

BOARD MEETING DATE: February 3, 2017

AGENDA NO. 3

**PROPOSAL:** Execute Contracts to Conduct In-Use PM Emission Study for Gasoline Direct Injection Vehicles and Establish Renewable Natural Gas Research Center 

**SYNOPSIS:** Since mobile sources represent the largest NO<sub>x</sub> and PM sources in the South Coast Air Basin, the Draft 2016 AQMP identifies development and implementation of new technologies to reduce mobile source emissions as a key strategy. It is also equally important to assess new technologies to prevent or mitigate any negative impact on air quality and public health. The University of California Riverside (UCR) CE-CERT recently submitted two unsolicited proposals that address these needs and staff recommends cost-sharing the proposed projects to: 1) conduct an in-use emission study to characterize tailpipe PM emissions from gasoline direct injection vehicles under real-world driving conditions; and 2) support establishment of a research center to study promising renewable natural gas production technologies to expedite commercial implementation. This action is to execute contracts with UCR CE-CERT to cost-share these projects in an amount not to exceed \$322,000 from the Clean Fuels Fund (31).

**COMMITTEE:** Technology, January 20, 2017; Recommended for Approval

**RECOMMENDED ACTION:**

Authorize the Chairman to execute contracts with UCR CE-CERT for the following projects from the Clean Fuels Fund (31):

- a. Conduct in-use PM emission study for gasoline direct injection vehicles in an amount not to exceed \$222,000; and
- b. Support establishment of a Renewable Natural Gas Research Center to study promising RNG production technologies in an amount not to exceed \$100,000.

Wayne Nastri  
Executive Officer

## **Background**

SCAQMD faces daunting challenges to achieve significant reductions in NO<sub>x</sub> emissions in order to meet the national ambient air quality standards for ozone. Since mobile sources represent the largest NO<sub>x</sub> and PM sources in the South Coast Air Basin, it is essential to support the development and implementation of new technologies that will help reduce mobile source emissions. It is also equally important to assess the new technologies to prevent or mitigate any negative impact on air quality and public health.

Gasoline direct injection (GDI) vehicles are the fastest growing market segment in the automobile industry as manufacturers introduce more GDI models to meet new and more stringent fuel economy standards. However, studies have shown that GDI vehicles emit higher PM emissions than conventional port fuel injection vehicles, with potentially significant impacts on air quality and public health. As a result, both U.S. EPA and CARB have been testing GDI vehicles over different test cycles to characterize their PM emissions. The SCAQMD also funded a UCR CE-CERT study to characterize tailpipe PM emissions, including secondary organic aerosols, from GDI vehicles using a chassis dynamometer. However, this dynamometer-based testing may be limited in providing accurate estimates of real-world on-road emissions, and in-use emission analysis using portable emission measurement systems (PEMS) may help address such limitations.

The SCAQMD has a long history of supporting clean alternative fuels including natural gas. This support has included expanding the region's natural gas refueling infrastructure and advancing the development of near-zero NO<sub>x</sub> emission heavy-duty natural gas-powered engines. Furthermore, since renewable natural gas (RNG) is an important alternative fuel that can help reduce GHG emissions and dependency on fossil fuels, SCAQMD has provided support for waste-to-energy projects, such as electricity generation from municipal solid waste (MSW) or landfill gas, and is extending support to local production and use of RNG as a transportation fuel. Two ongoing Board-approved RNG projects include the CR&R anaerobic digester utilizing municipal solid waste to produce RNG in Perris and the KORE Infrastructure project to produce RNG from biosolids. The primary use of RNG from these facilities is intended for medium- and heavy-duty natural gas vehicles.

Recently, UCR CE-CERT submitted two unsolicited proposals, one to characterize tailpipe PM emissions from GDI vehicles and another to evaluate promising RNG production technologies.

## **Proposal**

This action is to execute contracts with UCR CE-CERT to: 1) conduct an in-use emission study to characterize tailpipe PM emissions from GDI vehicles under real-world driving conditions; and 2) support establishment of an RNG research center to study promising RNG production technologies to accelerate their commercial implementation.

### In-Use PM Emission Study

Complementing prior and ongoing dynamometer-based testing, UCR CE-CERT proposes to conduct in-use emission testing of CARB-tested GDI models to measure their PM and particle number (PN) emissions under real-world driving conditions. The testing will be conducted with PEMS units over three different routes in Southern California to simulate urban, rural and highway driving patterns, with three test runs for each route per test vehicle for validation tailpipe emissions. Also, one of the test vehicles will be retrofitted with a gasoline particulate filter provided by the Manufacturers of Emission Controls Association (MECA) to test the efficacy of the control technology. The results of this study will be used, along with the CARB-test results, to characterize PM and PN emissions from GDI vehicles and facilitate a discussion on potential mitigation strategies.

### RNG Research Center

UCR CE-CERT proposes to establish a Renewable Natural Gas Research Center (RNGRC) which will study key RNG production technologies in demonstration-scale testbeds to address technical and other challenges as well as system optimization and integration needed for commercial implementation of the technologies in California and elsewhere. This proposal is to cost-share Phase 1 of the RNGRC project, which will consist of the following tasks:

- Evaluation of RNG production potentials via thermochemical conversion and power-to-gas (PTG) technologies;
- Techno-economic evaluation (technology pathway and cost-effectiveness analysis) of high viability projects, including well-to-wheel analysis of GHG and criteria pollutant emissions and energy use;
- Design basis for demonstration-scale projects and a roadmap that details the most feasible path towards commercialization, including technology choices, policy and regulatory barriers, timeline and financing strategies; and
- Education and outreach to the public, policymakers and other stakeholders through conferences and communication through media outlets, as well as technology demonstrations and publications.

Successful completion of the Phase I tasks may lead to Phase II in a subsequent project to fabricate, install and operate demonstration-scale testbeds with an ultimate path toward construction and operation of commercial-scale plants for selected RNG production technologies.

### **Sole Source Justification**

Section VIII.B.2 of the Procurement Policy and Procedure identifies provisions under which a sole source award may be justified. This request for sole source awards is made under provisions B.2.d.(1) and (8): Other circumstances exist which in the determination of the Executive Officer require such waiver in the best interest of the SCAQMD. Such circumstances may include but are not limited to projects involving cost-sharing by multiple sponsors and research and development efforts with educational institutions or nonprofit organizations.

UCR is an educational institution and CE-CERT is their research center with multidisciplinary resources to engage in diverse environmental and transportation research programs. The cost-share will consist of in-kind contributions from MECA for the in-use PM emission study and funding support from the Southern California Gas Company (SoCalGas) and U.S. Department of Transportation (DOT), along with in-kind contributions from UCR for the RNGRC.

### **Benefits to SCAQMD**

The proposed projects are relevant to the SCAQMD's priorities to reduce NO<sub>x</sub> and PM emissions from transportation and stationary sources as well as realizing GHG co-benefits to achieve national ambient air quality standards and protect public health.

The proposed in-use PM emission study will help to better understand the impact on air quality and public health from GDI vehicles that are increasing in popularity due to its higher fuel economy and power output. It will also facilitate discussions on potential control technologies to mitigate such impact.

Large-scale production of RNG in California will lead to the expanded availability of RNG as a transportation fuel as well as a clean alternative energy source. This will further accelerate the deployment of near-zero heavy-duty transportation technologies, helping to lower NO<sub>x</sub> emissions in our Basin, and potentially provide fuel with significant GHG benefits.

The proposed projects are included in the *Technology Advancement Office Clean Fuels Program 2016 Plan Update* under the categories of "Fuels/Emission Studies" and "Stationary Clean Fuel Technologies."

### **Resource Impacts**

The total estimated cost for the proposed projects is \$534,000, of which SCAQMD's proposed cost-share will not exceed \$322,000 from the Clean Fuels Fund (31), as summarized below:

**Proposed Project Cost-Share**

<b>Project Partner</b>	<b>In-Use Study</b>	<b>RNGRC</b>	<b>Total by Project Partner</b>
SCAQMD ( <i>requested</i> )	\$222,000	\$100,000	\$322,000
MECA (in-kind)	\$51,000		\$51,000
SoCalGas		\$100,000	\$100,000
U.S. DOT		\$25,000	\$25,000
UCR CE-CERT (in-kind)		\$36,000	\$36,000
<b>Total Project Cost</b>	<b>\$273,000</b>	<b>\$261,000</b>	<b>\$534,000</b>

Sufficient funds are available in the Clean Fuels Fund (31) for this proposed project. The Clean Fuels Fund (31) is 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.