

# CHAPTER 6: LOCOMOTIVES

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.

## A. Projects Eligible for Funding

The Moyer Program provides incentive to upgrade old high-polluting locomotives to new Tier 4 units. Rail equipment, designed for use on tracks, such as on-rail vehicles, railcar movers, sweepers, and wheel cranes which have tires or mounted tracks, that replace switcher locomotives, are also considered locomotives for the purposes of the Moyer Program. Funding opportunities may be limited due to the availability of Goods Movement Emission Reduction Bond Program (Proposition 1B Goods Movement Program) funding, and the South Coast and Statewide Memoranda of Understanding (MOU) with these railroads (See Table 6-1).

**Table 6-1  
Summary of Locomotive Funding Opportunities**

Railroad Class	Subject to ARB Rule or MOU	Moyer Funding Opportunities
Class 1 Freight Railroads (Burlington Northern Santa Fe Railroad and Union Pacific Railroad)	<i>2005 Statewide Railyard Agreement and 1998 South Coast MOU<sup>(a)</sup></i>	Projects in California’s goods movement trade corridors are generally ineligible for Moyer Program funding if Proposition 1B funds are available. <sup>(b)</sup> These projects are only eligible for Moyer Program funding on a case-by-case basis.
Class 2 and 3 Freight Railroads and Passenger Railroads	No	Class 2 and 3 and passenger railroad projects are not limited.

<sup>(a)</sup> The South Coast MOU limits funding eligibility for Class 1 freight railroad new purchase or engine remanufacture/repower projects in the South Coast. See: [http://www.arb.ca.gov/msprog/offroad/loco\\_ft.pdf](http://www.arb.ca.gov/msprog/offroad/loco_ft.pdf)

<sup>(b)</sup> For a map of the trade corridors, see: <http://www.arb.ca.gov/bonds/gmbond/docs/gmtradecorridors.jpg>

Project Types: Three types of locomotive projects are eligible for Moyer Program funding:

1. Locomotive Replacement
2. Locomotive Engine Repower
3. Head End Power Unit (HEP)

## B. 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 1/Class 2	75%
Class 3 and Passenger	85%

## C. 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**

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

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

<b>Tier and Engine Model Year</b>	<b>Type</b>	<b>NOx</b>	<b>HC</b>	<b>PM10</b>
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 4 2015	Line-haul and Passenger	1.3	0.14	0.03
	Switcher	1.3	0.14	0.03

**D. 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 in order 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 remanufacture 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 1 freight locomotive projects meeting the eligibility requirements for the Proposition 1B Goods Movement Program are only eligible for Moyer Program funding on a case-by-case basis. Moyer Program funds cannot be co-funded with Proposition 1B Goods Movement Program funds.

- (C) Class 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.
- (D) Military and industrial railroads are considered Class 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 and/or Air Resources Board (ARB) verification. In this instance, the air district contract with the grantee must specify that any work performed is done grantee's own risk. Air districts cannot make payment until certification and verification have 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) At a minimum the destruction of a locomotive engine must include a hole in the engine block 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).
- (J) Unless otherwise stated in this chapter, the minimum project life allowed is three years.

## **2. Locomotive Replacement**

- (A) New locomotives with an aggregate engine power rating greater than or equal to 1,006 horsepower (750 kW) must be certified by U.S. EPA and verified by ARB to achieve Tier 4 locomotive emission standards (or cleaner).
- (B) New 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 U.S. EPA off-road (non-road) emission standards. This lower horsepower equipment must

also be verified by ARB to meet or exceed the Tier 4 locomotive standards.

- (C) Zero-emission locomotives must have ARB verification.
- (D) Due to the design of alternative technology switchers, fuel consumption for the new locomotive may differ from baseline fuel consumption. For contractual purposes only, when specifying the annual usage requirement in the contract the air district may assume a fuel savings of 20 percent from that used in the cost-effectiveness calculation. This fuel savings is already embedded into the cost-effectiveness calculation, and therefore it should not be applied when determining cost-effectiveness for the project.
- (E) The baseline locomotive engine(s) must be destroyed. The grantee may choose to retain the baseline locomotive chassis since locomotive components have a long lifespan, ARB 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 the baseline locomotive, if brought back into service, will be repowered to a Tier 4 or cleaner locomotive engine standard.
- (F) Project life:
  - (1) Class 1 locomotive replacement projects in air districts other than the South Coast must have a minimum project life of ten years.
  - (2) All other locomotive replacement projects have a minimum project life of three years.
  - (3) The maximum project life for a locomotive replacement project is 15 years.

### **3. Locomotive Engine Repower**

- (A) Purchase and installation of an engine meeting Tier 4 locomotive emission standards or cleaner. The engine must be certified by U.S. EPA and verified by ARB to be eligible for Moyer Program funding.
- (B) The maximum project life for a locomotive engine repower project is 15 years.

### **4. Head End Power Unit (HEP)**

- (A) HEP repower is eligible on a case-by-case basis.
- (B) The baseline engine must be certified to the applicable off-road standard at the time of manufacture.

- (C) The new engine must be certified to the U.S. EPA Tier 4 final or cleaner off-road (non-road) emission standards.