

## **Appendix B**

# **SB 1204 REQUIREMENTS AND PERFORMANCE CRITERIA EVALUATION FOR HEAVY-DUTY PROJECTS**

(Health & Safety Code Section 39719.2(c) and (d))

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## **Overview**

SB 1204 (Lara, Chapter 452, Statutes of 2014) created the California Clean Truck, Bus, and Off-road Vehicle and Equipment Technology Program funded with Low Carbon Transportation Investments, to support the development, demonstration, pre-commercial pilot, and early commercial deployment of zero- and near zero-emission technologies with priority given to projects that benefit disadvantaged communities. This appendix describes the ten requirements of SB 1204 and how CARB is addressing each of these requirements, followed by an evaluation of how each applicable heavy-duty or off-road project proposed in the FY 2019-20 Funding Plan satisfies the proposed performance criteria.

CARB's proposed heavy-duty vehicle and off-road equipment projects were evaluated based on a range of criteria that address emission reductions, technology viability and advancement, and market acceptance. Both SB 1204 and AB 8 (Perea, Chapter 401, Statutes of 2013) provide important policy drivers behind CARB's process of evaluating heavy-duty and off-road projects for funding consideration. Projects funded by AQIP must be evaluated based on the benefit-cost of criteria pollutant reductions and five additional preference criteria consistent with the requirements of AB 8, as detailed in Appendix A – Emission Reductions: Quantification Methodology. While some of the heavy-duty and off-road projects receive funding from AQIP, most are funded from CARB's Low Carbon Transportation appropriation and must satisfy the requirements of SB 1204, discussed in this appendix. Therefore, to ensure compliance with the requirements from both bills, CARB evaluated all proposed heavy-duty projects consistent with the benefit-cost and additional preference criteria requirements of AB 8 and the requirements of SB 1204, regardless of the project funding source. The complete AB 8 and GHG emission analysis is detailed in Appendix A.

### **1. Addressing SB 1204 Requirements**

SB 1204 establishes specific program planning and project eligibility requirements and directs CARB to use the existing AQIP Funding Plan process to develop the guidance necessary to implement the program (Health and Safety Code section 39719.2(c)). The Funding Plan coordinates AQIP and Low Carbon Transportation investments in the heavy-duty sector, while implementing the specific statutory requirements that apply to each program.

SB 1204 establishes ten goals for California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program in Health and Safety Code section 39719.2(d) that should be addressed in CARB's guidance. The following describes how CARB will address each of these requirements, either by continuing procedures and processes that have been in place for previous AQIP or Low Carbon Transportation funding

cycles or through new requirements proposed in this Funding Plan, followed by CARB's overarching vision for heavy-duty vehicle investments.

SB 1204 Requirement 1: Outline performance criteria and metrics for deployment incentives. The goal shall be to design a simple and predictable structure that provides incentives for truck, bus, and off-road vehicle and equipment technologies that provide significant greenhouse gas reduction and air quality benefits.

As Low Carbon Transportation and AQIP evolve, there is a clear need to evaluate the effectiveness of program investments. Staff has and will continue to work with stakeholders to identify appropriate metrics of success for each project funded under AQIP and the California Clean Truck, Bus, Clean Off-Road Vehicle and Equipment Program.

To achieve the pace of technology advancement needed to meet long-term air quality and climate goals, this funding should spur increasingly low-emission and low-carbon technologies as they are introduced and achieve market acceptance. The availability of significant Low Carbon Transportation funding will enable the progression of advanced heavy-duty technologies toward commercialization at a faster pace. Similar to how light-duty vehicles transitioned from basic hybrids to plug-in and fuel cell electric vehicles, basic hybrid trucks are a precedent to advanced hybrids, and finally to the ultimate goal of zero-emission trucks (or trucks that achieve zero-emission miles in specific duty cycles).

California Clean Truck, Bus, and Off-Road Vehicle and Equipment Program funding will expedite widespread deployment of zero-emission urban buses, freight and line-haul trucks, and off-road equipment, which are responsible for the bulk of emissions from the heavy-duty sector. Investments in Clean Truck and Bus Vouchers (HVIP and Low NOx Engine Incentives), Clean Off-Road Equipment, and Heavy-Duty Demonstration and Pilot Projects play a critical role in transitioning the entire freight and passenger transportation sector to zero-emission technologies, while at the same time providing immediate benefits to disadvantaged communities.

Proposed Performance Criteria for Evaluating Heavy-Duty Projects: Staff proposes the following performance criteria for evaluating heavy-duty projects funded through AQIP, California Clean Truck, Bus, and Off-Road Vehicle and Equipment Program, or both. These performance criteria are also intended to fulfill SB 1204 requirements:

- Potential for statewide and local emission reductions and health benefits.
  - Near-term reductions in both GHG and criteria emissions.
  - Long-term reductions in GHG and criteria emissions.
  - Emission reductions in non-attainment areas.
  - Emission reductions in and benefiting disadvantaged communities.

- Potential for technology viability.
  - Cost parity compared to conventional technology.
  - Reliability and durability in chosen application.
  - Ability to transfer technology to other vehicle or equipment types.
  - Fueling infrastructure support.
  - Ability to integrate renewable fuels.
  
- Broad market acceptance.
  - Ability to leverage additional public and private funding.
  - Collaboration between multiple entities.
  - Ability to address market barriers.

*SB 1204 Requirement 2: Ensure that program investments are coordinated with funding programs developed pursuant to the California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007 (Chapter 8.9 (commencing with Section 44270) of Part 5).*

Developing a joint Funding Plan that covers both AQIP and Low Carbon Transportation funding sources ensures coordinated investments between these two programs. The California Clean Truck, Bus, and Off-Road Vehicle and Equipment Program complements and enhances the existing CARB/Energy Commission coordination in the AQIP planning process by directing additional funding for the development, demonstration, pre-commercial pilot, and early commercial deployment of zero- and near zero-emission truck, bus, and off-road vehicle and equipment technologies.

In developing the joint Funding Plan, CARB and the Energy Commission staff meet routinely during the development of each agency’s funding/investment plans for these respective programs to ensure that investments are coordinated. CARB has a representative on the Advisory Committee that assists with the development of the Energy Commission’s Clean Transportation Program (also known as the Alternative and Renewable Fuel and Vehicle Technology Program). Similarly, Energy Commission staff participate in the public workshops and work groups that are part of CARB’s annual funding plan development.

*SB 1204 Requirement 3: Promote projects that assist the state in reaching its climate goals beyond 2020, consistent with Sections 38550 and 38551.*

In all funding plans since FY 2014-15, heavy-duty projects focused on vehicles and industry sectors that, when transitioned to zero-emission, will have a significant impact on reducing climate change emissions. All of these Funding Plans included significant Low Carbon Transportation funding allocations for demonstrations, pilot commercial deployments, and ongoing deployments of commercially available vehicles that will achieve both near-term and long-term GHG emission reductions.

By continuing to develop promising near zero- and zero-emission technologies for use in industry sectors that: (1) are significant GHG emitters; and (2) hold promise for technology expansion and transfer to other sectors, these investments will help the State reach its long-term climate goals. Some of the key performance criteria listed above are “potential for long-term GHG reductions” and “ability to transfer technology to other vehicle or equipment types.” These criteria help to promote projects that will contribute to meeting post-2020 climate goals.

*SB 1204 Requirement 4: Promote investments in medium- and heavy-duty trucking, including, but not limited to, vocational trucks, short-haul and long-haul trucks, buses, and off-road vehicles and equipment, including, but not limited to, port equipment, agricultural equipment, marine equipment, and rail equipment.*

Since the launch of AQIP with the first annual Funding Plan in 2009, CARB has funded the types of projects identified by SB 1204, and staff proposes to continue and to expand these investments. As shown in Table 5 in Chapter 2 of this Funding Plan, there is a total of \$182 million allocated for demonstration, pilot, and commercial deployment projects in the truck, bus, and off-road vehicle and equipment sectors.

*SB 1204 Requirement 5: Implement purchase incentives for eligible technologies to increase use of the cleanest vehicles in disadvantaged communities.*

In prior years, approximately 30 percent of CARB’s Low Carbon Transportation funding was cumulatively spent in disadvantaged communities. Subsequent to the implementation of AB 1550 in 2016, approximately 35 percent of CARB’s Low Carbon Transportation funding has been spent in disadvantaged communities, with an additional 10 percent spent in non-overlapping low-income communities. For FY 2019-20, staff anticipates exceeding the current requirement that at least 35 percent of auction proceeds be invested for projects within and benefiting disadvantaged communities and 15 percent for projects within and benefiting low-income communities or benefiting low-income households statewide or that are within ½ mile of a disadvantaged community. This will ensure that CARB’s heavy-duty vehicle incentives increase the use of the cleanest vehicles in these communities.

Over past funding cycles, CARB has provided AQIP and Low Carbon Transportation funding for purchase incentives for clean technologies, reducing emissions from the heavy-duty sector and providing benefits to disadvantaged communities. HVIP has supported the purchase of 2,559 zero-emission trucks and buses, 2,631 hybrid trucks, 2,068 low NOx engines, and 195 trucks outfitted with electric power take off systems (ePTOs) by California fleets through June 30, 2019. About half of HVIP funding is providing benefits to disadvantaged communities, and about 70 percent spent in disadvantaged and low income communities.

SB 1204 Requirement 6: Allow for remanufactured and retrofitted vehicles to qualify for purchase incentives if those vehicles meet warranty and emissions requirements, as determined by the state board.

The Hybrid and zero-emission conversions of original equipment manufacturer (OEM) vehicles were added to HVIP in FY 2015-16 and is proposed to continue for this project in FY 2019-20.

SB 1204 Requirement 7: Establish a competitive process for the allocation of moneys for projects funded pursuant to this section.

CARB has used an established process for awarding AQIP funding through competitive solicitations since 2009. This process has served as the basis for allocating most Low Carbon Transportation funding since the FY 2014-15 funding cycle, and staff proposes using the same process moving forward to solicit and award California Clean Truck, Bus and Off-Road Equipment Program funding. Staff also proposes to allow funding allocations to be directed to a local air district or other agency to administer first-come first-served funding projects that more effectively address local needs.

SB 1204 Requirement 8: Leverage, to the maximum extent feasible, federal or private funding.

Currently, most grant solicitations require a minimum level of match funding, and projects that offer more match funding have the potential to be scored higher than projects with less match funding. Proponents are encouraged to seek additional funding from federal, state, and local public sources, as well as private sources. Staff proposes continuing the solicitation scoring criteria to encourage leveraging and is working with other funding providers to maximize federal and private funding.

SB 1204 Requirement 9: Ensure that the results of emissions reductions or benefits can be measured or quantified.

Since the inception of AQIP, all grant solicitations require that the project proponent report various metrics associated with vehicle operation and fuel consumption. Emissions from vehicles certified to a cleaner standard (i.e., low NOx) will be compared to a diesel baseline to determine emission reductions. Fuel consumption and carbon intensity will be used to quantify GHG emission benefits from hybrids, battery electric and fuel cell electric vehicles, as well as from vehicles using renewable fuels, compared to their conventional counterparts. All program-level emission reduction benefits will be quantified by comparing to conventional technologies on a well-to-wheel basis. In addition, telematic devices will be used when possible to monitor in-use data and provide information on usage in disadvantaged communities and other designated areas.

SB 1204 Requirement 10: Ensure that activities undertaken pursuant to this section complement, and do not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminants.

The zero- and near zero-emission technologies funded in California Clean Truck, Bus, and Off-Road Vehicle and Equipment Program provide GHG reductions as well as criteria pollutant and toxic air contaminant reductions, consistent with the existing AQIP program. These technologies operating in and near disadvantaged communities will reduce NOx and diesel particulate matter, contribute to criteria pollutant emission reductions, and reduce GHG emissions in the heavy-duty sector.

### **OVERARCHING VISION FOR HEAVY-DUTY VEHICLE INVESTMENTS**

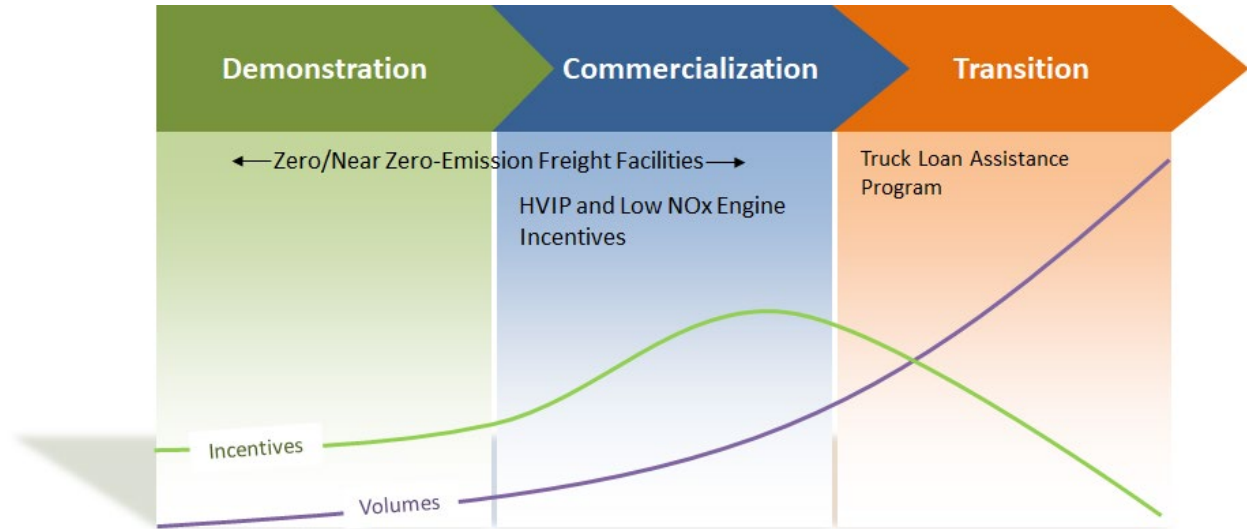
SB 1204 directs that the annual framework and plan required under Health and Safety Code Section 39719.2(f):

Articulate an overarching vision for technology development, demonstration, pre-commercial pilot, and early commercial deployments, with a focus on moving technologies through the commercialization process.

The recommended heavy-duty vehicle and off-road equipment projects support SB 1204's overarching vision for technology development, demonstration, pre-commercial pilot, and early commercial deployments, with a focus on moving technologies through the commercialization process. This evolutionary role of incentives – is illustrated in Figure B-1 and described below.



**Figure B-1: Recommended FY 2019-20 Heavy-Duty Vehicle and Off-Road Equipment Investments**



In the *demonstration phase*, manufacturers are placing pre-commercial vehicles and equipment in service under real-world operating conditions. In this phase, per-vehicle incentives are high because manufacturing is not standardized and is focused on smaller batches of vehicles.

Funding is also provided for *pilot projects* to help the technology evolve in the early commercialization phase by deploying a larger volume of vehicles and equipment. Pilot projects can include both pre-commercial pilots and commercial pilots depending on the stage of technology advancement. *Pre-commercial pilots* are focused on first-time demonstrations of advanced technologies in new applications. *Commercial pilots*, on the other hand, involve deployments of vehicles and equipment that have been demonstrated, are certified by CARB, come with a warranty, and are purchased or leased by the end user. Vehicles in commercial pilots are ready to be sold commercially, but in such small numbers that they would not be able to compete without incentive support.

**Table B-1: Pilot Project Categories**

Milestone	Demonstration or Pre-commercial Pilot	Early Commercial Deployment or Commercial Pilot
CARB Certification/Approval	Experimental permit	Vehicle/engine certification or zero-emission approval letter
Vehicle Ownership	Retained by manufacturer	Purchase or lease transaction
Manufacturer Warranty	No	Yes

In addition, many projects would not advance to commercialization without the appropriate fueling infrastructure. For this reason, CARB provides funding for fueling infrastructure that directly supports pilot-funded vehicles and equipment.

In the *commercialization phase*, incentives are provided to encourage consumer adoption of advanced technologies. The commercialization phase can be broadly separated into lower volume and higher volume production phases. In the lower volume commercialization phase, per vehicle incentives are high. As sales grow and economies of scale are achieved, incentive funding levels and vehicle eligibility requirements can be adjusted to reduce per vehicle funding to ensure maximum incentive efficiency. In this higher volume commercialization phase, while per vehicle incentives are decreasing, total sales are increasing and total incentive funding commitments increase as a result. As a technology moves from lower volume commercialization to a fuller more mature higher volume, the incentive funding goals shift from a focus on technology development to a more specific focus on moving the technology from early adopters to mainstream consumers, disadvantaged communities, and the secondary market.

As a technology moves from commercialization into the transition phase, incentives can be adjusted to focus specifically on moving the technology into new consumer demographic segments and on building upon earlier benefits in disadvantaged communities.

## **2. Project-Specific SB 1204 Performance Criteria Evaluation**

The following sections include an evaluation of each proposed heavy-duty and off-road equipment project in terms of how they satisfy the proposed performance criteria detailed earlier in this appendix.

### **ADVANCED TECHNOLOGY HEAVY-DUTY DEMONSTRATION AND PILOT PROJECTS**

Following is an assessment of the proposed Advanced Technology Demonstration Projects in terms of how they meet the proposed SB 1204 evaluation and performance criteria.

*Potential for Statewide and Local Emission Reductions and Health Benefits:* Advanced Technology Demonstration and Pilot Projects are focused on demonstrating technologies that are on the cusp of commercialization and have the potential for significant emission reductions. The proposed zero-emission drayage truck pilot project will enable us to assess the ability to deploy larger fleets and their ability to recharge or refuel large numbers of trucks on a daily basis. This will showcase technologies that can replace conventionally fueled trucks, leading to long-term emission reductions in the trucking sector once fully commercialized. In addition to cleaner on-road trucks, the projects focusing on demonstrating zero-emission charging and fueling infrastructure, which will result in immediate air quality benefits to

communities located near rail yards, ports, distribution centers, and airports – which in many instances are within or near disadvantaged community census tracts. Because of their larger size, these projects will result in more substantial emission reductions in the short term while also, more importantly, supporting the potential for longer term emission reductions from the technologies once fully deployed into the marketplace.

*Potential for Technology Viability:* Advanced Technology Demonstration and Pilot Projects can achieve several objectives: (1) determining the viability of applying advanced technologies in revenue service through real-world field demonstrations; (2) evaluating the potential for expanding use of the technologies in similar sectors or vocations; and (3) evaluating the use of demonstrated technologies in new applications and industry sectors. For example, the ocean-going vessel at-berth project would demonstrate the use of emission capture control and shore power technologies within and near the ports, while providing data to evaluate the potential for increasing the adoption of these systems throughout the State. Similarly, the inducement prize will build on advances made through other demonstration and pilot projects to fund more rapid technological advancement. Because many demonstration and pilot projects will require the installation of fueling infrastructure, they provide the opportunity to demonstrate hydrogen and charging fueling infrastructure in heavy-duty on- and off-road applications, and provide increased opportunities to integrate renewable fuels.

*Broad Market Acceptance:* The success of any Advanced Technology Demonstration and Pilot Project is forged on strong public-private partnerships, requiring collaboration between many entities, such as the State, regional municipalities, local air districts, ports and rail yards, fleet owners and equipment operators. Demonstration and pilot projects require private technology firms to team with public agencies or non-profit organizations in submitting their application for funding and a significant contribution of match funds. CARB requires a minimum of 25 percent cost share from the project applicants, where a higher contribution from the project proponents is scored higher than those projects that just meet the minimum match requirements.

## **CLEAN TRUCK AND BUS VOUCHERS (HVIP)**

### **HYBRID AND ZERO-EMISSION TRUCK AND BUS VOUCHER INCENTIVE PROJECT**

Following is an assessment of the proposed Zero-Emission Truck and Bus Pilot Commercial Deployment Projects relative to the proposed SB 1204 evaluation and performance criteria.

*Potential for statewide and local emission reductions and health benefits:* Zero-emission trucks and buses, along with hybrid trucks, are designed to achieve near-term and long-term emission reductions, while Low NOx engine incentives project achieve near-term reductions of GHG and criteria pollutant emissions.

Vouchers issued to date indicate that about two thirds of HVIP funding has provided benefits to disadvantaged communities. Staff expects that for FY 2019-20 allocations, about 55 percent of HVIP and Low NOx Engine Incentives would be located in disadvantaged communities and an additional 15 percent located in low-income communities, with a combined total of about 70 percent. HVIP is designed to encourage and accelerate the deployment of low NOx engines and new hybrid and zero-emission trucks and buses in California, ultimately leading to long-term reductions in criteria and greenhouse gas emissions, and aiding California in attaining federal ozone and particulate matter standard within non-attainment areas.

*Potential for technology viability:* The incremental cost for zero-emission trucks and buses is substantial when compared to their conventional counterpart. For hybrid and low NOx trucks, the incremental cost is not as significant. Providing incentive funding towards the purchase of zero-emission trucks and buses, along with hybrid trucks accelerates the penetration of these technologies into the heavy-duty market. Increased production volumes will lead to cost reductions in vehicle components and assembly, energy storage systems, and fueling infrastructure. Making this funding available to medium heavy-duty vehicles (14,001 to 26,000 pounds GVWR) will help transition the technology to heavy heavy-duty vehicles (greater than 26,000 pounds GVWR), since advanced technologies are often implemented in lighter weight classes before evolving to heavier weight classes with longer duty cycles. Increasing the numbers of advanced technology vehicles and miles traveled will also result in increased demand for electricity and hydrogen fuels, which will help the state meet goals for transitioning from petroleum to fuels produced from renewable resources. The requirement for low NOx trucks to use renewable fuels encourages the development of those fuels.

*Broad Market Acceptance:* HVIP is structured to encourage leveraging of local, State, federal funding and private funding. The collaboration between public agencies and their commitment to invest resources toward improving local air quality motivates advanced technology providers to invest in developing near zero-, and zero-emission technologies. Incentive funding, along with public and private partnerships, encourages the deployment of advanced technology, reduces production costs, and increases commercial viability within the truck and bus market.

#### **TRUCK LOAN ASSISTANCE PROGRAM**

The proposed allocation for this ongoing AQIP-funded program is not required to meet SB 1204 requirements, and much of SB 1204's performance criteria does not apply since no advanced technologies would be used. However, the project would continue to help small business truckers comply with the In-Use Truck and Bus Regulation, which would result in criteria pollutant and toxic air contaminant emission reductions as older diesel trucks are replaced with cleaner vehicles or retrofitted with diesel emission control devices. Because newer trucks are more fuel-efficient, fleet turnover resulting from the proposed allocation will also achieve GHG emission

reductions. Additionally, much of the Truck Loan Assistance Program funding has been spent in and benefits disadvantaged communities.