

#### **IV. Project Criteria**

These criteria provide the minimum requirements for Carl Moyer Program locomotive projects. Locomotive projects must also conform to general criteria of Chapter 2, as well as the project application, contract, reporting, and other 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 Locomotive Project Criteria**

(1) Class 1 freight locomotive projects in California's goods movement trade corridors, as defined in Section VI (Definitions) of this chapter, are only eligible for Carl Moyer Program funding on a case-by-case basis. Case-by-case project approval shall only be made if Proposition 1B Goods Movement Emission Reduction Program bond funding is unavailable for these projects.

(A) Proposition 1B Goods Movement Emission Reduction bond funding is considered available for locomotive projects in a goods movement corridor each fiscal year from the time a local agency within the corridor is approved bond funding by ARB for locomotive projects until all bond locomotive project funds in that corridor are committed to specific projects via executed contract.

(B) Locomotives that cannot meet bond program eligibility requirements for percent of operation within California as determined during the project case-by-case evaluation are not subject to the requirements of Section (A), above.

(C) A locomotive is considered inside a goods movement corridor if the rail yard where it primarily operates lies within California's Goods Movement Trade Corridors.

(2) Class 1 locomotives subject to the South Coast MOU are only eligible for Carl 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 Tier 2 emission rates for line-haul and switch locomotives identified in Appendix Table B-18. Locomotives subject to the South Coast MOU which receive Carl Moyer Program funding are ineligible to receive fleet average emission credits.

(3) Military and industrial locomotives railroads are subject to the same Carl Moyer Program criteria as Class 3 railroad locomotives. Class 2 railroad locomotives are subject to the same federal remanufacture requirements as Class 1 locomotives. There are currently no Class 2 railroad operators based in California. Should a Class 2 railroad apply for Carl Moyer Program funds, project eligibility and parameters shall be evaluated on a case-by-case basis. Section VI of this chapter provides definitions of railroad classes.

(4) Locomotive project activity must be based upon fuel consumption.

(5) Carl Moyer Program funds cannot be use to pay for labor or parts used during routine maintenance, with the exception of required maintenance of a verified

retrofit device or certified remanufacture kit.

(6) For all liquefied natural gas-diesel or other dual fuel locomotive projects, an EMU must be used to electronically monitor activity and fuel consumption by fuel type.

(7) All line-haul locomotive new purchase or repower projects must include an electronic monitoring unit (EMU) to track activity and geographic location. Eligible EMUs include a geographic positioning system (GPS) unit, transponding device, automated vehicle locator (AVL), or other similar device. The EMU must be capable of providing complete digital information regarding total activity both within the air district and the State of California; this information shall be reported to air districts annually for the project life. The full purchase, installation, warranty, and data retrieval, summarization or transmittal costs associated with the EMU is eligible for Carl Moyer Program funding, and must be included when calculating project cost-effectiveness.

(8) All locomotive projects receiving more than \$50,000 in Carl Moyer Program funds must include purchase and installation of an Automatic Engine Start-Stop (AESS) idle-limiting device to reduce unnecessary engine idling if the locomotive is not already equipped with such a device and AESS installation is technically feasible. Please see Part C of this section for ILD project minimum requirements.

(9) Projects in which a Carl Moyer Program grant is made to a locomotive manufacturer or other third party, who in turn leases the project locomotive to an end user are eligible for funding on a case-by-case basis. Project eligibility shall be based upon project life, lease terms, reporting and enforceability provisions, and other project parameters.

### **(b) Alternative Technology Switcher Purchase**

Alternative switcher locomotives funded by the Carl Moyer Program to date include genset locomotives (multi-engine switcher) and electric-hybrid locomotives (e.g. green goat). Multi-engine switchers are typically powered by two or three off-road engines, while green goats use a small diesel engine to charge batteries that provide locomotive power. These locomotives typically include an existing locomotive frame significantly refurbished with a new engine or engines, batteries, electronics, controls, and other equipment. The replacement engines have a much lower horsepower rating and emissions than the typical switch locomotive engine. U.S. EPA considers an alternative technology switcher a new locomotive if it includes at least 75 percent (by value) new parts.

(1) An alternative technology switcher must achieve a NO<sub>x</sub> emission rate of 3.5 g/bhp-hr and a PM emission rate of 0.14 g/bhp-hr. New locomotives with an aggregate engine power rating greater than or equal to 1,006 horsepower (750 kW) must be demonstrated by U.S. EPA to achieve this emission level (or cleaner). The applicable new locomotive emission factors are determined by following the instructions on the Carl Moyer Program supplemental documents webpage at: [www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm](http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm). 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.

If not certified as a locomotive by U.S. EPA, these lower horsepower locomotives must be verified by ARB, and may be evaluated and considered for funding based upon the project engine on-road or off-road certification and corresponding Carl Moyer Program emission factor.

(2) Baseline emissions for an alternative technology switcher project reflect Tier 0 emission rates for Class 1 and intercity passenger and commuter locomotives and uncontrolled emission rates for Class 3 locomotives and small passenger locomotives related to tourism. The cost of an alternative technology switcher eligible for Carl Moyer Program funding shall not exceed 50 percent of the total cost of the new switcher for Class 1 railroads or intercity passenger and commuter railroads, and 85 percent of the total cost of the new switcher for Class 3 railroads or small passenger railroads related to tourism.

(3) An alternative technology switcher must use the cleanest available certified onroad or off-road engine.

(4) Class 1 alternative technology switcher projects in air districts other than the South Coast must have a minimum project life of ten years. ARB may approve a project life of less than ten years for these locomotives on a case-by-case basis. All other locomotive projects have a minimum project life of three years. Projects with shorter lives may be subject to additional funding restrictions, such as a lower cost-effectiveness limit or a project cost cap.

(5) The maximum project life for a locomotive new purchase project is 20 years. A longer project may receive case-by-case approval if applicants provide justifying documentation.

(6) For alternative technology switcher projects, fuel consumption for the new locomotive may differ from baseline fuel consumption if the new locomotive fuel use is sufficiently documented to ARB and air district staff.

(7) Alternative technology locomotives which are not switch locomotives may be considered for funding on a case-by-case basis.

### **(c) Idle-Limiting Device**

Installation of an automatic engine start-stop (AESS) ILD can significantly reduce emissions from locomotives, which typically spend 40 to 60 percent of their operating time in the idle duty cycle. The AESS provides an automatic, fully integrated mechanism to reduce idling and does not rely upon a locomotive operator or require additional engines or infrastructure. An AESS typically uses a central computer to monitor vital engine parameters, such as battery charge, water temperature, and brake pressure, and automatically shuts off the engine after a set time. This technology is generally applicable to more locomotive types and operating conditions than other ILD devices.

(1) If not already required by a rule, regulation, MOU, or other legal mandate, the Carl Moyer Program may pay up to 50 percent of the purchase and installation cost for an AESS ILD.

(2) AESS emission reductions are calculated by applying the ILD factors in Appendix Table B-18. Appendix E provides details regarding use of the ILD factors.

(3) All ILDs must comply with applicable durability and warranty requirements.

(4) The maximum project life for a locomotive ILD project is ten years. A longer project may receive case-by-case approval if applicants provide justifying documentation.

(5) Benefits of an AESS are reflected by applying the ILD factor to the newer locomotive engine only if: 1) the project locomotive is operated by a Class 3 railroad; 2) the baseline engine does not have a functioning ILD; and 3) a functioning AESS is to be installed on the project locomotive. The ILD factor is never used to calculate the cost-effectiveness of new locomotive purchase projects or for Class 1 locomotive projects (since Class 1 locomotives are required to install an AESS as part of the Statewide Locomotive MOU). The first example locomotive cost-effectiveness calculation in Appendix D utilizes the ILD factor to calculate project cost-effectiveness.

(6) Installation of an ILD is required by U.S. EPA for intercity passenger and commuter locomotives when these locomotives are remanufactured, if the locomotive does not already have a functioning device. Therefore, an ILD is only eligible for funding on a case-by-case basis if it is not federally required (i.e. not part of an engine remanufacture) and it can be demonstrated that the project locomotive will not be remanufactured for at least three years. The project life for an intercity passenger or commuter locomotive ILD project shall not exceed the number of years until the next engine remanufacture. U.S. EPA considers an engine to have been remanufactured if all of the power assemblies have been replaced within a five year period.

**(d) U.S. EPA-Certified Engine Remanufacture Kit or Engine Repower**

Engine remanufacture kits typically include new fuel injectors, cylinder head assemblies, pistons, and other engine components. Class 1 freight locomotives and passenger locomotives are required to remanufacture their engines to the tier corresponding to the original engine manufacture date, as identified in Table 8-3. Engine remanufacture kit projects for these railroads must therefore be surplus to this federal requirement. Engine remanufacture kits must be also certified by U.S. EPA and meet all of the following criteria to be eligible for Carl Moyer Program funding. Locomotive engine repowers are also eligible for funding, although very few have been funded to date.

(1) Purchase and installation of the cleanest available tier U.S. EPA-certified remanufacture kit or engine repower is eligible for Carl Moyer Program funding. Applicants must provide evidence that the kit for which funding is requested is the cleanest available kit certified for use on the project locomotive. Baseline emissions reflect the emissions tier level required by federal locomotive remanufacture standards (See Table 8-3 for Class 1 freight railroad and passenger railroad locomotive remanufacture requirements). Pre-1973 locomotives and Class 3 locomotives use the uncontrolled emission rates in Appendix Table B-18, unless the locomotive engine has already been upgraded to emit at a cleaner (Tier 0-2) emission level. In this case, baseline emissions would reflect existing engine Tier emission rate as indicated in Appendix Table B-18.

(2) Projects which include a replacement of between 50 and 75 percent (by value) of an existing locomotive's parts with new parts (including conventional new engine technology) are defined as "locomotive refurbishment" by U.S. EPA. Refurbished locomotives with less than 3000 engine horsepower that are at least 30 percent cleaner than the standard applicable to the baseline locomotive are eligible for Carl Moyer Program funding as a locomotive repower project. These projects must meet all the requirements of locomotive repower projects, including the eligible cost criteria identified in Section IV(d)(7) of this chapter. A refurbished locomotives which is demonstrated by U.S. EPA not to exceed 3.5 g/bhp-hr NOx and 0.14 g/bhp-hr PM, consistent with Section IV(b)(1) of this chapter, shall be considered alternative technology switcher and is subject to alternative technology switcher project criteria.

(3) The U.S. EPA Certificate of Conformity (such as that shown in Appendix Figure F-3) identifies the applicable locomotive models and model years for which the remanufacture kit may be used, as well as the engine family used to verify the emission rate associated with the remanufacture kit. Step-by-step instructions for determining project emission factors emission factors are determined by following the instructions on the Carl Moyer Program supplemental documents webpage at:

[www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm](http://www.arb.ca.gov/msprog/moyer/guidelines/supplemental-docs.htm).

(4) The Carl Moyer Program may pay up to the following percentage of the total cost of a U.S. EPA-certified remanufacture kit or repower:

(A) Class 1 Railroad Locomotive – 50 percent

(B) Class 3 Railroad/Passenger Locomotive: Tier 0+: 75 percent

Tier 1+: 80 percent

Tier 2+: 85 percent

(5) Remanufacture kits must be demonstrated not to increase in-use emissions of NOx, ROG, or PM emissions.

(6) Remanufacture kit projects have a maximum project life of six years. A longer project may receive case-by-case approval if applicants provide justifying documentation. If fuel injectors are required to be replaced by the U.S. EPA Emissions Warranty for the project kit before the end of the project life, the applicant must commit to replace the injectors as required with equivalent low emission injectors. The Carl Moyer Program project cost may include funds for the replacement injectors. The project annual reports must include documentation that all required maintenance identified in the U.S. EPA Emissions Warranty is completed on schedule. Maintenance other than replacement of low-emission fuel injectors is not eligible for Carl Moyer program funding.

(7) The maximum project life for a locomotive repower project is 10 years if the new engine does not meet current federal new locomotive standards and 20 years if it meets or is cleaner than required by these standards.

(8) The baseline cost for a Carl Moyer Program remanufacture kit or repower project include only those items the Certificate of Conformity identifies as 1) being part of the rebuild kit and 2) those the certificate indicates must be contained in the base engine. Each of these specific items on the Certificate of

Conformity must be individually itemized in the project invoice. The eligible baseline cost of the remanufacture kit may also include the following items: camshafts, injectors power assemblies (including piston rings, cylinder lines and cylinder head pistons), engine CPU, engine software, aftercoolers, heat exchangers (including radiators and oil cooler), cooling circuits, cooling fans, microprocessor, fuel injectors, oil separator element, governor, water, cooling, and scavenging pumps and pump installation kits, top deck cover seals, rocker arm sets, valve bridges, rod bearing sets, top deck cover seals, blower thrust valves, lower liner inserts, and locomotive control system software. Other items may be eligible for funding on a case-by-case basis.

(9) Locomotive engine remanufacture and engine repower projects must achieve at least a 30 percent NO<sub>x</sub> reduction beyond baseline emission levels.

(10) Alternative-fueled engines must be ARB- or U.S. EPA-certified to achieve a reduced emission level in a locomotive application. Alternative-fueled engines not certified to achieve a reduced emission limit in a locomotive application may be eligible for funding on a case-by-case basis.

#### **(e) Retrofit**

Retrofits involve hardware modifications to the engine or exhaust system to reduce emissions, and include selective catalytic reduction, diesel oxidation catalysts or diesel particulate filters. Other retrofit projects may be eligible for funding on a case-by-case basis. A retrofit device must typically be verified by ARB or U.S. EPA to reduce emissions from the project engine to be eligible for funding. While no devices have been verified as of January 1, 2008, ARB is evaluating several retrofit devices for potential verification.

(1) A retrofit device must be ARB- or U.S. EPA-verified to reduce emissions from the project engine in order to be eligible for funding. Non-verified technologies may be considered on a case-by-case basis if: 1) an application for verification of the retrofit or add-on equipment on the proposed engine category is pending, 2) the retrofit or add-on equipment has been verified by ARB and certified by U.S. EPA (if available) for use on a similar engine category, or 3) project emission benefit, durability, and applicability have been demonstrated through in-situ testing.

(2) A retrofit project must achieve at least a 15 percent reduction in NO<sub>x</sub> emissions if taking credit for NO<sub>x</sub> reductions.

(3) Up to 100 percent of the total cost of a locomotive retrofit project is eligible for Carl Moyer Program funding.

(4) Retrofits considered for funding on a case-by-case basis must be clearly demonstrated to achieve the expected emission reductions for the full project life, function properly under the project locomotive engine duty cycle, and to not harm the locomotive engine.