845 15th ST, SUITE 103 #49216, SAN DIEGO, CA 92101
619.255.9361 WWW.OBERONFUELS.COM

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California Air Resources Board
1001 I Street
Sacramento, CA 95814
Via Online Submission

Re: Response to RFI: Senate Bill 1206 Assessment Report for Transitioning Hydrofluorocarbons (HFCs) to Ultra-Low Global Warming Potential (GWP) and/or No-GWP Alternatives

Thank you for the opportunity to provide comments in response to Request for Information (RFI) - Senate Bill 1206 Assessment Report for Transitioning Hydrofluorocarbons (HFCs) to Ultra-Low Global Warming Potential (GWP) and/or No-GWP Alternatives.

As background, Oberon is an innovative California company founded in San Diego 13 years ago with a focus on producing renewable dimethyl ether (DME). With the support of a California Energy Commission grant in 2019 we upgraded our existing facility to use a 100% renewable feedstock and are now producing rDME® fuel at our Brawley, California production facility using 100% biogenic feedstocks.

Renewable DME can be made from various in-state waste streams (*e.g.*, dairy manure biogas, wastewater treatment plants, process organics diverted from landfills), which can enable smaller, often stranded, agricultural wastes to create commercial opportunities, avoid waste of low carbon feedstocks and reduce greenhouse gas emissions.

Response to Section 8: Question 35

> *35. Are there emerging technologies for non-refrigerant HFC end-uses (including products with application-specific allowances) that show promise in addressing the transition to ultra-low GWP or no-GWP alternatives?*

Renewable DME is an emerging technology that can support the transition to ultra-low GWP alternatives for non-refrigerant HFC end-uses. As the 2015 *California Dimethyl Ether Multimedia Evaluation Tier 1* report notes, DME has application as, inter alia, a CFC substitute for propellants in cosmetic- or paint- aerosol cans, a refrigerant, adhesive sprays, and a carrier for livestock insect sprays and foggers.[1]

[1] *California Dimethyl Ether Multimedia Evaluation Tier 1,* 2015. https://ww2.arb.ca.gov/resources/documents/fuels-multimedia-evaluation-dimethyl-ether-dme

Since the publication of this report the DME market continues to evolve with use in a variety of aerosol propellants and foams including foam plastics.

The GWP of DME is 2.0, and life time of DME in the atmosphere is 0.013 year. When 1kg of DME is oxidized to CO2 in the atmosphere, the weight is 1.91 kg-CO2 (=1/46×2×44).[2]

Oberon is producing the first-ever renewable DME in the U.S. using waste methanol from the pulp and paper industry. Other potential feedstocks include: biogas from dairy waste, food wastes, agricultural waste, as well as excess electricity and CO2 resulting in ultra-low carbon to carbon-negative DME. Each feedstock comes with opportunities and challenges and different carbon intensities.

CARB has estimated that dairy-gas-based DME produced by the Oberon process to have a carbon intensity of -278 g CO2e/MJ when used as a transportation fuel.[3] EPA and Argonne National Laboratory estimate that renewable-based DME offers 68-101% greenhouse gas reduction.[4]

Renewable DME as a new technology pathway offers a direct, easily substitutable ultra-low GWP alternative to fossil DME and other blowing agents, propellants, and carriers. It has the added advantage of reducing lifecycle GHGs supporting decarbonization across all potential end uses.

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

[2] DME Handbook, Japan DME Forum, 2007.

[3] Letter from CARB to Oberon Fuels, September 2018

[4] EPA Citation: https://www.epa.gov/sites/default/files/2015-08/documents/oberon-fuels-determination.pdf
Argonne Citation: Lee, Uisung & Han, Jeongwoo & Wang, Michael & Ward, Jacob & Hicks, Elliot & Goodwin, Dan & Boudreaux, Rebecca & Hanarp, Per & Salsing, Henrik & Desai, Parthav & Varenne, Emmanuel & Klintbom, Patrik & Willems, Werner & Winkler, Sandra & Maas, Heiko & De Kleine, Robert & Hansen, John & Shim, Tine & Furusjö, Erik. (2016). Well-to-Wheels Emissions of Greenhouse Gases and Air Pollutants of Dimethyl Ether from Natural Gas and Renewable Feedstocks in Comparison with Petroleum Gasoline and Diesel in the United States and Europe. SAE International Journal of Fuels and Lubricants. 9. 10.4271/2016-01-2209.