CHAPTER 6: LOCOMOTIVES

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I. Guidance

This chapter describes the minimum criteria and requirements for Carl Moyer Memorial Air Quality Standards Attainment Program (Moyer Program) locomotive projects. Air quality management districts or air pollution control districts (air districts) may set more stringent requirements based upon local priorities.

Please note that to fund projects in this category, Chapters 2 and 3 include general provisions and administrative requirements. Appendices A-E provide additional supporting information.

A. Projects Eligible for Funding

The Moyer Program provides incentives to upgrade old, high-polluting locomotives to Tier 4 or cleaner units. Railcar movers which have tires or mounted tracks, that replace switcher locomotives are considered locomotives for the purposes of the Moyer Program. Funding opportunities may be limited due to ~~CARB's In-Use Locomotive Regulation, and~~ the South Coast ~~and Statewide~~ Memorandum~~a~~ of Understanding (MOU) with Class I ~~1~~ railroads (See Table 6-1).

Table 6-1
Summary of Locomotive ~~Regulations~~ Programs and MOUs

Railroad Class	Subject to CARB ~~Regulation~~ Program or MOU
Class I ~~1~~ Freight Railroads (Burlington Northern Santa Fe Railroad and Union Pacific Railroad)	~~CARB's In-Use Locomotive Regulation(1) and~~ 1998 South Coast MOU~~(2)~~(1)
Class II ~~2~~ and III ~~3~~ Freight Railroads and Passenger Railroads	~~CARB's In-Use Locomotive Regulation(1)~~No

~~(1) Projects must be surplus, and applicants must be in compliance with the requirements of the regulation to be eligible for Moyer funding. See Locomotive Fact Sheets:~~
~~(2)~~(1) The South Coast MOU limits funding eligibility for Class I ~~1~~ freight railroad replacement or engine repower projects in the South Coast. See Rail Emission Reduction Agreements.

1. Project Types

Locomotive projects eligible for Moyer Program funding include:

(A) Locomotive Replacement: An older locomotive that includes an engine(s) with remaining useful life is replaced with a Tier 4 or cleaner locomotive.

(B) Locomotive Engine Repower: A Tier 4 or cleaner engine is installed in place of a higher-polluting engine in an existing locomotive.

(C) Locomotive Conversion: An older locomotive with a combustion engine is converted to a zero-emission locomotive.

(D) Locomotive Retrofit: A Tier 4 or cleaner emission control system is added to an in-use engine.

(E) Infrastructure Projects: See Chapter 10 for details regarding applicant eligibility and project types for infrastructure to support zero-emission locomotives.

Two-for-One Calculations – Projects in which two or multiple locomotives of similar design and function are replaced with one or multiple locomotives are eligible for funding. The project is eligible for a grant based on the combined usage and emission reductions achieved from the baseline and reduced locomotives respectively.

Leasing is allowed for zero-emission locomotives replacement projects only. The lease term must be equal to the project life and be between three to seven years. The contract must specify the responsible party in case Moyer Program requirements are not met anytime throughout the contract term. The lessor and lessee must both sign and agree to the contract terms. All lease projects must destroy the baseline locomotive.

2. Maximum Eligible Funding Amounts

Table 6-2 summarizes the maximum eligible funding for each project type. All projects are also subject to the cost-effectiveness threshold defined in Appendix C.

Table 6-2
Maximum Grant Amount for Moyer Program Locomotive Projects

Railroad Class/Type	All Project Types
Class I 1/Class II 2 Line Haul	80%
Class III 3, Switcher, and Passenger	85%

B. Emission Standards

The U.S. EPA has adopted regulations for exhaust emission standards for new and remanufactured locomotives. For reference, Tables 6-3 and 6-4 below summarize the hydrocarbon (HC), oxides of nitrogen (NOx) and particulate matter (PM) standards in grams per brake horsepower-hour (g/bhp-hr) for the 1998 Federal Standards and the 2008 Federal Standards.

Table 6-3
U.S. EPA Locomotive Emission Standards (g/bhp-hr) Based on 1998 Federal Standards[1]

Tier and Engine Model Year	Type	NOx	HC	PM10
Uncontrolled Pre-1973	Line-haul and Passenger	13.5	1.00	0.60
	Switcher	17.4	2.10	0.72
Tier 0 1973 – 2001	Line-haul and Passenger	9.5	1.00	0.60
	Switcher	14.0	2.10	0.72
Tier 1 2002-2004	Line-haul and Passenger	7.4	0.55	0.45
	Switcher	11.0	1.20	0.54
Tier 2 2005 – 2011	Line-haul and Passenger	5.5	0.30	0.20
	Switcher	8.1	0.60	0.24

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Table 6-4
U.S. EPA Locomotive Emission Standards (g/bhp-hr) Based on 2008 Federal Standards[1]

Tier and Engine Model Year	Type	NOx	HC	PM10
Tier 0+ 1973-2001	Line-haul and Passenger	7.4	0.55	0.22
	Switcher	11.8	2.10	0.26
Tier 1+ 2002-2004	Line-haul and Passenger	7.4	0.55	0.22
	Switcher	11.0	1.20	0.26
Tier 2+ 2005-2011	Line-haul and Passenger	5.5	0.30	0.10
	Switcher	8.1	0.60	0.13
Tier 3 2011-2014	Line-haul and Passenger	5.5	0.30	0.10
	Switcher	5.0	0.60	0.10

Tier and Engine Model Year	Type	NOx	HC	PM10
Tier 4 2015 or later	Line-haul and Passenger	1.3	0.14	0.03
	Switcher	1.3	0.14	0.03

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C. Project Criteria

The minimum qualifications for locomotives are listed below. All projects must also conform to the requirements in Chapter 2: General Criteria, and in Chapter 3: Program Administration. Participating air districts retain the authority to impose additional requirements to address local concerns. Note that railroad classes are defined in Appendix B.

1. General Locomotive Project Criteria

(A) Baseline emission factors must reflect the tier level required by federal locomotive remanufacturer standards (i.e., the baseline emission factors are the required remanufacture standards, which may not be the certification standard of the baseline locomotive).

(B) Class I ~~1~~ freight locomotives subject to the South Coast Memorandum of Understanding (MOU) are only eligible for Moyer Program funding on a case- by-case basis. These locomotive projects must be excluded from the fleet average emission rate calculations which demonstrate compliance with the MOU provisions. The baseline emission rates used to determine emission reductions and cost-effectiveness for these locomotive projects reflect the U.S. EPA Locomotive Tier 2 emission rates for line-haul and switch locomotives.

~~(C) Air districts must verify applicants are in compliance with all requirements of CARB's In-Use Locomotive Regulation and emission reductions are early or extra to the Regulation's requirements. CARB must verify projects utilizing alternative options or extensions under the regulation. These projects may need to be handled on a case-by-case basis.~~

(D) Military and industrial railroads are considered Class III ~~3~~ railroads for the purposes of the Moyer Program.

(E) Locomotive project activity must be based upon fuel consumption. If fuel consumption is not available, megawatt hours from the electronically logged data may be used.

(F) Moyer Program funds cannot be used to pay for labor or parts used during routine maintenance.

(G) Air districts may enter into contract and work may begin on a locomotive project prior to U.S. EPA certification, CARB verification, or CARB equipment approval. In this instance, the air district contract with the grantee must specify that any work performed is done at the grantee's own risk. Air districts cannot make payment until certification, verification, or approval been received.

(H) Participant must have owned the baseline locomotive for at least one year prior to application submittal, and the locomotive must be operational.

(I) For replacement, repower, and conversion projects the baseline locomotive engine or engines must be destroyed. At a minimum, the destruction of a locomotive engine must include a hole in the engine block, between the cylinders, with a diameter of at least eighteen inches at the narrowest point. The hole must be irregularly shaped (i.e., no symmetrical squares or circles) to render the engine permanently inoperable. Non-locomotive engines may follow off-road guidance, requiring a minimum hole diameter of three inches.

(J) All locomotive projects must have a minimum three-year warranty that covers both parts and labor.

2. Project Life

(A) The minimum project life for a locomotive project is one year.

(B) The maximum project life for a locomotive project is 15 years.

(C) For zero-emission locomotive replacement projects, the lease term must be equal to the project life and be between three to seven years.

~~(D) Project lives may be limited due to CARB's In-use Locomotive Regulation.~~

~~(E) Project lives may include partial years, with a minimum duration of one month (e.g., project life could be one year and one month, totaling 13 months).~~

3. Locomotive Replacement

(A) Locomotives with an aggregate engine power rating greater than or equal to 1,006 horsepower (750 kW) must be certified by U.S. EPA ~~or~~ and verified by CARB to achieve Tier 4 locomotive emission standards (or cleaner).

(B) Locomotives with an aggregate engine power rating less than 1,006 horsepower are not required to be certified by U.S. EPA to locomotive standards but are required to be certified to U.S EPA off-road (nonroad) emission standards or verified by CARB to meet or exceed the Tier 4 locomotive standards.

(C) Zero-emission locomotives must have CARB verification or approval.

(D) If a railcar mover is replacing a switcher locomotive, the applicant must evaluate and verify the replacement railcar mover is able to perform the duties of the baseline switcher locomotive.

(E) The baseline locomotive engine(s) must be destroyed. The grantee may choose to retain the baseline locomotive chassis or donate the chassis to a museum or similar exhibit. Since locomotive components have a long lifespan, CARB recognizes the benefits of reusing and/or recycling baseline locomotives. To prevent the baseline locomotive body from being fitted with a similar high-polluting engine, the grantee must sign an agreement with the air district which will ensure, with due diligence, that for the remaining life baseline locomotive, if brought back into service, will be repowered to a Tier 4 or cleaner locomotive emission standard.

4. Locomotive Engine Repower

Purchase and installation of an engine meeting Tier 4 locomotive emission standards or cleaner. The engine must be certified by U.S. EPA or verified by CARB to be eligible for Moyer Program funding.

5. Locomotive Retrofit

Purchase and installation of a retrofit device meeting Tier 4 locomotive emission standards or cleaner. The retrofit device must be certified by U.S. EPA or verified by CARB to be eligible for Moyer Program funding.

6. Locomotive Conversion

Purchase and installation of a zero-emission conversion kit. The conversion kit must be certified by U.S. EPA, verified by CARB, or approved by CARB to be eligible for Moyer Program funding.

II. Acronyms

Acronym	Definition
AB	Assembly Bill
CARB	California Air Resources Board
bhp-hr/gal	Brake horsepower-hour per gallon
bhp-hr/yr	Brake horsepower-hour per year
CARL	Clean Air Reporting Log
CCR	California Code of Regulations
CO	Carbon Monoxide
DOT	Department of Transportation
G	Gram
g/bhp-hr	Gram per brake horsepower-hour

Acronym	Definition
GMERP	Goods Movement Emission Reduction Program
GPS	Geographic Positioning System
Hp	Horsepower
Hr	Hour
H&SC	Health and Safety Code
kW	Kilowatt
NOx	Oxides of Nitrogen
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
ROG	Reactive Organic Gas
SIP	State Implementation Plan
U.S. EPA	United States Environmental Protection Agency
V	Volt
YR	Year

III. Definitions

Air District or District: An air pollution control district or an air quality management district.

Air Pollution Control Officer: The air pollution control officer, executive director, executive officer or designee as determined by each air district.

California's Goods Movement Trade Corridor: The entirety of the South Coast Air Basin, San Joaquin Valley Air Basin, Sacramento Federal Ozone Nonattainment Area, San Francisco Bay Area Air Basin, San Diego County Air District, Imperial County Air District, and Port Hueneme.

Certification: A finding by the California Air Resources Board (CARB) or the U.S. EPA that a mobile source or emissions control device has satisfied applicable criteria for specified air contaminants.

Class I ~~1~~ Freight Railroad: As defined by the Surface Transportation Board (STB), a carrier with annual operating revenues above a threshold set by the STB, which is adjusted annually for inflation. ~~As of January 2017,~~ As of 1996, Union Pacific Railroad (UP), Burlington Northern and Santa Fe Railway~~road~~ (BNSF), and their subsidiaries are the only Class I ~~1~~ freight railroads operating in California.

Class II ~~2~~ Freight Railroad: As defined by the ~~Surface Transportation Board~~ STB, a carrier with annual operating revenues below the Class I threshold but above the Class III threshold, as determined by the STB. ~~As of January 2017, Arizona and California Railroad, Central Oregon and Pacific Railroad are the only Class 2 freight railroads operating in California.~~ As of 2025, there are no known Class II freight railroads operating in California. These railroads, commonly known as regional carriers, typically operate over moderate distances and are more prevalent in other parts of the United States.

Class III ~~3~~ Freight Railroad: As defined by the ~~Surface Transportation Board~~ STB, a carrier with annual operating revenues below a threshold set by the STB, which is adjusted annually for inflation. As of 2025, there are numerous Class III freight railroads operating in California, including s~~S~~hort-line ~~railroads, and~~ military, and industrial railroads. ~~are generally considered Class III 3 freight railroads for the purposes of eligibility.~~ These carriers typically operate over short distances, providing local freight service and connecting with larger Class I railroads.

Cost-Effectiveness: A measure of the dollars provided to a project for each ton of covered emission reduction (H&SC Section 44275(a)(4)).

Covered Emissions: Emissions of oxides of nitrogen, particular matter, and reactive organic gases from any covered source.

Emission Factor (EF): A category specific estimate of emissions per unit of activity. On-road emission factors are based on CARB mobile source emission inventory model values. Off-road emission factors are based on values applied in CARB category specific inventory models.

Freight Locomotive: A locomotive that hauls freight as its primary function.

Grant Amount: Contracted amount of Moyer funds for a project, which may not exceed the maximum dollar amount or maximum percentage of eligible cost specified by source category and project type.

Head End Power Unit: Most passenger locomotives are equipped with head end power (HEP) or hotel power, an onboard generator typically about a 500 horsepower that provides power to the passenger cars of the train for such functions as heating, lighting and air conditioning.

Incremental Cost: The cost of the project less a baseline cost that would otherwise be incurred by the applicant in the normal course of business. Incremental costs may include added lease, energy, or fuel costs pursuant to Health and Safety Code Section 44283 as well as incremental capital costs.

Maximum Grant Amount: The maximum amount of money a grantee is eligible to receive for a cost-effective Moyer Program project. The maximum grant amount for a project is the lowest of the three following values: (a) the grant amount at the cost-effectiveness limit; (b) the maximum percentage of eligible cost; or (c) any maximum dollar amount specified in the relevant source category chapter.

Memorandum of Agreement (MOA) or Memorandum of Understanding (MOU): A document recording the basic terms of a proposed transaction or setting forth the principles and guidelines under which parties will work together.

Project Life: The period for which the Moyer Program funds surplus emission reductions for a given project.

Rail equipment: Non-locomotive equipment designed for use on tracks, such as on- rail vehicles, railcar movers, sweepers, and wheel cranes that have tires or mounted tracks.

Equipment that replaces switcher locomotives are considered locomotives for the purposes of the Moyer Program.

Repower: A repower is the replacement of the existing engine with an electric motor or a newer emission-certified engine instead of rebuilding the existing engine to its original specifications.

Retrofit: Modifications to the engine and fuel system so that the retrofitted engine does not have the same emissions specifications as the original engine, or the process of installing a CARB-verified emissions control system on an existing engine.

~~Sweeper/Scrubber: A large spark-ignition engine-powered piece of industrial floor cleaning equipment designed to brush and vacuum up small debris and litter and then scrub and squeegee the floor.~~

Switch Locomotive: A locomotive powered by an engine or engines typically totaling less than 2,300 total horsepower, and used to separate and move railcars from track to track or transfer cars to and from regional carriers. All Class III ~~3~~ railroad locomotives – including all short-line and military and industrial locomotives – are considered switch locomotives for the purposes of the Moyer Program eligibility.

Tier 1, 2, and 3 Engines: Engines that are subject to California Code of Regulations, title 13, Section 2423(b)(1)(A) and/or Code of Federal Regulations, title 40, part 89.112(a). This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 1, 2, and 3 Family Emission Limits (FEL) listed in California Code of Regulations, title 13, Section 2423(b)(2)(A) and/or Code of Federal Regulations, title 40, part 89.112(d).

Tier 4 Engine: Engines that are subject to interim or final after-treatment based Tier 4 emission standards in California Code of Regulations, title 13, Section 2423(b)(1)(B) and/or Code of Federal Regulations, title 40, part 1039.101. This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 4 FEL listed in California Code of Regulations, title 13, Section 2423(b)(2)(B) and/or Code of Federal Regulations, title 40, part 1039.101. For locomotives, the term refers to the Tier 4 (2015 engine model year) emission standards in the Code of Federal Regulations, title 40, Part 1033.

~~Uncontrolled Large Spark-Ignition Engines: Means pre-2001 uncertified engines and 2001-2003 certified 'noncompliant' large spark-ignition engines.~~

Verification: A determination by CARB or the U.S. EPA that a diesel emission control strategy meets specified requirements, based on both data submitted and engineering judgement.

Violator: An individual, company, or entity responsible for a violation of an environmental law, regulation, or rule.

IV. References

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http://nepis.epa.gov/Exe/ZyPDF.cgi/P1000509.PDF?Dockey=P1000509.PDF

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