

BOARD MEETING DATE: December 5, 2025

AGENDA NO. 4

PROPOSAL: Execute Contract to Assess Emissions of a Linear Generator

SYNOPSIS: Linear generators provide a rapidly deployable and scalable pathway to support EV charging infrastructure by generating electricity onsite. Their flexibility to operate on different fuels and low-emission power generation has led to their emergence as an alternative prime power generation technology that can support and accelerate charging infrastructure and backup generation. This project will utilize a Hyliion KARNO linear generator to assess the emission aspects of this technology using different fuel sources. This action is to execute a contract with the University of California, Riverside College of Engineering – Center for Environmental Research and Technology in an amount not to exceed \$423,723 from the Clean Fuels Program Fund (31) to conduct the studies on a Hyliion KARNO linear generator.

COMMITTEE: Technology, November 21, 2025; Recommended for Approval

RECOMMENDED ACTION:

Authorize the Executive Officer to execute a contract with the University of California, Riverside College of Engineering - Center for Environmental Research and Technology (UCR/CE-CERT) to assess emissions performance of a fuel-flexible linear generator in an amount not to exceed \$423,723 from the Clean Fuels Program Fund (31).

Wayne Natri.
Executive Officer

AK:MW:VP:SC:HL

Background

In 2019, linear generators were introduced to South Coast AQMD as an alternative power generation technology to diesel generators with significantly reduced emissions. Unlike traditional internal combustion engines, linear generators produce

electricity by driving magnets through copper coils in a linear motion. This efficient operation creates ultra-low emissions without aftertreatment controls such as selective catalytic reduction where there is potential for ammonia slip and PM emissions. Linear generators also have the ability to operate on a wide variety of fuel types, such as renewable natural gas, biogas, hydrogen and ethanol. Linear generators have other desirable aspects such as the ability to follow electrical loads, and can be used as prime power generation where facilities are seeking interim energy solutions while waiting for grid power connections or as a backup power generation. Linear generators are increasingly being used for power generation solutions for medium- and heavy-duty charging depots where sufficient grid support isn't available. Due to its recent introduction to the market, increasing utilization in infrastructure applications, potential for high efficiency with low emissions, and its unique fuel agnostic characteristics there is a need to understand the long-term durability, emissions and performance of this technology using different fuel sources.

Under this project, a linear generator from Hyliion Inc. (Hyliion) will be evaluated for its emissions under different fuels and loads, as well as emission performance over time.

Proposal

UCR/CE-CERT will conduct an emissions study on a Hyliion KARNO fuel-flexible linear generator located at Hyliion's headquarters in Ohio with up to five fuel types. The project team will also characterize the criteria and toxic air pollutants emissions, which in part include particulate matter, polycyclic aromatic hydrocarbons and the pollutants listed in the table below. Although initial testing has alleviated concerns regarding hexavalent chromium emissions, understanding other toxic and criteria pollutant emissions of linear generators in use is particularly interesting to South Coast AQMD as more linear generators are deployed in the South Coast Air Basin (Basin) for buildings and transportation electrification.

Pollutants to be Tested
Nitrogen Oxides (NOx)
Carbon Monoxide (CO)
Carbon Dioxide (CO2)
Particulate Matter (PM 2.5)
Total Hydrocarbon (THC), Methane (CH4), & Non-Menthane Hydrocarbon (NMHC)
Carbonyl Compounds
Volatile Organic Compounds (VOCs)

In addition, Hyliion has plans to deploy the KARNO generator in the Basin and allow the project team to evaluate the long-term emissions operating under real-world conditions. The proposed linear generator will be installed at a fleet depot and provide prime power to EV charging stations. UCR/CE-CERT will conduct emissions testing and assess the durability and performance of the KARNO linear generator over a period of two years.

Sole Source Justification

Section VIII.B.2 of the Procurement Policy and Procedure identifies four major provisions under which a sole source award may be justified. This request for sole source award is made under provision B.2.d.: Other circumstances exist which, in the determination of the Executive Officer, require such a waiver in the best interests of South Coast AQMD. Specifically, these circumstances are B.2.d.(8): Research and development efforts with educational institutions or nonprofit organizations.

Benefits to South Coast AQMD

Projects supporting EV charging infrastructure are included in the Technology Advancement Office Clean Fuels Program 2025 Plan Update under “Zero Emission Infrastructure,” “Stationary Clean Fuel Technologies,” and “Fuel and Emissions Studies.” Research and support for infrastructure are key components to deploying zero-emission technologies for the transportation sector. The deployment of heavy duty EVs within the Basin has created a need for large amounts of grid power to support charging infrastructure, and linear generators provide interim and resilient power solutions. Understanding the toxic and criteria pollutant emissions from in-use linear generators on multiple fuel sources and fuel blends is of particular interest to South Coast AQMD as more linear generators are deployed in the Basin to provide power generation to buildings and to supplement the grid electricity in heavy duty battery EV charging applications.

Resource Impacts

South Coast AQMD’s support for the evaluation of emissions, performance, and long-term durability of the Hyliion linear generator with UCR/CE-CERT shall not exceed \$423,723 from the Clean Fuels Program Fund (31).

Funding Source	Funding Amount	Percent
Hyliion, Inc (In-Kind)	\$2,230,000	84%
South Coast AQMD (<i>requested</i>)	\$423,723	16%
Total	\$2,653,723	100%

Sufficient funds are available from the Clean Fuels Program 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.