

Chapter 8: OFF-ROAD LARGE-SPARK IGNITION EQUIPMENT

This chapter describes the minimum criteria and requirements for Carl Moyer Program off-road large spark-ignition engine (LSI) projects. Criteria and requirements for the off-road equipment replacement category can be found in Chapter 9. Air districts may set more stringent requirements based upon local priorities.

A. Projects Eligible for Funding

The Air Resources Board (ARB) has adopted in-use LSI Engine Fleet Requirements (LSI Fleet Rule). There are limited funding opportunities for equipment subject to this rule.

**Table 8-1
Summary of Off-Road LSI Equipment Funding Opportunities¹**

Equipment Type	Subject to ARB Fleet Rule	Moyer Funding Opportunities ¹
Forklifts, sweeper/scrubbers, industrial tow tractors, airport ground support equipment (GSE)	LSI Engine Fleet Requirements ²	Small fleets: Not limited by regulation. Large/Medium fleets: Very limited opportunities.
Agricultural crop preparation services (forklifts only)	LSI Engine Fleet Requirements ²	Pre-1990 model year forklifts: Not limited by regulation. 1990 and later model year forklifts: Very limited opportunities.
All other equipment (e.g., aerial lifts, construction, mining, other industrial)	No	Not limited by regulation.

¹Limited opportunities mean a fleet's compliance status with the ARB regulation must be determined. Contact air district 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.

²Large Spark Ignition (LSI) Engine Fleet Requirements: <http://www.arb.ca.gov/msprog/offroad/orspark/orspark.htm>

Project Types:

1. Equipment Replacement: Purchases of new or used LSI equipment replacing a fully functional LSI piece of equipment may be eligible. For these projects, refer to Chapter 9.
2. Retrofit Purchase.
3. New Electric Purchase.
4. Other Project Types: New purchases of LSI equipment certified to optional low-emission standards and repowers with cleaner engines have not been typical LSI projects, but may be funded on a case-by-case basis only with prior ARB approval.

Please see Section D (Project Criteria) for detailed minimum eligibility requirements for all off-road LSI project categories.

B. Maximum Eligible Funding Amounts

Table 8-2 summarizes the maximum eligible funding for each project type. All projects are also subject to the cost-effectiveness threshold defined in Appendix G.

**Table 8-2
Maximum Percentage Eligible for
Carl Moyer Off-Road Large Spark-Ignition Engine Projects**

Project	Maximum
New Electric Equipment Purchase	30 percent
Retrofit	100 percent

C. Engine Emission Standards

New and in-use standards have substantially reduced emissions for large spark-ignition equipment over time. ARB and United States Environmental Protection Agency (U.S. EPA) have adopted regulations for exhaust emission standards for new off-road LSI engines and equipment. These engine exhaust emission standards are summarized in Table 8-3. The project criteria in Section D detail the availability of funding for engines manufactured under these provisions.

**Table 8-3
Exhaust Emission Standards for
New Off-Road LSI Engines >1.0 liter
grams per brake horsepower-hour (g/bhp-hr)**

Model Year	NOx+ Non-Methane Hydrocarbons (NMHC)
2001-2006 ⁽¹⁾	3.0
2007-2009	2.0
2010 and later	0.6

⁽¹⁾ Standards phased in from 2001 – 2004

LSI Fleet Rule: This regulation established fleet-average hydrocarbons plus oxides of nitrogen (HC + NOx) emission requirements, which become more stringent over time. The compliance dates shown in Table 8-4 below, with the fleet average requirements, are for the impacted fleets of forklift equipment, sweepers/scrubbers, industrial tow tractors, and/or pieces of airport ground support equipment.

**Table 8-4
Fleet Average Emission Level Requirement
(g/bhp-hr HC + NOx)**

Fleet Type	Compliance Dates		
	1/1/2009	1/1/2011	1/1/2013
Large Forklift Fleet (26+)	2.4	1.7	1.1
Medium Forklift Fleet (4-25)	2.6	2.0	1.4
Non-forklift Fleet	3.0	2.7	2.5

D. Project Criteria

The minimum qualifications for off-road large spark-ignition projects 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.

1. General Off-Road LSI Equipment Project Criteria

- (A) Maximum project life:
 - (1) New electric purchase 10 years
 - (2) Retrofit 5 years
 - (3) Farm equipment* (all projects) 10 years*

*Air districts are required to offer a 10 year project life for farm equipment; however, applicants may request a project life less than 10 years.

A longer project life may be granted case-by-case approval by ARB if an applicant provides justifying documentation. The maximum project life does not consider regulatory requirements and may be shorter. Regulatory requirements may reduce actual project lives below these maximum values.

- (B) LSI equipment with propulsion engines greater than 25 horsepower (hp) and electric equipment that is greater than 19 kilowatts (kW) are eligible for funding.
- (C) LSI equipment with an engine displacement of less than or equal to one liter may be eligible for funding on a case-by-case basis only with prior ARB approval.
- (D) Auxiliary engines on mobile equipment and portable engines may be eligible on a case-by-case basis with prior ARB approval.
- (E) The following industries are not eligible for funding under this chapter: food retail stores, cold storage, and confined space operations (such as freezers).

- (F) Project emission reductions must be based upon readings from an installed and fully operational hour meter. If equipment does not have a functioning hour meter at the time of the project, the hour meter must be installed, repaired and/or replaced. If during the project life the hour meter fails for any reason, the hour meter must be repaired or replaced as soon as possible at the owner's cost.
- (G) Projects that include leased-to-own equipment are eligible provided the signed contract with the air district specifies that the applicant will keep and use the equipment for the entire project life.
- (H) The certification emission standard for the engine must be determined from the Executive Order or U.S. EPA Certificate of Conformity (for federally preempted engines) issued for that engine. ARB Executive Orders for off-road engines may be found at:
http://www.arb.ca.gov/msprog/offroad/cert/cert.php?eng_id=LSIE
- (I) Case-by-case projects must receive approval from ARB prior to funding. These projects must follow the requirements as described in Chapter 3, Program Administration.

2. Retrofits

Retrofit is the installation of a verified emission control system on an existing engine. For LSI equipment, this generally involves the addition of a stoichiometric air/fuel controller and a three-way catalyst. Information on LSI verified retrofit systems may be found at: <http://www.arb.ca.gov/msprog/offroad/orspark/verdev.htm>

- (A) For forklifts only, Classes 4, 5, and 6, are eligible for retrofit project funding.
- (B) The retrofit kit must be verified by ARB to the highest level available for the engine being retrofitted.
- (C) Eligible costs include purchase and installation of a verified retrofit kit and an hour meter if none exists on the equipment.

3. New Purchase

- (A) Electric Equipment
 - (1) Electric forklift equipment that is less than 19 kW may be eligible for funding if manufacturer documentation (e.g., manufacturer specification sheet) is submitted verifying that electric forklift capacity is equal to or

greater than 3,000 pounds. This verification documentation must be included in the project file.

- (2) Electric equipment other than forklifts that are rated less than 19 kW may be eligible on a case-by-case basis with prior ARB approval. Documentation must be provided indicating that work performed is equivalent to a 25 hp LSI engine.
- (3) For forklifts only, new electric forklift purchases of Class 1, lift codes 4, 5, or 6 are eligible.
- (4) For eligible projects, applicants must sign a declaration that old electric equipment is not being replaced with new electric equipment, and the applicant would not normally purchase electric equipment.
- (5) Eligible projects must include evidence of a plan to install either the number of battery chargers corresponding to the number of pieces of equipment purchased or fast charging units for use with multiple pieces of equipment.
- (6) Costs for battery chargers and necessary peripheral equipment associated with electric equipment projects may be included in the determination of the grant award amount. These costs are considered infrastructure and can only be funded with air district match funds.
- (7) Purchase of new zero-emission equipment other than electric is eligible on a case-by-case basis only with prior ARB approval (e.g., fuel cell equipment).

(B) LSI Equipment

Current LSI regulations allow manufacturers to certify engines to optional standards that are below the required emission standards. New LSI engines may certify to optional emission standards as low as 0.10 g/bhp-hr HC+NO_x. It is likely, due to market demand driven by current regulations, that the price differential between equipment certified to the standard and equipment certified to the optional standard may be rather small. As such, new LSI equipment certified to the optional standard and at least 30 percent below the current applicable emission standard may be eligible on a case-by-case basis only with prior ARB approval.

4. Repower: A repower is the replacement of the in-use engine with an emission-certified engine instead of rebuilding the existing engine to its original specifications. Repowers in LSI equipment are not typical due to the relatively low value of the equipment by the time an engine repower is needed. Repowers

of forklifts and other LSI equipment can be considered on a case-by-case basis only with prior ARB approval.

5. Projects Subject to the Off-Road Large Spark-Ignition Engine Fleet Requirement

The LSI Fleet Rule requires reductions in fleet average HC+NOx emissions. The fleet size is determined by aggregating an operator's equipment in the State of California. The regulation impacts owners of fleets of four or more LSI forklifts and/or four or more LSI sweepers/scrubbers, industrial tow tractors, and/or pieces of airport ground support equipment.

- (A) Eligible funding must provide at least three years of surplus emission reductions to the LSI fleet regulation, with a corresponding minimum project life of at least three years.
- (B) Carl Moyer Program funded projects may not be used to delay compliance and will receive no credit towards an in-use regulation.
- (C) Large and Medium Forklift Fleets and Fleets of Four or More Sweeper/Scrubbers, Ground Support Equipment, and/or Industrial Tow Tractors: In order to be eligible for funding, large and medium forklift fleets and fleets of four or more non-forklift LSI equipment must meet the final fleet average emission level applicable on January 1, 2013.
- (D) Agricultural Crop Preparation Forklift Fleets Model Year 1990 and Newer: These fleets are required to either retrofit, repower, or replace 100 percent of their fleet by January 1, 2012, or currently meet a 3.0 g/bhp-hr fleet average HC + NOx level. Fleets that have met the 3.0 g/bhp-hr fleet average can apply for funding. Additionally, in accordance with SBx2 3, fleets that have retrofitted/repowered 20 percent of their fleet in compliance with the regulation are eligible for funding up to the final compliance date. In order to be eligible, these projects must be under executed contract and must be installed and in operation prior to the applicable compliance date.
- (E) LSI fleets that have achieved compliance with the final regulatory deadline are eligible for funding.
- (F) Due to the regulatory requirements for rental and lease equipment subject to the LSI Fleet Rule, projects that include rented or leased equipment are not eligible.
- (G) Fleets with equipment not subject to the LSI Fleet Rule are eligible for funding, including:

- (1) Agricultural crop preparation non-forklift equipment and pre-1990 forklifts.

- (2) Forklifts used exclusively in fields to harvest and maintain crops.
 - (3) Non-forklift LSI equipment such as aerial lifts, lawn and garden tractors, commercial turf equipment, mining and construction equipment, and industrial equipment.
 - (4) Small fleets (one to three forklifts and/or one to three sweepers/scrubbers, industrial tow tractors, or pieces of airport GSE).
6. Required Off-Road LSI Fleet Information: For forklifts, sweeper/scrubbers, GSE, and/or Industrial Tow Tractors, an applicant's fleet size impacts project eligibility. The following basic information is needed from the applicant for all equipment subject to the regulation in order to demonstrate fleet size. All documentation submitted must be signed and dated by the applicant and include language certifying that the fleet list provided is accurate and complete.
- (A) Large/Medium/Non-Forklift Fleets: For large, medium, and non-forklift fleets subject to the LSI Fleet Rule, applicants will need to provide the compliance records for the entire statewide fleet as described in the regulatory language (California Code of Regulations, title 13, § 2775.2). The required fleet information includes:
 - (1) Equipment type (e.g., forklift, GSE, etc.)
 - (2) Make of engine and equipment
 - (3) Model of engine and equipment
 - (4) Serial number of engine and equipment
 - (5) Engine emission certification standard or retrofit verification level (include Emission Control Group name)
 - (B) Small Fleets: Small fleets are not required to maintain compliance records, but for the purposes of determining project eligibility, air districts must obtain the following information for the entire statewide fleet:
 - (1) Equipment identification number (vehicle identification number, fleet assigned identification, etc.)
 - (2) Equipment type (e.g., forklift, GSE, etc.)
7. Applicants are not required to submit information on exempted equipment (except as noted above for small fleets). Information on exempted LSI equipment can be found in California Code of Regulations, title 13, sections 2775(b), 2775.1(c) (4), and 2775.1(d-f) of the Final Regulation Order (<http://www.arb.ca.gov/regact/lore2006/oalapprovedfro.pdf>).