BOARD MEETING DATE: December 1, 2017 AGENDA NO. 6

PROPOSAL: Execute Contract to Develop and Demonstrate Near-Zero Emission Opposed Piston Engine

SYNOPSIS: CALSTART, Inc., and Achates Power, Inc., have been awarded $7 million to develop and demonstrate emission opposed piston (OP) engine technology in Class 8 heavy-duty, line-haul trucks that meet a 0.02 g/bhp-hr NOx target, with concurrent reductions in CO2 emissions. The project was awarded under CARB's Low Carbon Transportation Greenhouse Gas (GHG) Reduction Fund Investments, with total project costs estimated at $15.55 million. The trucks will provide revenue service on regional long haul routes within California. Staff proposes to cost-share this project. This action is to execute a contract with CALSTART, Inc., to develop and demonstrate near-zero emission OP engines in an amount not to exceed $1 million from the Clean Fuels Fund (31).

COMMITTEE: Technology, November 17, 2017; Recommended for Approval

RECOMMENDED ACTION:
Authorize the Chairman to execute a contract with CALSTART, Inc., to develop and demonstrate near-zero emission OP engines in an amount not to exceed $1 million from the Clean Fuels Fund (31).

Wayne Nastri
Executive Officer

MMM:FM:NB

Background

In May 2017, CARB issued a grant solicitation under the Fiscal Year 2016-17 Low Carbon Transportation and Fuels Investments and the Air Quality Improvement Programs for On-Road Advanced Technology Demonstrations. In August 2017, CALSTART, with technology provider Achates Power, Inc., (API), submitted a proposal to develop four and demonstrate two opposed piston (OP) engine equipped heavy-duty on-road trucks.

API, whose headquarters is located in San Diego, is leading the effort to modernize and commercialize opposed piston (OP) engines. The company supports original equipment manufacturer (OEM) development and commercialization of OP engines via engineering services and technology licenses and has ten global OEMs among its customers. The first OP engine with technology licensed from API is planned for market release in 2018 for stationary power applications. In addition, API is currently partnered with Cummins to develop a 1,000 horsepower advanced combat engine for the U.S. Army. The OP engines have previously been used in marine, military, stationary and other applications, and OP engines are on the cusp of commercialization in Class 8 line haul trucks. In addition to the efficiency advantages, OP engines have significant advantages in reducing criteria emissions, in part by addressing critical engine cold-start conditions. The unique rapid catalyst light-off capability of the OP engine uses high internal exhaust gas recirculation (EGR) to minimize NOx while elevating exhaust gas temperatures to accelerate catalyst activity during cold-start and low-load engine operation.

On October 19, 2017, CARB notified CALSTART that their project proposal had been selected for a grant award in the amount of $7 million, with the remaining $8.55 million in cost-share to be provided by project partners, which currently include API, Peterbilt Motors Company, Wal-Mart Logistics, LLC, (Walmart), Tyson Foods, Inc., San Joaquin Valley Air Pollution Control District and Sacramento Metropolitan AQMD. Staff proposes to cost-share this project to provide the remaining project funding needed. The project is intended to accelerate the adoption and commercial deployment of near-zero heavy-duty emission technologies by developing and deploying OP technology for long haul truck applications. This will be the first demonstration in the U.S. of a high-efficiency and low-NOx engine powertrain vehicle in Class 7-8 applications.

Proposal

The OP-engine Class 8 demonstration will deploy and validate engine design that will meet the near-zero NOx requirement (0.02 g/bhp-hr), while simultaneously providing a 15-20 percent increase in fuel efficiency compared to 2017 EPA requirements. Specifically, API will develop four 10.6-liter OP engines including aftertreatment systems and install two of the four engines into Class 8 trucks with Peterbilt, a subsidiary of Paccar, an American manufacturer of medium- and heavy-duty commercial vehicles. Peterbilt will secure tractors, perform integration services and support, and perform vehicle calibration and testing. Subsequently, the trucks will be placed into revenue service for a minimum of three months with Walmart and Tyson Foods in regional long haul routes, including disadvantaged communities, located in the jurisdictions of the Sacramento Metropolitan, San Joaquin Valley, San Diego and South Coast air districts. The demonstration will include the use of renewable diesel. The other two engines to be developed by API will be used for testing.

The overall goal of the project is to realize near- and long-term certification and commercialization goals and establish higher efficiency, near-zero emission, liquid-fueled engines as an industry standard. CALSTART, which will administer and provide oversight for this project, has previously worked with numerous manufacturers and fleets engaged in publicly funded programs to develop and deploy near-zero and zero emission heavy-duty vehicles. This action is to execute a contract with CALSTART, Inc., to develop and demonstrate near-zero emission OP engines.

Sole Source Justification
Section VIII.B.2. of the Procurement Policy and Procedure identifies provisions under which a sole source award may be justified. The request for a sole source award for this project is made under the provisions B.2.c.(1): The unique experience and capabilities of the proposed contractor or contractor team; B.2.c.(2): The project involves the use of proprietary technology; and B.2.d.(1): Projects involving cost-sharing by multiple sponsors. CALSTART has extensive experience in administering such projects, and API has extensive knowledge and experience in advanced OP engine technology needed to successfully complete this project and will utilize their proprietary technologies for this project. This demonstration project will be cost-shared by CARB and the other project partners, as described further in Resource Impacts.

Benefits to SCAQMD
Projects to support development and demonstration of various electric and near-zero emission container transport technologies are included in the *Technology Advancement Office Clean Fuels Program 2017 Plan Update* under the category Engine Systems. This project is to develop and demonstrate near-zero emission heavy-duty, liquid-fueled engines suitable for Class 8 trucks. Successful demonstration of such projects will contribute to the attainment of clean air standards in the South Coast Air Basin by significantly reducing NOx emissions from replaced diesel trucks.

Resource Impacts
The SCAQMD's cost-share will not exceed $1 million from the Clean Fuels Fund (31). The estimated total project cost is $15.55 million, as follows:

Proposed Project Cost-Share by Partner

Project Partner	Funding Amount (in millions)	Percent of Project
CARB	$7.0	45.0
Achates Power, Inc.	$6.55	42.0
San Joaquin APCD	$1.0	6.5
SCAQMD *(requested)*	$1.0	6.5
Total	**$15.55**	**100.0**

Sufficient funds are available from the Clean Fuels Fund (31), established as a special revenue fund resulting from the state-mandated Clean Fuels Program. The Clean Fuels Program, under Health and Safety Code Sections 40448.5 and 40512 and Vehicle Code Section 9250.11, establishes mechanisms to collect revenues from mobile sources to support projects to increase the utilization of clean fuels, including the development of the necessary advanced enabling technologies. Funds collected from motor vehicles are restricted, by statute, to be used for projects and program activities related to mobile sources that support the objectives of the Clean Fuels Program.