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Air Products Response to Request for Information Docket #24-EVI-01

Additional submitted attachment is included below.

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June 10, 2024

Ms. Sarah Sweet, Federal Liaison
California Energy Commission
Docket Unit MS 4
715 P Street
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RE: Request for Information Docket #24-EVI-01

Air Products Contact:
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Dear Ms. Sweet,

On behalf of Air Products, we are grateful for the opportunity to respond to the Request for Information (RFI) under the California Energy Commission (CEC) in partnership with the California Department of Transportation (Caltrans), the Oregon Department of Transportation (ODOT), and the Washington State Department of Transportation (WSDOT) for information to support potential medium- and heavy-duty (MDHD) corridor projects under the U.S. Department of Transportation's Charging and Fueling Infrastructure Discretionary Grant Program (CFI Program). We are grateful for the opportunity to provide our input and considerations for projects that together with the CEC, Caltrans, ODOT, and WSDOT would support fueling infrastructure deployment for the Tri-State corridors near term (2024-2027).

As a leader in hydrogen (H2) refueling, Air Products strongly supports the group's plans to further the goal of a convenient and accessible network of charging and refueling infrastructure for fleets and operators. We recognize that the intent of this RFI (#24-EVI-01) is to gather insights to aid in

a Tri-State CFI application(s) specifically for connections within the states for publicly accessible battery-electric charging infrastructure with a vision to identify a limited number of MDHD battery electric hubs and connections for publicly accessible battery-electric charging infrastructure. However, the limitation to battery electric charging is disappointing as hydrogen fueling, particularly for MDHD transportation is also critical to achieving Federal and state climate goals. It is good to see consideration by the states for future inclusion of hydrogen in the longer-term vision of a West Coast MDHD battery-electric and hydrogen highway along Interstate 5 (I-5) (and beyond) in the coming years and that future CFI rounds may consider a focus on publicly accessible hydrogen but we urge the addition of hydrogen stations to be included in the current (2024) Tri-State CFI application and as the focus of a future CFI application directed towards publicly accessible hydrogen. The inclusion of hydrogen is critical at this ground stage of CFI given the timelines needed to develop and commission large scale (up to ~6000 kg/day) reliable hydrogen fueling stations that will serve MDHD trucking along heavily traveled corridors as well as to provide certainty to OEMs and fleet owners that hydrogen infrastructure will be readily available to them. An inclusive application strategy would align with the vision of the Pacific Coast Collaborative as presented in their report entitled, " Low-Carbon-Transportation-Vision-and-Roadmap.pdf (pacificcoastcollaborative.org)" that calls for transitioning the West Coast to clean modes of transportation and reduce greenhouse gases from the transportation sector through a variety of actions including working with the private sector to invest in electric vehicle charging and hydrogen fueling infrastructure.

The Air Products team is available to discuss this RFI response and subsequent questions in more detail. Please do not hesitate to contact us. We respectfully provide the following comments to the questions in the docket:

Q1. Please disclose your business type and vehicle class, if applicable. Are you a driver, fleet operator, truck stop operator, installer, manufacturer, utility, public agency, or other? Are you part of a small, veteran-owned, woman-owned, or minority-owned business?

A1. **Headquartered in Allentown, Pennsylvania, Air Products is a fully integrated industrial gas company, hydrogen producer, as well as a hydrogen fueling station developer, installer and operator.** We have world class engineering, global manufacturing operations, and global project management and execution capabilities with an expertise in hydrogen. We also own and operate our own heavy-duty truck fleet that is in the process of being converted to hydrogen fuel cells and we directly employ our truck drivers. Air Products currently operates six first-generation hydrogen refueling stations (HRS) serving light duty (LD) vehicles and fueling stations serving buses or transit agencies in California (OCTA and UC Irvine) with more in development. In addition, Air Products supplied the equipment used in another more than 20 other fueling stations that are currently operated by third parties throughout California. Based on our experience in the hydrogen refueling business over the past 20 years, Air Products believes access

to hydrogen and hydrogen fueling stations is the most significant obstacle to the rapid adoption of hydrogen in both the light-duty and the emerging medium- and heavy-duty transportation market sectors throughout the state. This obstacle can be solved through project partnership opportunities like this one with the CEC, Tri-States, and the U.S. Department of Transportation (DOT).

Globally, Air Products has firsthand operating experience at over 250 hydrogen fueling station projects worldwide in 20 countries (www.airproducts.com/h2fm). Our dispensers have completed over 11 million vehicle fills since 2005 and our equipment is providing over 100,000 fills per month to a wide range of vehicles. It is through this data and experience that we provide our comments to this RFI.

Q2. Would you consider applying for CFI grant funding for site development if the tri-state agencies are awarded funding?

A2. Yes, Air Products would immediately apply for any applicable available funding to accelerate our goal to build a network of permanent, commercial-scale, multi-modal hydrogen refueling stations stretching from Northern California to Southern California. The Air Products Hydrogen for Mobility team is actively pursuing suitable parcels of land to build our multimodal liquid hydrogen refueling stations along the I-5 corridor as well as other priority Alternative Fuel Corridors in the state of California and eventually expanding farther North. CFI funding is critical to station developers' efforts like Air Products that are privately investing in building stations at scale to grow the market and maximize customer experience by having large scale liquid storage on site with robustness and redundancy of major equipment to ensure maximum station uptime and reliability. These critical elements add significant cost to the station, thus, leveraging government incentives and grant funds such as the CFI help to lower capital spending while equipment is procured, fabricated, assembled, and shipped to the HRS site. The funding support carries forward when the station achieves open retail status and station utilization is low initially but ramps up over time. The addition of grant funds to support equipment costs will provide the lift needed to offset high initial costs and investment for hydrogen station infrastructure, accelerating the pace of additional station buildout. Given the multitude of requirements that must be achieved to build a hydrogen refueling station (i.e., land availability, permitting, proximity to green hydrogen sources, etc.) the identification of suitable HRS locations to support high utilization rates on designated key corridors is challenging and takes considerable time. Government support is therefore critical to early adopters like Air Products using private investment to ensure fuel availability to the pre-commercial MDHD vehicle market.

As all subsequent questions pertain to battery electric charging, we took this opportunity to respond with an eye to the near future where hydrogen should be included.

Q3. Do you already operate or are you planning to use zero-emission battery electric MDHD vehicles in the next five years? Please use a 1-5 rating scale where 1= least likely and 5= most likely. Please add additional information regarding your (planned) use of zero-emission battery electric MDHD vehicles as desired.

A3. Air Products will convert its global distribution fleet of > 2,000 heavy-duty trucks to zero emission fuel cell electric. Fuel cell trucks in our California fleet are already being piloted and the first few stations are under construction to support fueling requirements of our fleet and others. While we are technology agnostic, we believe there is a strong case for immediate use of hydrogen in heavy-duty trucking and hydrogen should be equivalently considered under the planned Tri-State CFI in parallel with battery electric charging infrastructure efforts.

Q4. What type of MDHD ZEV public charging do you anticipate being most important in the next three years (2024-2027) – en route or overnight charging? For what purposes do you anticipate needing public charging infrastructure – drayage, last-mile, delivery, long-haul freight, other?

A4. Air Products believes that to get to net zero emissions, all charging and fueling options must be considered and pursued concurrently. However, specifically for long-haul MDHD ZEV trucking traveling on the major freight corridors within the Tri-State region, providing a fueling experience that most closely resembles that of diesel fueling will be critical to enabling rapid adoption of ZEVs without disrupting the trucking industry's well-established driver practices and travel procedures. Hydrogen FCEVS will have a clear advantage for MDHD vehicles (Class 4-8) on designated freight corridors and are best served by multimodal stations to ensure maximum utilization. A large-scale, publicly available liquid hydrogen multimodal station has the fuel capacity and provides the fueling rates able to achieve fill times very close to that of diesel. The stations are similarly designed with ease of use and robust safety features. Market assessments across all types of MDHD trucking fleets from drayage to long haul consistently identify the market limitation of battery electric vehicles and where hydrogen fuel-cell vehicles provide a superior market advantage over battery vehicles. In charting the future to zero-emission MDHD mobility, the need to develop hydrogen zero-emission mobility at scale is now. Major hydrogen fueling projects and corridors need to be planned, funded, and executed to enable zero-emission MDHD transportation that will help to achieve state emission goals and provide market confidence. **A key benefit for long haul trucking by using hydrogen refueling is its fast fill rates, thereby making overnight refueling unnecessary.** Vehicle operators can stay close to the same schedules they are currently used to with today's diesel-powered vehicles. Further, nominal electrical demand for a hydrogen refueling station ranges from 350-750kW, which makes siting hydrogen refueling infrastructure easier in terms of utility and resource planning.

Q5. From 2024-2027, what is your first priority for power level and number of charging ports for public en route charging at a station? For public overnight charging? Do you have a second or third configuration preference?

A5. For hydrogen refueling stations, they should replicate the characteristics of a traditional fueling station in that they should be open and available 24/7, provide consistent and predictable fueling rates with user experience consistent with what vehicle operators are used to today. Initially, 2-4 dispensers (with 4-6 fueling positions) at a site may be sufficient as this would have the capacity to serve around 200 heavy-duty trucks or 2,000 cars per day. For sites with a larger footprint, when additional demand and larger fueling capability becomes available, sites should be future proofed for expansion, as is feasible and practical.

Q6. Please identify the percentage of pull-in or pull through parking preferred and other desired station configurations at a given site. Describe the vehicle class and vocation considered when making this recommendation if it differs from the information provided in question 1.

A6. For large scale multimodal hydrogen refueling stations for light-, medium- and heavy-duty vehicles, safety is paramount. All stations must be installed per NFPA 2 as well as company standards that includes meeting required safety setback distances. The HRS should be designed for full-size tanker hydrogen deliveries and area traffic so that maneuvering the delivery vehicle does not incur or create any hazards and a suitable safety setback zone can be maintained at all times during deliveries. Foundations and any additional site-specific requirements are per the local/current building code and Authority Having Jurisdiction (AHJ). Light duty lanes should have separate fueling islands from medium heavy-duty lanes to prevent cross traffic and maintain vehicle flow.

Q7. What distance should separate charging stations to support zero-emission trucks along the I-5 corridor? Provide description of typical route or use-case considered when making this recommendation. Describe the vehicle class and vocation if it differs from the information provided in question 1.

A7. For hydrogen refueling infrastructure, refueling stations along highway corridors every ~100-150 miles are practical for initial station development. However, with respect to the zero-emission fueling in the ports, a denser concentration of refueling locations will be key to initiating early adoption in the drayage segment.

Q8. What amenities are you seeking at a charging facility? Is there a desire for additional parking at a facility beyond charging stalls? Is there a desire for reservation options?

A8. None. We prefer to solely provide fueling facilities for our customers.

Q9. If possible, provide any general cost estimates for MDHD charging stations you have designed, built, or have experience with, including charger power levels and number of chargers installed. Please provide a range of public cost share as a percentage of total project cost that would be necessary to support more public charging stations to serve zero-emission trucks along freight corridors.

A9. Per the NREL report entitled, "*Levelized Cost of Dispensed Hydrogen for Heavy-Duty Vehicles*" (NREL/TP-5400-88818 https://www.nrel.gov/docs/fy24osti/88818.pdf.), the cost of a 4 MTPD LH2 Station (700 bar dispensing) in 2022 dollars was reported to be around $10.9 million. Given this range of investment, around a 50 - 60 % government cost share or about $4-6 million per station is the minimum requirement to support and encourage public investment in ZEV infrastructure.

Q10. Use the maps under the "Corridor Segments" section below to identify locations within the National Zero-Emission Freight Corridor Strategy hubs along I-5 (identified in the map segment below) you anticipate needing EV charging in the next three years (2024-2027)
8. You may identify sites where you plan to or would be interested in building charging stations or where you would like to see charging as a consumer. Please detail preferred locations across California, Oregon, and Washington. For each location, please provide desired site characteristics including number of chargers, power levels, type of charging desired (overnight or en route), and vehicle class and vocation if the information differs across locations or differs from the information provided in the questions above.

A10. Refer to answer to question 7.

Q11. If you represent a utility, please use the maps under the "Corridor Segments" section below to identify locations within the National Zero-Emission Freight Corridor Strategy hubs along I-5 (identified in the map segments below) where there may be capacity for 5 megawatts or more of power in the next five years. This information may be considered in the development for future Requests for Proposals.

A11. No response

We recommend that the CEC and the Tri-State coalition reconsider its funding strategy for its 2024 CFI application and to include hydrogen in its FY2024 CFI corridor proposal. Given long time frames to build hydrogen refueling stations and this segment having the greatest potential to reduce emission coming from the highest percentage of transportation emissions (medium to heavy duty trucking), the omission of hydrogen would be a significant disservice to the region's

climate change goals. In mapping out the future, it is important to keep hydrogen fueling in parity to the mix of MDHD zero emission solutions. Thank you for your consideration of our responses.