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

July 14, 2021

California Air Resources Board
1001 I St.
Sacramento, CA 95814
slcp@arb.ca.gov
(916) 327-0481
Submitted online via Comment Submittal Form

Oberon Fuels comments on "Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target" Draft June 2021

Introduction

Oberon Fuels (Oberon) appreciates the opportunity to comment on the Draft Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target. Oberon supports SB 1383 and the urgency behind it. Oberon also thanks the California Air Resources Board for their work in preparing the report.

Oberon is a California-based company that produces innovative, low-carbon renewable dimethyl ether (rDME), which can used directly as a feedstock for renewable hydrogen, a diesel replacement fuel and as a carbon reducer when blended with propane.

Oberon recognizes that under SB 1383, California's greenhouse gas (GHG) reductions are critical to the state achieving its carbon reduction targets. Oberon supports this policy and has been actively engaged with working groups in the dairy and livestock sector. As described below, we are committed to accelerating the global carbon-reduction effort by adding carbon-negative fuel to California's suite of solutions.

Oberon provides these remarks to demonstrate our commitment to accelerating California's carbon-reduction effort by adding innovative, first-of-their kind fuels technology to the mission. We submit these comments in the interest of bringing the existing fleet of liquid-fueled vehicles to carbon neutrality well before that deadline as well as increasing the options for carbon reductions in the fuel for zero emission vehicles like fuel-cell electric vehicles.

rDME's Relevance to SB 1383

We believe DME has a key role to play in CARB's LCFS and other fuel and vehicle GHG and criteria emission policies. Renewable DME can be produced from a variety of waste streams and renewable feedstocks including dairy manure, food waste, landfill gas, wood, and waste from Kraft pulp mills (which Oberon is using in its current CEC project referenced below). Depending on the feedstock, rDME can range from ultra-low carbon to being carbon negative. Because DME does not require pipeline access to be transported as it can be moved by the existing, global propane infrastructure, DME offers an opportunity to monetize stranded biogas assets. It holds the potential to support the state's additional goals of methane reduction as well as fossil fuel replacement for those vehicles that will remain in the fleet. In addition, rDME provides an economical pathway to the goal of zero-emission mobility and carbon neutrality.

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

Oberon is currently leading a project funded by the California Energy Commission to demonstrate production of rDME from renewable feedstocks at its plant in Brawley, a city in Imperial County, Calif. When Oberon began producing rDME on May 27, 2021 at its Imperial Valley facility, this represented the first-ever rDME production in the United States, and the only current commercial production of this molecule in the world.

DME has been used for decades as an energy source in China, Japan, Korea, Egypt and Brazil, and can be produced domestically from a variety of feedstocks, including biogas from organic waste produced in cities or by agricultural operations, as well as natural gas. Ideal uses in North America are in the transportation, agriculture, emergency power and construction industries.

DME is a gas under ambient conditions. Because it can be stored as a liquid under moderate pressure, similar to propane (LPG), it eliminates the need for the high-pressure containers used for CNG or H2, or cryogenics, as in the case of LNG of LH2. DME's easy handling properties make fueling and infrastructure relatively simple and inexpensive.

DME is approved as a renewable fuel under the U.S. EPA's Renewable Fuels Standard, making it eligible for RINs credits when made from biogas with the Oberon process. The EPA estimated that biogas-based DME offers a 68% reduction in greenhouse gases. Argonne National Laboratory, at the direction of the US Department of Energy, worked with Oberon, Volvo, Ford, Haldor Topsoe, and Lulea University in 2016 to update the GREET lifecycle analysis of DME. When using renewable feedstocks, the updated GREET analyses estimated DME to offer 85-101% GHG reduction. The abstract is published here with the complete article available from the *Society of Automotive Engineers*. DME has also been issued specifications by ASTM International and the International Organization for Standardization (ISO) to ensure that as DME is rolled out as a fuel the right standards and regulations are in place to ensure a robust supply chain.

As calculated by CARB, the current carbon intensity (CI) score of propane is 83 g CO_2e/MJ (ultra-low-sulfur diesel has a CI near 100 gCO_2e/MJ). CARB has calculated – when renewable DME (rDME) is made from dairy biogas (which itself has a CI of -150) – rDME has a CI value of -278. With only a 16% volume/20% weight blend, the CI value decreases to just 35. By blending renewable propane and rDME, you can create a blended fuel that approaches carbon neutrality or is carbon-negative in an economic manner using the same vehicles and fueling infrastructure.

Consideration of Innovative Fuels

In its analysis of the status of the Dairy and Livestock Sectors' roles in GHG reduction, the report notes "challenging sector economics" while also finding the sector "must still achieve considerable methane reductions to meet its 2030 target." (Executive Summary, p. ES-4)

One avenue to help the sector would be to make sure SB 1383 programs are open to innovative technologies and fuels that can help the market potential. The report cites high pipeline connection costs and cost issues (10X cost) to use biogas to replace fossil natural

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

gas. To us, one logical solution to this dilemma is to look for alternative market uses for the biomethane produced by anaerobic digesters.

The production of rDME and its use as a feedstock for renewable hydrogen is one potential alternative. Oberon Fuels has demonstrated the viability of the renewable fuel as part of its CEC grant and operates an easily replicable and scalable, small-scale production process that could avoid the high costs of pipeline connection and/or provide an option for dairies that are not located near a pipeline. As was noted in the CARB report, "with public incentives like LCFS credits and RFS RINs, the need for upfront public investments in digester projects may be reduced or even eliminated…." Oberon Fuels believes having a viable path to market for biomethane to rDME to rH2, given the projections for growing demand for rH2, is one innovative approach that should be encouraged under this program.

Oberon's belief is supported by the US Department of Energy's recent announcement that a public-private partnership between Los Alamos National Laboratory (the Laboratory) and Oberon Fuels has secured DOE funding (Technology Commercialization Fund). The Laboratory/Oberon project is expected to scale-up steam reforming technology to produce renewable hydrogen (rH2) from rDME, an innovative approach to increasing the global renewable hydrogen supply. Renewable DME has the potential to overcome the two largest barriers to widespread hydrogen adoption: the lack of cost-competitive, sustainable production and lack of energy-dense storage and transport.

Actively seeking to include such innovative fuels and approaches is one method of expanding the reach of the SB 1383 program to help it meet the 2030 targets without exclusively relying on additional government funding.

Very truly yours,

Rebecca Boudreaux

Rebecca Boudreaux, Ph.D.
President & CEO
Oberon Fuels, Inc.