

WORKING PAPER:  
FINANCING  
LOW- AND ZERO-  
EMISSION FREIGHT  
TRANSPORTATION  
TECHNOLOGIES IN  
CALIFORNIA

A Review of Funding Sources and  
Stacking Opportunities

WRITTEN BY:

Stacey Davis and David Xue

AUGUST 2018



**GOLDMAN SCHOOL**  
OF  
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UNIVERSITY OF CALIFORNIA BERKELEY

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# Financing Low- and Zero-Emission Freight and Commercial Transportation Technologies in California

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A Review of Funding Sources and Stacking Opportunities

Working Paper

FINAL

*August 2018*

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## Acronyms

APR	Annual Percentage Rate
AQIP	Air Quality Improvement Program
AQMD	Air Quality Management District
ARFVTP	Alternative and Renewable Fuel and Vehicle Technology Program
BAAQMD	Bay Area Air Quality Management District
ARB	Air Resources Board
CalCAP	California Capital Access Program
CARB	California Air Resources Board
CNG	Compressed Natural Gas
CMP	Carl Moyer Memorial Air Quality Standards Attainment Program
CPCFA	California Pollution Control Financing Authority
CPUC	California Public Utility Commission
DERA	Diesel Emissions Reduction Act
EPA	United States Environmental Protection Agency
ePTO	electric Power Take-Off
GHG	Greenhouse Gas
GVWR	Gross Vehicle Weight Rating
HVIP	Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project
LCTOP	Low Carbon Transit Operations Program
LNG	Liquefied Natural Gas
NOx	Oxides of Nitrogen
TCEA	Trade Corridor Enhancement Account
TIRCP	Terminal Rental Adjustment Clause
TRAC	Transit and Intercity Rail Capital Program
VW	Volkswagen



# Financing Low- and Zero-Emission Freight and Commercial Transportation Technologies in California

## Introduction

Recognizing the urgent need to reduce diesel pollution and the climate footprint of the freight and commercial transportation sector, the California legislature and other California and federal policymakers have launched a number of programs to help communities, ports, warehouses, fleet owners, shipping companies and individual truck owners acquire and use cleaner technologies and fuels. All together, these programs amount to more than \$1.8 billion.

The vast majority of the funding is aimed at reducing emissions from freight and commercial transportation and more than half is dedicated to truck electrification. Some of the funding sources are potentially renewed each year, while others offer a one-time funding opportunity. In all, it is anticipated that these resources will demonstrate the viability of cleaner alternatives, build experience and drive future demand for electric trucks and freight equipment.

It is important to note that the \$1.8 Billion reflects current funding levels, and it appears likely that additional appropriations and budget allocations will follow in future years, if the current programs are successful. Given the size of California's logistics sector and the more than 5.7 million commercial trucks registered in the state,<sup>1</sup> these programs necessarily focus on bringing down costs of clean technologies through innovation and economies of scale, and encouraging the needed infrastructure at ports and other facilities. Another policy objective behind this funding is to achieve near-term health benefits. Many of the programs prioritize funding for reduction of air pollution hotspots in disadvantaged communities (in coordination with AB617 programs).

Over time this level of funding has potential to significantly improve air quality and transform freight and trucking markets. For example, assuming clean vehicles currently require an average incentive of \$90,000 (offered for new Class 6 battery-electric trucks under the HVIP), the \$1.8 billion available statewide would be enough to convert all of the 18,000 trucks serving the LA and Oakland maritime ports. Although the funding is not targeted this way in the near term, ports have many applications for electric trucks and could serve as incubators for electric truck markets in their regions. Hence this example suggests that gradually these programs are big enough to significantly increase the market for electric trucks and supporting infrastructure and to meaningfully reduce exposures to harmful pollution.

The purpose of this report is to help trucking industry leaders understand the financial incentives available to reduce up-front costs of clean freight and commercial transportation technologies. This paper, *Financing Low- and Zero-Emission Freight and Commercial Transportation Technologies in California*, offers a snapshot of available funding programs. For each program, the paper considers the

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<sup>1</sup> Source: Department of Motor Vehicles, Statistics for Publication, 2017.  
<https://www.dmv.ca.gov/portal/wcm/connect/5aa16cd3-39a5-402f-9453-0d353706cc9a/official.pdf?MOD=AJPERES>

technologies supported, the scale of effort, the application timeframe and process, and other factors. The paper also looks at where there may be opportunities to apply funding from multiple sources to a given investment. Note that while every effort was made to ensure that the information was current at the time of publication, many of the specifics will change annually, or even more often, as funding programs are reauthorized, and with changes in technologies and programmatic priorities.

### **Synthesis of Funding Opportunities**

Table 1 summarizes funding programs available to support electrification and diesel emission reductions from heavy duty vehicles in California. We expect many of these programs will be renewed to support continued progress. Programs are listed in alphabetical order. Note that a given project type may be supported by multiple funding programs, and in some cases, a single funding program may support multiple project categories.

**Table 1 FY 2017-2018 Funding Projects for Low- and Zero-Emission Freight Transportation Technologies in California**

Projects	Authorities	Funding Source (if different from the projects funded)	Funding Amount	Purpose	Distribution
<b>Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP)</b>	CEC	NA	\$97.2 million	To promote accelerated development and deployment of advanced transportation and fuel technologies.	Subject to annual appropriation
<b>Carl Moyer Program</b>	CARB and Air Districts	Carl Moyer Program	\$69 million	To fund the incremental cost of cleaner-than-required engines, equipment, and other sources of air pollution.	Subject to annual appropriation
		Community Air Protection Program	Up to \$250 million <sup>2</sup>		One-time appropriation <sup>3</sup>
<b>Clean Diesel Funding Assistance Program</b>	EPA	NA	\$40 million	Engine, vehicle or equipment replacement; Idle reduction technologies; Engine upgrades	Subject to annual appropriation
<b>Clean Truck Projects in accordance with Proposition 1B</b>	CARB and Air Districts	Community Air Protection Program	Up to \$100 million <sup>4</sup>	To support community emission reduction plans in South Coast, San Joaquin and Bay Area; to support early actions in deploying cleaner technologies	One-time appropriation (an additional one-time appropriation is in the proposed budget for 2019-2020, also for \$250 million)

<sup>2</sup> The \$250 million funds for the Community Air Protection Program are being administered through the Carl Moyer Program. However, at their discretion, air districts can choose to allocate up to 40 percent of the Community Air Protection Program funds they receive in accordance with CARB’s Proposition 1B Goods Movement Emission Reduction Program Guidelines. See Appendix 16 for details.

<sup>3</sup> An additional \$250 million one-time appropriation for Community Air Protection Program is proposed in the FY2018-2019 budget.

<sup>4</sup> Please see footnote 1.

Projects	Authorities	Funding Source (if different from the projects funded)	Funding Amount	Purpose	Distribution
<b>Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) and Low NOx Engine Incentives</b>	CARB	Air Quality Improvement Program (AQIP)	\$8 million	To encourage and accelerate the deployment of zero-emission trucks and buses, vehicles using engines that meet the optional low NOx standard, and hybrid trucks and buses in California.	Subject to annual appropriation - sunsets in 2023
		Low Carbon Transportation Program	\$180 million		Subject to annual appropriation
<b>Low Carbon Transit Operations Program</b>	Caltrans	NA	\$97 million	To provide operating and capital assistance for transit agencies to reduce greenhouse gas emissions and improve mobility.	Subject to annual appropriation
<b>On-Road Heavy-Duty Vehicle Air Quality Loan Program</b>	CalCAP/ CARB	AQIP	\$20 million	To provide financing opportunities to qualified small-business truckers who fall short of conventional lending criteria and are unable to qualify for traditional financing for cleaner trucks or retrofits.	Subject to annual appropriation - sunsets in 2023
<b>Pacific Gas and Electric Company (PG&amp;E)'s Fleet Ready Program</b>	CPUC	Transportation Electrification Standard Review Projects	\$236 million	To support fleets of medium- and heavy-duty vehicles by providing make-ready infrastructure at, for example, municipal bus transit depots, warehouses and seaports.	One-time funding

Projects	Authorities	Funding Source (if different from the projects funded)	Funding Amount	Purpose	Distribution
<b>School Bus Replacement Program</b>	CEC	NA	\$75 million	To provide schools with options to purchase next generation zero-emission vehicles and improve children's health by limiting their exposure to transportation-related air pollution.	One-time funding
<b>Southern California Edison (SCE)'s Medium- and Heavy-Duty Vehicle Charging Infrastructure Program</b>	CPUC	Transportation Electrification Standard Review Projects	\$343 million	To provide the electric infrastructure, up to and including the make-ready stub, to serve charging equipment for medium- and heavy-duty vehicles.	One-time funding
<b>Transit and Intercity Rail Capital Program</b>	CEC	NA	\$122.2 million <sup>5</sup>	To reduce emissions of greenhouse gases by reducing congestion and vehicle miles traveled throughout California.	One-time funding
<b>VW Mitigation Trust (Heavy-Duty and Off-Road Vehicle funding only)</b>	CARB	NA	\$350 million for 2017+ <sup>6</sup>	To mitigate the excess NOx emissions caused by VW's use of illegal defeat devices in certain diesel vehicles.	One-time funding through Trust; 10 years to spend

<sup>5</sup> Based on the program's 2018 Awards List, this is a rough estimate of funds dedicated to deploying zero-emission freight and commercial vehicles and upgrading the associated charging infrastructure.

<sup>6</sup> Of the total \$423 million allocated to California under the VW settlement, \$350 million is an estimate of funds to be used for freight and commercial vehicles. California has 10 years from October 2, 2017 to request their allocation and disburse the funds. The state may request up to 1/3 of its allocation the first year.

Projects	Authorities	Funding Source (if different from the projects funded)	Funding Amount	Purpose	Distribution
<b>Zero- and Near Zero-Emission Freight Facilities Project</b>	CARB	Low Carbon Transportation Program	\$100 million	To reduce GHG and criteria pollutant emissions in freight facilities.	Subject to annual appropriation
		Zero- and Near Zero-Emission Warehouse Program	\$50 million		One-time funding (solicitation issued in March 2018)
<b>Zero-Emission Off-Road Freight Voucher Incentive Project</b>	CARB	Low Carbon Transportation Program	\$40 million	To accelerate the deployment of off-road freight equipment using cleaner technologies.	Subject to annual appropriation

While all of these programs support lower-emission freight and commercial transportation projects, they vary significantly in their specific purposes, scale, eligibility, requirements and application procedures. Some programs are implemented via voucher payments that are immediately authorized and applied to the purchase of a new vehicle, while others operate through a competitive proposal-based solicitation process that requires grant writing teams and produces a small number of winners. Generally, the former programs support commercially available emission reduction technologies for individual pieces of equipment, while the latter programs focus on larger and more advanced demonstration projects. Other programs, falling in the middle, operate via an application process.

*Figure 1 Scale illustrating the different procedures involved to apply for freight incentive projects and programs<sup>7</sup>*

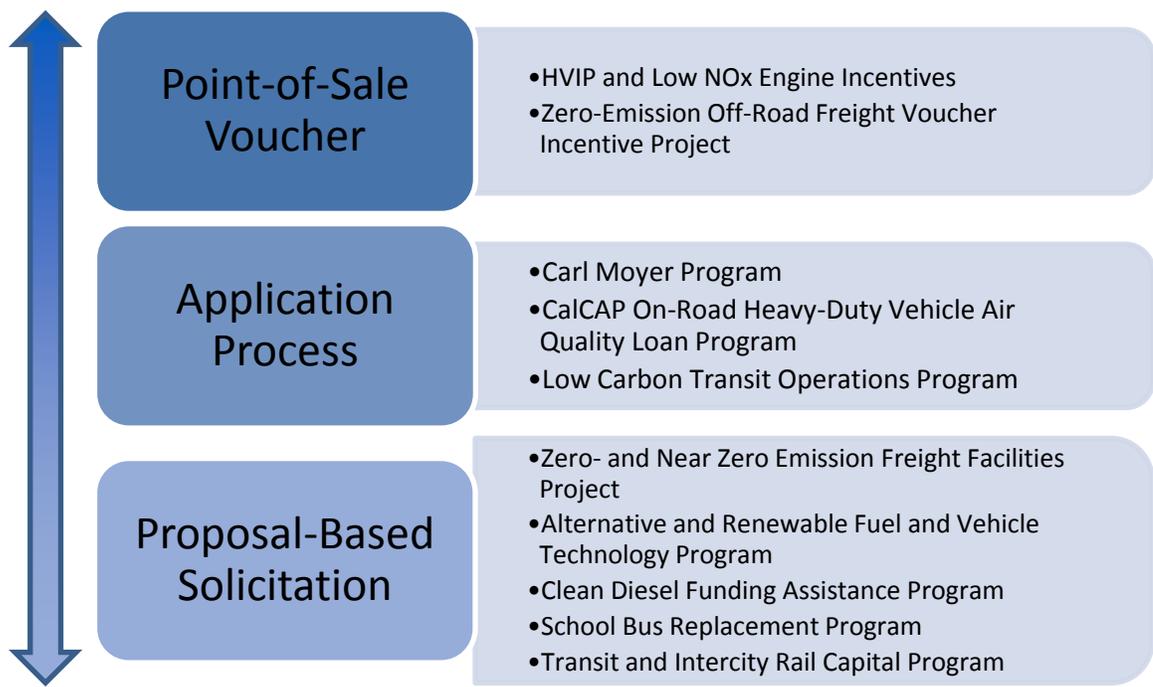


Table 2, below, identifies the types of equipment and technologies supported by the different funding programs, highlighting areas of overlap. Boxes that include multiple funding programs identify instances where there is a choice of funding programs that can be used to fund the desired equipment. In some instances, as shown in Table 3, it may be possible for a given equipment upgrade (e.g., replacement, conversion, repowering or retrofit) to receive funds from two or more funding programs at the same time, typically subject to funding limits or other programmatic restrictions. Also note that the owners of the listed vehicle/technology/equipment types are not always eligible to apply for the funds: some programs are restricted to government entities and non-profits (though private companies might participate in the project).

<sup>7</sup> The application process for the VW Mitigation Trust Program will be determined in upcoming work group meetings.

**Table 2 Emission Reduction Actions Supported by Different Funding Projects and Programs<sup>a</sup>**

	Indirect source and port freight handling equipment <sup>b</sup>	Truck stop/distribution facility	Heavy-duty on-road trucks	Transit, school and shuttle buses	Locomotives and/or ships at berth
<b>New vehicles</b>					
New clean vehicles (ZEV)	Zero- and Near Zero-Emission Freight Facilities Project VW Mitigation Trust Alternative and Renewable Fuel and Vehicle Technology Program <sup>c</sup> Clean Diesel Funding Assistance Program Carl Moyer Community Air Protection Program Low Carbon Transit Operations Program Transit and Intercity Rail Capital Program	Zero- and Near Zero-Emission Freight Facilities Project	HVIP + Low NOx Engine Incentives Carl Moyer <sup>d</sup> VW Mitigation Trust <sup>e</sup> Alternative and Renewable Fuel and Vehicle Technology Program Clean Diesel Funding Assistance Program Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program	VW Mitigation Trust HVIP + Low NOx Engine Incentives Carl Moyer Alternative and Renewable Fuel and Vehicle Technology Program School Bus Replacement Program Community Air Protection Program Low Carbon Transit Operations Program	VW Mitigation Trust <sup>f</sup> Carl Moyer Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program
New clean vehicles (hybrid)	Carl Moyer Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program	Zero- and Near Zero-Emission Freight Facilities Project	HVIP + Low NOx Engine Incentives Carl Moyer Clean Diesel Funding Assistance Program Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program	HVIP + Low NOx Engine Incentives Carl Moyer Community Air Protection Program	VW Mitigation Trust ( <i>ferries, tugboats, towboats only</i> ) Carl Moyer Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program

	Indirect source and port freight handling equipment <sup>b</sup>	Truck stop/distribution facility	Heavy-duty on-road trucks	Transit, school and shuttle buses	Locomotives and/or ships at berth
Purchase of low emission diesel vehicles (2007+ engine year satisfying CARB emission standard <sup>g</sup> )			On-Road Heavy-Duty Vehicle Air Quality Loan Program <sup>h</sup>		
Aerial boom vehicles with ePTO			HVIP + Low NOx Engine Incentives Carl Moyer Community Air Protection Program	Carl Moyer Community Air Protection Program	
New Vehicles Using Low NOx Engines <sup>i</sup>	Zero- and Near Zero-Emission Freight Facilities Project	Zero- and Near Zero-Emission Freight Facilities Project	HVIP + Low NOx Engine Incentives Carl Moyer VW Mitigation Trust Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program	HVIP + Low NOx Engine Incentives Carl Moyer Community Air Protection Program	Zero- and Near Zero-Emission Freight Facilities Project
Zero-emission and near zero-emission <b>off-road</b> vehicles (based on list of eligible equipment models) <sup>j</sup>	Zero- and Near Zero-Emission Freight Facilities Project (zero-emission only) VW Mitigation Trust Carl Moyer Community Air Protection Program	Zero- and Near Zero-Emission Freight Facilities Project	Zero-Emission Off-Road Freight Voucher Incentive project (zero-emission only) VW Mitigation Trust Carl Moyer Community Air Protection Program	Carl Moyer VW Mitigation Trust Community Air Protection Program	Zero- and Near Zero-Emission Freight Facilities Project
<b>Converted vehicles</b>					

	Indirect source and port freight handling equipment <sup>b</sup>	Truck stop/distribution facility	Heavy-duty on-road trucks	Transit, school and shuttle buses	Locomotives and/or ships at berth
Converted clean vehicle (ZEV)	Zero- and Near Zero-Emission Freight Facilities Project	Zero- and Near Zero-Emission Freight Facilities Project	HVIP + Low NOx Engine Incentives <sup>k</sup> Carl Moyer <sup>l</sup> Clean Diesel Funding Assistance Program Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program	HVIP + Low NOx Engine Incentives Carl Moyer Community Air Protection Program	Zero- and Near Zero-Emission Freight Facilities Project
Converted clean vehicle (hybrid)	Zero- and Near Zero-Emission Freight Facilities Project	Zero- and Near Zero-Emission Freight Facilities Project	HVIP + Low NOx Engine Incentives <sup>m</sup> Carl Moyer Clean Diesel Funding Assistance Program <sup>n</sup> Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program	HVIP + Low NOx Engine Incentives Carl Moyer Community Air Protection Program	Zero- and Near Zero-Emission Freight Facilities Project
<b>Repowering and retrofits</b>					
Repowered Vehicles Using Low NOx Engines	Carl Moyer Community Air Protection Program		HVIP + Low NOx Engine Incentives Clean Diesel Funding Assistance Program Carl Moyer VW Mitigation Trust Community Air Protection Program	HVIP + Low NOx Engine Incentives Carl Moyer Community Air Protection Program	Clean Diesel Funding Assistance Program Carl Moyer Community Air Protection Program

	Indirect source and port freight handling equipment <sup>b</sup>	Truck stop/distribution facility	Heavy-duty on-road trucks	Transit, school and shuttle buses	Locomotives and/or ships at berth
Retrofit, repower or replace old engines with new, cleaner engine	VW Mitigation Trust		Carl Moyer <sup>o</sup> VW Mitigation Trust <sup>p</sup> (zero-emission only) Clean Diesel Funding Assistance Program On-Road Heavy-Duty Vehicle Air Quality Loan Program Community Air Protection Program	Carl Moyer VW Mitigation Trust (zero-emission only) Community Air Protection Program	VW Mitigation Trust (zero-emission or hybrid for ferries, tugboats, towboats) Clean Diesel Funding Assistance Program Carl Moyer Community Air Protection Program
Diesel exhaust retrofits			On-Road Heavy-Duty Vehicle Air Quality Loan Program <sup>q</sup>		
<b>Infrastructure and electrification</b>					
Infrastructure for zero- and near zero-emission vehicles and equipment	Carl Moyer Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program VW Mitigation Trust (associated with a vehicle) Alternative and Renewable Fuel and Vehicle Technology Program <sup>r</sup> PG&E's Fleet Ready	Carl Moyer Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program	HVIP + Low NOx Engine Incentives <sup>s</sup> Carl Moyer <sup>t</sup> Community Air Protection Program VW Mitigation Trust (associated with a vehicle) Alternative and Renewable Fuel and Vehicle Technology Program Zero- and Near Zero-Emission Freight Facilities	HVIP + Low NOx Engine Incentives <sup>u</sup> VW Mitigation Trust (associated with a vehicle) PG&E's Fleet Ready Program SCE's Medium- and Heavy-Duty Vehicle Charging Infrastructure Program Alternative and Renewable Fuel and Vehicle Technology	VW Mitigation Trust (associated with a vehicle) Carl Moyer Zero- and Near Zero-Emission Freight Facilities Project Community Air Protection Program

	Indirect source and port freight handling equipment <sup>b</sup>	Truck stop/distribution facility	Heavy-duty on-road trucks	Transit, school and shuttle buses	Locomotives and/or ships at berth
	<p>Program</p> <p>SCE's Medium- and Heavy-Duty Vehicle Charging Infrastructure Program</p> <p>Low Carbon Transit Operations Program</p> <p>Transit and Intercity Rail Capital Program</p>		Project	<p>Program</p> <p>Carl Moyer</p> <p>Community Air Protection Program</p> <p>School Bus Replacement Program</p> <p>Low Carbon Transit Operations Program</p>	
Truck stop electrification		<p>Carl Moyer</p> <p>PG&amp;E's Fleet Ready Program</p> <p>SCE's Medium- and Heavy-Duty Vehicle Charging Infrastructure Program</p> <p>Zero- and Near Zero-Emission Freight Facilities Project</p> <p>Community Air Protection Program</p>			

	Indirect source and port freight handling equipment <sup>b</sup>	Truck stop/distribution facility	Heavy-duty on-road trucks	Transit, school and shuttle buses	Locomotives and/or ships at berth
Shoreside electrification <sup>v</sup>	Zero- and Near Zero-Emission Freight Facilities Project  Carl Moyer PG&E's Fleet Ready Program  SCE's Medium- and Heavy-Duty Vehicle Charging Infrastructure Program  Community Air Protection Program				Carl Moyer  VW Mitigation Trust  Community Air Protection Program
System and energy efficiencies at freight facilities	Zero- and Near Zero-Emission Freight Facilities Project	Zero- and Near Zero-Emission Freight Facilities Project			Zero- and Near Zero-Emission Freight Facilities Project
Vehicle emissions testing	Zero- and Near Zero-Emission Freight Facilities Project				Zero- and Near Zero-Emission Freight Facilities Project
Locomotive idle reduction technologies	Zero- and Near Zero-Emission Freight Facilities Project				Clean Diesel Funding Assistance Program  PG&E's Fleet Ready Program  SCE's Medium- and Heavy-Duty Vehicle Charging Infrastructure Program

	Indirect source and port freight handling equipment <sup>b</sup>	Truck stop/distribution facility	Heavy-duty on-road trucks	Transit, school and shuttle buses	Locomotives and/or ships at berth
Ship emissions capture and control equipment	Zero- and Near Zero-Emission Freight Facilities Project  Carl Moyer  Community Air Protection Program				Carl Moyer  Community Air Protection Program

<sup>a</sup> The Proposition 1B: Goods Movement Emission Reduction Program is not covered in the table since it no longer receives funding.

<sup>b</sup> Refers to infrastructure and equipment located at warehouses, distribution centers, ports, freight airports, and railyards.

<sup>c</sup> Currently, the program is not requiring new vehicles to be zero-emission; low-emission vehicles are also eligible. However, since a [Governor's Executive Order](#) was signed in January 2018 to boost the supply of zero-emission vehicles in California, the program will only fund zero-emission vehicles in the near future.

<sup>d</sup> Carl Moyer requires replacement with cleaner-than-required equipment. New guidelines provide an additional incentive to turn over engines and fleets to the cleanest certified technologies now emerging in the marketplace. In addition, the old vehicle must be scrapped.

<sup>e</sup> Scrap and replace for on-road freight trucks, transit and shuttle buses, school buses, forklifts and port cargo handling equipment, commercial marine vessels, and freight switcher locomotives.

<sup>f</sup> Scrap and replace for on-road freight trucks, transit and shuttle buses, school buses, forklifts and port cargo handling equipment, commercial marine vessels, and freight switcher locomotives. The replaced vehicles or engines must be scrapped.

<sup>g</sup> Potentially includes diesel fuel, compressed natural gas (CNG), liquefied natural gas (LNG) or other fuels.

<sup>h</sup> This program is aimed at small fleets that conduct most of their business in California. Eligibility requirements include having 10 or fewer trucks, 100 or fewer employees, and \$10 million or less in annual revenues.

<sup>i</sup> CEC's Natural Gas Vehicle Incentive Project (NGVIP) is not included since no funding is currently available.

<sup>j</sup> Includes off-road terminal trucks, forklifts, side handlers/reach stackers/top picks, transport refrigeration units, airport ground support equipment, rubber-tired gantry cranes.

<sup>k</sup> For the purpose of HVIP, converted zero-emission vehicles mean new or in-use vehicles with any fuel type that convert to zero-emission, including battery electric and fuel cell technologies.

<sup>l</sup> In Carl Moyer, conversions involve the replacement or modification of the original engine or vehicle to include either a cleaner engine or other system that provides motive power and change of the fuel type used. Full conversion is not required

<sup>m</sup> For the purpose of HVIP, a hybrid vehicle conversion means installing a hybrid driveline and other advanced technology to a newly manufactured vehicle or chassis.

<sup>n</sup> Currently, the only hybrid conversion that has been verified is for certain tugboats and rubber tire gantry cranes.

<sup>o</sup> In Carl Moyer, repowering means a newer, cleaner engine being installed in place of a higher-polluting engine in an existing vehicle or piece of equipment.

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<sup>p</sup> Engine repowering / electric conversion is eligible for funding.

<sup>q</sup> Satisfying CARB emissions standards.

<sup>r</sup> Expedites development of conveniently-located fueling and charging infrastructure for low-and zero-emission vehicle available to the public, existing fleets, public transit, and transportation corridors.

<sup>s</sup> Must be associated with an eligible truck purchase.

<sup>t</sup> Battery charging stations are not included because applicants do not make commitments to use that infrastructure.

<sup>u</sup> Must be associated with an eligible truck purchase.

<sup>v</sup> Shoreside electrification refers to the installation of electrification infrastructure on ship berths.

The following table identifies instances where different funding programs can and cannot be used together (e.g., stacked) to support a given technology or piece of equipment. Some cells are shaded to avoid redundancy. Notably, while stacking of resources may be necessary for some applicants to afford the upfront cost of clean equipment, the more that resources are stacked, the fewer the total number of vehicles that will benefit from the available funding programs.

**Table 3 Stacking between funding programs**

	HVIP	CalCAP Loan	Freight Facilities	Off-road Freight	Carl Moyer	VW	Alternative Fuel & Vehicle	Clean Diesel Funding Assistance	CPUC's Utility Infrastructure Projects
HVIP <sup>w</sup>		Allowed for medium- and heavy-duty vehicles	Allowed for low NOx engines <sup>x</sup>	No overlap	Allowed in most eligible projects except natural gas trucks	Allowed for low NOx engines	Allowed for new ZEVs and infrastructure for ZEVs	Allowed for most eligible projects	Allowed for heavy-duty infrastructure
CalCAP Loan			No overlap	Allowed for zero-emission off-road vehicles	Allowed for repowering and replacing engines	Allowed for repowering and replacing engines	Allowed for new ZEVs	Allowed for repowering and replacing engines	No overlap
Freight Facilities				No overlap	Not allowed	Allowed for most projects that support heavy duty infrastructure <sup>y</sup>	Not allowed	Allowed for new ZEVs	Allowed for heavy-duty infrastructure, shoreside and truck stop electrification
Off-road Freight					No overlap	No overlap	No overlap	No overlap	No overlap
Carl Moyer <sup>z</sup>						Not allowed	Not allowed	Can be possible in certain cases	Allowed for heavy-duty infrastructure, shoreside and truck stop electrification

	HVIP	CalCAP Loan	Freight Facilities	Off-road Freight	Carl Moyer	VW	Alternative Fuel & Vehicle	Clean Diesel Funding Assistance	CPUC's Utility Infrastructure Projects
VW							Allowed for most projects that support heavy-duty infrastructure. <sup>aa</sup>	Allowed for most projects that support heavy duty infrastructure. <sup>bb</sup>	Allowed for heavy-duty infrastructure, and shoreside electrification
Alternative Fuel & Vehicle								Allowed for new ZEVs	Only allowed for zero-emission vehicle infrastructure
Clean Diesel Funding Assistance									Allowed for locomotive idle reduction
CPUC's Utility Infrastructure Projects									

<sup>w</sup> The HVIP program sets the following limits on combining incentive programs: for private fleets, total incentives can cover at most 90 percent of the total cost of the vehicle; for public fleets, total incentives can cover at most 100 percent of the total cost of the vehicle.

<sup>x</sup> For the \$8 million of HVIP program funds that comes from AQIP, which is only for the purchase of the 11.9 Low NOx Cummins Westport engine, the incentive can be stacked if other programs fund the incremental cost of a vehicle from a pre-2010 engine standard to the 2010 emission standard.

<sup>y</sup> There are exceptions to stacking of infrastructure funding sources. For example, stacking of shore-side power funding would be excluded as this funding must compete for funding based on cost per ton of emissions reduced, and the emissions reduced could not be counted under multiple programs.

<sup>z</sup> Carl Moyer program requires that projects to replace equipment with alternative fuel or zero-emissions new equipment can co-fund with other state, federal or private incentive programs for up to 80 percent of the total cost of the replacement technology.

<sup>aa</sup> Please see Footnote y.

<sup>bb</sup> Please see Footnote y.

Some programs cannot be used in tandem for the simple reason that they support different types of equipment and/or technological solutions. In instances where multiple programs *can* potentially support the same equipment and technologies, a main reason why some programs still cannot be stacked is to avoid taking credit twice for the same emissions reductions (also known as “double counting”). Thus, some funding programs that quantify and/or take credit for emissions reductions achieved cannot be paired with another funding program that also seeks to quantify and take credit for the emissions reduced.

In cases where funding from multiple programs *can* be stacked for a given project, applicants must be aware of the funding requirements for both programs. For example, some programs require vehicle scrapping or specify a particular order for developing applications. Some programs also specify overall limits on the amount of funding that can be received for a given investment.

In addition to the state and federal funding programs described in this document, California also offers incentives for certain freight and commercial investments that lower the carbon intensity of transport via California’s Low Carbon Fuel Standard (LCFS).<sup>8</sup> By opting in to the program, depending on the specifics of the fuel shift and the market price per credit, it may be possible to earn up to a few thousand dollars, per year, per vehicle, in addition to incentives received from the funding projects and programs described above. While the transaction costs to participate would likely be high for a single vehicle, fleet owners may find participation worthwhile.

A final consideration in developing a financing plan for clean freight and commercial transportation equipment relates to program and project timelines. Some projects provide funds on a rolling basis, potentially until the available funds are fully disbursed. Other programs have a specified application deadline. Still others are being developed and the application process is still to be defined. Application timelines for the different projects and programs are summarized in Table 4, below.

**Table 4 Application timeline and upcoming deadlines for freight projects and programs**

Project	Application Timeline
<b>Alternative and Renewable Fuel and Vehicle Technology Program</b>	A solicitation for hydrogen refueling infrastructure may be available in the 4th quarter of 2018. Potential applicants could subscribe to the listserv to receive notification. The subscription form can be found at <a href="http://www.energy.ca.gov/altfuels/">http://www.energy.ca.gov/altfuels/</a>
<b>On-Road Heavy-Duty Vehicle Air Quality Loan Program</b>	CALCAP is accepting applications on a rolling basis.
<b>Carl Moyer Program</b>	Program deadlines vary by air district. The BAAQMD is currently accepting applications on a first-come first-served basis until all funds are awarded. The South Coast AQMD sets a deadline for program applications. The next deadline is expected to be in 2019.

<sup>8</sup> See Appendix 15.

Project	Application Timeline
<b>Clean Diesel Funding Assistance Program</b>	In FY 2018, EPA began soliciting proposals in April 24, 2018 and set a deadline of June 12, 2018. The next solicitation is expected in 2019.
<b>Community Air Protection Program</b>	The overall Community Air Protection effort, which includes specific community identification, monitoring efforts, etc., has not started yet. A Board Meeting will be held in September 2018 to consider Final Planning Documents. Funds are now available in some air districts. For instance, BAAQMD is offering \$50 million in grants to reduce toxic air emissions and ozone-forming pollutants from older diesel engines as an early action component of the program. This funding is now available for projects to upgrade or replace on-road vehicles, school buses, off-road and agricultural equipment, marine equipment, and locomotives. <sup>9</sup>
<b>HVIP and Low NOx Engine Incentives</b>	Funding is available for HVIP on a rolling basis.
<b>School Bus Replacement Program</b>	The deadline to submit an application is <b>September 20, 2018, by 5:00 p.m.</b>
<b>VW Mitigation Trust</b>	Not started yet. CARB continues soliciting public comments. Funding will be available starting in late 2018 or early 2019.
<b>Zero- and Near Zero-Emission Freight Facilities Project</b>	The FY 2018 solicitation opened on March 21, 2018. Applications were due to CARB by 5:00 pm on July 19, 2018.
<b>Zero-Emission Freight Voucher Incentive Project</b>	Not started yet. The anticipated commencement of the program is in late 2018.

Note that applications for the HVIP Program and CalCAP Loan Program are accepted on a rolling basis. In the Bay Area, Carl Moyer Program funds are distributed on a first-come first-served basis until all funds are awarded.

## Conclusions

Programs are available to fund nearly any type of freight emission mitigation measure, including infrastructure, various types of vehicles and equipment. Some programs only fund zero-emission technologies while others seek to meet specific emission rate goals. To maximize the impact of these funds, it will be important to target support to the greatest need—disadvantaged communities most affected by harmful air quality—as well as demonstrate the economic viability of clean resource investments. In some cases, applicants may need multiple incentives to support the higher first costs.

While there are a number of projects and programs supporting cleaner freight in California, due to timing differences and programmatic restrictions, opportunities to stack funding sources are available, but limited. The most promising stacking opportunities involve the programs that do not require applicants to quantify emissions reductions, such as the HVIP program and the CalCAP Loan Program. It may also be possible to stack investments in charging stations or other infrastructure. In addition, pursuant to the Low Carbon Fuel Standard (LCFS) Program, certain entities that undertake freight

<sup>9</sup> Please refer to <http://www.acgov.org/board/district1/documents/7.2.1860MillionAvailableinAirDistrictFunds.pdf>

electrification projects can voluntarily opt in to the LCFS program. Credits generated under this program can be sold in the program's Clearance Market, offering another revenue stream for eligible emission reduction activities.

For an indirect source (e.g. a warehouse or port), the large proposal-based application opportunities might offer the most promising path to a system-wide shift to cleaner technologies; the higher amounts of funding from such programs can be used to achieve change at scale, resulting in a more transformative outcome. Large fleets may wish to combine the Carl Moyer and HVIP programs, while smaller fleets could utilize the CalCAP Loan Program in combination with the Carl Moyer and HVIP programs. Starting later this year or early 2019, the VW Mitigation Trust offers an important opportunity for many types of equipment, including some (e.g., new zero-emitting ships and locomotives) that are not included under other existing incentive programs. However, in many cases, applicants will need to make a choice on whether to pursue funds from the VW Mitigation Trust or from the Carl Moyer Program, as the two programs cannot be used in tandem.

Finally, while this paper describes a range of funding programs that can reduce the cost of investing in low- and zero-emission freight and commercial transportation technologies, there may be other barriers inhibiting investments in cleaner equipment apart from higher costs of the technology and lack of awareness of funding programs. For example, in some cases, a particular vehicle may be ineligible for an incentive if it doesn't meet certain conditions. In other cases, there may be concerns about stranded assets, automation and loss of jobs, and operational issues such as charging times and range. In other instances, before the cleaner technologies are installed, there may be a need for workforce training and improved coordination across different players (e.g., the utility, port and tenants) that would be involved in the decarbonization strategy. As applicable, such barriers can be addressed in the design of policies and measures to complement the chosen incentive program(s).

## Appendices

Note: While some of the programs described below may also address light duty vehicles, the program descriptions that follow emphasize support available for low- and zero-emission freight and commercial transportation technologies.

## Appendix 1. Alternative and Renewable Fuel and Vehicle Technology Program (CEC)

### Program Purpose

The Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP), administered by the California Energy Commission, was established by Assembly Bill 118, which took effect on January 1, 2008, and was extended through January 1, 2024 by Assembly Bill 8. Through annual investments of up to \$100 million, the program promotes accelerated development and deployment of advanced transportation and fuel technologies.

### Eligible Technologies and Project Types

Compared to other state and federal funding programs, ARFVTP focuses more on funding infrastructure rather than funding vehicles. The Program supports projects that:

- Expand alternative fueling infrastructure and fueling stations available to the public, existing fleets, and transportation corridors.
- Improve the efficiency, performance, and market viability of alternative medium-, and heavy-duty vehicle technologies.
- Retrofit medium- and heavy-duty on-road fleet and nonroad freight vehicles to alternative technologies or fuel use.
- Offer incentives for the purchase of alternative fuel vehicles.

The following tables summarize the funding allocation for FY 2018-2019.

**Table 5 FY 2018-2019 ARFVTP Funding Allocations**

Category	Funded Activity	2018-2019 (Previously Proposed)	2018-2019 (Currently Proposed)
Zero-Emission Vehicle Infrastructure	Electric Vehicle Charging Infrastructure	\$20	\$134.5
	Hydrogen Refueling Infrastructure	\$20	\$92
	Manufacturing	\$5	\$8.5
	Workforce Training and Development	\$3.5	
	Emerging Opportunities	\$4.2	-
	Regional Alternative Fuel Readiness	-	
Advanced Technology Vehicle Support	Advanced Freight and Fleet Technologies	\$17.5	\$17.5
Alternative Fuel Production	Low-Carbon Fuel Production and Supply	\$25	\$25*
Natural Gas Vehicles and Infrastructure	Natural Gas Vehicles	-	-
	Natural Gas Fueling Infrastructure	-	-
<b>Total</b>		<b>\$95.2</b>	<b>\$277.5</b>

Source: California Energy Commission. \*Funded from the Greenhouse Gas Reduction Fund.

### ***Eligible Applicants***

Eligible recipients include: public agencies, private businesses, public-private partnerships, vehicle and technology consortia, workforce training partnerships and collaboratives, fleet owners, consumers, recreational boaters, and academic institutions.

### ***Can funds be used with other incentives?***

The program quantifies emission reductions and therefore is not eligible for stacking with other programs that aim to take credit for criteria pollutant reductions, including the Carl Moyer Program, VW Mitigation Trust, Zero- and Near Zero-Emission Freight Facilities Project, PG&E's Fleet Ready Program, and SCE's Medium- and Heavy-Duty Vehicle Charging Infrastructure Program. Furthermore, stacking with other CEC programs is not allowed. Other than these, the funds can generally be used with other state and federal incentive programs.

### ***Program Requirements***

In compliance with the Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program, and the specifics of the solicitation.

### ***Timing***

The program usually releases solicitations in December so that agreements between CEC and the grant recipients can be made the following June. The timeline for freight and commercial solicitations during FY2017-2018 is shown below. Except for natural gas fueling infrastructure and natural gas vehicles, the next round of funding will occur in FY 2018-2019.

- **Electric charging infrastructure**
  - <https://calevip.org/incentive-project/fresno>
  - No information regarding solicitations during FY 2017-2018.
- **Hydrogen refueling infrastructure**
  - Solicitation will be released in Q2 2018.
- **Natural gas fueling infrastructure**
  - No information regarding solicitations during FY 2017-2018.
- **Natural gas vehicle incentives**
  - Solicitation ended in February 2018.
- **Advanced freight and fleet technologies**
  - Solicitation ended in February 2018.

### ***Website and Documentation***

- [Solicitations for Transportation Area Programs](#)
- [FY2017-2018 Investment Plan](#)
- [FY2018-2019 Investment Plan](#)

### ***Contact Information***

Sarah Williams, Energy Commission Specialist, CEC, (916)-651-9866,  
[sarah.k.williams@energy.ca.gov](mailto:sarah.k.williams@energy.ca.gov)  
CEC Fuels and Transportation Division: [FTD@energy.ca.gov](mailto:FTD@energy.ca.gov)

## Appendix 2. Carl Moyer Program

### *Program Purpose*

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program, or CMP) is a grant program that funds up to 85 percent of the eligible costs of cleaner-than-required engines, equipment, and other measures that reduce air pollution.

The program is administered by air districts according to state guidelines. The main Carl Moyer funding “window” is proposal-based, and requires applicants to quantify their criteria pollution emissions reductions (but not GHGs). There is also a secondary voucher window under Carl Moyer that is simplified and streamlined, making it easier to apply, and calculate eligible funding levels before submitting the application.

The Carl Moyer Program provides about \$60 million for projects each year statewide, funded through tire fees and smog impact vehicle registration fees. More than \$16 million will be available for projects in the Bay Area.

### *Eligible Technologies and Project Types*

In the freight and commercial vehicle areas, funds are available for the following project types:

- **Replacement:** An older vehicle or piece of equipment that includes an engine with remaining useful life is replaced with a newer, cleaner vehicle or piece of equipment. On-road trucks and buses may be replaced through a fleet modernization contract or through a voucher incentive program (VIP). Off-road equipment also may be replaced under contract or through an off-road VIP. In all cases, the older vehicles and equipment are scrapped.
- **Repower:** A newer, cleaner engine is installed in place of a higher-polluting engine in an existing vehicle or piece of equipment.
- **Retrofit:** An emission control system is added to an in-use engine, vehicle or piece of equipment.
- **Infrastructure:** Moyer funds the installation of fueling or energy infrastructure to fuel or power replaced and repowered vehicles funded through the program. Though infrastructure does not directly deliver emission reductions, it enables the advanced clean vehicles and equipment that deliver these benefits.

### *Eligible Applicants*

Owners of heavy-duty vehicles and equipment (public and private entities).

### *Funding Amounts*

The program pays up to 85 percent of the eligible cost to repower engines and up to 100 percent to purchase a CARB-verified retrofit device. Maximum grant amounts vary for purchase of new vehicles and equipment. For retrofit projects, the maximum State funding amount is \$20,000.

Projects are evaluated based on the amount of air pollution (in tons) reduced per dollar provided to a project (from Carl Moyer and other state incentive programs) – the “cost-effectiveness” of the project.

Projects must meet or fall below the established cost-effectiveness threshold to be eligible for the full value of the incentive. Projects exceeding the threshold may still be eligible for funding, but at a reduced level such that the applicable cost-effectiveness threshold will not be exceeded.

The general cost-effectiveness threshold has recently been raised to \$30,000 per weighted ton of NO<sub>x</sub>, ROG (reactive organic gases) and PM<sub>10</sub> emission reductions. This enables larger grants for cleaner engines. For advanced technology zero-emission projects, or projects that meet the cleanest certified optional standard applicable to the source category, air districts have the option to apply a cost-effectiveness limit of up to \$100,000 per weighted ton. This higher limit provides an additional incentive to turn engines and fleets over to the cleanest certified technologies now emerging in the marketplace.

### *Can funds be used with other incentives?*

Projects to replace equipment with alternative fuel or zero-emissions new equipment can co-fund with other state, federal or private incentive programs for up to 80 percent of the total cost of the replacement technology. Co-funded projects must meet the requirements of each funding source. For example, if co-funding with the Hybrid Voucher Incentive Project (HVIP), the owner must apply to CMP first, before placing an order or submitting a purchase order as required by HVIP, since CMP prohibits funding for projects that order equipment or begin work on a funded project before the grant agreement for the project has been fully-executed (signed).

Carl Moyer has a requirement against double counting emissions reductions, so this prevents stacking with the VW and Prop 1B programs that also seek to take credit for criteria pollutant emissions reductions. However, stacking with the HVIP program is allowed in most cases, since most HVIP funding comes from GHG auction proceeds and does not require applicants to quantify pollutant reductions at all for criteria pollution or GHGs.<sup>10</sup> Furthermore, stacking with the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) and the Clean Diesel Funding Assistance Program can be possible in certain cases under the Carl Moyer program.

### *Program Requirements*

Engine owners with approved projects must sign a grant agreement (contract) with the air district and agree to a number of conditions, including:

- Participate in pre-project and post-project inspections. All existing equipment must be in working condition at the time of the award. Post-inspection confirms that the project was completed as stated in the grant agreement. For engine or vehicle replacement projects, post-project inspections include documenting the destruction of the original equipment.
- Agree that the funded equipment will operate in the Bay Area at similar usage level as the equipment that was replaced. This commitment typically lasts between three and ten years.

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<sup>10</sup> Note that CMP funds cannot be stacked with HVIP programs funded through the AQIP, mainly involving conversion to renewable natural gas in small fleets of 3 or fewer trucks. In the other word, Carl Moyer and HVIP can be stacked except for natural gas trucks.

- Submit annual monitoring reports that document the mileage, fuel use or operating hours and location where the equipment operates.
- Maintain general and property liability insurance and (when required) machinery insurance equal to the full replacement value of the equipment covered under the grant agreement.

### *Timing*

The program is currently in the 19<sup>th</sup> year application cycle. The most recent cycle began in October 2017. The program is funded through an annual appropriation, and 1/3 of the funding will expire in 2023.

The BAAQMD is currently accepting applications on a first-come first-served basis until all funds are awarded. In contrast, the South Coast AQMD has a deadline to submit applications. The deadline for FY2017-2018 was June 5, 2018.

### *Application Process*

Applicants apply directly to the applicable air district, and the process may differ somewhat from one district to another. For applications to BAAQMD:

- Apply online on the air district website starting October 12, 2017.
- A Carl Moyer Program staff person will reach out within 10 business days after the application has been submitted online to follow up with any required administrative steps.

### *Website and Documentation*

- [Carb's Carl Moyer Program Website](#)
- [Carl Moyer Program Guidelines](#)
- [BAAQMD's Carl Moyer Program Website](#)
- [BAAQMD's Program Overview Fact Sheet](#)
- [Carb's Proposed Fiscal Year 2017-18 Funding Plan for Clean Transportation Incentives](#)

### *Contact Information*

BAAQMD's contact:

Anthony Fournier, Air Quality Program Manager, (415) 749-4961, [afournier@baaqmd.gov](mailto:afournier@baaqmd.gov)

## Appendix 3. Clean Diesel Funding Assistance Program (EPA)

### *Program Purpose*

The Clean Diesel Funding Assistance Program is a national grant program run by EPA and authorized by the Diesel Emissions Reduction Act (DERA). The Program solicits proposals nationwide for projects that achieve significant diesel emission reductions and reduce exposure, particularly from fleets operating in areas designated by the Administrator as having poor air quality. EPA anticipates awarding approximately \$40 million in DERA funding in FY 2018.

### *Eligible Technologies and Project Types*

- Verified Engine Upgrades and Certified Remanufacture Systems: EPA will fund up to 40 percent of the cost (labor and equipment) of eligible verified engine upgrades and certified remanufacture systems.
- Verified Cleaner Fuels and Additives: EPA will not fund stand-alone cleaner fuel use. EPA will fund the cost differential between the eligible cleaner fuel and conventional diesel fuel if the cleaner fuel is used in combination, and on the same vehicles, with other eligible vehicle/engine technologies funded through the program.
- Verified Idle Reduction Technologies:
  - Verified Locomotive Idle Reduction Technologies: EPA will fund up to 40 percent of the cost (labor and equipment) of eligible idle reduction technologies for locomotives.
  - Marine Shore Connection Systems: EPA will fund up to 25 percent of the cost (labor and equipment) of eligible electric power marine shore connection systems.
  - Electrified Parking Spaces: EPA will fund up to 30 percent of the cost (labor and equipment) of an eligible electrified parking space technology.
- Certified Engine Replacement: EPA will fund: up to 40 percent of the cost (labor and equipment) of replacing a diesel engine with a diesel or alternative fueled engine (including hybrids) certified to EPA emission standards; up to 50 percent of the cost of replacing diesel engine with an engine certified to meet CARB's Optional Low-NOx Standards; and up to 60 percent of the cost (labor and equipment) of replacing a diesel engine with a zero-emission power source.
- Certified Vehicle/Equipment Replacement: EPA will fund: up to 25 percent of the cost of a replacement vehicle or piece of equipment powered by a diesel or alternative fueled engine (including hybrids) certified to EPA emission standards; up to 35 percent of the cost of a replacement vehicle or piece of equipment powered by an engine certified to meet CARB's Optional Low-NOx Standards; and up to 45 percent of the cost of a replacement vehicle or piece of equipment powered by a zero-emission power source.
  - Replacement of Drayage Trucks: EPA will fund up to 50 percent of the cost of a replacement drayage truck.
- Certified Clean Alternative Fuel Conversion: EPA will fund up to 40 percent of the cost (labor and equipment) of an eligible certified or compliant clean alternative fuel conversion.

### *Eligible Applicants*

Regional, state, or local agencies, tribal governments (or intertribal consortia) and native villages, or port authorities, which have jurisdiction over transportation or air quality, and nonprofit organizations or

institutions that: a) represent or provide pollution reduction or educational services to persons or organizations that own or operate diesel fleets or b) have, as their principal purpose, the promotion of transportation or air quality. Individuals and private companies are not eligible for the funding.

Projects are evaluated on a 170-point scoring system, considering the project summary and approach (25); project location (30); project sector (15); benefits to the community (5); community engagement and partnerships (5); project sustainability (20); environmental results (30); programmatic capability and past performance (20); budget (15); and applicant fleet description (5).

### *Can funds be used with other incentives?*

In general, state, tribal, local and private funds may be used as a cost-share on a DERA grant. Other federal grants may not be used as cost-share under DERA unless the statute authorizing the other federal funding provides that the federal funds may be used to meet a cost-share requirement on a federal grant.

Furthermore, applicants must attach emission reduction calculations. But the program does not require crediting emissions reductions towards NAAQS attainment.

### *Timing*

The FY2018 deadline for proposal packages was June 12, 2018.<sup>11</sup>

### *Application Process*

Applicants must download an application package. The Project Narrative and any supporting documents should be attached to the application package, and the full package submitted to EPA through Grants.gov using the “Workspace” feature.

### *Website and Documentation*

- [Program website](#)
- [2018 Request for Proposals](#)

### *Contact Information*

EPA Clean Diesel Helpline: 1-877-623-2322, [cleandiesel@epa.gov](mailto:cleandiesel@epa.gov)

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<sup>11</sup> There will be another deadline about the same time in 2019.

## Appendix 4. Community Air Protection Program

### *Program Purpose*

In response to Assembly Bill (AB) 617 (C. Garcia, Chapter 136, Statutes of 2017), the California Air Resources Board (CARB) established the Community Air Protection Program (CAPP). The Program's focus is to reduce exposure in communities most impacted by air pollution.

### *Funding*

The state Legislature adopted AB 134 in 2017 to fund the Community Air Protection Program. According to AB 134, as an initial down payment to deliver on the goals of AB 617, \$250 million from Governor's Fiscal Year 2017-18 Budget has been designated for incentive projects to support early action to reduce emissions through the deployment of cleaner mobile source technologies in impacted communities. These funds are being administered through the Carl Moyer Program, except that at its discretion, an air district may allocate up to 40 percent of the funds it receives to incentivize clean trucks in accordance with CARB's Proposition 1B Goods Movement Emission Reduction Program Guidelines.

As directed by the Legislature, the funds are distributed as follows:

- \$107.5 million to the South Coast Air Quality Management District;
- \$80 million to the San Joaquin Valley Air Quality Management District;
- \$50 million to the Bay Area Air Quality Management District; and
- \$12.5 million to other California air districts, as determined by CARB in consultation with the districts.

An additional \$5 million has been appropriated for community assistance grants to facilitate participation in the AB 617 process.

### *Funding Amounts*

Air districts determine how to allocate funds to emission reduction options, in accordance with local priorities and in consultation with local stakeholders. The funding principles specify that air districts conduct public outreach to local residents and community groups to inform investment decisions, and select projects in communities that are known to be heavily burdened (e.g., disadvantaged and/or low-income communities). The funds should also focus on vehicles and/or equipment that spend a substantial amount of time in those communities.

### *Timing*

The overall Community Air Protection effort has not started yet. A CARB Board Meeting will be held in September 2018 to consider Final Planning Documents. However, BAAQMD is offering \$50 million in grants through the Community Health Protection Grant Program, consistent with the Carl Moyer, to reduce toxic air emissions and ozone-forming pollutants from older diesel engines as an early action component of the program.

The overall Community Air Protection effort has not started yet. A CARB Board Meeting will be held in September 2018 to consider Final Planning Documents. However, BAAQMD is offering \$50 million through the Community Health Protection Grant Program to reduce toxic air emissions and ozone-forming pollutants from older diesel engines as an early action component of the program.

### *Website and Documentation*

- [Community Air Protection Funds webpage](#)
- [Community Air Protection Program webpage](#)
- [BAAQMD's program website](#)
- [Program Concept Paper](#)

### *Contact Information*

CARB staff involved with the Community Air Protection Funds:

Mr. Kyle Goff, Air Pollution Specialist, (916) 324-9424, [kyle.goff@arb.ca.gov](mailto:kyle.goff@arb.ca.gov)

Mr. Douglas Thompson, Manager, (916) 322-6922, [douglas.thompson@arb.ca.gov](mailto:douglas.thompson@arb.ca.gov).

BAAQMD: Anthony Fournier, Air Quality Program Manager, (415) 749-4961, [afournier@baaqmd.gov](mailto:afournier@baaqmd.gov)

Community Air Protection Program helpline: (800) 242-4450

CARB Diesel Hotline (truck and bus): [8666diesel@arb.ca.gov](mailto:8666diesel@arb.ca.gov), (866) 634-3735

## Appendix 5. Clean Truck Projects in accordance with Proposition 1B Program

### *Program Purpose*

The Proposition 1B: Goods Movement Emission Reduction Program, in its last year of funding, is a partnership between the California Air Resources Board (ARB) and local agencies (like air districts and seaports) to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. The program offered a financial incentive to owners/operators of eligible equipment involved in goods movement operations to upgrade their equipment, install electrical infrastructure at a truck stop or distribution facility, or implement other projects aimed at reducing diesel air pollutant emissions. CARB made its final award to air districts early in 2015. The last solicitations closed in early 2018 and no further funds are available.

While the Prop 1B Program is coming to a close, in 2017, the state Legislature adopted AB 134 to fund the Community Air Protection Program, which gives each air district the option to allocate up to 40 percent of the \$250 million funds it receives from this program in FY 2017-2018 to incentivize clean trucks in accordance with Proposition 1B Program Guidelines (in lieu of the Carl Moyer Program). Therefore, the program guidelines remain relevant even as the Prop 1B program will soon cease operations.

### *Eligible Technologies and Project Types*

According to the final Prop 1B Program guidelines, the following types of projects were eligible for funding:

- Equipment/vehicle replacement - replace heavy-duty diesel trucks, transport refrigeration units, grocery cold storage trailers, cargo handling equipment, and locomotives with the cleanest available equipment;
- Engine repower/electric conversion - repower small-fleet diesel truck engine with 2016 or newer zero-emissions or alternatively-fueled engine, convert diesel yard truck to electric;
- Truck stop electrification – install electric infrastructure to reduce diesel engine idling where trucks congregate;
- Charging & fueling infrastructure – Install electric charging, hydrogen fueling or cryogenic recharge infrastructure for trucks, cargo handling equipment or TRUs;
- Locomotive retrofit – repower or install a remanufacture kit or filter to reduce emissions from a locomotive engine;
- Emission capture & control equipment – install an emissions capture & control system to reduce diesel emissions from locomotives and ships at berth;
- Shoreside electrification (ships at berth) – for cargo ship berths visited solely by vessels not subject to the control requirements of the CA Ships at Berth Regulation, install grid-based or non-grid-based electrification infrastructure.

### *Eligible Applicants*

Local agencies (including air districts and seaports).

### *Can funds be used with other incentives?*

Stacking is allowed under the Prop 1B program guidelines. It generally follows the requirements of the other programs which applicants attempt to stack it with Prop 1B funds. For example, stacking with HVIP program won't allow fleets to go above the full incremental cost of the vehicle with the additional grants. However, stacking with Carl Moyer is not allowed due to the risk of double counting the emissions reductions.

### *Timing*

To be determined by air districts.

### *Application Process*

To be determined by air districts.

### *Website and Documentation*

- [CARB's program Website](#)
- [2015 Program Guidelines](#)
- [December 2017 semi-annual update](#)
- [BAAQMD's program website](#)

### *Contact Information*

BAAQMD program hotline: (415) 749-4994

CARB: (916) 44-GOODS (444-6637), [gmbond@arb.ca.gov](mailto:gmbond@arb.ca.gov)

## Appendix 6. HVIP and Low NOx Engine Incentives

### *Program Purpose*

The HVIP (Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project) and Low NOx Engine Incentives are intended to encourage and accelerate the deployment of: 1) zero-emission trucks and buses; 2) vehicles using engines that meet the optional low NOx standard; and 3) hybrid trucks and buses in California. The program is launched by CARB in partnership with CALSTART, a nonprofit organization for clean transportation technology. The program is internet-based, and uses a streamlined process to offer set amounts of funding (via vouchers applied at the time of purchase) for vehicle purchasers to reduce the upfront cost of these advanced technology vehicles.

In FY 2017-2018, Low Carbon Transportation Program provides up to \$180 million for clean truck and bus vouchers. Of the \$180 million allocation, \$35 million must be set aside to fund zero-emission buses. In addition, the Air Quality Improvement Program (AQIP) provides \$8 million for Low NOx Engine Incentives.

### *Eligible Technologies and Project Types*

Funding is available for medium- and heavy-duty vehicles and associated infrastructure, including:

- New zero-emission vehicles, either battery or fuel cell.
- New hybrid vehicles.
- Hybrid vehicle conversions, which entail installing a hybrid driveline to a newly manufactured vehicle or chassis.
- Zero-emission vehicle conversions. This could be new or in-use vehicles with any fuel type that are subsequently converted to zero-emission, including battery electric and fuel cell technologies.
- Aerial boom vehicles with ePTO.<sup>12</sup>
- New vehicles using low NOx engines, including 9-liter engines (refuse, transit) and 12-liter engines (tractor trailers). Emissions from the low-NOx natural gas trucks are 90 percent cleaner than the 2010 NOx standard. The purchase prices are higher, but HVIP and Low NOx funding offsets the incremental cost.
- Repowered vehicles with brand new low NOx engines. This entails swapping out the existing engine for electric or hybrid drive line.
- Associated infrastructure. Starting December 15, 2017, HVIP funds can be used for infrastructure, but only if it is associated with an eligible zero-emission truck or bus purchase. For battery trucks, for every truck voucher that is granted, the fleet can get up to \$30K for equipment infrastructure costs. This can include hardware (e.g., charging stations, solar systems)

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<sup>12</sup> “Aerial boom vehicle” means an on-road vehicle equipped with a fully integrated, mounted bucket at the end of an on-board hydraulic system used to raise personnel to complete work at an elevated height. ePTO, electric Power Take-Off, refers to a device that takes power from an on-vehicle source that produces no emissions. These are utility bucket trucks that include a battery pack that allows for on-site operations without idling. This technology does not reduce emissions when the vehicle is moving, but eliminates the need to idle at the work site.

and software (e.g., load monitoring), but NOT labor or utility upgrade costs. For fuel cell Class 7 and 8 trucks and buses, up to \$100k is allowed per voucher for hydrogen infrastructure after 5 or more vehicles have been purchased.

Note that given the relatively high cost of hydrogen infrastructure, most applications for this technology are likely to come from transit systems (e.g., Palm Springs).<sup>13</sup> Moreover, since HVIP does not require scrapping the old vehicles, scrapping costs are not eligible for the HVIP voucher.

A current list of eligible vehicles can be found [here](#). Detailed description of vehicle technology eligibility can be found [here](#).

### *Eligible Applicants*

Vehicle purchasers and lessees – HVIP provides vouchers for California purchasers and lessees of zero-emission trucks and buses, and for eligible hybrid trucks and buses on a first-come, first-served basis. In addition, HVIP provides increased incentives for fleets purchasing zero-emission vehicles located in disadvantaged communities. (For the purposes of the HVIP program, a fleet refers to vehicles traveling in California owned by a person, business, non-profit or government agency and consists of one or more vehicles.) Trucks and buses that are outfitted with engines meeting the optional low NOx standard are eligible for funding through Low NOx Engine Incentives, through HVIP on a first-come, first-served basis.

### *Funding Amounts*

The base voucher amount ranges from \$2,000 to \$315,000 for eligible vehicles, depending upon: type of application (hybrid, hybrid conversion or zero-emission); its Gross Vehicle Weight Rating (GVWR); and whether it is located in a disadvantaged community. Voucher funding levels can be found [here](#). Purchasers can apply for more than one voucher. Note that only one voucher is assigned per vehicle.

The HVIP program is often subject to a waiting list due to limited funding. However, this is not the case in the current fiscal year. In FY 2017-2018, the legislature allocated \$188 million to the program. This is expected to be enough funding to fulfill the past wait list and meet the entire current year demand, likely with a bit of a buffer. Earlier, allocations were \$36 million, and before that, only \$5-20 million per year. The program gave out \$45 million in the first 5 months of FY 2017-2018.

The new higher funding level for the HVIP program gives purchasers enhanced certainty that they can rely on voucher support. The timing flexibility could also facilitate consideration of stacking opportunities, since purchases can be aligned more easily with the application processes used in other programs.

### *Can funds be used with other incentives?*

Yes. In fact, CARB encourages stacking under the HVIP. However, they won't allow fleets to go above the full incremental cost of the vehicle with the additional grants. The specific limits on funding vary depending on whether the applicant is a private or public fleet:

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<sup>13</sup> Conversation with Tom Brotherton, CALSTART, April 19, 2018.

- TOTAL incentives can cover at most 90 percent of the total cost of the vehicle (if it is a private fleet)
- TOTAL incentives can cover at most 100 percent of the total cost of the vehicle (if it is a public fleet)

If the stacking is with Carl Moyer, there is a scrapping requirement. This is a cost to the vehicle owner, due to the lost sales value of the old truck, and the cost of scrapping the old truck. As noted earlier, the scrapping cost is not an eligible cost under HVIP, but may be covered by the Carl Moyer program.

Here is the math under an example scenario: replacing a 2007-2009 engine model year medium heavy-duty diesel truck with a BYD brand T7 Class 6 truck (23,600 lbs GVWR, 100 percent battery-electric, \$195K) qualifies for a \$90K voucher from the HVIP<sup>14</sup> and a \$47.66K voucher from Carl Moyer<sup>15</sup>, assuming a project life of 4 years and cost-effectiveness level of \$100,000/ton (or below). In this instance, the applicant would be allowed to apply the full value of both incentives to the truck purchase, since the lower programmatic limit on the total value of the incentive (80 percent for Carl Moyer)<sup>16</sup> is not reached.<sup>17</sup>

In the case of the \$8 million of HVIP program funds that comes from AQIP, which is only for the purchase of the 11.9 Low NOx Cummins Westport engine, HVIP also does not claim NOx reductions. This incentive can be stacked if another program funds the incremental cost of a vehicle from a pre-2010 engine standard to the 2010 emission standard. Then, HVIP pays for the increment from the 2010 standard to the optional low NOx standard.

### *Program Requirements*

The low NOx engine, truck or bus purchaser is responsible for completing the voucher request and redemption forms with the dealer and for paying the non-voucher portion of the vehicle cost.<sup>18</sup> More detailed requirements can be found [here](#).

### *Timing*

Funding was available for HVIP starting in January 2018 and for Low NOx engines starting in April 2016. The program is currently accepting applications on a rolling basis. There is a ticker on the [program](#)

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<sup>14</sup> The voucher amount can be found on the HVIP website, [here](#).

<sup>15</sup> As described in Chapter 4 of the Carl Moyer Program Guidelines (2017 Revisions), the [state funding limit](#) (maximum amount of funds from all State sources) is \$150K for zero-emission medium heavy-duty trucks and no more than 80 percent of vehicle cost for fleets with 10 or less vehicles.

<sup>16</sup> While the HVIP program allows a higher total amount of incentive to be used (90 percent of the total cost of the vehicle), when stacking programs together, the applicant must meet the requirements of each program.

<sup>17</sup> Note that this result is sensitive to the assumed life of the vehicle. If the vehicle is assumed to operate for seven years (the maximum amount of time), the incentive received from Carl Moyer would be higher, but the combined incentive would be limited by the funding cap.

<sup>18</sup> Purchasers are expected to keep the vehicle and meet all applicable project requirements for a minimum three-year period after the vehicle or low NOx engine purchase date. However, resale of a vehicle may be allowed within this three-year period if necessitated by unforeseen or unavoidable circumstances.

[website](#), which shows much money remains. It reflects the real-time value of the fund, based on the vouchers requested to-date.

### *Application Process*

1. A fleet/vehicle purchaser must work with an HVIP Approved Vendor or dealer to submit a voucher request to receive incentives through HVIP.
2. The approved vendor or dealer will log in to a virtual network (VPC) using the company account user name and password provided by the Voucher Administrator to complete and submit the voucher request along with a signed purchase order to the VPC.
3. The vehicle purchaser must sign the HVIP Purchaser Terms & Conditions and Voucher Request Form.
4. The vehicle purchaser will receive the HVIP incentive at the point of sale. Purchasers are then required to report their odometer readings annually, as described in the Voucher Reporting Training.

### *Website and Documentation*

- [California HVIP Website](#)
- [2018 Implementation Manual](#)
- [Carb's Proposed Fiscal Year 2017-18 Funding Plan for Clean Transportation Incentives](#)

### *Contact Information*

CALSTART, Inc.: Tom Brotherton, 303-825-7550, TBrotherton@calstart.org  
AQIP: Ryan Murano, ryan.murano@arb.ca.gov, (916) 322-2383  
HVIP's Hotline: 1-888-457-4847

## Appendix 7. Low Carbon Transit Operations Program (Caltrans)

### *Program Purpose*

The Low Carbon Transit Operations Program (LCTOP) is one of several programs that are part of the Transit, Affordable Housing, and Sustainable Communities Program established by the California Legislature in 2014 by Senate Bill 862. The LCTOP was created to provide operating and capital assistance for transit agencies to reduce greenhouse gas emission and improve mobility, with a priority on serving disadvantaged communities.

This program is administered by the California Department of Transportation (Caltrans) in coordination with Air Resource Board (ARB) and the State Controller's Office (SCO).

Senate Bill 862 continuously appropriates five percent of the annual auction proceeds received by the Greenhouse Gas Reduction Fund (Fund) for LCTOP, beginning in 2015-16. In FY17-18, the eligible allocation was \$97 million. Requests for FY17-18 funding were due in March 2018.

### *Eligible Applicants*

Eligible recipients include transportation planning agencies and transit operators.

### *Eligible Technologies and Project Types*

Moneys from the program shall be expended to provide transit operating or capital assistance that meets any of the following:

1. Expenditures that directly enhance or expand transit service by supporting new or expanded bus or rail services, new or expanded water-borne transit, or expanded intermodal transit facilities, and may include equipment acquisition, fueling, and maintenance, and other costs to operate those services or facilities.
2. Operational expenditures that increase transit mode share.
3. Expenditures related to the purchase of zero-emission buses, including electric buses, and the installation of the necessary equipment and infrastructure to operate and support zero-emission buses.

### *Website and Documentation*

- [Program Website](#)
- [FY 2017-2018 Final Draft Guidelines](#)

### *Contact Information*

Amar Cid, Branch Chief, (916) 651-6114

## Appendix 8. On-Road Heavy-Duty Vehicle Air Quality Loan Program (CalCAP/CARB)

### *Program Purpose*

In partnership with the California Pollution Control Financing Authority's (CPCFA) California Capital Access Program (CalCAP), the California Air Resources Board (CARB) offers the On Road Heavy-Duty Vehicle Air Quality Loan Program to provide financial assistance to truckers affected by the Truck and Bus Regulation. CalCAP/CARB provides financing opportunities to qualified small-business truckers who fall short of conventional lending criteria and are unable to qualify for traditional financing for cleaner trucks or retrofits.

### *Eligible Technologies and Project Types*

Eligible project types include:

- 2007 or newer (engine year) heavy-duty truck (over 14,000 GVWR). CPCFA anticipates CARB will raise the engine year eligibility to 2010 or newer in the next couple of years;
- Diesel Exhaust Retrofits;
- Trailers when purchased with tractor or Diesel Exhaust Retrofit;
- The engines can use diesel fuel, compressed natural gas (CNG), liquefied natural gas (LNG), electric power or other fuels that satisfy the Air Resources Board's emission standard.

Note that more advanced technologies are also eligible for loans. Also, while the program is focused on on-road equipment, in practice, loans are provided based on engine type. It is therefore possible for off-road vehicles to receive loans through this program.

### *Eligible Applicants*

Fleet owners – any small business with:

- 0-10 trucks in the fleet at the time of loan signing (subject to the regulations)
- 100 or fewer employees (does not include sub-contractors)
- \$10 million or less in annual revenues (averaged over the last three years)
- A majority of the business conducted in California

### *Funding Amounts*

The maximum loan amount is \$5 million (maximum of \$2.5 million enrolled over a 3-year period), and can be enrolled for up to ten years. There is no minimum loan amount. CalCAP, in conjunction with CARB, an Independent Contributor contributes up to 14 percent of the principal balance of the CalCAP/CARB enrolled loan into the lender's loss reserve account to cover losses related to the higher risk loans. The actual CARB contribution begins at 14 percent and declines to 7 and 4 percent over time as different total lending amounts are reached. The maximum interest rate that a lender may charge on any single loan is 20 percent annual percentage rate (APR). Lenders set the terms and conditions of the loans and decide which loans to enroll into the Program. Loans or Terminal Rental Adjustment Clause

(TRAC) leases can be short or long-term, have fixed or variable rates, be secured or unsecured, and bear any type of amortization schedule.

Note that this program is well-financed and has not run out of funds; when the program runs low, the administrators are able to request additional resources.

### *Can funds be used with other incentives?*

Applicants are allowed to have a grant that helps with the loan. For example, stacking with HVIP is allowed for medium- and heavy- duty vehicles (no less than 14,000 pounds) and there is no double counting issue or scrapping requirement.

### *Timing*

Applicants may apply at any time.

### *Application Process*

1. The borrower applies for a loan at a CalCAP lender participating in ARB's program and fills out the Borrower Eligibility Criteria and Certification Form. CalCAP lenders and truck dealerships may be able to assist the borrower in completing this form. In addition, the borrower completes the lender's required loan application forms and provides substantiated documentation as requested by the lender.
2. If the borrower qualifies, based on the lender's loan underwriting standards, loan documents are prepared and signed by the borrower and lender.
3. The lender disburses funds to the borrower.
4. The borrower is responsible for timely and full repayment of the loan.

### *Website and Documentation*

- [CARB's CalCAP On-Road Heavy-Duty Vehicle Air Quality Loan Program website](#)
- [CPCFA's CalCAP On-Road Heavy-Duty Vehicle Air Quality Loan Program website](#)
- [Program Summary](#)
- [Carb's Proposed Fiscal Year 2017-18 Funding Plan for Clean Transportation Incentives](#)

### *Contact Information*

Angie Hernandez, CPCFA, [ahernandez2@treasurer.ca.gov](mailto:ahernandez2@treasurer.ca.gov)

CARB's contact: 1-866-6DIESEL (1-866-634-3735)

## Appendix 9. Pacific Gas and Electric Company (PG&E)'s Fleet Ready Program (CPUC)

### *Program Purpose*

PG&E's Fleet Ready Program was approved by the California Public Utilities Commission (CPUC) on May 31, 2018 as one of CPUC's efforts to meet the clean energy and widespread transportation electrification goals of Senate Bill 350. The program targets make-ready infrastructure to support fleets of medium- and heavy-duty vehicles at, for example, municipal bus transit depots, warehouses and seaports.

CPUC approved roughly \$236 million for PG&E's FleetReady Program. How the funding is distributed will be determined in the future as PG&E develops its implementation plans. PG&E has indicated its intent to allow enrollment in the make-ready programs for five years or until its budget is exhausted.

### *Eligible Technologies and Project Types*

Over a five-year period from the date of first installation, PG&E plans to provide:

- Make-ready infrastructure<sup>19</sup> for non-light-duty electric vehicles for customers who commit to purchasing electric vehicles;<sup>20</sup>
- Operation and maintenance of installed infrastructure;
- Education and outreach for customers regarding the benefits of electric vehicles.

Note that PG&E would own, operate and maintain the make-ready infrastructure,<sup>21</sup> but not the charging equipment (EVSE). PG&E will provide a new service connection with meters and panels exclusively for the make-ready installation.

### *Eligible Applicants*

Both public and private entities are eligible. PG&E will develop specific eligibility criteria including, but not limited to: proof of purchase of electric vehicle(s) and electric vehicle charging equipment; a plan for further transportation electrification on site; agreement to adopt a load-management plan; and agreement to disclose data regarding charging habits and fueling costs to the utility for at least 10 years.

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<sup>19</sup> The make-ready includes every component from the distribution circuit up to the stub for the EVSE or idle-reduction equipment.

<sup>20</sup> The revised Proposed Decision may also allow large EVSE rebates for disadvantaged communities and buses.

<sup>21</sup> The revised Proposed decision would make this optional for both PG&E and SCE, so that the customer could own the make-ready in exchange for an 80 percent rebate from the utility.

### *Can funds be used with other incentives?*

The CPUC encourages potential program participants to seek other sources of funding for electric vehicles and/or charging equipment in combination with participation in the infrastructure programs. Utility infrastructure programs will be stackable with all vehicle funding programs and most competitive solicitations.

### *Program Requirements*

Customers must meet the following eligibility requirements for PG&E to preapprove the customer for participation:

- Demonstrate commitment to near-term procurement of eligible vehicles, EVSE, and associated safety equipment.
- Provide data related to vehicle and EVSE usage.
- Maintain the equipment for the expected useful life of the vehicle and/or EVSE.
- Demonstrate a long-term electrification plan for any requests to upsize infrastructure to accommodate future transportation electrification growth.

### *Application Process*

Not determined yet.

### *Website and Documentation*

- [CPUC's Transportation Electrification Activities Pursuant to Senate Bill 350](#)
- [Proposed Decision on The Transportation Electrification Standard Review Projects](#)

### *Contact Information*

CPUC: Carrie Sisto, (415)-703-2872, [carolyn.sisto@cpuc.ca.gov](mailto:carolyn.sisto@cpuc.ca.gov)

PG&E: [PGEEVChargingStationProgram@pge.com](mailto:PGEEVChargingStationProgram@pge.com)

## **Appendix 10. Southern California Edison (SCE)'s Medium- and Heavy-Duty Vehicle Charging Infrastructure Program (CPUC)**

### ***Program Purpose***

Southern California Edison (SCE)'s Medium- and Heavy-Duty Vehicle Charging Infrastructure Program was approved by the California Public Utilities Commission (CPUC) on May 31, 2018 as one of CPUC's efforts to meet the clean energy and widespread transportation electrification goals of Senate Bill 350.

The program proposes to provide electric infrastructure, up to and including the make-ready stub, to serve charging equipment for medium- and heavy-duty vehicles.

CPUC approved roughly \$343 million for SCE's Medium/Heavy Duty Infrastructure Program. Details on how the funding is distributed will be determined in the future as SCE develops its implementation plans. SCE has indicated that they intend to allow enrollment in the make-ready programs for five years, or until its budget is exhausted.

### ***Eligible Technologies and Project Types***

Eligible vehicles include:

- Class 2-8 trucks, ranging from delivery vehicles and refuse trucks to semi-trucks;
- Non-road cargo handling equipment such as forklifts and port equipment;
- Transportation refrigeration units for semi-truck trailers;
- Buses used for public transit or schools.

### ***Eligible Applicants***

Both public and private entities are eligible. SCE will develop specific eligibility criteria including, but not limited to: proof of purchase of electric vehicle(s) and electric vehicle charging equipment; a plan for further transportation electrification on site; agreement to adopt a load-management plan; and agreement to disclose data regarding charging habits and fueling costs to the utility for at least 10 years.

### ***Can funds be used with other incentives?***

The CPUC encourages potential program participants to seek other sources of funding for electric vehicles and/or charging equipment in combination with participation in the infrastructure programs. Utility infrastructure programs will be stackable with all vehicle funding programs and most competitive solicitations.

### ***Program Requirements***

To participate in SCE's program, non-residential customers must own or lease, or be the customer on record for, the participating site; agree to provide SCE continuous access to the site; agree to participate in data collection and surveys; take service on an eligible TOU rate; and agree to maintain the charging equipment for at least five years.

### ***Application Process***

Not determined yet.

### *Website and Documentation*

- [CPUC's Transportation Electrification Activities Pursuant to Senate Bill 350](#)
- [Proposed Decision on The Transportation Electrification Standard Review Projects](#)

### *Contact Information*

CPUC: Carrie Sisto, (415)-703-2872, [carolyn.sisto@cpuc.ca.gov](mailto:carolyn.sisto@cpuc.ca.gov)

SCE: [chargeready@sce.com](mailto:chargeready@sce.com)

Note that CPUC only approves these programs, which will be designed, implemented, and continuously administered by the utilities. It is advisable that interested customers contact their utility account representative.

## Appendix 11. School Bus Replacement Program (CEC)

### *Program Purpose*

The Energy Commission is in the process of establishing its School Bus Replacement Program to provide schools with options to embrace next generation zero-emission vehicles and improve children's health by limiting their exposure to transportation-related air pollution. SB 110 appropriates up to \$75 million for the program from The California Clean Energy Jobs Act.

The Energy Commission is currently holding public workshops to request input on the program's funding, eligibility requirements, proposed solicitations, evaluation criteria and information for submitting public comments and questions.

### *Eligible Technologies and Project Types*

Proposed project types include:

- Electric School Buses (any school bus replaced shall be scrapped);
- Infrastructure, including charging systems;
- Workforce training and development.

### *Eligible Applicants*

School districts and county offices of education are eligible.

Priority should be given to the oldest school buses, or school buses operating in disadvantaged communities and to schools that have a majority of students eligible for free or reduced-price meals in the prior year.

### *Can funds be used with other incentives?*

Unknown yet.

### *Timing*

**The program solicitation was planned for release in May-June 2018.** Funding will be available from July 1, 2018.

### *Application Process*

Not decided yet.

### *Website and Documentation*

- [CEC's program website](#)
- [Program Concept Workshop presentation](#)

### *Contact Information*

Jennifer Masterson, 855-279-6381, [Schoolbusprogram@energy.ca.gov](mailto:Schoolbusprogram@energy.ca.gov)

## Appendix 12. Transit and Intercity Rail Capital Program (CalSTA)

### *Program Purpose*

The Transit and Intercity Rail Capital Program (TIRCP) was created by Senate Bill 862 and modified by Senate Bill 9 to provide grants from the Greenhouse Gas Reduction Fund (GGRF) to fund transformative capital improvements that will modernize California's intercity, commuter, and urban rail systems, and bus and ferry transit systems to reduce emissions of greenhouse gases and reduce congestion and vehicle miles traveled throughout California.

The program is administered by The California Department of Transportation (Caltrans), in collaboration with California State Transportation Agency (CalSTA).

A total of \$2.65 billion funding was awarded in FY2018 through SB 1 and Greenhouse Gas Reduction Fund (GGRF). Furthermore, another \$1.675 billion funding was awarded through an Additional Multi-Year Funding Agreement. **The 2018 program solicitation closed in January 2018.**

### *Eligible Applicants*

Public agencies are eligible, including construction authorities, transportation authorities, and other similar public entities created by statute.

### *Eligible Technologies and Project Types*

To be eligible for funding, a project must demonstrate it will reduce greenhouse gas emissions using the CARB quantification methodology. Projects eligible for funding under the program include, but are not limited to, the following:

1. Rail capital projects, including the acquisition of rail cars and locomotives, and the facilities to support them, that expand, enhance, or improve existing rail systems and connectivity to existing and future transit systems, including the high - speed rail system.
2. Intercity, commuter, and urban rail projects that increase service levels, improve reliability, or decrease travel times. These projects may include infrastructure access payments to host railroads in lieu of capital investments, efforts to improve existing rail service effectiveness with a focus on improved operating agreements, schedules, and minor capital investments that are expected to generate increased ridership, as well as larger scale projects designed to achieve significantly larger benefits.
3. Rail, bus, and ferry integration implementation, including: integrated ticketing and scheduling systems and related capital investments (including integration with bus or ferry operators); projects enabling or enhancing shared - use corridors without increasing net air pollution (both multi - operator passenger only corridors as well as passenger - freight corridors); related planning efforts focused on, but not limited to, delivery of integrated service not requiring major capital investment; and other service integration initiatives.

4. Bus rapid transit and other bus and ferry transit investments (including vanpool services operated as public transit) to increase ridership and reduce greenhouse gas emissions, including capital investments, as a component implementing transit effectiveness studies, that will contribute to restructured and enhanced service.

Based on the 2018 program Award List, funded projects include the purchase of zero- or low-emission buses.

#### *Website and Documentation*

- [Program Website](#)
- [2018 Program Guidelines](#)
- [2018 Award List](#)

#### *Contact Information*

Ezequiel Castro, Branch Chief at Caltrans, (916) 654-8012

## Appendix 13. VW Mitigation Trust

### *Program Purpose*

The Volkswagen (VW) Environmental Mitigation Trust aims to mitigate the excess nitrogen oxide (NOx) emissions caused by VW's use of illegal defeat devices in diesel vehicles emission testing. The focus is on zero-emission vehicles, though in certain cases (ferries, tugboats, towboats) it will fund conversion to hybrid technology where that is considered best practice. Investments in vehicles can be coupled with an infrastructure component, but infrastructure cannot be funded on a stand-alone basis.

The Trust provides about \$423 million for California as one-time funding. California has 10 years from October 2, 2017 to request their allocation and implement mitigation actions, but may request up to 1/3 of its allocation the first year.

### *Eligible Technologies and Project Types*

The Trust provides funding for specified eligible actions, focused mostly on "scrap and replace" projects for the heavy-duty sector, including on-road freight trucks, transit and shuttle buses, school buses, forklifts, port cargo handling equipment, commercial marine vessels, and freight switcher locomotives. Recommended project types are as follows:

- Transit, School, and Shuttle Buses: Supports early adoption of commercially available Class 4-8 zero-emission technologies and reduces diesel's harmful impact on children.
- Class 8 Freight & Port Drayage Trucks: Focuses on later/future deployment of zero-emission technologies for heavy-duty trucks.
- Zero-Emission Freight / Marine: Funds the most cost-effective zero-emission freight or marine projects to ensure NOx reductions while supporting deployment of early commercial zero-emission technologies.
- Combustion Freight / Marine: Funds the most cost-effective, low NOx or cleanest available combustion technologies for the freight or marine sector.
- Light-Duty ZEV Infrastructure: Supports market adoption of zero-emission vehicles by enhancing funding and the pace of infrastructure development.

Vehicles or engines replaced in these projects must be scrapped. Electric conversion is eligible for funding. Zero-emission vehicle infrastructure is also an allowable expenditure when accompanying funded zero-emission vehicles or repowers.

According to the Proposed Beneficiary Mitigation Plan released in April 2018, the recommended categories and allocations are described in the following table.

*Table 6 Proposed VW Mitigation Trust Categories and Allocations*

Eligible Mitigation Action (Project) Category	Allocation (millions)
Zero-Emission Transit, School, Shuttle Buses	\$130
Zero-Emission Class 8 Freight and Port Drayage Trucks	\$90 <sup>22</sup>
Zero-Emission Freight / Marine - Forklifts and Port Cargo Handling Equipment, Airport GSE, Shore Power, Ferry/Tug/Tow Repowers	\$70
Combustion Freight / Marine - Low NOx Class 7-8 trucks, Tier 4 Freight Switchers, Tier 4 or Hybrid Ferry/Tug/Tow Repowers	\$60
Light-Duty ZEV Infrastructure	\$10
Reserve (including administrative costs)	\$63
<b>Total</b>	<b>\$423</b>

### *Eligible Applicants*

Both private and public entities are eligible to apply.

### *Can funds be used with other incentives?*

In certain cases, the VW program would allow co-funding with other sources of ZEV infrastructure funding. This is because the infrastructure itself is not taking credit for achieving reductions in NOx emissions. Examples of ZEV infrastructure funding sources that could be stacked include California Energy Commission funds and Federal Transit Administration (FTA) funds. In such cases, there is no restriction on the total value of the combined funding. However, there are limitations on stacking with infrastructure funding sources. For example, stacking of shore-side power funding might not work if cost per ton of emissions reduced for that infrastructure is too high. Moreover, the emissions reduced due to the shore power infrastructure could not be counted under multiple programs.

In order to prevent double counting of NOx reductions, in most cases, co-funding with other incentive programs is not allowed. For example, there is no stacking of incentives for zero-emission or hybrid vehicles with the Carl Moyer or HVIP programs. This is because the Carl Moyer program takes credit for NOx and PM reductions, and the HVIP program has been designed to offset most or all of the incremental costs.

### *Timing*

This is one-time funding. Beneficiaries (all 50 states, the District of Columbia, Puerto Rico, and federally recognized tribes) have 10 years to spend at least 80 percent of the allocated trust funds, beginning on October 2, 2017. After that, unused trust funds will be redistributed as supplemental funding among beneficiaries that have used at least 80 percent of their allocated trust funds. Such beneficiaries will be given five additional years to use the supplemental funding.

<sup>22</sup> Staff recommends 70 percent of the allocation be focused on expanding the market as additional manufacturers begin producing Class 8 zero-emission trucks in the next three to five years.

The California VW funding will probably be released in installments to facilitate access for small businesses and agencies. For example, 70 percent of the funds set aside for zero-emission class 7/8 trucks will be reserved for years 3-5 of the program, with the exact timing to depend on market conditions for zero-emission vehicles.

### *Application Process*

The application process will be determined during upcoming stakeholder work group meetings.

### *Website and Documentation*

- [VW Mitigation Trust for California Website](#)
- [Proposed Beneficiary Mitigation Plan](#)
- [CARB's Proposed Fiscal Year 2017-18 Funding Plan for Clean Transportation Incentives](#)

### *Contact Information*

CARB: Lisa Williams, staff lead, [lisa.williams@arb.ca.gov](mailto:lisa.williams@arb.ca.gov), (916) 324-7582

## Appendix 14. Zero- and Near Zero-Emission Freight Facilities Project

### *Program Purpose*

The Zero- and Near Zero-Emission Freight Facilities Project (Freight Facilities Project) is a new, multi-faceted project that is designed to reduce GHG and criteria pollutant emissions in freight facilities and help achieve additional benefits, such economic, environmental, and public health benefits to disadvantaged and/or low-income communities. The goal of this new project is to support bold, transformative emission reduction strategies that can be emulated throughout freight facilities statewide.

In FY 2017-18, the Low Carbon Transportation Program provided up to \$100 million for the program. Another \$50 million came from the Zero- and Near Zero-Emission Warehouse Program.

### *Eligible Technologies and Project Types*

The project will fund a variety of technologies and strategies designed to:

- Provide direct GHG, criteria, and toxic pollutant emission reductions from freight facilities.
- Synergistically demonstrate the practicality and economic viability of deploying system and energy efficiencies alongside multiple zero- and near zero-emission vehicles and equipment along with necessary infrastructure.
- Demonstrate the potential for widespread commercial acceptance of the various types of zero- and near zero-emission vehicles and equipment used in freight facilities and associated on-road freight applications.
- Accelerate commercialization of zero- and near zero-emission goods movement technologies.

Projects can support both pre-commercial technologies that are not yet widely offered for sale, as well as commercial technologies that have already been deployed into the marketplace. Selected projects should encourage other freight facilities to adopt demonstrated strategies and technologies, magnifying the future emission reduction potential through wide-scale market transformation.

Specifically, the 2017-2018 Solicitation may fund the following types of activities:

- Construction and deployment of pre-commercial vehicles and equipment with a high potential to be commercialized;
- Deployment of eligible commercially available vehicles and equipment;
- Production, installation, and supporting infrastructure operations and maintenance;
- Technologies that support ships at berth, including shore power and bonnet systems;
- Demonstration of the deployed vehicle technology and infrastructure;
- Renewable power generation and energy storage that support vehicle, equipment, facility operations and assist in managing energy demand;
- System efficiency upgrades including process improvements such as preferential queuing and operational strategies;

- Data collection and emission testing on vehicles, equipment, infrastructure and facility improvements deployed as part of a proposed project;
- Education and outreach components that highlight the economic benefits of a zero-emission freight facility transformation; and
- Project implementation costs (not to exceed 5 percent of the project amount funded by CARB).

Ineligible activities include: fully automated cargo handling equipment; research or design-only projects. In addition, technologies that by themselves do not provide a GHG benefit, but solely rely on the use of renewable fuel for GHG emissions reductions, will not be eligible.

There is a preference for certain types of technologies according to a technological hierarchy. There is a general preference for zero-emission technologies in all vehicle and equipment types. Where such technologies are not commercially available by major manufacturers, the next preference is for zero-emission enabling technologies<sup>23</sup>. Where zero-emission enabling technologies are not commercially available, low-NOx technologies are eligible for funding.

Practical field demonstrations are required for any pre-commercial technologies and for all equipment.

### *Eligible Applicants*

Eligible grantees (applicants) include local air districts, other California-based public entities, or California-based non-profit organizations. According to the 2017-2018 Grant Solicitation, applications should come from local air districts or other California-based public agencies and/or California-based non-profit organizations that demonstrate the requisite administrative and technical expertise in overseeing large scale advanced technology deployments.

### *Funding Amounts*

It is anticipated that up to \$150 million will be available under the first solicitation for the Freight Facilities Project, and at least \$50 million of this funding will be spent directly on zero and near zero-emission warehouses, as required under SB 132. This includes up to \$100 million from the FY 2017-2018 Low Carbon Transportation Allocation, noted above, and a \$50 million one-time appropriation from the Trade Corridor Enhancement Account (TCEA) for the Zero- and Near Zero-Emission Warehouse Program. The maximum grant that may be awarded to a single grantee is \$50 million.

Projects are evaluated on a 120 point scoring system, considering the qualifications of the applicant (5); project team capabilities and industry collaboration (10); project objectives and workplan (15); budget, including matching funds and financial capabilities (10); potential emission reduction benefits (5); cost-effectiveness (5); disadvantage community benefit (15); technology and innovation (10); potential for market penetration and technology commercialization (15); potential of project to act as a technology showcase (15); application completeness (5); timeline for project completion (5); and optional extra credit scoring criteria (5).

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<sup>23</sup> Zero-emission enabling vehicles are vehicles capable of zero-emission operation (e.g. extended range hybrids).

Projects that already have all the needed participants, such as the identified end users of the proposed vehicles or equipment, technology manufacturer(s), data collection and analysis provider, eligible local Community Based Organizations, and eligible Grantee will score higher than those that do not have team members identified in advance. Similarly, applications that show a benefit to a disadvantaged community will score better than applications that do not. Projects showing strong support from eligible community groups may be eligible for extra points.

Other advantageous design elements include:

- Dual use (public and private) charging/refueling stations.
- Projects that will continue to use the funded assets after the duration of the project.

### *Can funds be used with other incentives?*

Funds are provided from two sources: the cap-and-trade auction proceeds deposited into the Greenhouse Gas Reduction Fund (GGRF) and funds deposited into the TCEA. Since there is a requirement to document emissions reductions, there may be restrictions on stacking with other funding programs that also aim to take credit for emissions reductions.

### *Project Requirements*

The Grantee is required to match 50 percent (or more) of the total project cost. 10 percent of the total project cost must be a cash contribution. The remaining portion of the match may be through certain types of in-kind contributions, including equipment, materials, consumables and labor. (Public funds committed as part of an in-kind match cannot be sourced from GGRF.)

There are many other requirements for vehicles participating in the solicitation. For example, all on-road trucks must install data collection equipment, and data collection and analysis is a required element of all funded projects.

### *Application Process*

The completed application (including the signed original application package, four copies of the application package, and one CD with a single electronic file) was due to CARB by on July 19, 2018.

### *Website and Documentation*

- [CARB's Low Carbon Transportation Investments and Air Quality Improvement Program \(AQIP\) website](#)
- [CARB's Proposed Fiscal Year 2017-18 Funding Plan for Clean Transportation Incentives](#)
- [https://www.arb.ca.gov/msprog/mailouts/msc1810/zanzeff\\_solicitation.pdf](https://www.arb.ca.gov/msprog/mailouts/msc1810/zanzeff_solicitation.pdf)

### *Contact Information*

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## Appendix 15. Zero-Emission Off-Road Freight Voucher Incentive Project

### *Project Purpose*

The Zero-Emission Off-Road Freight Voucher Incentive Project (Off-Road<sup>24</sup> Freight Voucher Project) is a new project analogous to HVIP, but for off-road freight equipment. Like HVIP, it targets commercialized products and is designed to accelerate deployment of cleaner technologies by providing a streamlined way for fleets to purchase specific zero-emission equipment, with funding to offset the higher cost of such technologies. While the program is being designed to parallel HVIP, under this program only zero-emission equipment is eligible.

In FY 2017-2018, the project received \$40 million from the Low Carbon Transportation Program, which is subject to annual appropriation.

### *Eligible Technologies and Project Types*

According to the workshop materials from February 21, 2018, proposed eligible equipment types are as follows:

- Off-Road Terminal Tractors
- Transport Refrigeration Units (TRUs)
- Forklifts (>8,000 lbs. lift capacity)
- Railcar Movers
- Airport Cargo Loaders
- Rubber-Tired Gantry Cranes

In addition to the above equipment types, CARB may provide additional funds (“plus-ups”) for the associated infrastructure and technical support costs. Such payments would be in addition to the incremental cost of the ZEV off-road vehicle.

### *Eligible Applicants*

Vehicle purchasers. This program would operate on a first-come, first-served basis and supports a wide variety of private and public fleets to purchase specific commercially available zero-emission and near zero-emission products.

### *Funding Amounts*

The voucher value would be determined based on two components: the baseline voucher amount and voucher enhancements. The baseline voucher amounts are intended to represent the difference in cost between the zero-emission version of the equipment and the conventional internal combustion version. The following table summarizes the proposed baseline voucher caps. Program administrators are in the process of determining the voucher amounts based on the incremental cost of the ZEV technologies.

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<sup>24</sup> The In-Use Off-Road Diesel Vehicle Regulation applies to self-propelled vehicles with diesel engines 25 horsepower or greater used in California that were designed for off-road use, as further described [here](#).

**Table 7 Proposed FY17-18 Zero-Emission Off-Road Freight Voucher Incentive Project Baseline Voucher Caps**

Equipment Type	Specifications	Proposed Cap
New Off-Road Terminal Tractor	≤ 80,000 lbs GVWR	\$165,000
	> 80,000 lbs GVWR	\$165,000
Off-Road Terminal Tractor Conversion	≤ 80,000 lbs GVWR	\$82,500
	> 80,000 lbs GVWR	\$82,500
New TRU	Truck application (< 23 HP)	\$15,000
	Trailer application (≥23 HP)	\$60,000
TRU Conversion	Truck application (< 23 HP)	\$15,000
	Trailer application (≥23 HP)	\$50,000
New Forklift	8,001 – 12,000 lbs lift cap	\$15,000
	12,001 – 20,000 lbs lift cap	\$20,000
	20,001 – 33,000 lbs lift cap	\$50,000
	>33,000 lbs lift cap	\$150,000
New Locomotive Railcar Mover		\$350,000
New Airport Cargo Loader	≤ 20,000 lbs. lift cap.	\$25,000
	> 20,000 lbs lift cap	\$50,000
Rubber-Tired Gantry Crane		\$400,000

Voucher enhancements are intended to provide additional funding to help overcome barriers to adoption and will be in addition to the baseline voucher caps. The maximum voucher amount per piece of equipment, including the baseline voucher amount and any voucher enhancements, is \$500,000. Voucher enhancements would be provided for the installation of Electric Vehicle Supply Equipment (EVSE) and/or chargers, and manufacturers looking to offer extended warranties on their equipment.

#### ***Can funds be used with other incentives?***

The program, like HVIP, which does not require quantification of emissions reductions, thereby making it possible for applicants to combine the funds with programs that seek to take credit for emissions reductions.

#### ***Timing***

The program is expected to begin in late 2018.

#### ***Application Process***

As published in CARB’s Funding Plan: The structure for voucher disbursement would be similar to what is used for HVIP voucher transactions. The Off-Road Freight Voucher Project would provide dealers of eligible zero-emission off-road freight equipment with a voucher for the incentive amount, redeemable at the time of the equipment delivery. The Off-Road Freight Voucher Project website would include a list of eligible equipment models, as well as the eligible voucher amount for each vehicle. The webpage would include a voucher request form for the dealer (in concert with the purchaser) to submit at the time a specific piece of equipment is ordered, with the voucher to be redeemable at the time the equipment is delivered.

### *Website and Documentation*

- [CARB's Low Carbon Transportation Investments and Air Quality Improvement Program \(AQIP\) website](#)
- [CARB's Proposed Fiscal Year 2017-18 Funding Plan for Clean Transportation Incentives](#)
- [Handout for the February 21, 2018 Public Work Group Meeting](#)

### *Contact Information*

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## Appendix 16. Low Carbon Fuel Standard Program

### *Program Purpose*

The Low Carbon Fuel Standard (LCFS) is administered by the California Air Resources Board. Established in 2007 through California Assembly Bill AB 32 and the Governor's Executive Order S-01-07, it uses a market-based cap and trade approach to reduce greenhouse gas emissions from petroleum-based transportation fuels like reformulated gasoline and diesel. The LCFS requires producers of petroleum-based fuels to reduce the carbon intensity of their products, beginning with a quarter of a percent in 2011 and culminating in a 10 percent total reduction in 2020. Petroleum importers, refiners and wholesalers can either develop their own low carbon fuel products, or buy LCFS Credits from other companies that develop and sell low carbon alternative fuels, such as biofuels, electricity, natural gas or hydrogen.

### *Eligible Technologies and Project Types*

The California Low Carbon Fuel Standard regulation applies to any transportation fuel that is sold, supplied, or offered for sale in California. The types of transportation fuels to which the LCFS applies include:

- California reformulated gasoline;
- California diesel fuel;
- Fossil compressed natural gas ("Fossil CNG"), fossil liquefied natural gas ("Fossil LNG"), or fossil liquefied compressed natural gas ("Fossil L-CNG");
- Bio-CNG, bio-LNG, or bio-L-CNG;
- Electricity;
- Compressed or liquefied hydrogen;
- A fuel blend containing hydrogen;
- A fuel blend containing greater than 10 percent ethanol by volume;
- A fuel blend containing biomass-based diesel;
- Denatured fuel ethanol ("E100");
- Neat biomass-based diesel ("B100"); and
- Any other liquid or non-liquid fuel.

### *Eligible Applicants*

The LCFS regulation applies to any person who is responsible for a transportation fuel in a calendar year. However, certain transportation entities are able to opt-in to the program for the purpose of generating LCFS credits that can be sold to regulated parties to support compliance. In this way, the LCFS offers a source of funding for certain transportation entities opting to switch to low-carbon transportation fuels.

For electricity used as a transportation fuel, the entities that are eligible to generate LCFS credits are:

- Electric vehicle service providers (EVSP) for public charging stations;
- Site hosts of private access electric vehicle (EV) charging equipment at a business or workplace;
- EV fleet operators for fleets of electric vehicles (including electric forklifts);

- Transit agencies operating fixed guideway systems or electric buses;
- Battery switch station owners; and
- Electrical Distribution Utilities (EDU) for residential charging, and for all of the above categories, if no other parties opt in and generate credits.

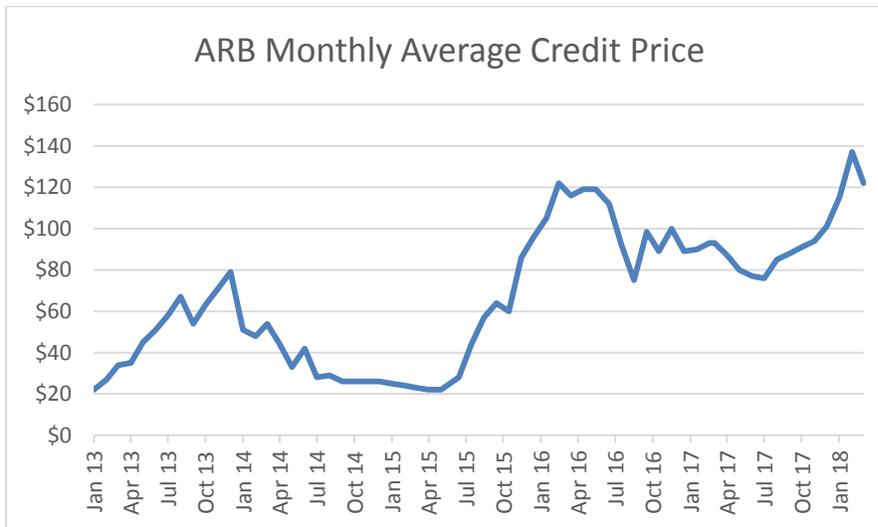
By opting into the LCFS program and providing electricity and hydrogen as transportation fuels, electricity and hydrogen providers can earn LCFS credits. The credits will have a monetary value when sold to regulated parties who must offset deficits created by their supply of fuels with carbon intensities that exceed the LCFS standards.

### **Funding Amounts**

The amount of funding generated for shifting to lower-carbon fuels depends on supply and demand for credits in the LCFS market. The other important factor is how the carbon intensity of the new fuel compares to the reference standard for the applicable year.

The maximum price for credits acquired, purchased or transferred via the Credit Clearance Market was \$200/credit in 2016. One credit represents one metric ton of avoided carbon dioxide emissions. This price shall be adjusted in subsequent years by a Consumer Price Index (CPI) deflator to keep pace with inflation and remain at a constant price, in real terms. Figure 2 shows the monthly average credit price since 2013. Even on a monthly basis, the price is highly variable.

**Figure 2 Monthly LCFS Credit Price**



The average April 2018 price was \$129/credit. The price varied from \$73 to \$157 per credit during the month.

### **Credit Calculation**

The LCFS credits earned for shifting to electric fuels can be calculated by the following equation:

$$\text{Credits} = \left( CI_{\text{standard}} - \frac{CI_{\text{Electricity}}}{EER} \right) \times \text{Energy Density} \times EER \times \text{Electricity Units} \times 10^{-6}$$

The Energy Economy Ratio (EER) is a value that represents the efficiency of a fuel as used in a powertrain as compared to a reference fuel. Electric trucks currently have an EER of 2.7, though CARB is now considering changing the number to 5.0<sup>25</sup>. The 2018 CI standard is 96.91 gCO<sub>2</sub>e/MJ for diesel substitute. The CI of electricity is 105.16 gCO<sub>2</sub>e/MJ. The Energy Density of electricity is 3.6 MJ/kWh.<sup>26</sup>

As an example, we will consider the credits that could be generated from an electric truck that drives 40,000 km per year<sup>27</sup> and consumes 90 kWh per 100 km.<sup>28</sup> Using the average April 2018 LCFS credit price of \$129/credit<sup>29</sup>, and assuming the appropriate EER and CI values noted above, the estimated credit revenue would be €7.27/kWh, and the credits generated from May 2017 to April 2018 would be worth \$2,616.30.

### *Can funds be used with other incentives?*

Credits generated in the LCFS program cannot be directly transferred to the California Cap and Trade regulation, the Renewable Portfolio Standard or any other similar programs. There are no restrictions on stacking with other California funding programs.

### *Program Requirements*

Opt-in entities must submit to the Executive Officer quarterly progress reports and annual compliance reports. The data for the quarterly reports must be uploaded in the LCFS Reporting and Credit Bank & Transfer System (LRT-CBTS) within the first 45 days after the end of the quarter.

An opt-in party's annual compliance obligation is met when it demonstrates via its annual report that it possessed and has retired a number of credits from its credit account that is equal to the sum of the deficits generated in the current compliance period and the deficits carried over from the previous compliance period.

### *Timing*

The Clearance Market period is from June 1<sup>st</sup> through July 31<sup>st</sup>, if the Executive Officer has determined the Clearance Market will occur. The Market will occur in FY 2018.

### *Application Process*

Opting into the LCFS program involves registering with ARB in the LRT-CBTS, and establishing an account. This registration process is simple, requiring organization name, organization address,

<sup>25</sup> Conversation with Jing Yuan, CARB, May 18, 2018.

<sup>26</sup> Data retrieved from [the LCFS Credit Price Calculator](#).

<sup>27</sup> According to Federal Highway Administration's [Highway Statistics 2016](#), the average distance traveled per medium- and heavy- duty vehicle in the United States is 40,293 km annually

<sup>28</sup> According to [a report](#), the E-Force One electric truck, one of the first heavy duty vehicles with electric power commercially available, uses around 80–110 kWh of electricity per 100 kilometers traveled at highway speeds, and 60–90 kWh per 100 kilometers traveled in urban areas.

<sup>29</sup> Data retrieved from [the LCFS Credit Price Calculator](#).

organization federal employer identification number, primary contact name, telephone number, and email address.

To sell credits in the LCFS market, an opt-in entity shall enter into an agreement with another party to transfer credits. Any such agreement must be fully documented in the LRT-CBTS. When a credit transfer agreement has been reached, within 10 business days the seller must initiate the documentation by completing and posting for the buyer's review an online Credit Transfer Form (CTF) provided in the LRT-CBTS.

#### *Websites and Documentation*

- [CARB Program Website](#)
- [California Energy Commission Program Website](#)
- [Current Regulation](#)

#### *Contact Information*

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