

Chapter 4: ON-ROAD HEAVY-DUTY VEHICLES

This chapter describes the minimum criteria and requirements for Carl Moyer Program on-road heavy-duty vehicle (HDV) projects, excluding fleet modification (see Chapter 4). Local air quality management or air pollution control districts may set more stringent requirements based upon local priorities. Definitions of HDV terminology can be found at the end of this chapter.

1. Projects Eligible for Funding

ARB has adopted many fleet rules that affect on-road heavy-duty diesel-fueled vehicles (see section III of this chapter). There are limited funding opportunities for vehicles subject to these rules and regulations.

**Table 4-1
Summary of On-Road Heavy-Duty Funding Opportunities**

Vehicle Type	Subject to ARB Fleet Rule?	Moyer Funding Opportunities ¹
Urban buses	Fleet Rule for Transit Agencies ²	Very limited opportunity
Transit Fleet Vehicles		
Solid Waste Collection Vehicles, excluding transfer trucks	Solid Waste Collection Vehicle Regulation ³	Very limited opportunities for NOx
Transport Refrigeration Units (TRU)	TRU Air Toxic Control Measure (ATCM) ⁴	Very limited opportunity
Auxiliary Power Units (APU)	Idling ATCM ⁵	Very limited opportunity for zero emission projects only
Municipal Vehicles and Utility Vehicles	Fleet Rule for Public Agencies and Utilities ⁶	Low-population counties - some funding through 2017 High-population counties – very limited opportunity
Port and Drayage Trucks	Port Truck Regulation ⁷	Very limited opportunity
Most other On-road Heavy-duty Vehicles	Statewide Truck & Bus Regulation ⁸	Limited opportunity for small fleets; no funding for large fleets

¹ *Limited opportunities* means a fleet's compliance status with the ARB regulation must be determined. Contact district Carl Moyer Program staff or consult fleet rule Carl Moyer Implementation Charts at: <http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm> in addition to these guidelines.

² Fleet Rule for Transit Agencies: <http://www.arb.ca.gov/msprog/bus/bus.htm>

³ Solid Waste Collection Vehicle Regulation: <http://www.arb.ca.gov/msprog/SWCV/SWCV.htm>

⁴ TRU Air Toxic Control Measure (ATCM): <http://www.arb.ca.gov/regact/trude03/fro1.doc>

⁵ Idling ATCM: <http://www.arb.ca.gov/regact/hdvide/frorev.pdf>

⁶ Fleet Rule for Public Agencies and Utilities: <http://www.arb.ca.gov/msprog/publicfleets/publicfleets.htm>

⁷ Port Truck Regulation: <http://www.arb.ca.gov/msprog/onroad/porttruck/porttruck.htm>

⁸ Statewide Truck & Bus Regulation: <http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm>

Project Types: Taking the above table into consideration, the following categories may be eligible for funding:

- **Fleet Modernization Projects (Truck Replacement)**
Most funding opportunities for on-road heavy-duty trucks are available for trucks in small fleets of three or fewer trucks through Fleet Modernization or the Voucher Incentive Program (VIP). Please see Chapter 4 for Fleet Modernization guidelines or the VIP Guidelines at www.arb.ca.gov/msprog/moyer/voucher/voucher.htm .
- **New Vehicle Purchase:** The purchase of new vehicles with engines cleaner than those required by law. Funding opportunities in this source category will be limited due to the lack of availability of new vehicles with engines certified below the 0.20 g/bhp-hr NOx emissions standard.
- **Repower Existing Vehicle:** Repower with an engine cleaner than that currently in the vehicle. Due to technological constraints presented with newer engines fitting into older chassis, funding opportunities are limited.
- **Retrofit Purchase:** The installation of a verified diesel emission control strategy. Diesel particulate filters are required for most on-road heavy-duty diesel vehicles in California, either as OEM equipment in new trucks or through phased compliance schedules for older trucks complying with ARB rules and regulations. Funding is limited to retrofits that provide early or extra emission reductions to the regulations.
- **Transport Refrigeration Units (TRU):** Due to the Air Toxic Control Measure (ATCM) that sets in-use performance standards for TRUs, projects available for funding are limited.
- **Idling Reduction:** Idle reduction projects include electric auxiliary power units (APU), as well as truck stop electrification for both on-board and off-board infrastructure. Funding is limited to projects that provide emission reductions beyond what is required by regulation, such as zero emission technologies.

Please see Section IV (Project Criteria) for detailed minimum eligibility requirements. Projects may be subject to more stringent requirements as described in Section III.

2. Maximum Eligible Funding Amounts

Table 4-2 summarizes the maximum eligible funding for each project type. All projects are also subject to the cost-effectiveness threshold defined in Chapter II – General Criteria.

Table 4-2

Maximum Funding Amounts for Carl Moyer On-Road Vehicle Projects

Project	Maximum Eligible for Carl Moyer Program Funding
New Vehicle Purchase	25 percent
Repower	\$30,000
Retrofit: Highest Level PM + NOx	\$10,000
Retrofit: 2007 Engine Standard Equivalent*	\$20,000
TRU Retrofit	100 percent
Idling Reduction Retrofit	100 percent

* Including ARB verified selective catalytic reduction (SCR) retrofits

3. Emission Standards

Table 4-3 lists the NOx and PM emission standards for on-road heavy-duty engines. Urban buses have a separate set of emission standards which are now aligned with those for heavy-duty vehicles.

**Table 4-3
Emission Standards for On-Road Heavy-Duty Diesel Engines
(g/bhp-hr¹)**

Model Year	NOx	PM
2007	1.20 ²	0.01
2010	0.20	0.01

¹ grams per brake horsepower-hour

² Between 2007-2009, U.S. EPA requires 50 percent of heavy-duty diesel engine family certifications to meet the 0.2 g/bhp-hr NOx standard. Averaging is allowed, and it is expected that most engines will conform to the fleet NOx average of approximately 1.2 g-bhp/hr.

4. Project Criteria

The project criteria listed below for on-road heavy-duty vehicles provide the districts, fleet operators, transit agencies, and applicants with the minimum qualifications for the Carl Moyer Program. All projects must also conform to general criteria of Chapter 2, as well as the requirements as described in Part III: Program Administration. Participating districts retain the authority to impose additional requirements in order to address local concerns.

A. General On-Road Heavy-Duty Vehicle Project Criteria

i. Maximum project life for on-road projects are capped as follows:

a) Buses \geq 60,001 CGW or GVW - New	12 years
b) School buses \geq 33,001 GVW – New	20 years
c) Other On-road - New	10 years
d) Repower Only (No Retrofit)	7 Years
e) Repowers + Retrofits	5 years
f) Retrofits	5 years
g) Fleet Modernization	See Chapter 5

A longer project may receive case-by-case approval if applicants provide justifying documentation. The maximum project life does not consider regulatory requirements and may be shorter. Regulatory requirements may reduce actual project life below these maximum values.

ii. On-road heavy-duty diesel vehicles with a GVWR between 8,501 and 14,000 pounds may be considered for Carl Moyer Program funding for new, repower and retrofit projects on a case-by-case basis.

iii. On-road heavy heavy-duty (HHD) vehicles (with GVWR over 33,000 pounds) must be powered by an engine certified to the HHD intended service class as shown on the engine certification executive order. Engines certified to the medium heavy-duty (MHD) service class (over 14,000 pounds and up to 33,000 pounds) may not be installed in HHD vehicles. However, MHD engines may be installed in a vehicle with a GVWR up to 39,601 (20 percent higher than 33,000 GVWR) with written warranty verification by the engine and chassis manufacturer. A copy of the written warranty verification must be maintained in the district project file.

iv. Carl Moyer Program (CMP) participants that received funding and are still under contract may not receive subsequent funding for the same project through the CMP, the Voucher Incentive Program (VIP), the Goods Movement Emission Reduction Program (GMERP), or any other program.

i. If an air district chooses to amend a contract to reduce the term, the amended project must be cost-effective during the reduced contract term, based on the cost-effectiveness value that applied when the original contract was executed. If an air district agrees to accept a prorated repayment of the CMP grant, the repayment and amended contract execution must both occur prior to applying for subsequent funding.

- ii. Emissions reductions that were previously funded are part of the baseline and must not be included as emissions benefits of the subsequent project.
- v. To receive funding through the Carl Moyer Program, a fleet owner/operator must have all engines in the fleet that are eligible for a low NOx software upgrade (reflash) reflashed within 60 days of receipt of payment. The fleet owner/operator may self-certify to the local district that the reflash has been performed by submitting receipts of reflash completed or a picture of the “Low NOx Reflash Label” from the reflashed engine to the district. Most heavy heavy-duty, and some medium heavy-duty engines manufactured between 1993 through 1998 are eligible for reflash. A list of engines eligible for reflash is available at: <http://www.arb.ca.gov/msprog/hdsoftware/hdsoftware.htm>.
- vi. Except as provided below, on-road calculations shall be based on projected annual mileage instead of fuel usage or engine hours, due to the fact that the mileage-based exhaust emission factors are more robust. Fuel based calculations may be used only if documentation of previous fuel use and mileage records are submitted to the district with the application that show the project to be at least 30 percent more cost-effective when using fuel based calculations. If using the fuel based calculations, usage must be based on two years of historical fuel usage documentation specific for the equipment being funded. Documentation may include fuel logs, purchase receipts or ledger entries. Fuel based analyses are appropriate for projects that involve extended idling, including but not limited to street sweepers and solid waste collection vehicles.
- vii. The emission factors in Appendix B, Tables B-4 and B-5 are based on in-use dynamometer testing data. All other on-road emission factors in Appendix B are converted emissions standards based on the engine certification level. On-road cost-effectiveness calculations shall use the same quantification methodology for the baseline calculation and the reduced emission calculation.
 - a) Mileage based calculations must use mileage based emission factors in Appendix B, Tables B-4 and B-5, for the baseline and reduced emission calculation.
 - b) Fuel based calculations must use converted emissions standards for the baseline and reduced emission calculation. Converted emissions standards are found in Appendix B, Tables B-2a, B-2b, B-3a, B-3b, B-6 and B-7.

- c) Other calculation methods will be considered by ARB on a case-by-case basis.
- viii. The engine model year, not the vehicle model year, shall be used to determine the appropriate emissions factors.
- ix. Although electronic monitoring units are not required by the ARB, when an EMU is required by a district, it is an eligible expense for any category.
- x. Refuse vehicles and street sweepers often have two engines, one for motive power and one for auxiliary operations. Since only the main engine is eligible for funding, emission benefits are calculated individually for each engine using fuel consumption rates for each unit if available. If individual engine fuel consumption information is not available, the applicant must provide and document an estimate for the typical activities of each engine based on best engineering judgment so that eligible surplus emissions reductions can be determined. The estimate must include factors such as fuel economy, typical operating loads, and hours of operation for each engine.
- xi. Any vehicle with an off-road engine that is subject to an on-road regulation must comply with the surplus requirements described in this chapter. For example, a yard truck with an off-road engine that is subject to the Statewide Truck and Bus Regulation must comply with all off-road Carl Moyer Program criteria described in Chapters V and/or VII, as well as all surplus criteria described in Section (IV)(h) of this Chapter.
- xii. Glider kits are not an eligible expense for Carl Moyer Program funding.
- xiii. Case-by-case projects must receive approval from ARB prior to contract execution. These projects must follow the requirements as described in Part III, Section 28.

B. Compliance Check

After the district receives an application for any on-road project but before the district pays for a project, the district must submit information regarding the project to ARB to check for outstanding violations and previous project funding.

- i. The district shall email its ARB district liaison the registered owner's name, vehicle identification number, California Highway Patrol number, Department of Transportation number or Interstate Commerce Commission number for each vehicle to be repowered or retrofitted in the project, as well as all other vehicles in the applicant's fleet. Due to the

large number of vehicles that could require compliance checks, districts are encouraged to submit this data as soon as possible after receipt of the application.

- ii. The liaison will forward that information electronically to the responsible parties at ARB. The liaison will email the district the results of the compliance check within 10 business days.
- iii. If the compliance check indicates that the vehicle has already received funding and is still under contract, the district will be notified and the application must be rejected.
- iv. If the compliance check indicates there is an outstanding violation with any truck in the applicant's fleet, the district shall inform the engine owner in writing that no disbursement may be made until the owner provides proof that each violation has been corrected and each fine has been paid.
- v. If the outstanding violation is based on problems with the baseline engine (e.g., gross polluter), then a new engine must be installed instead of fixing the old engine. The engine owner must pay the fine for each violation and submit documentation of violation correction with, or before submitting, the invoice.

C. New Purchase

New purchase projects must be 30 percent cleaner than the current NOx emissions standard. Based on the 2010 NOx standard of 0.20 g/bhp-hr, engines that are certified to 0.14 g/bhp-hr NOx or lower and 0.01 g/bhp-hr PM or lower are eligible for new purchase funding. The maximum grant amount is 25 percent of the new purchase cost. Due to tighter emissions standards, new purchase projects are not a common funding category.

D. Repower

A repower is the replacement of an in-use engine with an emission-certified engine instead of rebuilding the existing engine to its original specifications. Replacement engines for repower projects must be an ARB certified engine meeting the 0.2 g/bhp-hr NOx and 0.01 g/bhp-hr PM emissions standards.

However, due to technological constraints presented with the limited feasibility of newer engines with advanced emissions control equipment fitting into older chassis and maintaining durability, single vehicle repower projects are not eligible for Moyer funding.

There are a limited number of cases where the technical repower constraints described above do not apply. The economics of repower projects involving a large quantity of the same chassis and engine combination may allow compliance with the engine manufacturer quality assurance process that is equivalent to an OEM package. In these cases, a prototype vehicle (or vehicles) is thoroughly reviewed and tested to ensure that the installation meets OEM requirements, and the successful prototype installation is then replicated in other vehicles with the same chassis and engine combination. Air districts may approve repower projects that meet the above described OEM quality assurance process, subject to the following:

- i. Carl Moyer Program funding may not be used for any costs associated with the prototype vehicle or vehicles;
- ii. Repower contracts may not be executed until the prototype testing specified by the engine manufacturer is successfully completed;
- iii. Written documentation from the engine manufacturer confirming that the prototype was successful must be maintained in the project file;

E. Retrofit

Retrofit is the installation of a verified diesel emission control system on an existing engine. The Carl Moyer guidelines are aligned with the Statewide Truck & Bus Regulation to ensure retrofit projects reduce emissions beyond regulatory requirements. A list of currently verified retrofits may be found at <http://www.arb.ca.gov/diesel/verdev/verdev.htm>. A searchable database of verified retrofits is available at <http://arb.ca.gov/diesel/verdev/vdb/vdb.php>. Please refer to Appendix F for more details on retrofit verification.

- i. The maximum retrofit grant amount is:
 - a) \$10,000 or the total retrofit cost, whichever is less, for the highest level retrofit verified to achieve Level 3 PM reductions of 85 percent, and NOx reductions if available for the specific engine;
 - b) \$20,000 or the total retrofit cost, whichever is less, for retrofit devices verified to reduce NOx and PM emissions equivalent to 2007 engine standards of 1.20 g/bhp-hr NOx and 0.01 g/bhp-hr PM.
- ii. Only ARB-verified retrofits are eligible for funding.
- iii. Retrofit projects that reduce NOx emissions must be verified by ARB to a NOx reduction level of at least 15 percent from the baseline engine to claim NOx reductions from the project.

- iv. Retrofit projects must use the highest level technically feasible technology verified for the engine being retrofitted. ARB considers the retrofit device that achieves the highest level of PM reductions (level 3 - 85 percent) and the highest level of NOx reductions to be the highest level retrofit.
- v. Fleets/agencies affected by fleet regulations may be able to use Carl Moyer Program funding for retrofit projects if the project life expires prior to the final compliance date or achieves reductions beyond the regulatory requirements. See applicable criteria below for each fleet regulation.
- vi. If the retrofit device reduces both NOx and PM emissions and is being installed to comply with a PM requirement, only the costs of the NOx reductions are eligible for Carl Moyer Program funding.
- vii. The full cost of a retrofit kit, up to the maximum incentive amount described above, and maintenance of the retrofit during the project life may be funded subject to the weighted cost-effectiveness limit.
- viii. Only the minimum ARB verified levels of NOx and PM10 emission reductions will be used to calculate cost-effectiveness for retrofit projects.

F. Funding Eligibility for Projects Subject to In-Use Regulations

Most on-road vehicles are subject to an in-use regulation. Funding is available for emissions reductions that are early or extra to regulatory requirements. In addition, fleets that have achieved compliance with the final regulatory deadline may be eligible for funding.

- i. Port and Drayage Trucks

No funding is available for projects at the Ports of Long Beach and Los Angeles. For all other ports and intermodal rail yards, limited fleet modernization funding may be available. See Chapter IV.

- ii. Private Fleets (Statewide Truck and Bus Regulation)

Funding is available for retrofits on vehicles with model year 2004-2006 engines in small fleets (three or fewer trucks) that are installed and in operation by December 31, 2010. See Chapter V for surplus funding options for fleet modernization projects.

Any fleet that is subject to the Statewide Truck and Bus Regulation when entering into a Carl Moyer funding contract must use either, 1) the BACT Compliance Schedule for Moyer funded vehicles, or 2) the optional requirements

for small fleets, not BACT Percentage Limits or Fleet Averaging, for the term of the contract.

iii. Public Agency and Utility Fleets

Due to low mileage, public agency and utility vehicle projects are generally eligible for minimal grant amounts.

- a) All public agency and utility vehicle projects must submit total fleet compliance records as described in the Fleet Rule for Public Agencies and Utilities showing that the funds will not be used to meet the rule's requirements.
- b) For counties that have a population greater than 125,000: The final compliance deadline for Public Agency and Utility fleets that are not in a low population county (or granted low-population county status) is December 31, 2012. Fleets that have achieved the applicable final compliance are eligible for funding.
- c) Low-Population County fleets (counties with a population of less than 125,000) or those that have qualified for Low-Population County status, have two options for compliance: accelerated turnover option or BACT implementation schedule for Low-Population Counties. Low-Population County fleets must declare with submittal of their application which compliance path they will follow. The final compliance deadline for fleets that are in a low population county (or granted low-population county status) is December 31, 2016. Fleets that have achieved the applicable final compliance are eligible for funding.
- d) NOx reductions may be available for funding in retrofit projects, repower projects, and new purchases.
- e) For more information on eligibility for public fleets, please see the On-Road Fleet Carl Moyer Program Implementation Chart available through your local district or at <http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm>.

iv. School Buses

School buses are eligible for Carl Moyer Program funding if they meet the general program criteria above; however, their relatively low annual miles usually allows for minimal grant amounts.

- a) Any school bus that receives funding through the Carl Moyer Program must use the BACT compliance schedule for School Bus Fleets shown in Table 5 of the Truck & Bus Regulation, and may not use BACT Percentage Limits or the PM Fleet Averaging compliance options. School buses with engine model years 1994 or newer are eligible only for NO_x and ROG reductions. PM reductions do not meet the minimum three year surplus project life.
 - i. School buses with engine model years 1987-1993 are eligible for PM reductions in projects that are complete and in operation by December 31, 2009.
 - ii. School buses manufactured after April 1, 1977 and with engine model years 1986 and older are eligible for PM reductions in projects that are complete and in operation through December 31, 2010.
 - b) School bus calculations shall use the MHD vehicle emission factors and conversion factors to calculate cost-effectiveness.
- v. Solid Waste Collection Vehicles
- a) The final compliance deadline for SWCVs subject to the SWCV rule is December 31, 2010. SWCV fleets that have achieved final compliance are eligible for funding.
 - b) All SWCV projects must submit compliance records as described in the SWCV rule to show that funds will not be used to meet the rule's requirements. The companies must also identify out of which terminal the vehicles potentially receiving Carl Moyer Program funds operate. This information must be submitted with the application. The district and/or ARB will notify applicants if any additional documentation is required.
 - c) Solid waste transfer trucks are subject to the Statewide Truck & Bus Regulation, and must meet applicable eligibility criteria identified above.
 - d) For more information on eligibility for SWCVs, please see the SWCV Fleet Carl Moyer Program Implementation Chart available through your local district or at <http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm>.
- vi. Transit Vehicles (Urban Buses and Transit Fleet Vehicles)
- a) Transit agencies are required to submit annual documentation of compliance with the transit fleet rule to ARB. Districts will work with

ARB to determine if applicants are in compliance with the regulatory requirements and to ensure that Carl Moyer Program funds will not be used to meet these requirements. Transit agencies are not required to submit any additional regulatory compliance information with the Carl Moyer Program application and will be notified if districts and/or ARB require additional documentation.

- b) Transit Fleet Vehicles: The final compliance deadline for Transit Fleet Vehicle requirements is December 31, 2010. Transit fleet vehicles that have achieved final compliance are eligible for funding.
- c) Urban Buses: The final compliance deadline for Urban Bus requirements is January 1, 2009. Urban Bus fleets that have achieved final compliance are eligible for funding.
- d) The Federal Transit Administration (FTA) provides up to an 80 percent grant for new urban bus purchases and repowers. For these projects the incremental cost would be the difference between the FTA grant amount and the cost of the reduced technology or baseline technology.
- e) For more information on funding eligibility, please see the On-Road Fleet Carl Moyer Program Implementation Chart available through your local district or at <http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm>.

vii. Idling Reduction

- a) Heavy-duty trucks are eligible for zero-emission technologies for APUs. The baseline for these projects would be an ARB certified Tier 4 engine with a level 3 DECS.
- b) An hour-meter or other means to measure usage must be installed with an idle reducing project to track operation. The participant shall provide this information to ARB or the district upon request during the life of the project.
- c) The installation of electric power infrastructure at truck stops and distribution centers is eligible for funding through air districts' Carl Moyer Program match funds.
- d) Advanced truck stop electrification - Carl Moyer Program funds may be used for installing advanced truck stop electrification systems

(e.g., IdleAire systems). In these cases, a partial payment would be made upfront to help offset the initial capital investment. The remainder of the grant amount would be paid out in installments based on system utilization. The amount of the initial payment and subsequent installments will be determined on a case-by-case basis.

e) Other idle reducing projects may be considered on a case-by-case basis.

viii. Transport Refrigeration Units (TRU)

- a) The participant shall install an hour-meter or other means to measure usage on the TRU to track operating hours, and shall provide this information to ARB or the district upon request.
- b) Alternative technologies such as electric standby and pure cryogenic systems are not required to be verified, but ARB must review and approve such systems in writing on a case-by-case basis.
- c) Funding opportunities may exist for a zero emission new purchases or repowers on a case-by-case basis.
- d) Funding opportunities may exist to retrofit to a ULETRU level. For more information on funding eligibility for TRUs please see the TRU Carl Moyer Program Implementation chart available through your local district or at <http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm>.

G. Cost-Effectiveness Calculation Specific Criteria

Sample calculations that illustrate the methodology for determining emission reductions and cost-effectiveness are included in Appendices C and E.

5. Minimum Project Application Requirements

Districts must ensure project applications include the specific information needed to determine project eligibility and populate the CARL database, including the information needed to track the project and calculate project cost-effectiveness.