Fiscal Year 2025–26 Long-Term Heavy-Duty Investment Strategy

Including Three-Year Investment Recommendations for Clean Transportation Incentives

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Executive Summary

The California Air Resources Board's (CARB) Long-Term Heavy-Duty Investment Strategy (hereafter referred to as the "Strategy") serves as a roadmap for Low Carbon Transportation and Air Quality Improvement Program (AQIP) incentives (collectively known as Clean Transportation Incentives). Specifically, the Strategy focuses on the heavy-duty (HD) transportation sector, helping to achieve the State's climate change and air quality goals. The document also fulfills the requirements outlined in Senate Bill (SB) 1403 (Lara, Chapter 370, Statutes of 2018). Each year, CARB updates and refines its priorities for the technologies and project categories that merit investments to help the State reach its goals. At the same time, CARB strives to distribute incentives equitably, providing them to those who need them most while simultaneously driving overall market momentum through high-volume vehicle deployments. This helps to maximize benefits for overburdened communities, and the projects funded by these investments include specific support to the communities most impacted by poor air quality.

The Strategy identifies priority focus areas and recommended levels of incentive funding. The levels of funding represent a critical down payment toward meeting these goals but do not approach the entire amount needed to achieve all of the State's goals, listed in the annual Funding Plan for Clean Transportation Incentives.[1] Emphasis is placed on the strategic use of State investments to incentivize the development and market expansion of clean HD vehicle and off-road equipment technologies into the marketplace. California has traditionally relied on a combination of regulations and incentives to help meet these goals relative to cleaner on-road and off-road fleets. Unfortunately, recent unprecedented and illegal actions taken by the federal government have challenged CARB regulations. The resulting regulatory gaps heighten the need for incentives to reduce emissions. In turn, these incentives can help motivate further alternative vehicle technology purchasing decisions. As the commercial zero-emission vehicle (ZEV) market continues to grow and diversify, greater volumes of incentives can help to drive large-scale adoption while also lowering overall technology prices and creating the momentum that can eventually lead to a self-sustaining market.

The Strategy also includes metrics to help assess the performance of Clean Transportation Incentives projects. These include targeted metrics that address ways to support healthy communities, grow the green economy, and encourage technology evolution.

Previous investments in deployments of zero-emission (ZE) truck and bus technologies have been instrumental in advancing the on-road ZEV market to where it is today, with a wide array of vehicles and equipment now available on the commercial market. Recent

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[1] CARB. Fiscal Year 2024-25 Funding Plan for Clean Transportation Incentives. Pages 1-3 through 1-5. *https://ww2.arb.ca.gov/sites/default/files/2024-10/Proposed%20Funding%20Plan%20Fiscal%20Yearl%202024-25.pdf*

investments in the development and demonstration of heavier and more specialized ZE off-road vehicles and equipment have resulted in a growing list of commercial products in the off-road sector. Continued commitment to these markets in the form of commercial incentives and funding for demonstration and pilot projects will play an essential role in meeting California's air quality and climate goals; promoting equity by ensuring that investments benefit the communities most impacted by poor air quality and provide assistance to small businesses and owner-operators; supporting high-quality jobs; and enhancing California's leadership role as an incubator and marketplace for clean, ZE technology.

Table 1: Focused Recommendations for Clean Transportation Incentives Priorities[2]

Category	FY 2026–27	FY 2027–28	FY 2028–29
Demos and Pilots	$325–$515 million ZE Line-Haul Rail, ZE/AT Aviation, AT OGV, ZE/Hybrid Heavy Marine, ZE Heavy Specialty and Off-Road Equipment, ZE Ecosystems	$360–$480 million ZE Line-Haul Rail, ZE/AT Aviation, AT OGV, ZE/Hybrid Heavy Marine, ZE Heavy Ag/Construction, ZE Extra-Specialty, ZE Ecosystems	$300–$400 million ZE Line-Haul Rail, ZE/AT Aviation, AT OGV, ZE Heavy Marine, ZE Heavy Ag/Construction, ZE Extra-Specialty, ZE Ecosystems
Market Momentum	$620–$680 million ZE Heavy Specialty and Off-Road Equipment, ZE Switcher Rail, ZE Light Marine, Volume ZE Trucks, ZE School/ Transit, Temp. Fueling, ZE Ecosystems	$650–$710 million ZE Heavy Specialty and Off-Road Equipment, ZE Light Marine, Volume ZE Trucks, ZE School/Transit, ZE Ecosystems	$680–$740 million ZE Heavy Specialty and Off-Road Equipment, ZE Light Marine, Volume ZE Trucks, ZE School/Transit, ZE Light Aviation, ZE Ecosystems
Market Equity	$520–$580 million ZE Drayage/Small Fleets, ZE Forklifts, ZE School/Transit, Financing and Insurance Assistance, Secondary Market Support, ZE Ag and Construction	$550–$610 million ZE Drayage/Small Fleets, ZE Forklifts, ZE School/Transit, Financing and Insurance Assistance, Secondary Market Support, ZE Ag and Construction	$580–$640 million ZE Drayage/Small Fleets, ZE Forklifts, ZE School/Transit, Financing and Insurance Assistance, Secondary Market Support, ZE Ag and Construction
Total Funding	**$1,465–$1,775 million***	**$1,560–$1,800 million***	**$1,560–$1,780 million***

*The vehicle and equipment types listed in the table above are a prioritized selection of the project types that CARB would invest in, given sufficient available funds. These focus areas are identified utilizing the strategy laid out in this document. This is not an exhaustive list of technologies or applications that Clean Transportation Incentives would fund, and total funding recommendations are reflective of ideal appropriations and are not limited to existing appropriations.

[2] Acronym and category key: advanced technology (AT); Heavy Specialty and Off-Road includes ag, construction, cargo-handling, mining, emergency vehicles; ocean-going vessels (OGV)

Introduction

California has led the way for heavy-duty ZEV adoption in the United States, investing billions of dollars to date with the goal of accelerating the development and adoption of the cleanest available technologies. These investments further California's work toward improving community sustainability, reducing overall carbon emissions and criteria air pollutants, and reducing exposure to toxic air contaminants. California is working toward achieving the goals in the Governor's Executive Order N-79-20, which aims to reach a 100% zero-emission drayage truck and off-road equipment population by 2035 and 100% zero-emission medium- and heavy-duty vehicle population by 2045, where feasible. Meeting the State's goal of carbon neutrality by 2045 will also help reduce the adverse impacts of climate change and provide Californians with healthier air to breathe. Making the transition equitably requires repairing the harm caused by decades of discriminatory transportation, land use, and housing practices and building more inclusive and equitable places that prioritize providing vulnerable communities with opportunities to thrive.

Medium- and heavy-duty vehicles[3] and off-road equipment continue to be the largest source of criteria pollutants, including diesel particulate matter, a toxic air contaminant directly linked to adverse health impacts. Reducing HD emissions, especially with ZEV technology, is a key element of this Strategy.

The Strategy serves as a roadmap for how CARB plans to invest its Low Carbon Transportation and AQIP funding (collectively known as Clean Transportation Incentives) in a variety of HD on- and off-road technologies. Included in this document is a discussion on the overall CARB incentive funding portfolio and the critical role that Low Carbon Transportation and AQIP play in complementing regulations and increasing adoption of ZE technology. This document also details a strategy for investing these funds, which includes continuing support for previous investments and focusing those investments where they will be most impactful.

California continues to lead the way in fostering the development of ZE technologies and improving their equitable distribution. CARB is working closely with other agencies to support sector-wide clean HD technology adoption, for example through its efforts with the California Energy Commission (CEC) to support the deployment of ZE infrastructure. CARB has a long history of building a broad suite of regulatory actions to reduce emissions from the transportation sector, including the Advanced Clean Fleets (ACF) and companion Advanced Clean Trucks (ACT) regulations, the Heavy-Duty Vehicle and Engine Omnibus Low NOx (Omnibus) regulations, the Innovative Clean Transit (ICT) regulation, the ZE Forklift regulation, the Commercial Harbor Craft regulation, and the Ocean-Going Vessels at Berth

[3] "On-road medium- and heavy-duty vehicles" encompasses all non-light-duty vehicles from class 2b through class 8 (8,501 pounds gross vehicle weight rating or higher). Together with off-road equipment, this is referred to collectively as heavy-duty, or HD.

regulation – which has been complemented by a comprehensive incentive portfolio that supports technologies from the precommercial phase all the way through legacy fleet turnover. However, on June 12, 2025, President Trump signed congressional resolutions purporting to revoke the waivers for certain CARB regulations, including those authorizing enforcement of ACT and amendments to Omnibus. In response, California and a coalition of states promptly filed suit to challenge these resolutions[4]. The Governor also issued Executive Order (EO) N-27-25, which establishes an effort to adopt measures that will support increased ZEV deployment in California. The Governor's EO calls on CARB and its sister agencies to assess additional actions to advance progress on light-, medium-, and heavy-duty ZEV adoption in California.

Beyond the regulations mentioned above and the statutory drivers detailed in the annual Funding Plan for Clean Transportation Incentives, several other CARB-produced documents help guide CARB investments. Most notably, the Mobile Source Strategy and the California Sustainable Freight Action Plan provide a key focus with specific strategies relevant to the HD vehicle and off-road sectors. The Mobile Source Strategy is the State's integrated plan that identifies the level of need for cleaner mobile source technologies needed to achieve California's many air quality, climate, and community risk reduction goals.[5] The California Sustainable Freight Action Plan is designed to integrate investments, policies, and programs across several State agencies to help realize a singular vision for California's freight transport system.[6] Additional key guiding documents include the California State Implementation Plans, the 2017 Climate Change Scoping Plan, the 2016 ZEV Action Plan, the ZEV Market Development Strategy, the Cap-and-Trade Auction Proceeds Investment Plan, the California Sustainable Communities and Climate Protection Act 2018 Progress Report, and the SB 350 Low Income Barriers Study, Part B: Overcoming Barriers to Clean Transportation Access to Low Income Residents.

Every year, the Strategy evolves to reflect current conditions. This year's document focuses on building additional market momentum while still helping to achieve equity. While technology advancement continues to play an essential role, much of the technology described in the Strategy – particularly in the on-road space – has already advanced to the point where it no longer needs to be updated and included here. In the off-road space, however, there are still opportunities to achieve further advances in technology. Accordingly, the majority of the discussion on technology status focuses on the off-road sector for this year's Strategy, while the focus for market momentum centers around on-road.

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[4] State of California, et al., v. United States of America, et al., (ND Cal., case no. 3:25-cv-04966).

[5] CARB. *2020 Mobile Source Strategy*. *https://ww2.arb.ca.gov/resources/documents/2020-mobile-source-strategy*

[6] *California Sustainable Freight Action Plan*. July 2016. *https://ww2.arb.ca.gov/sites/default/files/2019-10/CSFAP_FINAL_07272016.pdf*

Background

This document represents the ninth update of the Strategy; the first iteration was developed as a companion document to the FY 2017–18 Funding Plan. The following year, the legislature defined the Strategy in statute. SB 1403 (Lara, Chapter 370, Statutes of 2018) directed CARB to produce annually a three-year investment strategy for Low Carbon Transportation and AQIP investments, beginning with FY 2019–20, along with Three-Year Recommendations for Clean Transportation Incentives, appearing in this document as Table D-1 and Table D-2. According to statute, the Strategy must:

- Describe the role of public investments in supporting the demonstration and deployment of advanced HD and off-road technologies;
- Provide an assessment of the investment needed from Low Carbon Transportation and AQIP funds;
- Describe CARB's portfolio of investments; and
- Include a report on the State's school bus fleet in consultation with CEC, providing information related to milestones achieved by the State's school bus incentive programs and the projected need for funding, taking into consideration the State's school bus inventory, turnover, and useful life (*SB 1403 School Bus Project Report*).

The Role of Incentives and California Air Resources Board Portfolio of Heavy-Duty Funding

In its ongoing effort to reduce criteria and climate pollutant emissions from the transportation sector, California has allocated billions of dollars to a multitude of programs, with different but complementary goals. CARB's portfolio emphasizes technology advancement, the accelerated deployment of ZE HD vehicles and off-road equipment, turnover of the legacy fleet, and equitably distributed investments. These efforts to incentivize clean technologies complement CARB's regulatory efforts to ensure these technologies are deployed in strategic and impactful ways that support the State's climate and low-carbon transportation goals.

CARB's incentive programs have traditionally been designed to work hand-in-hand with its regulatory programs to accelerate the reduction of HD emissions. Incentives play an important role in each stage of the commercialization pathway. At the earliest stage, incentives to demonstrate pre-commercial technologies help bring them to market and prepare for future regulatory requirements. Early investments in emerging solutions de-risks technology providers to bring them to market sooner. Once commercialized, incentives help to drive early adopter purchase decisions by reducing incremental costs and supporting vehicle and equipment cost reductions over time by building manufacturer economies of scale. Typically, when regulatory requirements approach, CARB's incentive strategy will shift toward focusing financial and other assistance for smaller businesses that face unique challenges switching to ZEVs.

CARB administers a portfolio of incentive programs, each with its own statutory requirements or policy goals, and often specializing in specific commercialization stages. Technologies progress across the commercialization pathway and often transition to the next program in the funding succession, and eventually away from incentives completely as they become more established in the market.

Clean Transportation Incentives projects can help to rapidly advance technology to meet California's long-term climate, air quality, and community protection goals. These project types fund advanced technologies in their early stages, starting with demonstration and pilot projects and continuing through the early stages of commercialization, and generally do not require scrappage. Low Carbon Transportation and AQIP funds play a growing role in assisting small businesses to successfully deploy the cleanest available technologies.

As a technology reaches market scale, other programs within CARB's portfolio play a primary role, such as the Carl Moyer Memorial Air Quality Standards Attainment Program (Moyer), the Volkswagen Mitigation Trust, Community Air Protection Program (CAPP), and Funding Agricultural Replacement Measure for Emission Reductions (FARMER). These programs focus on achieving cost-effective emission reductions, especially in disadvantaged communities (DACs), that are not otherwise required by law. These programs tend to focus on turning over the existing fleet at an accelerated pace and often require additional measures such as scrappage. Scrappage programs provide additional emission benefits because an older, polluting vehicle must be taken off the road as a condition for funding a clean replacement. ZE truck dealers in California will also be able to participate in the California Clean Fuel Reward program – a statewide electric vehicle price reduction incentive program funded through credit revenue from CARB's Low Carbon Fuel Standard program.

CARB will continue to coordinate its overall investment strategy across the broader portfolio of incentive programs, both within the agency and with other local, State, and federal partners. State and air district programs complement CARB's work with vehicles and other project elements. As a key example, infrastructure investments by CEC (for example through the Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles Project[7]), transportation agencies, and utilities help to support the deployment of ZE trucks, buses, and off-road equipment. In prior years, federal funding has been available to complement funding from CARB and other State agency programs, particularly for transportation infrastructure projects.

With multiple goals guiding State action on clean HD vehicles and off-road equipment, maintaining multiple programs with different but complementary objectives is necessary. CARB's portfolio of programs is designed to achieve emission reductions and emphasizes

[7] EnergIIZE (Energy Infrastructure Incentives for Zero-Emission) Commercial Vehicles Project. *https://www.energiize.org/*

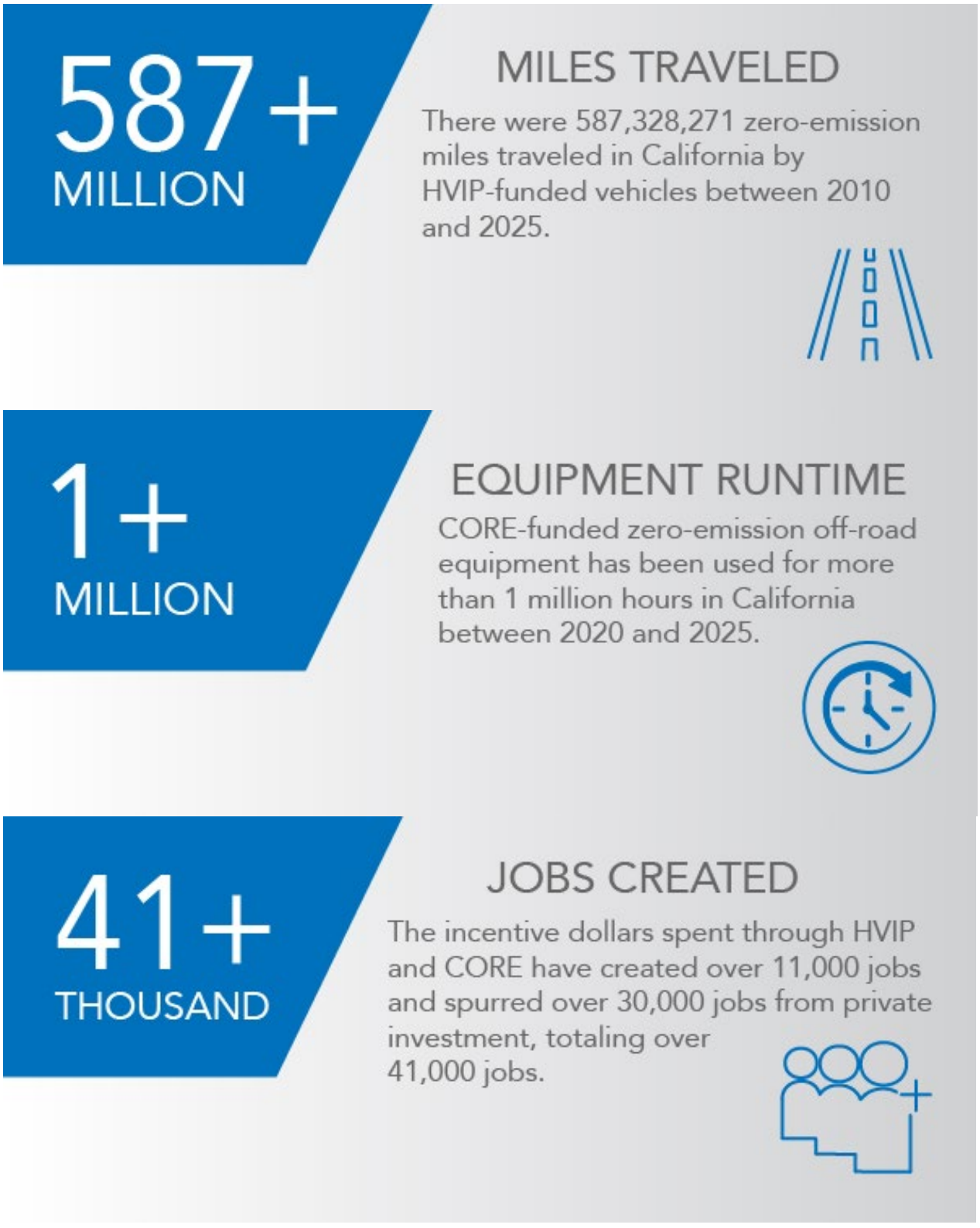
community protection, with investments focused on overburdened communities, while also driving greater volumes of ZEVs in the marketplace.

Programmatic Metrics for Clean Transportation Incentives

In addition to identifying priority focus areas and recommending levels of incentive funding, this document also includes metrics to help assess the performance of Clean Transportation Incentives projects in meeting the requirements of SB 1403. CARB has identified three broad categories that define success for these programs with some overlap between the three: (1) Supporting Healthy Communities, (2) Growing the Green Economy, and (3) Encouraging Technology Evolution.

CARB continues to refine and improve how we measure the success of our Clean Transportation Incentives projects. These metrics track impacts and achievements from across our portfolio, including from the Clean Truck and Bus Voucher Incentive Project (HVIP) including the Innovative Small E-Fleet (ISEF) and Zero-Emission School Bus Infrastructure (ZESBI) projects, the Clean Off-Road Equipment Voucher Incentive Project (CORE), and Sustainable Heavy-Duty Initiatives for Future Technology (SHIFT, formerly known as Advanced Technology Demonstration and Pilot Projects). All programmatic metrics shown in this year's Strategy have been updated with data through April 30, 2025.

Summary of Incentive Accomplishments



Supporting Healthy Communities

An essential part of CARB's mission is to protect the health of Californians from the harmful effects of air pollution – particularly for overburdened communities that are disproportionately impacted. Equity is an important factor CARB considers when creating incentive programs, and being able to track voucher amounts to small and public fleets is an additional way to show support for small businesses. To date, 41% of vouchers (HVIP and CORE combined) have funded vehicles and equipment deployed in overburdened communities. In addition, those vehicles have traveled more than 339 million cleaner-than-diesel miles in DACs. Furthermore, funded ZEVs have logged more than 587 million miles in California. From 2021–2025, 69% of all HVIP vouchers were given to public or small fleets, and in FY 2024-25, that figure has risen to 81%.

41
PERCENT

VOUCHERS IN PRIORITY POPULATION AREAS

Forty-one percent of vouchers (HVIP and CORE combined) have funded vehicles and equipment deployed in priority population areas, as identified by California Climate Investments.

339
MILLION

DAC MILES TRAVELED

HVIP-funded vehicles have traveled approximately 339 million miles in DACs, as identified in CalEnviroScreen.

81
PERCENT

SMALL AND PUBLIC FLEET SUPPORT

Eighty-one percent of FY 2024-2025 HVIP vouchers were given to public or small fleets (fleets of 20 or fewer vehicles and <$15 million in annual revenue).

Industry Example

Clean Mobility Options Pilot Program Aligns with HVIP

The Clean Mobility Options Pilot Program (CMO) provides funding to support clean, shared, ZE mobility services in under-resourced and low-income communities across California, including tribes. The program is funded by CARB and CEC and is administered by CALSTART and the Shared Use Mobility Center in collaboration with other partners. The CMO program promotes community-driven solutions by funding both transportation needs assessments and the implementation of mobility projects such as car sharing, microtransit, fixed-route, and micromobility services. To date, more than $64 million has been awarded through the CMO program, including $33 million in the most recent funding round, benefiting 38 communities. CMO awardees are supported with technical assistance throughout the implementation process to ensure projects are tailored to community needs.

CMO is strategically aligned with HVIP, also funded by CARB. Through this alignment, several CMO-funded projects have leveraged HVIP vouchers for eligible medium- and heavy-duty vehicles, such as ZE cargo-vans and school buses. Through this partnership, HVIP is indirectly supporting CMO goals by reducing costs to the CMO program.

Through this intra-funding mechanism, HVIP has supported vehicle deployments for two mobility projects, Oakland Unified School District (Oakland USD) and Fresno Metro Black Chamber Foundation (FMBCF). Oakland USD, with the help of their transportation provider Zum, has become the first public school district to deploy an all-electric fleet of school buses. Oakland USD is deploying a fleet of 74 ZE school buses to transport 1,300 students with disabilities, made possible through $9.9 million in California Climate Investments funding received from the CMO program and HVIP. FMBCF launched a bikeshare program, Biz-Bikes, in the City of Fresno aimed at expanding mobility access and fostering the development of bikeable communities. Through this co-funding initiative, CMO- and HVIP-funded vehicles will travel over 260,000 zero-emission miles, serving 1,950 riders, while creating local green jobs and expanding green transportation options for the community.

Growing the Green Economy

CARB's investments are intended to create downstream economic benefits where possible. The presence of consistent funding for clean technology projects helps to attract clean tech manufacturing to California and the United States, bringing high-quality jobs and fostering the development of a valuable industry. Model availability between HVIP- and CORE-eligible vehicles and equipment includes 523 models (170 in HVIP and 353 in CORE) from 107 different Original Equipment Manufacturers (OEMs) (53 in HVIP and 59 in CORE)[8]. Since 2010, HVIP and CORE have funded over $2 billion toward the purchase of 18,456 vehicles or equipment, with approximately $400 million of that funding happening in the past year. While these investments help create high-quality jobs in California, the benefits will also be seen throughout the United States.

[8] Some OEMs participate in both, HVIP and CORE, which explains why the sum of OEMs participating in each program exceeds the total.

$2+
BILLION

VEHICLE PURCHASE

HVIP and CORE have funded $2 billion toward the purchase of 18,456 clean vehicles and equipment since 2010.

523
MODELS

MANUFACTURERS

There are 107 HVIP- and/or CORE-eligible manufacturers offering 523 vehicle or equipment models.

$5.4
BILLION

TOTAL INVESTMENT

Additional public and private spending toward these purchases totaled $5.4 billion--over $3 for every $1 of voucher investment. Leveraged private spending represents purchases redirected from traditional technologies to clean technologies.

Encouraging Technology Evolution

Clean technologies for some demanding applications, such as ocean-going vessels and aviation, are not yet available at commercial scale. CARB investments can help to spur the development, improvement, and commercialization of needed advanced technologies in demanding applications. Specifically, SHIFT demonstration and pilot projects will help advance ZE and other emission-reducing technologies for demanding applications and provide opportunities for innovative solutions to achieve emission reductions. To date there has been $436 million allocated for SHIFT projects, with $424 million of that benefitting overburdened communities. These 34 projects have collectively produced more than 750 vehicles and equipment – many of them world firsts – from a battery-electric freight locomotive and fuel cell passenger ferry to large-scale deployments of ZE trucks.

Survey data is valuable for understanding fleet attitudes and perceptions of new vehicle technology and providing valuable feedback from early adopters. One of the best indicators of satisfaction is when a fleet that participated in a demonstration or pilot project or received a voucher continues to express interest in or procure additional advanced technology vehicles/equipment. Surveys this year found that 80% of HVIP and 57% of CORE survey respondents indicated that they plan to purchase additional ZE vehicles or equipment within the next five years.

While current criteria for monitoring success across the three metric categories provide valuable feedback on the effectiveness of CARB investments, there are additional benefits that are not yet reflected. CARB will continue to work with stakeholders to solicit, develop, refine, and implement additional metrics that better communicate the full range of benefits accruing from Clean Transportation Incentives.

82
MODELS

NEW TECHNOLOGY

Eighty-two new zero-emission vehicle and equipment models were eligible for vouchers for the first time this past year.

80
PERCENT

FUTURE ZEV PURCHASES

Eighty percent of HVIP voucher recipients surveyed plan to purchase additional medium- and heavy-duty zero-emissions vehicles within the next five years.

57
PERCENT

FUTURE ZE EQUIPMENT PURCHASES

Fifty-seven percent of CORE voucher recipients surveyed plan to purchase additional medium- and heavy-duty zero-emission off-road equipment within the next five years.

Industry Example

Zero-Emission Work Crew

The Glendale Municipal Green Zone Construction Work Crew project, led by the Center for Transportation and the Environment (CTE) in partnership with the City of Glendale, is an innovative pilot designed to demonstrate the feasibility and impact of using ZE construction equipment in municipal operations. The project aims to deploy a fully electric municipal construction crew to support Glendale's broader Green Zones initiative, which seeks to reduce pollution and improve public health outcomes in overburdened communities.

This pilot project is part of California's SHIFT program (formerly known as Advanced Technology Demonstration and Pilot Projects) and is supported by two primary funding agencies– CARB and the CEC. Each agency plays a distinct role; CARB is funding the vehicles and equipment, while CEC is supporting the infrastructure required to charge and operate the equipment. In this project, the City of Glendale will acquire four electric vehicles to constitute a construction work crew, including a dump truck, excavator, pick-up truck, and wheel loader.

These vehicles will work as a unit to carry out various public works projects throughout Glendale, with a focus on sites located in priority populations within city limits. Over the course of the approximately one-year demonstration period, the crew will perform routine city maintenance and construction tasks, allowing the city to test the real-world performance, reliability, and cost-effectiveness of the electrified fleet. The wheel loader and excavator have already been delivered and are set to start working in tandem with one another this year, while the crew is awaiting the delivery of the other pieces of equipment. In addition to vehicle deployment, the project includes a robust workforce training component. Operators and technicians will receive a combination of virtual and hands-on training to ensure safe and effective use of the equipment. The project has generated strong interest under the State's Green Cities program and is being closely watched as a model for how public fleets can transition construction operations to ZE technologies – especially in areas that have historically borne the brunt of environmental pollution.

Technology and Market Status Updates

Assessing the technology and market readiness of key ZE vehicle and equipment platforms is an important part of ensuring the long-term effectiveness of this Strategy, tracking progress toward goals, and helping to set priorities for funding. Fundamentally, Clean Transportation Incentive funding is tasked with achieving greenhouse gas (GHG) reductions and other co-benefits through strategic investments in advanced technologies, with the end goal of broader market acceptance and greater equity. This Strategy takes a two-pronged approach, beginning with technology readiness and then assessing market readiness. This approach allows CARB to formulate more nuanced and effective funding recommendations and priorities. Technology readiness refers to the ability of a platform to perform comparably to conventional counterparts and is a general assessment of the status of a vehicle or piece of equipment on the path to commercialization. In this process, the technology moves from the pre-commercial demonstration stage to larger scale early commercial deployments in the pilot stage, and finally to a stage of full commercial availability. This is complemented by market readiness: the market and economic factors that can potentially affect the success and uptake of what would otherwise be a technologically advanced, commercially viable platform. The goal of tracking technology and market readiness is to provide better-informed directional guidance on where technology platforms are in terms of technology readiness for the market and determining how best to help facilitate further adoption.

Significant momentum has taken hold across both on- and off-road ZE technology platforms. In the on-road space, every major OEM, along with several new market entrants, now offer commercial ZEV models across a variety of weight classes and duty cycles. Fleets today have access to a broader and more capable range of vehicles than ever before. Similarly, many smaller off-road platforms – such as compact forklifts, wheel loaders, and excavators – have achieved commercialization.

Heavier-duty and more demanding applications – such as those used in agriculture, construction, mining, and maritime settings – face steeper technological and operational challenges. These applications will require deeper investment in pilots and demonstrations over a longer time horizon. Future projects will increasingly concentrate on these demanding applications to drive innovation and deployment in settings where ZE options are limited or still in early stages of development.

As ZE technologies become commercially viable, the barrier to adoption shifts from technological readiness to market readiness – including factors such as cost, infrastructure access, operational integration, and workforce familiarity. To unlock the full potential of ZE technology, California must accelerate deployments across all fleet types and regions. This includes supporting fleets that are ready to deploy at larger scales, while continuing to ensure that small fleets and those operating in priority communities have the resources and support they need to participate.

Incentive projects like HVIP are evolving to reflect this balance: opening the door to broader participation from fleets with the capacity to deploy multiple vehicles, while preserving tailored support mechanisms for fleets facing greater cost or resource barriers. This approach helps align incentive investments with growing technology availability.

Moving forward, investments will be guided by a dual mandate: to scale zero-emission vehicle and equipment deployments across all sectors, and to ensure equitable access and support for those facing higher transition barriers. These combined goals will help build a durable and inclusive ZE transportation system—one that delivers economic, environmental, and health benefits across California.

Priorities for Clean Transportation Incentives

Each year, the Strategy includes an updated assessment of projected funding needs and recommended priority investment areas for Clean Transportation Incentives.

Priorities guiding this year's update include:

- A continuing focus on ensuring equitable access to and disbursement of public funds;
- Building market momentum through high-volume deployments of ZE medium- and heavy-duty on-road vehicles; and
- Signaling to technology providers and other market participants California's interest in accelerating the arrival of advanced technologies in demanding applications like ocean-going vessels and aviation.

Other key updates to this year's priorities include:

- A new third year with a narrower scope that reflects more technologies graduating from our incentive programs and a greater focus on demanding applications, growing market momentum in the on-road space, and equity.
- Use of the term Advanced Technology, or AT, which signifies non-ZE solutions applicable to only the most challenging or demanding applications. AT represents true steppingstones to ZE in demanding applications, not just cleaner combustion, renewable fuels, or conventional hybrids. Examples may include hydrogen turbine hybrids in aviation, ZE-capable hybrids in marine, or other solutions.
- ZE, Hydrogen, and Off-Road Ecosystem projects, which will continue progress on a variety of platforms, interconnected systems, and practices.
- New ideas that support secondary markets for clean technology and help small fleets with financing and insurance assistance.

It is important to note that the levels of funding recommended do not represent the total funding necessary to support the technologies needed. Rather, these amounts are guided in part by an assessment of OEM and supplier capacity for producing a meaningful number of demonstration and pilot projects during the three-year investment strategy timeframe.

These recommendations are designed to ensure that State funds are focused on the technologies that need to advance in commercialization over the next three years, which will impact 2030 and 2050 outcomes while also providing benefits today. If additional resources were to become available, the increased funding could help spur manufacturers to increase production capacity and provide additional fleet support, training, and infrastructure.

Industry Example

Refrigerated Transport with Zero-Emission Trucks

OK Produce, a family-owned fresh produce wholesaler based in Fresno, CA, is leading the way in sustainable logistics by transitioning its fleet and operations toward ZE. With a strong commitment to environmental responsibility and innovation, OK Produce is demonstrating how ZE solutions can be integrated into daily fleet operations without compromising their logistics business. OK Produce has taken advantage of both HVIP and CORE programs: they added 17 Class 8 battery-electric and three battery-electric terminal tractors to their mid-sized fleet of 100 vehicles total. Through the funds obtained with the HVIP and CORE projects, OK Produce was able to procure these vehicles at a lower cost, as the point-of-sale vouchers allowed them to purchase the vehicles through the dealer with the incentive already included in the final purchase price. These vehicles are already being used to support their regional delivery routes of fresh refrigerated goods. OK Produce is also a key project partner in the CARB and CEC jointly funded Grocery Operations for Carbon Emission Reductions (GROCER) project. With the GROCER project, OK Produce plans to add 68 Class 8 battery-electric vehicles to its fleet along with 7.2 megawatts of charging hardware, 2.5 megawatt-hours of battery storage, and 2 megawatts of photovoltaic solar capacity (in addition to an already existing 3 megawatts).

The purchase of these battery-electric trucks and energy infrastructure is only part of OK Produce's goal to produce, distribute, and handle fresh fruits and vegetables in the most environmentally responsible way. In addition to electrifying most of their fleet, OK Produce is taking other steps toward sustainability with energy efficient ammonia refrigeration, 20% biodiesel in all other trucks, and more. OK Produce's commitment to ZE technology serves as a replicable model for small- to-mid-size fleets seeking to modernize their operations sustainably. Their experience highlights the growing feasibility of electrification in refrigerated logistics.

Building Market Momentum

Hostility by the federal government to CARB's regulatory activities has threatened communities overburdened by mobile source pollution and California's progress toward self-sustaining ZEV markets. The change in political climate has elevated the importance of incentives to help drive the large-scale change that would have been effectuated by regulations like ACF. This Strategy responds with an increased focus on CARB's commercial technology incentive programs to drive greater volume adoption of ZE trucks to backfill emission reductions and create momentum that will result in reduced emissions and improved public health, lower vehicle costs, greater acceptance, and an eventual self-sustaining market.

This year's Priorities Table recommends modest increases to the levels of investment in the Market Momentum category (which includes HVIP) to help maintain market momentum that would have been achieved by ACF. While these levels of incentives won't approach the ZE truck deployments and emissions reductions that would have resulted from the regulation, they will help to continue building market momentum, albeit more slowly.

Clean Transportation Incentives Three-Year Investment Recommendations

The Strategy includes a set of funding recommendations that function as a snapshot in time, incorporating a rolling three-year funding horizon. This year's update to the Strategy builds on the funding levels identified in the FY 2024–25 report, addresses FY 2026–27 and FY 2027–28, and adds a new third year, FY 2028–29. CARB has reevaluated and updated the projected levels of investment needed to move technologies toward meeting State goals over the new three-year funding period.

The recommended levels of funding have been developed around a central core of established priorities and updated priorities identified in the discussion above. For example, continuing to support hydrogen fuel cell technologies will be important to advancing those vehicle and equipment platforms that have the potential to considerably extend the range of operations for ZE technologies, including new off-road sectors. Building on further development of ZE ecosystems helps to demonstrate success of these technologies to perform at more expansive facility, corridor, or community deployment levels. While many prior demonstrations and pilots have focused on deployments in port environments, newer projects have also been conducted at rail yards and distribution centers. Ongoing demonstrations of ZE rail and marine technologies have already shown great potential for further deployment. The application of ZE technologies in the areas of large construction and agricultural equipment are expected to follow and benefit from earlier on-road technologies and they are now ready for further development. Looking forward, CARB will continue to apply an equity overlay to all of these investments that looks at ways to target funding to small businesses, overburdened communities, and underserved communities.

The aggregated results of these funding projections are shown in Table D-2. The table summarizes key focus areas grouped by project type: Demonstrations and Pilots, intended

to accelerate the technological and market readiness of included platforms; Market Momentum, projects that reduce upfront costs to increase market volumes and drive early adopter uptake; and Market Equity, a category that includes innovative solutions for small fleets and focuses on benefits to overburdened communities. The priorities table frames the range of investments ideally needed each year over the course of the next three FYs. Both low and high funding levels are shown to suggest the range of investment needed to maintain progress. At the lower funding levels, not all of the priorities can be achieved. The higher levels represent aggressive levels of investment sufficient to maintain critical momentum for all the identified priorities, potentially allowing additional applications within a pathway to advance.

These recommendations focus on creating the critical technology capability and product mix needed to meet the State's goals, without fully and completely funding those projects and pieces of equipment needed for meeting the goals. As has been highlighted in prior Strategy documents and by way of input from public meetings, the need for incentives geared toward meeting California's ambitious GHG and air quality goals continues to exceed the recommended funding levels shown here.

Table 2: Focused Recommendations for Clean Transportation Incentives Priorities

Category	FY 2026–27	FY 2027–28	FY 2028–29
Demos and Pilots	$325–$515 million ZE Line-Haul Rail, ZE/AT Aviation, AT OGV, ZE/Hybrid Heavy Marine, ZE Heavy Specialty and Off-Road Equipment, ZE Ecosystems	$360–$480 million ZE Line-Haul Rail, ZE/AT Aviation, AT OGV, ZE/Hybrid Heavy Marine, ZE Heavy Ag/Construction, ZE Extra-Specialty, ZE Ecosystems	$300–$400 million ZE Line-Haul Rail, ZE/AT Aviation, AT OGV, ZE Heavy Marine, ZE Heavy Ag/Construction, ZE Extra-Specialty, ZE Ecosystems
Market Momentum	$620–$680 million ZE Heavy Specialty and Off-Road Equipment, ZE Switcher Rail, ZE Light Marine, Volume ZE Trucks, ZE School/ Transit, Temp. Fueling, ZE Ecosystems	$650–$710 million ZE Heavy Specialty and Off-Road Equipment, ZE Light Marine, Volume ZE Trucks, ZE School/Transit, ZE Ecosystems	$680–$740 million ZE Heavy Specialty and Off-Road Equipment, ZE Light Marine, Volume ZE Trucks, ZE School/Transit, ZE Light Aviation, ZE Ecosystems
Market Equity	$520–$580 million ZE Drayage/Small Fleets, ZE Forklifts, ZE School/Transit, Financing and Insurance Assistance, Secondary Market Support, ZE Ag and Construction	$550–$610 million ZE Drayage/Small Fleets, ZE Forklifts, ZE School/Transit, Financing and Insurance Assistance, Secondary Market Support, ZE Ag and Construction	$580–$640 million ZE Drayage/Small Fleets, ZE Forklifts, ZE School/Transit, Financing and Insurance Assistance, Secondary Market Support, ZE Ag and Construction
Total Funding	**$1,465–$1,775 million***	**$1,560–$1,800 million***	**$1,560–$1,780 million***

*The vehicle and equipment types listed in the table above are a prioritized selection of the project types that CARB would invest in, given sufficient available funds. These focus areas are identified utilizing the strategy laid out in this document. This is not an exhaustive list of technologies or applications that Clean Transportation Incentives would fund, and total funding recommendations are reflective of ideal appropriations and are not limited to existing appropriations.

Conclusion

As CARB's roadmap for investing Low Carbon Transportation and AQIP funding on HD on- and off-road technologies, the Heavy-Duty Investment Strategy helps to ensure that CARB's overall incentive funding portfolio focuses those investments where they will be most impactful. California has allocated billions of dollars to a variety of programs, with different but complementary goals. These investments emphasize technology advancement, the accelerated deployment of ZE HD vehicles and off-road equipment, turnover of the legacy fleet, and equitably distributed investments. Ultimately, they incentivize clean technologies in a way that ensures these investments are deployed in strategic and impactful ways that support the State's climate and air quality goals.

Recent federal actions to curb California's health-protective regulatory authority are likely to result in both putting the U.S. economy and American ZE HD manufacturers at a global disadvantage,[9] as well as slowing or even reversing progress made towards achieving our clean air and climate goals. Incentives remain a substantial and effective tool to drive the ZE market forward and deliver emission benefits to California communities.

Market equity remains a key priority of the Strategy, while also recognizing that overall market acceleration is what is most needed to ensure that all Californians – and especially those who live in the State's most affected disadvantaged and low-income areas – continue to see progress in emission reductions. This aligns with the Governor's Executive Order N-27-25, under which the State will be identifying and adopting measures that will support increased ZEV adoption in California.

California's policies, investments, and multilateral collaborations are working to spur global innovation and market acceptance of ZEVs. As of 2024, 16% of new medium- and heavy-duty vehicles sold in the state were ZE, marking a substantial milestone on the path to sector decarbonization.

California's leadership and success remains a global model for clean transportation and climate action. California Environmental Protection Agency Secretary Yana Garcia concisely framed the progress made by and benefits of the State's investments: "In California, we are proving year after year that it is possible to reduce emissions while growing our economy."[10]

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[9] BlueGreen Alliance. 17 April 2025. 2025 Manufacturing Roadmap. *https://www.bluegreenalliance.org/resources/bluegreen-alliance-unveils-new-manufacturing-roadmap/*

[10] CalEPA. 15 November 2024. *https://calepa.ca.gov/2024/11/15/press-release-calepa-secretary-joins-other-california-and-subnational-leaders-calling-for-more-urgent-climate-action-at-cop29/*

Acronym List

ACF – Advanced Clean Fleets

ACT – Advanced Clean Trucks

AQIP – Air Quality Improvement Program

AT – Advanced Technology

CAPP – Community Air Protection Program

CARB – California Air Resources Board

CEC – California Energy Commission

CMO – Clean Mobility Options

CORE – Clean Off-Road Equipment Voucher Incentive Project

DAC – Disadvantaged Community

EO – Executive Order

FARMER – Funding Agricultural Replacement Measures for Emission Reductions

FMBCF – Fresno Metro Black Chamber Foundation

FY – Fiscal Year

GHG – Greenhouse Gas

GROCER – Grocery Operations for Carbon Emission Reductions

HD – Heavy-Duty

HVIP – Clean Truck and Bus Voucher Incentive Project

ICT – Innovative Clean Transit

ISEF – Innovative Small e-Fleet Pilot Project

Moyer – Carl Moyer Memorial Air Quality Standards Attainment Program

Oakland USD – Oakland Unified School District

OEM – Original Equipment Manufacturer

OGV – Ocean-Going Vessel

SB – Senate Bill

SHIFT – Sustainable Heavy-Duty Initiatives for Future Technology

ZE – Zero-Emission

ZEV – Zero-Emission Vehicle