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California Air Resources Board
1001 I Street
Sacramento, CA 95814
Via: https://ww2.arb.ca.gov/public-comments/sb-1075-report-hydrogen-deployment-development-and-use-kickoff-workshop

Comments on SB 1075 Report: Hydrogen Deployment, Development, and Use Kickoff Workshop

Dear California Air Resources Board (CARB) Staff:

Thank you for the opportunity to provide comments in response to the Joint Agency Kickoff Workshop to initiate the development of a comprehensive report on hydrogen, as called for in SB 1075.

California-based Oberon Fuels (Oberon) is an innovative company that has focused for over ten years on dimethyl ether (DME). We propose to use DME to support solving hydrogen distribution and infrastructure challenges and deliver cost-competitive carbon-negative hydrogen (< 0 gCO2e/MJ lifecycle emissions CI). Because DME handles like LPG/propane, DME can be delivered to customers using the existing, expansive LPG distribution network with minimal modifications and leverages the expertise of the LPG industry's existing workforce.

Oberon is the only commercial producer of renewable DME in North America and is currently partnered with Los Alamos National Laboratory to scale up DME-H2 technology. Oberon is also participating in ARCHES. We are pleased to be able to provide input into the SB 1075 report and offer the following comments regarding Oberon's role in the California hydrogen economy.

With the support of the California Energy Commission, Oberon started commercial production of renewable DME at our Maverick Innovation Center in Brawley, CA in 2021 and anticipates deploying a proprietary, first-of-its-kind 1,000 kg H2 per day DME-H2 reformer at this site in Q4 2023. Demonstrating the full DME-H2 value chain at scale would help bring large volumes (upwards of 100,000 MT/year) of renewable hydrogen to market by 2030 and do so in areas where there is limited access to centralized SMR+CCS or transmission constraints on electrolytic hydrogen making local production impossible and tube or cryogenic liquid hydrogen transport cost prohibitive.

The section below highlights some of the benefits of this approach, building on the physical properties of DME as non-toxic, a liquid under light pressure similar to propane for transport and storage, and that can be produced from a vast range of renewable feedstocks.

- **Waste Reduction -** By diverting wastes from agricultural and industrial operations and utilizing them for hydrogen production, hydrogen produced from DME offers a solution for waste management and simultaneously generates a valuable hydrogen carrier, helping to reach greenhouse gas emission targets paired with tangible local improvements in waste management practices and air quality.

- **Feedstock Availability -** Hydrogen carried as DME offers an innate resiliency to feedstock source supply as it can use a diverse range of feedstocks across varying sectors, such as animal wastes, agricultural waste, and pulp mill wastes. Versatility in feedstock supply offers flexibility and allows for the utilization of locally available resources, reducing transportation costs and promoting regional energy independence.

- **Location -** DME-Hydrogen units are compact and scalable, allowing for centralized and decentralized hydrogen production. This approach promotes energy resilience across various regions as it is not grid-dependent and provides hydrogen access to both remote and highly populated areas.

DME has functional similarities to hydrogen carriers such as ammonia and methanol but with several significant advantages:

- **Established Infrastructure -** DME has the substantial benefit of utilizing the propane industry's vast network of existing transportation, storage, and distribution infrastructure to move hydrogen molecules due to DME's physical similarities to propane. Using these well-established networks, DME can be more cost-effectively transported to fueling stations where DME is converted into hydrogen at the site of fueling or a nearby location. The benefit of having physical similarities between propane and DME expands to the use of both the physical networks and the over 100 years of technical expertise in the existing propane industry, which can be applied to handling DME.

  The US LPG infrastructure encompasses all 50 states with a focus on rural areas. DME can use LPG railcars, tanker trucks, bobtails, cylinders, and dispensing equipment with only minor modifications to ensure compatible seal materials.

- **Creates User Resiliency** – Using DME as a carrier allows large volumes of fuel to be stored on-site at an H2 station in significantly less expensive tanks than traditional hydrogen storage while providing days/weeks of available hydrogen due to DME's molecular H2 density. Paired with Oberon's DME-H2 reformer technology, this solution is not pipeline dependent, can operate during blackouts, and be a 24/7 reliable source of on-demand hydrogen for critical fleet or commercial applications.

- **Safety** – Because DME is non-toxic, transporting, storing, and permitting facilities and equipment for hydrogen production is more straightforward and less expensive than methanol or ammonia. Additionally, hydrogen leakage has been noted as a concern in large-scale adoption. This concern is largely mitigated when moving and storing hydrogen as DME, as the opportunity for hydrogen leakage is limited to the point after DME has been reformed into hydrogen.

- **Scalability and Deployment –** Modular units can be fabricated off-site, delivered, and deployed at the end-use location, avoiding significant building times and costs, certain permitting requirements, and size-based equipment or facility location barriers that large-scale hydrogen production facilities may commonly face.

  Low utility requirements avoid electrical and substation upgrades, pipeline interconnects, and other site limitations.

This technology offers tangible near-term deployment of modular hydrogen production units in California and beyond, allowing for integration at various levels of the supply chain and economy due to the relatively quick fabrication timeframes and flexible scalability of reformer units based on the desired footprint or output for a given location or application.

There is potential for rapid replication and expansion of the DME-H2 model for local renewable DME production with regional distribution to hydrogen reforming and fueling facilities. DME-H2 reformers would be sited at the participating partner's medium or heavy-duty transportation fueling station(s) or hydrogen demand site(s), integrating with the partner's existing or planned hydrogen storage and dispensing facilities. The skid-mounted reformer units facilitate easier equipment installation and deployment. Workforce benefits are substantial as this market strategy facilitates a smooth energy transition from fossil molecules to renewable molecules for associated LPG industry transportation, installation, and operational jobs.

Thank you for your time and consideration. Please do not hesitate to contact me at david.mann@oberonfuels.com with any questions.

Sincerely,

David Mann
Vice President, Regulatory and Government Affairs
Oberon Fuels