MOMENTUM

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Notice of Funding Opportunity

Title: California Energy Commission – Hydrogen Fuel Cell Truck and Bus Technology Integration and Demonstration
Website: https://www.energy.ca.gov/solicitations/2021-07/gfo-21-501-hydrogen-fuel-cell-truck-and-bus-technology-integration-and
Funding: Total: $4,000,000. Maximum awards: $1.5M-$2M, depending on project.
Dates: Pre-Application Workshop: August 3, 2021 at 1PM
Deadline for Written Questions: August 10, 2021
Deadline to Submit Full Applications: October 15, 2021

Summary: The purpose of this solicitation is to fund research, development, and demonstration projects to improve the cost effectiveness and performance of hydrogen fuel cell-powered heavy-duty trucks and buses with challenging duty cycles.

Project Topic Areas:
Projects funded through this solicitation must demonstrate an advanced, zero-emission hydrogen fuel cell-electric truck or bus that can meet challenging duty cycle requirements such as long routes, limited refueling opportunities, and high payload weight capacity needs. Projects must develop improved hydrogen fuel cell vehicle integration strategies or integrate pre-commercial component technologies (e.g., more durable and lower cost fuel cells, more efficient air management, lighter on-board storage tanks or tank configurations) to improve performance, fuel efficiency, durability, maintainability, and total cost of ownership. Projects must aim to advance the technology readiness level (TRL) of the improved hydrogen fuel cell vehicle integration strategy and/or pre-commercial component technology from TRL 4-5 to TRL 7-8. Projects must have a path to commercialization to ensure benefits beyond the initial vehicle demonstration. Along with any other proposed targets (e.g., horsepower, torque, range, payload weight capacity, and refueling time) important for commercialization of hydrogen fuel cell trucks and buses, projects must aim to achieve the target performance metrics indicated below. These and other critical target metrics should be identified and explained in the Project Performance Metrics.

Metric	Truck Targets	Bus Targets
Fuel cell system lifetime	25,000 hours or 10 years/ 1,000,000 miles	25,000 hours or 12 years/ 500,000 miles
Fuel economy improvement over equivalent internal combustion engine (ICE) powered vehicle, or Energy Economy Ratio (EER)	At least 1.9x	At least 1.9x
Total cost of ownership reduction compared to current fuel cell vehicle technology	At least 30 percent	At least 30 percent

Funding:
There is up to $4,000,000 available for grants awarded under this solicitation. The minimum funding amount for each project is $1,500,000. The maximum funding amount is $2,000,000. Match funding is required in the amount of at least 20 percent of the requested project funds. Applications that include match funding will receive additional points during the scoring phase. CEC funding under this solicitation can be used for temporary hydrogen refueling infrastructure or hydrogen fuel to support the proposed demonstration. This can include costs related to supplying hydrogen to the demonstration vehicle using existing hydrogen refueling stations or a mobile refueler. CEC funding under this solicitation cannot be used for deploying permanent hydrogen refueling stations. Applicants are highly encouraged to leverage existing hydrogen refueling infrastructure, future accessible infrastructure in development, or other funding sources for infrastructure to support the demonstration. To further infrastructure standardization efforts for heavy-duty vehicles, projects may not include use of proprietary refueling receptacles.

Project Requirements:
General Requirements

- Develop a heavy-duty hydrogen fuel cell truck or bus design that can meet the equivalent operational performance of a traditional ICE-powered vehicle including but not limited to horsepower, torque, range, payload weight capacity, refueling time, and durability. The hydrogen fuel cell truck or bus design must be able to effectively compete with a traditional ICE-powered vehicle as a one-to-one replacement.
- Incorporate learnings from initial pre-production prototype demonstrations and component-level advancements to accelerate progress towards the introduction of commercially attractive heavy-duty hydrogen fuel cell trucks and buses.
- Develop engineering advancements or innovative integration strategies to improve performance, efficiency, durability, and operating costs of the hydrogen fuel cell truck or bus over representative duty cycles in pursuit of the target metrics identified. Evaluate key design tradeoffs between various subsystems including the hydrogen fuel cells, onboard storage, thermal management, power electronics, batteries, controls, and others to optimally meet the performance needs of the vehicle application.
- Demonstrate the vehicle using the improved hydrogen fuel cell powertrain with a California fleet in representative real world operation. Demonstrations must be designed to validate the vehicle's ability to meet the specified challenging duty cycle requirements. Projects may include multiple demonstration sites and fleet partners, but at least one demonstration site must be located in a California natural gas Investor Owned Utility (NG IOU) territory.
- Analyze collected real world demonstration data to validate design improvements and calculate a projected total cost of ownership with a detailed breakdown of capital, operating, and maintenance costs associated with the vehicle. Compare the final vehicle cost and performance metrics with equivalent ICE and battery-electric vehicles. Projects must also compare final vehicle metrics with the current state of hydrogen fuel cell vehicle technology to document improvements.
- Leverage real world demonstration data to identify opportunities for commercialization and continued technology advancement.
- Conduct outreach and collaborate with community and industry partners to share the results of the demonstration and educate the public on project benefits.

Data Collection Requirements

Projects must provide a minimum of 12 months of data collection from the vehicle demonstration. The Project Narrative must describe how actual project benefits will be measured and quantified, and how the following data, at the minimum, will be collected and reported over the course of the demonstration:

- Vehicle and powertrain specifications including manufacturer, gross vehicle weight, fuel capacity, battery capacity, and rated power.
- Vehicle operation including duty cycle, descriptions of daily usage, average speed, payload weight, trip duration, and trip distance.
- Vehicle performance including maintenance information, vehicle availability, vehicle range, fuel cell degradation, and battery degradation.
- Fuel consumption including fuel price, refueling time, distance traveled to refuel, refueling source, refueling frequency, and energy efficiency.
- Fleet experience including qualitative comparisons with other vehicle technologies, remaining gaps or barriers to adoption, and operator feedback.

Eligible Applicants:

This solicitation is open to all public and private entities. Demonstration projects in this solicitation must be located in the service territory of a California natural gas Investor Owned Utility (NG IOU), which includes Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company. All projects in this solicitation must benefit natural gas IOU ratepayers.