan Program, $6 million in funds redirected from the FY 2012-13 HVIP, and $12 million in funding from the Energy Commission. [4] Includes $24.55 million in funding from AB 101 (Budget, Chapter 354, Statutes of 2013), which redirected funding from the Energy Commission to AQIP, $20 million in funding from SB 359 (Corbett, Chapter 415, Statutes of 2013), $5 million in funding from the Energy Commission, and $30 million in funding approved by SB 852 (Leno, Chapter 25, Statutes of 2014) and SB 862 (Budget and Fiscal Review, Chapter 36, Statutes of 2014) to address FY 2013-14 waiting list.						
HVIP	--	$20.4	$23[5]	$11	$0	$15[6]	Launched Feb 2010. ~$52M of $69.4M spent as of June 30, 2014; ~1,700 vouchers issued; implementation ongoing.
	[5] Includes $4 million in funding from the Energy Commission. [6] Includes $10 million from Low Carbon Transportation investments.						
Advanced Technology Demonstrations	--	$1.8	$1.8	$1.7[7]	$1	--	~$5M of $6.3M spent; 12 projects complete/ended; 1 project ongoing.
	[7] Includes $500,000 in funds for hybrid truck testing, and $199,800 in funds redirected from the FY 2009-10 Agricultural Utility Terrain Vehicle Rebates project to hybrid truck testing.						
Truck Loan Assistance Program	$30	--	--	--	$4[8]	$20[9]	Launched April 2009. ~$42M of $54M spent; over 4,655 loans issued; implementation ongoing.
	[8] $4 million in funds redirected from HVIP in FY 2012-13. [9] Includes $10 million as a loan from VIRF per SB 359 (Corbett, Chapter 415, Statutes of 2013).						
Past AQIP Projects							
Lawn & Garden Equipment Replacement	--	$1.6	$1	--	--	--	Launched spring 2010 with 9 air districts. Nearly $2.6M spent; 12,893 mowers replaced; project discontinued.
Hybrid Off-Road Equipment Pilot	--	--	$2	--	--	--	Launched July 2011; project complete. 16 vouchers issued; ~$900,000 spent; Emission testing completed.
Zero Emission Agricultural Utility Terrain Vehicle Rebates	--	$0.13	--	--	--	--	Launched April 2010; closed December 2011. 56 rebates issued.
Total Funding	**$30**	**$28.03**	**$34.8**	**$28.9**	**$41.5**	**$124.55**	**$287.78**

FY *2014-15 Funding Plan*

The FY 2014-15 AQIP allocations continue investments in CVRP, HVIP, and the Truck Loan Assistance Program. The Low Carbon Transportation Investments allocation complements AQIP investments by increasing funding for CVRP and HVIP to meet projected demand. The Low Carbon Transportation Investments also add new projects including a Light-Duty Pilot Project in Disadvantaged Communities, Zero Emission Truck and Bus Pilots, and Advanced Technology Freight Demonstration Projects. These projects are described further in the FY 2014-15 Funding Plan.[8]

The status updates provided in this section will focus on past and current AQIP projects, as of June 30, 2014. A status report on the AQIP projects in the FY 2014-15 Funding Plan will be included in the next annual funding plan as well as the next report to the Legislature.

Emission Benefits

AQIP investments are an important first step in the fundamental transformation of the California fleet to one with widespread use of advanced vehicles that are critical to meeting California's long-term air quality and climate change goals. Technology advancing projects funded through AQIP are critical in bringing the next generation of vehicles and equipment to California. The two largest AQIP technology advancing project categories are: (1) rebates for zero emission or plug-in hybrid passenger cars through CVRP, and (2) vouchers for the purchase of hybrid and zero emission trucks and buses through HVIP. The technologies supported by the two projects are at a key point where public incentives can spur adoption to help them become mainstream choices.

CVRP achieves criteria pollutant benefits and relatively greater direct carbon dioxide emission reductions, measured in metric tons of carbon dioxide equivalent ($MTCO_2e$), reflecting the fuel efficiency of plug-in hybrid and zero emission passenger vehicles. HVIP provides greater NO_X and particulate matter (PM) 2.5 emission reductions per vehicle as the project supports the deployment of advanced technology heavy-duty trucks and buses that reduce or eliminate the use of diesel fuel. Due to the scale of CVRP and HVIP projects and the large number of vehicles supported, most of the emission benefits generated by AQIP are derived from these two projects.

The NOx emission benefits for the Truck Loan Assistance Program are also included in the table because the purchase of new trucks accelerates the reduction of NOx. The Truck and Bus Regulation requires nearly all trucks and buses to have 2010 model year engines or equivalent, by January 1, 2023. However, the Truck and Bus Regulation already requires filter technology that reduces PM 2.5. Therefore the new trucks that are purchased as a result of the Truck Loan Assistance Program do not result in additional PM 2.5 reductions beyond those required by the Truck and Bus Regulation as of June 2014.

[8] https://www.arb.ca.gov/msprog/aqip/fundplan/final_fy1415_aqip_ggrf_fundingplan.pdf

The Advanced Technology Demonstration Projects are designed to advance technology from pre-commercialization to full commercialization, enabling future long-term emission reductions. Therefore, near-term emission reductions are not quantified.

The Lawn and Garden Equipment Replacement Project replaces gasoline-powered residential lawn and garden equipment with cordless, zero emission equipment, encouraging further development and deployment of this technology. The low emission reductions for this pilot project compared to other programs were due to the limited scope of the pilot and the relatively small size of the lawn equipment engines.

The Hybrid Off-Road Equipment Pilot Project emission benefits were not quantified. The purpose of this project was to determine if hybrid off-road equipment could achieve emission reductions, and whether it would be a viable deployment project in the future. CARB found that this project category was not viable because NOx emissions increased when the equipment performed certain tasks. Funding was not continued beyond the initial FY 2010-11 investment and the project was completed in June 2013.

The Zero-Emission Agricultural Utility Terrain Vehicle (Agricultural UTV) Rebate Project was also discontinued because program popularity was low and the emission benefits of the approximately 50 rebates requested were negligible. Therefore emissions benefits for this project were not quantified, and program funding was limited to the initial FY 2009-10 investment.

Table 2 identifies the emission benefits attributable to AQIP funding over the life the projects.

Table 2. Statewide Criteria Pollutant and GHG Emission Reductions Attributable to AQIP [1,2,3]

	AQIP Funding (millions)	**NOx** (tons)	**PM 2.5** (tons)	**CO_2** ($MTCO_2e$)
CVRP[4]	$59	169	75	2,390,000
HVIP[5]	$55	91	19	217,500
Truck Loan Assistance Program[6]	$44	4,900		
Advanced Technology Demos				
Lawn/Garden Equipment Replacements[7]		<1	<1	
Hybrid Off-Road Equipment Pilots				
Zero Emission Ag Utility Terrain Vehicle Rebates				
Total		**5,160**	**94**	**2,607,500**

[1] Emission reductions are calculated based on AQIP funding spent through June 30, 2014, which may be less than the allocated amount shown in the table. Emission reductions achieved through AQIP programs but funded with non-AQIP monies, such as Low Carbon Transit monies from the Greenhouse Gas Reduction Fund, are not included in this table.

[2] Criteria pollutant (NOx, PM2.5) emission benefits are calculated for exhaust emissions only. GHG (CO_2) emission benefits are calculated on a well-to-wheel basis, which accounts for the emissions produced during the production, distribution, and usage of the different fuel types, including hydrogen and electricity, and any associated exhaust emissions. If criteria pollutant reductions were calculated on a well-to-wheel basis, CVRP NOx emission reductions would be approximately 400 tons and CVRP PM reductions would be approximately 93 tons.

[3] Passenger vehicle life for CVRP is based on a 15-year vehicle life. The assumption is based on the median life for passenger cars in California, which is 14 years, or 186,000 miles, and other factors. Staff assumed a conservative life of 15 years for HVIP eligible vehicles, but trucks can have a useful life of over 20 years.

[4] Based on 37,638 advanced technology passenger vehicles supported by AQIP funding under CVRP as of June 30, 2014.

[5] Based on 1,688 advanced technology trucks and buses supported by AQIP funding under HVIP as of June 30, 2014.

[6] Based on 4,749 trucks supported by the Truck Loan Assistance Program as of June 30, 2014.

[7] Based on 12,893 mowers supported by the Lawn/Garden Equipment Replacements Project as of June 30, 2014.

Overall, AQIP continues to be effective and is supporting the early development and deployment of advanced technologies needed to meet California's longer-term, post-2020 SIP goals. The program is also supplementing other CARB programs that are providing near-term emission reductions with the use of fully commercialized and readily available emission control technologies by supporting advanced clean vehicles and equipment that are not commercially available. Technologies supported by AQIP generate near-term emission benefits but, more importantly, help to advance the development and deployment of advanced clean technologies, such as zero emission vehicles and equipment, which are needed to meet California's long-term air quality

goals. Additionally, because of the focus on zero emission technologies, AQIP provides complementary support toward meeting the State's 2020, 2030, and 2050 climate change goals. The remainder of this chapter provides a description and status update of each of the AQIP project categories funded through FY 2013-14.

1. Clean Vehicle Rebate Project

Overview

CVRP offers vehicle rebates on a first-come, first-served basis for light-duty ZEVs, plug-in hybrid electric vehicles (PHEVs), zero emission motorcycles, and neighborhood electric vehicles. CVRP helps get the cleanest vehicles on the road in California by providing consumer rebates to partially offset the higher initial cost of these advanced technologies. Current rebates range from $2,500 for fully functioning battery electric vehicles (BEVs) to $900 for zero emission motorcycles and neighborhood electric vehicles. Further, CVRP is intended to:

- Support CARB's ZEV Regulation, which is projected to result in 1 out of every 7 new cars purchased in 2025 being a zero emission or plug-in hybrid electric vehicle.
- Support the goal of 1.5 million ZEVs by 2025, consistent with California ZEV regulations and the Governor's Executive Order B-16-2012.
- Accelerate production economies of scale; and encourage co-investment in infrastructure and workforce training.

The early investment of rebates for clean vehicle technologies will prime the market for the larger number of vehicles needed over the next decade and beyond to meet the State's air quality standards and climate change goals. As ZEV and PHEV technologies improve and manufacturers begin to produce more vehicles to meet the Governor's Executive Order and CARB's ZEV Regulation, CVRP helps increase consumer demand for the advanced clean vehicles. CVRP plays an important role in educating consumers and incentivizing the purchase of ZEVs to help manufacturers build volumes that will bring down vehicle costs over time. Finally, the CVRP investments – coupled with corresponding investments in vehicle charging and fueling infrastructure by the Energy Commission, regional governments, and the federal government – provide a signal to manufacturers that there is a demand for clean vehicle technologies and support manufacturers who focus investments on advanced technology vehicle development and deployment.

Through FY 2013-14, CARB, with funding support from the Energy Commission, has allocated a total of approximately $140 million for CVRP and demand continues to increase. AQIP funding plans have been developed to provide flexibility to respond to market conditions. As a result, CARB has implemented different strategies, such as reducing rebate amounts, shifting funds from other programs, and instituting a waiting list to help CVRP continue without interruptions to satisfy increasing demand. The Legislature also provided an additional infusion of funding with SB 359 (Corbett,

Chapter 415, Statutes of 2013) and AB 101 (Budget, Chapter 354, Statutes of 2013) to support the growing demand for rebates.

To address growing demand, CVRP was allocated a total of $121 million for FY 2014-15, with $5 million from AB 118 funding, $5 million provided by the Energy Commission, and $111 million from GGRF. Also, as light-duty fuel cell electric vehicles (FCEVs) are in the early stages of commercialization and are not as widely available, CARB increased rebate amounts for FCEVs to $5,000 in the FY 2014-15 Funding Plan, consistent with the rebate levels offered to BEVs during the equivalent stage of commercialization. Beyond FY 2014-15, the passage of SB 1275 (De León, Chapter 530, Statutes of 2014) requires CARB to implement revisions to CVRP in the FY 2015-16 AQIP Funding Plan to limit consumer eligibility based on income, ensure that rebate levels can be phased down in increments based on cumulative sales, and consider conversions to prequalification or point-of-sale rebates.

A grantee is selected annually via competitive solicitation to implement CVRP. The Center for Sustainable Energy, a non-profit organization based in California, has been the grantee since project inception with the primary responsibility of processing rebates. The CVRP webpage, at https://energycenter.org/clean-vehicle-rebate-project, provides a real-time accounting of rebate funds available to consumers, a downloadable rebate application and instructions, list of eligible vehicles, an online tutorial, and other project information.

CVRP has supported the maturation of a diverse and competitive clean light-duty vehicle market. In the first two years of the project, Nissan purchasers originally received nearly 90 percent of the rebates because Nissan was the only major manufacturer with an eligible vehicle. However, today, there are currently more than 25 models of eligible vehicles available to consumers and more vehicle introductions are planned. Growing consumer interest for PHEVs, which were introduced in late February 2012 to CVRP, increased the popularity of the program, and PHEVs now comprise 47 percent of total rebates. As the clean vehicle market grows, consumer choices in vehicle price and range options continue to expand.

Program Status as of June 30, 2014

Since the project's consumer launch in March 2010, rebates for over 67,000 vehicles totaling approximately $140 million have been issued.

Table 3 presents a summary of rebates by vehicle type and model.

Table 3. Rebates by Vehicle Types and Model through June 30, 2014

	Number of Rebates Issued	Total Rebate Amount	% of Rebates
ZEV	**35,455**	**$92,538,487**	**52.9%**
Nissan Leaf	16,778	$45,975,180	25.0%
Tesla Model S	9,137	$22,826,361	13.6%
FIAT 500e	3,988	$9,967,708	5.9%
Toyota RAV4 EV	1,258	$3,139,417	1.9%
Smart Electric	1,228	$2,888,000	1.8%
Ford Focus Electric	1,212	$3,020,973	1.8%
Chevrolet Spark EV	835	$2,087,500	1.2%
Honda Fit EV	347	$866,250	0.5%
Mitsubishi i-MiEV	186	$389,061	0.3%
Tesla Roadster	162	$675,000	0.2%
BMW i3	108	$270,000	0.2%
BMW 1 Series Active E	70	$52,500	0.1%
Th!nk City	53	$126,037	0.1%
CODA	49	$122,500	0.1%
Mercedes-Benz F-CELL	26	$65,000	0.0%
Honda FCX Clarity	15	$57,500	0.0%
Wheego LiFe	2	$4,500	0.0%
Hyundai Tucson Fuel Cell	1	$5,000	0.0%
PHEV	**31,166**	**$46,709,451**	**46.5%**
Chevrolet Volt	14,741	$22,101,851	22.0%
Toyota Prius Plug-in Hybrid	11,338	$16,979,567	16.9%
Ford Fusion Energi	2,573	$3,859,500	3.8%
Ford CMAX Energi	2,258	$3,384,533	3.4%
Honda Accord Plug-In	229	$343,500	0.3%
Cadillac ELR	27	$40,500	0.0%
Other	**433**	**$1,370,175**	**0.6%**
Zero	209	$207,700	0.3%
GEM	102	$97,450	0.2%
Smith Newton 1-9	39	$780,000	0.1%
Miles EV ZX40S-AD	35	$44,100	0.1%
Brammo	31	$31,625	0.0%
Navistar eStar 300 series	10	$200,000	0.0%
Vectrix VX-1	6	$7,800	0.0%
Vantage EVX1000	1	$1,500	0.0%
Grand Total	**67,054**	**$140,618,113**	**100.0%**

Table 4 presents rebates issued by applicant type. About 96 percent of the rebates have been issued to individual consumers, with the remainder going to businesses, non-profit organizations, or government fleets.

Table 4. Rebates by Applicant Type

Type of Application	Number of Rebates	Total Dollars Allocated	Percentage of Total Dollars Allocated
Private individual or sole proprietor	64,700	$135,269,352	96.20%
California Licensed Business	1,997	$4,670,061	3.32%
Local government agency	157	$335,400	0.24%
State government agency	105	$185,450	0.13%
Non-profit organization	67	$122,650	0.09%
Federal government agency	28	$35,200	0.03%
TOTAL	**67,054**	**$140,618,113**	**100%**

Figure A illustrates the trends in rebate activity under CVRP through June 2014. The project was launched in March 2010, but the number of rebate applications was low until the release of the Nissan LEAF in early 2011. Another rebate spike occurred in March 2012 after the commercial release of several PHEV models. Demand has increased significantly and continued to grow with over 4,000 rebates issued in March and June of 2014.

Figure A. Rebates Issued by Month

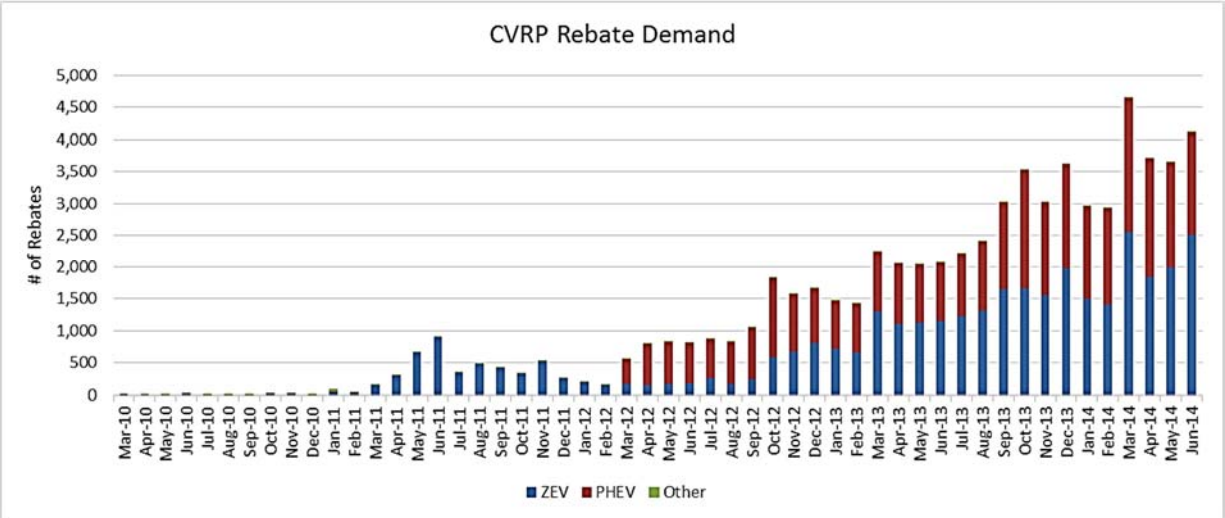


Figure B. Distribution of Clean Vehicle Rebates by Air District

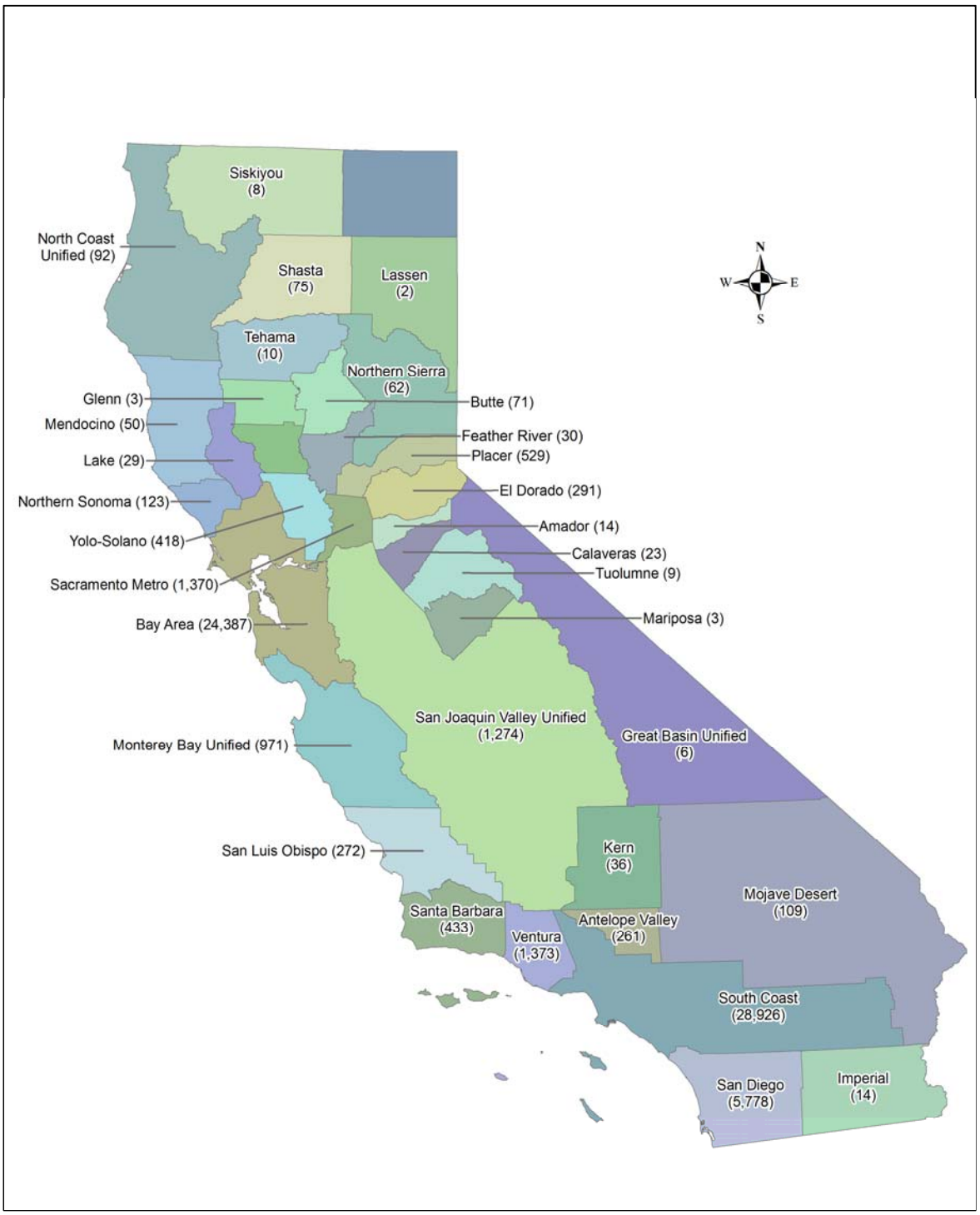


Figure B illustrates the statewide distribution of rebates by air district. The majority of rebates are in the Bay Area AQMD, South Coast AQMD, and San Diego County APCD. This distribution is due to manufacturer marketing, population density, and additional incentives for charging infrastructure focused in these areas.

CVRP's Role in Meeting Air Quality and Climate Change Goals

Nearly all new vehicle sales by the 2040 model year need to be ZEVs and PHEVs in order to achieve California's long term 2050 GHG reduction goals in the light-duty vehicle sector. Additionally, Governor Brown issued Executive Order B-16-2012 in March 2012 that directs the deployment of 1.5 million ZEVs on California's roadways by 2025. Amendments to the ZEV Regulation in 2012 strengthened ZEV requirements and required manufacturers to produce increasing numbers of ZEVs and PHEVs in the 2018-2025 model years, with 15 percent of new cars produced in 2025 being ZEVs and PHEVs. The continuation of rebate funding, in combination with other monetary and non-monetary incentives, is critical to early wide-scale consumer acceptance and adoption of clean vehicle technology. CVRP rebates have been instrumental in assisting the early stage California clean car market.

As demand for CVRP rebates grow, near- and long-term adjustments may be necessary to ensure project sustainability while meeting project goals. In the FY 2014-15 Funding Plan, CARB identified potential metrics that may be considered in determining the success of the project. Additionally, as part of SB 1275, the bill requires CARB to incorporate in the FY 2016-17 Funding Plan an assessment of when a self-sustaining market is expected and a forecast of the immediate fiscal year and two subsequent fiscal years. Efforts are currently underway to address the above requirements. In future Funding Plans, the metrics of success and analysis specified by SB 1275 will be evaluated and used to inform CVRP's long-term plan to allow the project to be as effective as possible in encouraging the continued transformation of California's clean vehicle market. CARB will provide additional information on this process in the next report to the Legislature.

2. Hybrid and Zero Emission Truck and Bus Voucher Incentive Project

Overview

HVIP is intended to encourage truck and bus manufacturers to offer, and California fleets to purchase or lease, progressively cleaner advanced technology vehicles in multiple truck and bus vocations. HVIP helps ensure California consumer acceptance of the nation's first commercially-available hybrid and zero emission trucks and buses, and helps drive production economies of scale while lowering technology costs. HVIP is also structured to encourage smaller fleets to consider purchase of these technologies as they make their way into the market and prices decline.

HVIP offers vouchers on a first-come, first-served basis to help California fleets purchase new hybrid and zero emission trucks. Through FY 2013-14, CARB has allocated a total of $65.4 million for HVIP. The Energy Commission also contributed an additional $4 million of its AB 118 funding to CARB to help fund zero emission trucks in mid-2011, bringing the cumulative total for the project to $69.4 million. For FY 2014-15, CARB allocated a total of $10-$15 million to HVIP, with $5 million from AB 118 funding and $5-$10 million from the GGRF. Separately, the San Joaquin Valley Air Pollution Control District has invested $2 million to enhance voucher amounts and further the acceleration of hybrid and zero emission trucks in the Valley.

HVIP proved successful in introducing the first wave of hybrid electric and battery electric trucks to California and the nation. For example, Hino Motor Company, a vertically integrated hybrid truck manufacturer owned by Toyota, selected California as the market to introduce their first U.S. product offering in October 2012. HVIP is also supporting the growth of businesses and jobs in the San Joaquin Valley. Electric Vehicles International (EVI), with headquarters and manufacturing facilities in Stockton, California, is one of the leading manufacturers of zero emission battery electric trucks in the U.S. Through HVIP, the State provided nearly $5 million to support the deployment of over 100 EVI zero emission trucks in California.

The project has also helped to identify a number of deployment challenges for these vehicles. Vehicle technology costs, vehicle charging infrastructure costs, electricity demand charges, fuel economy uncertainties, and the lack of long-term vehicle performance and benefits data are some of the critical barriers facing truck fleets that wish to utilize advanced technology trucks and buses. However, incentives play a significant role in addressing some of these barriers and along with ongoing project refinements, HVIP continues to assist with achieving widespread commercialization of advanced technologies in medium- and heavy-duty vehicles. Due to the success of HVIP, the project is currently being duplicated in other parts of the nation.

Similar to CVRP, a project grantee is selected annually via competitive solicitation to implement HVIP. The California-based non-profit transportation consortium Calstart has been the grantee since project inception and is responsible for processing voucher applications. The HVIP webpage, at http://www.californiahvip.org/, provides a real-time

accounting of voucher funds remaining, on-line application, list of eligible vehicles, training, and other project information.

Program Status as of June 30, 2014

Since the project's launch in February 2010, vouchers for approximately 1,700 vehicles have been issued totaling approximately $51.7 million of the total $69.4 million allocation as of June 30, 2014. Tables 5, 6, and 7 contain cumulative summaries of vouchers issued by eligible vehicle type, vehicle weight, and vehicle manufacturer, while Figure C illustrates voucher distribution by air district.

Table 5. Vouchers Issued By Vocation[1]

Vehicle Type	Vouchers Issued	Total Voucher Funds	Average Voucher Amount	% of Total Vouchers	% of Total Voucher Funds
Parcel Delivery	642	$19,382,000	$30,190	38%	38%
Beverage Delivery	436	$14,591,000	$33,466	26%	28%
Other Truck	218	$5,633,000	$25,839	13%	11%
Food Distribution	151	$5,162,000	$34,185	9%	10%
Uniform & Linen Delivery	117	$2,935,000	$25,085	7%	6%
Tow Truck	64	$2,144,000	$33,500	4%	4%
School, Shuttle or Urban Bus	33	$951,776	$28,842	2%	2%
LP Pick-up & Delivery	24	$352,000	$14,667	1%	1%
Refuse Hauler	14	$514,000	$36,714	1%	1%
Total	**1,699**	**$51,664,776**	**$30,409[2]**	**100%**	**100%**

[1] Data includes $4 million in funding from the Energy Commission.

[2] Overall average for all vouchers provided in the program.

Table 6. Vouchers Issued By Gross Vehicle Weight Range[1]

Gross Vehicle Weight Range	Vouchers Issued	Total Voucher Funds	% of Total Vouchers	% of Total Voucher Funds
5,001 – 6,000 lbs.	51	$653,000	3%	1%
6,001 – 10,000 lbs.	0	$0	0%	0%
10,001 – 14,000 lbs.	34	$715,000	2%	1%
14,001 – 19,500 lbs.	726	$21,120,000	43%	41%
19,501 – 26,000 lbs.	364	$12,330,000	21%	24%
26,001 – 33,000 lbs.	97	$2,521,776	6%	5%
>33,000 lbs.	427	$14,325,000	25%	28%
Total	**1,699**	**$51,664,776**	**100%**	**100%**

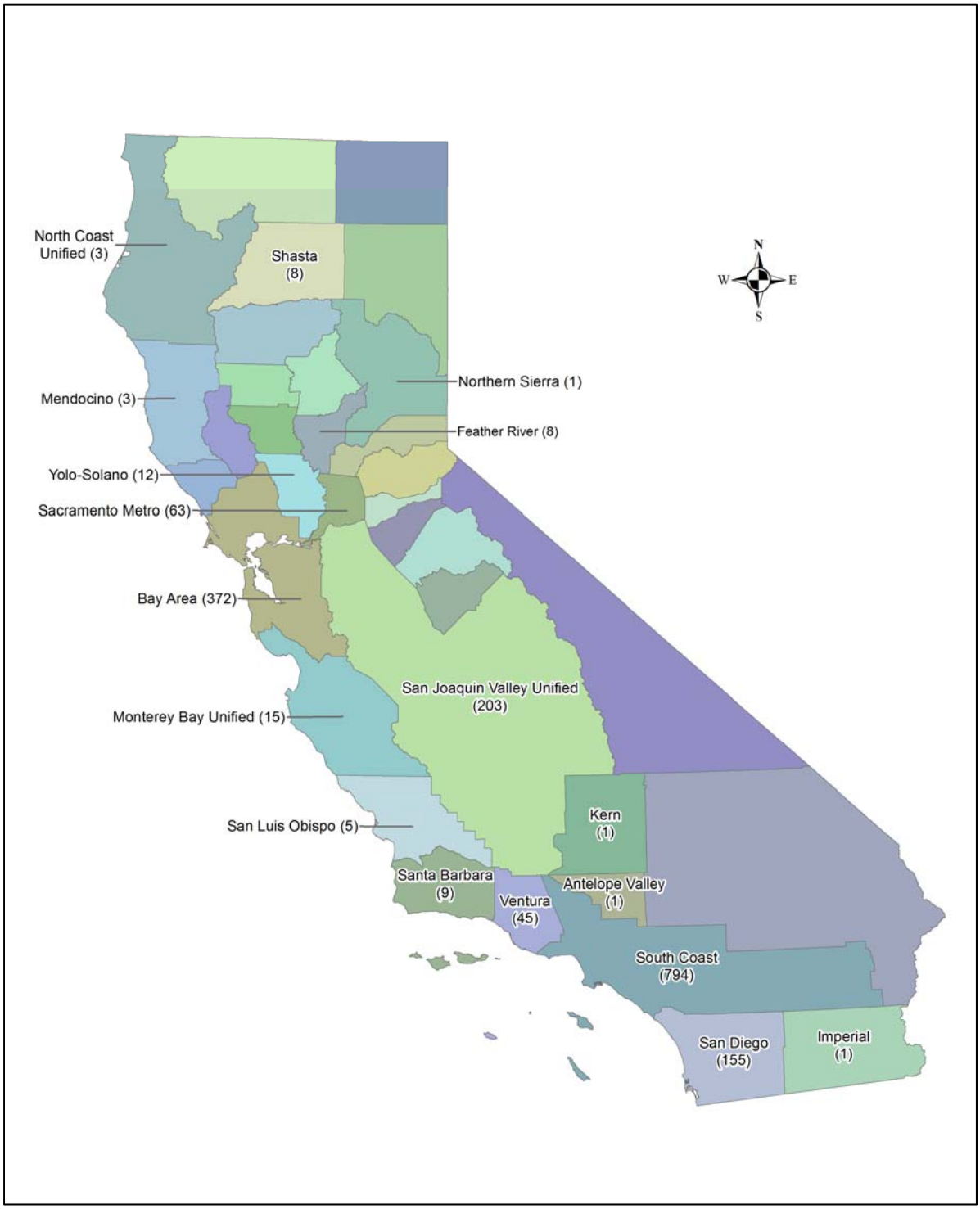
[1] Data includes $4 million in funding from the Energy Commission.

Table 7. Vouchers by Vehicle Types and Model[1]

Vehicle Types by Model	Number of Vouchers	Average Voucher Amount	Total HVIP Funding
Hybrid			
Hino Motors	492	$30,701	$15,105,000
Freightliner	217	$32,373	$7,025,000
Kenworth	201	$33,483	$6,730,000
Ford	138	$24,565	$3,390,000
FCCC	150	$19,500	$2,925,000
Navistar	106	$26,102	$2,766,776
Peterbilt	15	$27,333	$410,000
New Flyer	7	$40,714	$285,000
Autocar	6	$45,000	$270,000
Thomas Built	6	$31,667	$190,000
Total	**1,338**	**$29,220**	**$39,096,776**
Zero Emission			
Smith Electric	167	$37,365	$6,240,000
Electric Vehicle International (Box Truck)	109	$45,505	$4,960,000
Ford/Azure (Transit Connect)	51	$12,804	$653,000
Navistar (eStar 300)	34	$21,029	$715,000
Total	**361**	**$34,814**	**$12,568,000**

[1] Data includes $4 million in funding from the Energy Commission.

Figure C. Distribution of Hybrid and Zero Emission Truck and Bus Vouchers by Air District



Shifting Fleet Demand

In the first year of the program, FY 2009-10, HVIP was allocated about 70 percent of the total funding available. While the project experienced robust program demand in the first fiscal year, the program experienced lower demand in the following fiscal year as the several large "early adopter" California fleets that drove initial program demand (such as UPS and Coca-Cola) did not return for additional hybrid truck purchases after their initial experiences with the first generation vehicles. Demand for hybrid trucks, however, began to rebound in FY 2011-12, with the introduction of the vertically-integrated Hino Motor Company's hybrid medium-duty delivery truck. Additionally, while zero emission truck manufacturers have faced some economic challenges, which have slowed production, new HVIP-eligible zero emission bus manufacturers, such as Proterra and BYD, have led a modest increase in demand for zero emission buses.

Challenges, such as high cost zero emission truck and bus charging infrastructure, demand charge costs based on peak electricity use, uncertainties regarding vehicle performance and reliability, the shortage of long-term vehicle performance and benefits data, and fleet's risk averse nature to new technologies have also made it difficult to entice the next generation of potential early adopters. To address this, HVIP updates have focused on increasing program participation from the more challenging "next tier" of potential California fleets. HVIP's funding structure encourages smaller fleets to participate with higher voucher amounts for the first three hybrid or zero emission trucks and buses purchased by a fleet. This has proved effective in encouraging smaller California fleets to purchase the Hino hybrid truck, which now accounts for the bulk of HVIP demand. In June 2014, the Board also approved significantly higher voucher amounts for zero emission trucks and buses, and allowed the sum of public incentives to exceed incremental cost to help accelerate the market for this technology. The Board also approved higher voucher amounts for zero emission trucks and buses that benefit disadvantaged communities.

While early vehicle deployment challenges persist, continued investment in commercially available (yet more expensive and not widely adopted) advanced, low-emission truck technologies is critical to ensure California achieves its air quality and climate change goals. Incentives will continue to play a significant role in addressing existing market barriers and HVIP remains the primary driver for achieving widespread advanced technology medium- and heavy-duty vehicle adoption. Continuing the commitment for investments is needed to ensure a viable early market for these critical technologies.

HVIP's Role in Meeting Air Quality and Climate Change Goals

A significant increase in hybrid and zero emission truck and bus deployment is needed over the next several years to meet longer-term air quality and climate change goals. Realizing these goals relies upon accelerating early market penetration of hybrid technology with significant fleet penetration of these vehicles into California. Production

capacity has substantial growth potential for both hybrid and zero emission trucks and buses, but current low production volumes contribute to a $20,000 to $50,000 vehicle cost premium for hybrid trucks and up to $100,000 cost premium for medium-duty battery electric trucks over conventional diesel models. Looking ahead, CARB expects production costs to decline as hybrid driveline and battery production volumes increase, thereby supporting increased deployments of these vehicles to achieve CARB's near- and long-term air quality goals and commitments. However, to further accelerate widespread adoption of these new technologies, additional incentives or regulatory approaches may be needed.

3. Truck Loan Assistance Program

Overview

In the first year of AQIP, in recognition that CARB would spend the 2008-09 fiscal year developing the regulatory guidance necessary to implement AQIP prior to funding projects, the Legislature directed that FY 2008-09 AQIP funds be used to establish a new financial assistance program to help smaller truck fleets affected by CARB's In-Use Truck and Bus Regulation and the Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Regulation.[9] The Truck Loan Assistance Program was developed to assist small-business fleet owners by providing financing assistance to upgrade to newer trucks or 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 through its California Capital Access Program, the Truck Loan Assistance Program creates financing opportunities for truck owners that fall below conventional lending criteria and are unable to qualify for traditional financing. Historically, nearly 70 percent of enrolled loans have been issued to owner operators with one truck, and 90 percent of enrolled loans have been issued to fleet owners with 10 or fewer employees. 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. CARB has allocated a total of $54 million for the Truck Loan Program. For FY 2014-15, CARB allocated an additional $10 million from AQIP funding to continue this important program in helping small business owners improve air quality across the State.

Project Status as of June 30, 2014

Approximately $42 million of the $54 million allocated to the project have been leveraged to provide nearly $306 million in financing for the purchase of over 5,200 cleaner trucks, exhaust retrofits, and trailers.

Table 8 summarizes the Truck Loan Assistance Program by project type.

[9] HSC Section 44274.7

Table 8. Vehicles/Equipment Financed through the Truck Loan Assistance Program

Program	Number of Loans Issued	Number of Projects Financed	Project Type	$ Spent	Total Amount Financed
CARB/California Pollution Control Financing Authority Truck Loan Assistance Program	4,655	4,869	Truck Purchases	$41.8M	$306M
		335	Exhaust Retrofits		
		36	Trailers		

Looking Forward

The majority of participants in the Truck Loan Assistance Program are small-business fleet owners with one truck. At its April 2014 meeting, the Board approved regulatory amendments to the In-Use Truck and Bus Regulation to provide small fleet owners additional time to meet upgrade requirements. CARB anticipates that future funding plans will identify a continuing need to maintain funding for the program to support small-business fleets through the extended compliance deadlines. Assessments of ongoing funding needs will take into account updated program activity trends, which reflect truck owners' demand for financing assistance, compliance schedules, and noncompliance rates. Based on historical program activity, staff anticipates ongoing baseline annual funding needs in the $14 million to $20 million range until the In-Use Truck and Bus Regulation is fully implemented. With ongoing near-term regulatory deadlines under the In-Use Truck and Bus Regulation, CARB staff expects a continued strong demand for program funding to assist the small-business trucking sector most in need of financing for required truck upgrades.

4. Advanced Technology Demonstration Projects

Overview

The primary goal of Advanced Technology Demonstration Projects is to accelerate the introduction of pre-commercial technologies into the California marketplace. A public investment in these technologies helps to achieve significant emission reductions of criteria pollutants and toxic air contaminants sooner than would be possible otherwise. Funding Advanced Technology Demonstration Projects carries inherent complexities such as schedule delays and engineering challenges. CARB mitigates this potential by requiring a competitive selection process to award funding to the most promising technologies, requiring a significant cost share from the technology demonstrator, and requiring that the project applicant be a California-based public agency with expertise in the project category. Grants are awarded to public agencies to manage the day-to-day administration of the projects with CARB oversight. Typically, public agencies are local air districts, port authorities, or public school districts, but other agencies are eligible. The team concept for demonstration projects, with technology demonstrators partnering with a local public agency and one or more end-users, has proven to be effective, and is planned to continue for future projects.

Project Status

Through Advanced Technology Demonstration Projects, AQIP has funded 13 separate projects totaling $5.4 million (Table 9). AQIP investment has leveraged approximately $6 million in match funding from grantee and technology demonstrators resulting in a total of over $11 million in combined demonstration funding.

AQIP Advanced Technology Demonstration Projects have provided funding to support the demonstration of advanced pre-commercial technologies in the following categories:

- Locomotive
- Marine
- School Bus
- Zero Emission Off-Road Equipment
- Zero Emission Commercial Lawn and Garden Equipment

Detailed information on each of the Advanced Technology Demonstration Projects can be found in Appendix B of the FY 2014-15 Funding Plan:
https://www.arb.ca.gov/msprog/aqip/fundplan/final_fy1415_aqip_ggrf_fundingplan.pdf

Final reports from completed projects are located on the AQIP Advanced Technology Demonstration Projects webpage: https://www.arb.ca.gov/msprog/aqip/demo.htm

Table 9 provides information on each demonstration project.

Table 9. AQIP Advanced Technology Demonstration Projects

Advanced Technology Demonstration Projects					
Fiscal Year	**Grantee**	**Project Category**	**Project Title**	**Award Amount**	**Status**
2012-2013	Port of Los Angeles and Port of Long Beach	**Zero Emission Off-Road Equipment**	Electric Yard Truck Demonstration	$1,000,000	On-going
2011-2012	San Diego Country APCD	**School Bus**	Economical Electric School Bus Project	$503,304	Project Complete
	Kings Canyon Unified School District		Central Valley Electric/Hybrid School Bus Demonstration	$421,661	Project Complete
2010-2011	San Joaquin Valley APCD	**Zero Emission Commercial Lawn and Garden Equipment**	Cordless Zero Emission Commercial Lawn and Garden Equipment Demonstration	$250,000	Project Complete
	Mojave Desert AQMD		Can Green Take the Heat?	$15,000	Project Complete
	South Coast AQMD		Demonstration of Cordless Zero Emission Lawn and Garden Equipment for Commercial Use	$51,667	Project Complete
	Bay Area AQMD	**Locomotive**	Tier-4 NREC Genset Switcher	$508,466	Project Complete
	Bay Area AQMD		DPF Retrofit of a Genset Switcher: GTE Device	$229,830	Project Complete
	Bay Area AQMD	**Marine**	Wind Assist Marine Demonstration Project for Ferry Districts on San Francisco Bay	$164,250	Project Complete
	South Coast AQMD		Retrofit a Tugboat with Hug Nauticlean DPF/SCR System	$439,000	Project Complete
2009-2010	Sacramento Metropolitan AQMD	**Locomotive**	EMD Line-Haul DPF Retrofit	$502,865	Project Complete
	Port of Los Angeles		Tier-4 PM Retrofit System for a Genset Switcher: Johnson Matthey Device	$346,178	Project Complete
	Port of Long Beach	**Marine**	Hybrid Tugboat Retrofit	$1,000,000	Project Complete

Advanced Technology Demonstrations' Role in Meeting Air Quality and Climate Change Goals

Advanced Technology Demonstration projects are a critical component for achieving long-term emission reduction and climate change goals. The acceleration of advanced technologies into the marketplace and into different sectors is necessary for California to meet its reduction goals for GHG and criteria pollutant emissions. The movement toward near-zero or zero emission technologies in on-road, off-road, locomotive and other categories is supported by a strong financial commitment made by the State. The commitment provides a signal to vehicle and equipment manufacturers as well as end-users of such equipment that their support for advanced technologies will provide a return on their investments, reducing the costs to manufacture and operate advanced technology equipment while providing air quality benefits to California.

The funding necessary for the development and demonstration of new technologies can be significant, especially at volumes necessary to drive down costs. For FY 2014-15, a total of $50 million has been allocated to Advanced Technology Freight Demonstration projects. The transition of funding from AQIP to GGRF for advanced technology demonstration projects better provides the resources necessary to serve the funding needs of this important component of AQIP.

5. Lawn and Garden Equipment Replacement Project

Overview

The Lawn and Garden Equipment Replacement Project replaces gasoline-powered residential lawn and garden equipment with cordless, zero emission equipment, encouraging further development and deployment of this technology. AQIP's Lawn and Garden Equipment Replacement Project augmented local air district programs that proved successful in reducing criteria pollutant emissions cost-effectively, but were limited in scope partially due to deficient funding. Funding was awarded to local air districts to administer the program and disburse funding to consumers for the purchase of zero emission law and garden equipment. In FY 2009-10, AQIP awarded $1.6 million in funding to the Lawn and Garden Equipment Replacement Project, with an additional $1 million in FY 2010-11. The project proved to be a success and the rebates were able to meet Carl Moyer Memorial Air Quality Standards Attainment Program cost-effectiveness requirements. Therefore, in FY 2011-12, CARB shifted zero emission lawn mower replacement projects to the Carl Moyer Memorial Air Quality Standards Attainment Program.

A total of 12,893 mowers were replaced with AQIP funds (Table 10). Additionally, the nine local air districts that participated in the program also provided funding to match AQIP funds, doubling the available funding which resulted in the replacement of approximately 12,000 additional lawn mowers.

Table 10 shows grant awards and equipment replaced in each participating air district.

Table 10. Lawn and Garden Equipment Replacement Project Summary[1]

District	Fiscal Year	Grant Award	Mowers Replaced
Antelope Valley AQMD	2009-10	$ 10,000	50
	2010-11	$ 10,000	50
Bay Area AQMD	2010-11	$ 46,180	206
Mojave Desert AQMD	2009-10	$ 10,000	50
	2010-11	$ 50,000	221
South Coast AQMD	2009-10	$ 816,000	4,690
	2010-11	$ 494,314	2,713
San Diego APCD	2009-10	$ 150,000	648
San Joaquin Valley APCD	2009-10	$ 464,000	1,671
	2010-11	$ 183,661	735
Sacramento Metropolitan AQMD	2009-10	$ 75,000	682
	2010-11	$ 57,198	538
Ventura County APCD	2009-10	$ 50,000	225
Yolo-Solano AQMD	2009-10	$ 25,000	234
	2010-11	$ 18,990	180
Total		**$2,600,000**	**12,893**

[1] Excludes equipment replaced with match funding provided by air districts

6. Hybrid Off-Road Equipment Pilot Project

Overview

The goal of the Hybrid Off-Road Equipment Pilot Project was to accelerate the deployment of commercialized hybrid construction equipment while evaluating the emission benefits in real world applications. The deployment element of the project provided funding for up to half of the incremental cost of fully commercialized hybrid off-road equipment. This project was designed to help provide the foundation for growth in the hybrid off-road equipment fleet by spurring initial deployment of commercially available (but more expensive) hybrid equipment and to provide fleets with experience using and maintaining the new technology.

Hybrid equipment in the demonstration phase of commercialization was not eligible for this project. Two equipment makes/models were commercially available for California purchase in early 2011 – the Caterpillar D7E dozer and the Komatsu HB215-LC-1 excavator. The dozer's and excavator's respective $75,000 and $28,500 voucher amounts reflect approximately half of the hybrid equipment's incremental cost.

CE-CERT was competitively selected in June 2011, to administer both the voucher distribution and emission testing elements of the Hybrid Off-Road Equipment Pilot Project. The goal of the equipment testing element was to determine NOx, PM, total hydrocarbon, carbon monoxide, and carbon dioxide emission benefits of funded equipment relative to its conventional counterpart. Equipment characterization and emissions testing were conducted on three hybrid Komatsu HB215-LC-1 excavators and three hybrid Caterpillar D7E dozers in a variety of typical vocations.

Project Status

Vouchers for 16 pieces of equipment totaling over $900,000 were issued. The deployment element of this project ended in March 2013, and the project was completed in June 2013. Results from emissions testing showed that emission benefits of both the Caterpillar D7E hybrid dozer and the Komatsu HB215-LC-1 hybrid excavator depend heavily upon the type of work being done. While the results showed a consistent decrease in CO_2 emissions for the hybrid equipment, NOx emission increases were observed based on the type of work being performed. The data suggests that the next generation of hybrid construction equipment will need additional technological advances to ensure it continues to achieve substantial GHG benefits while also delivering NOx emission reductions across all duty cycles. CE-CERT completed the project and final report in June 2013[10].

Tables 11 and 12 provide cumulative summary of vouchers issued by eligible equipment type and voucher distribution by air district. Table 13 provides the amount of

[10] https://www.arb.ca.gov/msprog/aqip/off-road%20hybrid/offrd_hybrid_final_report.pdf

vouchers and funding distributed by California fleets participating in the Hybrid Off-Road Equipment Pilot Project.

Table 11. Vouchers Issued By Equipment Make/Model (Completed and In-Progress)

Vehicle Type	Vouchers Issued	Total Voucher Funds	Average Voucher Amount	Average Equipment Purchase Price
Caterpillar Hybrid D7E Dozer	10	$675,000	$67,500	$607,514
Komatsu Hybrid HB215-LC-1 Excavator	6	$171,000	$28,500	$288,389
Total	**16**	**$901,578**	**$60,105**	**$520,365**

Table 12. Voucher Distribution by Air District

Location of Participating Fleet	Number of Vouchers	Total Funding
South Coast AQMD	5	$375,000
San Diego County APCD	4	$207,000
Bay Area AQMD	2	$150,000
Sacramento Metropolitan AQMD	2	$57,000
San Joaquin Valley APCD	1	$28,500
Shasta County AQMD	1	$28,500
Antelope Valley AQMD	1	$55,578
Total	**16**	**$901,578**

Table 13. Voucher Distribution by Fleet

Purchasing Fleet	Number of Vouchers	Total Funding
Hybrid Caterpillar D7E Dozer		
Waste Management	2	$130,578
Orange County Water District	2	$150,000
Republic Services, Incorporated	5	$375,000
Riverside County	1	$ 75,000
Hybrid Komatsu Excavator		
Road Machinery, Limited Liability Corporation	4	$114,000
Clairemont Equipment	2	$ 57,000
Total	**16**	**$901,578**

7. Zero Emission Agricultural Utility Terrain Vehicle Rebate Project

In FY 2009-2010, AQIP allocated $1.1 million to the Zero Emission Agricultural Utility Terrain Vehicle Rebate Project with the purpose of accelerating the deployment of zero emission work vehicles for use in California agricultural operations. As a first step in introducing zero emission technology into the off-road and agricultural sectors, all-terrain vehicles and utility terrain vehicles were selected for funding support as they are used extensively in the agricultural industry. The equipment population of these vehicles in the California agricultural industry is second only to that of agricultural tractors. Eligible vehicles included zero emission all-terrain and utility vehicles that satisfied specified horsepower, vehicle weight, payload limit, and tow capacity criteria. Initially, the project provided rebates for 15 percent of the manufacturer suggested retail price (MSRP), up to $2,500 per vehicle (which corresponded to about half of the vehicle incremental cost) to qualified individuals and entities.

However, demand for rebates was low from the start of the project. CARB responded by increasing the rebate amount from 15 percent to 25 percent of MSRP in September 2010 to further spur demand. Over the course of the project, 41 vehicle models were approved for rebates, ranging from $1,374 to $5,250 per vehicle. However, even with the increased rebate amount, the project did not provide enough money to encourage more agricultural operators to consider purchasing a zero emission utility terrain vehicle. As a result of insufficient consumer interest and expenditure deadlines, the project closed on December 31, 2011, and remaining funds were reallocated to other AQIP projects. The San Joaquin Valley Air Pollution Control District, the project's grantee, suggested that the biggest hurdle was the amount of the incentive since the rebate was less than the incremental cost.

Between February 1, 2010 and December 31, 2011, 56 rebates totaling $134,509 were issued. CARB will continue to monitor the development of zero emission technologies in this area.

III. **Conclusion**

AQIP continues to be effective in supporting the development and deployment of advanced technologies needed to meet California's longer-term, post-2020 SIP goals, while complementing other CARB programs' focus on near-term emission reductions from fully commercialized emission control technologies. Additionally, because of the focus on zero emission technologies, AQIP provides complementary support toward meeting 2050 climate change goals.

Each of the projects funded through AQIP has provided valuable experience to enable the expansion of advanced clean technologies in the California marketplace. Demand for rebates under CVRP has grown significantly since 2010, resulting in the placement of over 67,000 advanced clean vehicles on California roads. HVIP has already provided funding for over 1,700 hybrid and electric trucks, and, perhaps more importantly, helped to identify key deployment barriers that CARB and other stakeholders are working to overcome. Also, Advanced Technology Demonstration Projects supported by AQIP helped bring the next generation of advanced technology vehicles and equipment to California. Finally, the Truck Loan Assistance Program continues to provide small-business fleet owners financing assistance to upgrade to newer trucks or diesel exhaust retrofits.

CARB anticipates that AQIP, along with new funding from Low Carbon Transportation Investments, will continue to be effective with businesses and consumers as California vehicle and equipment owners embrace new technologies that reduce emissions. While there is an initial cost-premium for these new, cleaner technologies, there are often cost savings over their lifetime in the form of fuel savings and reduced maintenance costs. AQIP helps reduce the initial costs of new technologies through economies of scale by increasing production volumes and promotes consumer acceptance, so these advanced technology vehicles and equipment become mainstream choices without the need for incentives.

The State plays a vital role in technology and fuel advancement by supporting pre-commercial and early commercialization through incentives to both industry and consumers. The public investments support the State's commitment to these technologies, encouraging industry to develop, test, invent, and market new emission reduction technologies, alternative and clean vehicles and fuels, and build essential supporting infrastructure. Public investments also lead to product diversity and improvements in overall product features and reliability, which is key for increasing consumer acceptance of these new technologies. Further, as California's economy continues to grow with more vehicles traveling an increasing number of miles, public incentive dollars will be necessary to accelerate the turnover of old highly-polluting engines, thereby reducing the impacts of smog-forming pollutants on all Californians.