

DOCKETED

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*Comment Received From: Sean Gibson
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Modern Hydrogen On-Site Production Comments

Additional submitted attachment is included below.



June 28, 2024

California Energy Commission

715 P Street
Sacramento, California 95184

RE: Request for Information Docket #24-EVI-01 – Considerations for the California Energy Commission Zero-Emission Medium- and Heavy-Duty Drayage Infrastructure Application for the U.S. Department of Transportation’s Charging and Fueling Infrastructure Discretionary Grant Program

Dear California Energy Commission:

We are pleased to submit our response to the Request for Information (RFI) docket number 24-EVI-01.

Modern Hydrogen provides distributed clean hydrogen production and solid carbon capture solutions, and we wish to share our unique perspective on ways we can help strengthen and bolster the hydrogen refueling infrastructure with our technology.

Below, we have provided responses to questions one, two, five, and seven. We are happy to provide further details or answer any additional questions you may have.

We are excited to contribute to this discussion and look forward to collaborating with you in building and scaling the hydrogen refueling network in California for medium- and heavy-duty drayage vehicles.

Sincerely,

A handwritten signature in black ink, appearing to read 'M Pahl', written over a horizontal line.

Mothusi Pahl

Vice President, Business Development and Government Affairs
Modern Hydrogen



1. Please disclose your business type and vehicle class, if applicable. Are you a driver, fleet operator, truck stop operator, charging and/or hydrogen fueling provider, installer, manufacturer, utility, public agency, or other? Are you part of a small, veteran-owned, woman-owned, or minority-owned business?

Modern Hydrogen provides distributed clean hydrogen production and solid carbon capture solutions. We build and deliver onsite hydrogen generation systems that require only access to pipeline-spec natural gas or RNG/biogas. We produce low-carbon-intensity (CI) hydrogen via clean pyrolysis using a proprietary thermal process that requires no electrical heating, water inputs or catalysts. Our outputs are low-CI hydrogen and solid carbon, in compliance with California air quality specifications. Modern Hydrogen is a growing company with 70 employees and headquarters in the State of Washington. We are committed to working with small and midsize businesses in California. We can train, subcontract and collaborate with California-certified small businesses (SB) and/or disabled veteran business enterprises (DVBE).

The key benefits that our technologies bring to the hydrogen mobility ecosystem include:

- **Onsite Production:** Our technology eliminates hydrogen delivery risks by diversifying hydrogen sources and leveraging the extensive natural gas pipeline network for hydrogen delivery.
- **No Need for Process Electricity:** Our pyrolysis units use a thermal process powered by a slipstream of the hydrogen that we produce, with the remaining hydrogen delivered to customers for vehicle fueling. As our on-site, self-sufficient approach requires electricity only for balance-of-plant operations, we avoid the need for costly and time-intensive new electricity interconnections and upgrades to generate hydrogen.
- **Low Carbon Intensity Hydrogen:** Our production process has low-to-negative carbon intensity, depending on the feedstock, and runs clean regardless of scope 1 additionality, time matching or geographic requirements often associated with electrically driven hydrogen generation.
- **Avoids Large Infrastructure Projects:** Our unit installations do not require large-scale infrastructure modifications.

We provide installation, commissioning and maintenance of our onsite hydrogen pyrolysis units. We have pilots operating in Oregon, Florida and Washington.

2. The purpose of this RFI is to help inform the CEC's application to the Federal Highway Administration (FHWA) for federal funding. If awarded, the CEC will release a competitive grant funding solicitation to provide funding to end recipients who would develop and construct the zero-emission MDHD infrastructure. Would you consider applying for CFI grant funding for site development if the CEC is awarded funding?

Yes, we would strongly consider applying. We would apply in collaboration with hydrogen station designers, owners and/or operators, as Modern Hydrogen is a hydrogen producer, not a hydrogen station developer, owner or operator.



5. For EV charging and hydrogen fueling providers, describe:

- a. Your organization’s business model for public charging and/or hydrogen fueling offerings.**
- b. Mechanisms your organization might leverage to provide affordable charging and fueling services to drayage fleet operators.**
- c. The scope of services, facilities and amenities provided at your recharging/refueling locations.**
- d. The anticipated site size, parking configuration (e.g., pull-through), total number of charging stalls capable of simultaneous charging, and total number of truck parking spaces that are not dedicated to charging or refueling.**
- e. How your organization approaches right-sizing infrastructure for near-term market demand and future-proofs infrastructure to be responsive to evolving needs**

Modern Hydrogen is a technology provider responsible for the delivery, installation and proper operation of our pyrolysis units to produce hydrogen on-site by decarbonizing methane gas wherever pipeline infrastructure is available. We provide necessary support and regular maintenance to our units. All other machines, construction and fueling station operation are provided by others.

There are two scenarios for the participation of Modern Hydrogen in hydrogen fueling stations:

- (i) Sale of Pyrolysis Unit:** We sell our pyrolysis unit to station owners or a third party. They own and operate the machine, while we provide maintenance, repairs, and support for our unit. Hydrogen handover occurs at the outlet of our system.
- (ii) Hydrogen-as-a-Service:** We sell hydrogen as a service to station owners. In this scenario, we operate our pyrolysis unit and may also handle post-process purification and/or compression, depending on the station agreement. If we provide post-production services, we will also operate and maintain these machines.

One Modern Hydrogen pyrolysis unit produces 500 kg of hydrogen per day from a 40-foot container footprint. Our units are designed to be deployed in a modular fashion to increase production as demand rises. This scalability allows us to grow based on market dynamics while maintaining the option to stay small as the vehicle market develops.

Hydrogen pricing and risk management of assets are best decided on a station-by-station basis. The optimal structure will depend on the stakeholders involved, the location and customer requirements. Our technology is designed to achieve competitive hydrogen prices in line with U.S. government forecasts.

7. If possible, provide any general cost estimates for MDHD charging and/or hydrogen fueling stations you have designed, built, or have experience with, including charger power levels and number of stations installed. Please provide a range of public cost-share as a percentage of the total project cost necessary to support more public charging stations to serve zero-emission trucks along drayage corridors. For example, should the publicly funded cost share be 50% CEC/federal and 50% private/other?



Modern Hydrogen units are a part of a broader hydrogen station. Through research and industry conversations about our technology for fueling solutions, three considerations when thinking about cost estimates are worth highlighting:

- (i) **Lower CAPEX compared to H2 delivery:** Our technology does not require large infrastructure investments. Central hydrogen production costs hundreds of millions of dollars, involves complex technical and stakeholder coordination, and requires costly new specialized hydrogen delivery infrastructure that will take years/decades to build out. Our solution is a turnkey unit that comes in a skid and leverages the millions of miles of existing gas pipelines to make ubiquitous hydrogen possible.
- (ii) **Lower and More Stable OPEX:** Methane prices—our main feedstock—are more stable than water and electricity prices and are likely to continue on a downward trend as the economy moves towards decarbonization. As a result, our production process has lower costs than comparable low-carbon-intensity hydrogen solutions. Additionally, producing hydrogen onsite eliminates costly steps, including transportation and delivery.
- (iii) **Mitigates Costly Downtime:** Designs and early tests of hydrogen stations rarely consider downtime. One of the biggest drivers of downtime has been the inability to reliably supply fueling stations with hydrogen due to vagaries in the hydrogen delivery network. Any link in the value chain can fail, such as tube trailers being down or the central plant requiring unplanned maintenance. Without distributed, onsite hydrogen production as an option, these events can prove very costly to hydrogen fleet owners and station owners. Procuring hydrogen from other central plants is expensive or unavailable. Having onsite hydrogen production helps to always have hydrogen available and mitigates these unforeseen delivery failure risks.