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

Comments on Potential Changes to the LCFS Regulation

Dear California Air Resources Board (CARB) Low Carbon Fuel Standard Program Staff:

Thank you for the opportunity to provide comments in response to the "Public Workshop to Discuss Potential Changes to the Low Carbon Fuel Standard" held July 7, 2022. We appreciate CARB hosting this workshop and presenting an array of forward-looking ideas for the future of the LCFS. Oberon is pleased to be able to provide comments on several areas of LCFS policy and put more detail to our previous remarks provided to CARB in comments we made on the draft 2020 Scoping Plan Update and separately on the Workshop on Methane Dairies Livestock and RNG.

As background, Oberon is an innovative California company founded in San Diego 12 years ago with a focus on decarbonizing the global LPG/propane industry while laying the foundation for green hydrogen. We are accomplishing this today by producing renewable dimethyl ether (rDME) at our Brawley, California production facility using a cellulosic feedstock which would otherwise be disposed of as waste. rDME can be made from various in-state waste streams (*e.g.*, dairy manure biogas), which can enable smaller, often stranded, biogas suppliers to participate in the LCFS program, thereby expanding opportunities under the program while avoiding wasteful non-fuel uses of advanced feedstocks and providing similar or reduced greenhouse gas emissions for the DME lifecycle.[1] rDME can reduce the carbon footprint of transportation when used as a: 1) blending agent with Liquid Petroleum Gas (LPG)/propane; 2) hydrogen carrier to power the growing fuel-cell electric vehicle market; and 3) diesel substitute.

Responses to Workshop Presentation

Changes to the 2030 CI Targets: Oberon agrees that the LCFS is a successful program and is overperforming. We are concerned the program may become a victim of its own success, with surging alternative fuel supply depressing credit

[1] The California Air Resources Board has estimated dairy biogas-based DME made by the Oberon process has a carbon intensity of -278.

values and stifling future investment in the types of carbon neutral/negative fuels that are needed to meet California's long-term emissions goals. We are pleased CARB acknowledges these challenges and is considering a comprehensive evaluation of the LCFS to sustain and improve its effectiveness over time. Oberon supports an aggressive CI reduction target of 30 percent by 2030. Oberon also supports CARB re-evaluating its annual standards every five years. Five-year interim targets will help the market and CARB judge credit price stability and make better-informed decisions. The 2035 target should be set no later than five years in advance (2030) and earlier if possible.

Principles for Alignment: Oberon agrees with the Principles for Alignment but cautions CARB to listen carefully to stakeholder comments on interpretation of those Principles, particularly around defining mature low-carbon technologies and phasing-out their incentives. The adoption of a technology or fuel type should not be viewed as a universal end goal; decisions informed by the expected availability of a low-carbon fuel credit may have a longer return-on-investment period than the point at which a new fuel, technology and infrastructure is actually deployed.

ZEV Infrastructure: Oberon believes CARB should weight infrastructure focus towards hydrogen as electric vehicle charging is substantially more mature, may have lower capital requirements, and has less commercial risk than hydrogen fueling infrastructure. Eligibility should be agnostic towards public or dedicated fleet refueling to allow market forces to drive the most cost- and environmentally-effective projects forward in the quickest timeframe possible.

Oberon is a part of the hydrogen fueling ecosystem. We are producing the first-ever rDME in the U.S. using waste methanol from the pulp and paper industry. In June 2021, Oberon and Los Alamos National Laboratory teamed up for a U.S. Department of Energy funded project to scale-up steam reforming technology to produce renewable hydrogen (rH2) from rDME, which we see as an innovative approach to increasing global renewable hydrogen supply and access.

Because our rDME handles like LPG/propane, conveying rDME to customers requires minimal modifications to the existing, expansive, global LPG distribution network and leverages the expertise of the LPG industry's existing workforce. In short, rDME, along with other energy dense molecules, can help solve hydrogen distribution and infrastructure challenges. In our model, we can produce rDME locally in California and ship via truck, rail, or ISO container for reformation at the point of use or via a hub and spoke model, which greatly improves the conveyance efficiency and lowers the costs of the supply chain. On-site reformation at fueling stations is possible with easy-to-install skid-mounted or containerized systems. As such, having Hydrogen Refueling Infrastructure crediting include the on-site production of H2 at fueling stations would benefit this model.

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Fuels and Vehicle Applications: Oberon strongly supports the inclusion of DME as an opt-in fuel for novel applications. The first commercial entry to the California fuel market for rDME is blending into propane to reduce its carbon intensity in existing LCFS-eligible applications such as forklifts. Codifying this use into the LCFS would be helpful.

Additionally, there are other fuel applications in California to which CARB could extend the LCFS to cover that would quickly bring more rDME into the market. For example, there are many areas of niche value where DME's zero-soot clean burning properties are a value-add benefit, such as providing heat, power, and a clean CO2 exhaust to greenhouses and growhouses. Also, there are broad categories and applications for DME that CARB could include, such as the following:

A rDME/propane blend:

- In agriculture including tractors, irrigation engines, heaters, frost protection/wind machines
- In power generation applications
- In entertainment and leisure, including small propane cylinder use for portable heaters and barbeques
- In residential and commercial applications

Neat rDME:

- The applications noted above
- Diesel replacement for vehicles, generators, engines, and heaters
- Propane replacement for vehicles, generators, engines, and heaters

Expanding the LCFS to cover the above applications will reduce compliance complexity and help accelerate the market development of nascent fuels such as rDME. In general, such expansion will reduce complexity by capturing a larger share of end-uses that fuel dispensers may not currently track and reduce the use of fuel that is credit deficit generating in end uses without credit generating opportunities. With regards to rDME, expansion or other incentives would also support market development because inclusion of more mobile and semi-mobile[2] sources under the program would provide mutual support to decarbonizing agricultural and industrial sectors with traditional vehicles. The relatively higher value of rDME and other nascent technologies to reducing emissions in, for example, portable heating, will support rapid deployment. This will drive down costs for widespread use in vehicles.

[2] Mobile sources include engines such as tractors while semi-mobile includes portable or towed engines such as frost protection devices.

As CARB notes, zero-emission applications for rail, agricultural equipment, commercial harbor craft, and airport ground support equipment may all be considered as potential opt-in fuels. We strongly support allowing these applications as Tier 2 pathways and future lookup table pathways and urge CARB to consider other fuel applications such as those above, as well as laying the groundwork to make these fuels mandatory credit generating fuels in the future.

More extensive comments on enabling use of rDME in the LCFS are below.

Feedstocks

As Oberon continues to expand its rDME production capacity and create further market demand, the company is looking for opportunities to convert local waste streams into low-carbon or carbon-negative DME. Many of these waste streams are novel as it relates to LCFS pathways or conversion into transportation fuel. However novel the feedstock, the lifecycle greenhouse gas emission modeling remains straightforward.

Avoided methane emissions are well established in the LCFS and in the practice of lifecycle assessment are both auditable and verifiable. They are also tremendously important because they represent immediate and significant avoidance of potent methane greenhouse gas emissions that threaten to lock-in large warming impacts relative to similar quantities of CO2. Staff should therefore invite and encourage applicants with avoided methane projects.

Oberon requests CARB remove any ambiguity in the current regulations that may restrain avoided emissions projects and strongly urges CARB to make full use of its regulatory discretion and the Tier 2 pathway process to evaluate and approve novel feedstocks and pathways that include avoided methane emissions outside the specific requirements for dairy or swine manure or organic material diverted from a landfill (as dairy, swine, and organics diverted from landfill are subject to other California statutory and policy considerations).

Book and Claim Policy

Biogas is a critical, limited, and renewable alternative to fossil natural gas, petroleum, and coal. Currently, biogas is heavily incentivized under California and federal policy for use in compressed natural gas (CNG) and liquefied natural gas (LNG) applications.

Oberon Fuels and many other market participants *would* expand the number of organic feedstock sources to produce a wider-variety of biogas-based transportation fuels, thereby reducing overall carbon intensity of transportation

and hard-to-decarbonize sectors, *if* the LCFS recognized book-and-claim use of renewable natural gas: 1) produced from a wide variety of methane-mitigating waste streams; and 2) used as a feedstock and/or process energy to produce any LCFS-eligible finished fuels (not just CNG or LNG).

With appropriate limits and the verification and validation procedures CARB already has in place, we believe that any compliance risks can be reasonably managed.

The LCFS market signal successfully drove the development of biogas, but the book-and-claim flexibilities that make such biogas cost-effective are currently limited to use in natural gas vehicles with one exception: as a feedstock for hydrogen via reformation. However, this sole exception does not prove the rule; rather, it breaks the rule, and the success of book-and-claim hydrogen production demonstrates that broad opportunities for low-carbon fuel production and use can be unlocked by enabling the use of book-and-claim biogas as a low-carbon industrial feedstock. Treatment in this manner will facilitate the creation of low-carbon rDME, methanol, and other fuels.

Functionally, there is little difference between using a book-and-claim methodology to allocate biogas produced in one location for conversion into hydrogen in another region, than there would be for any other fuel (such as rDME, renewable methanol, renewable gasoline, or renewable diesel) for which biogas serves as feedstock or as another non-process energy component. The existing program rules and systems should be fully capable of evaluating, certifying, validating, verifying, and monitoring the value chain.

Additionally, increased production of rDME and other fuels through book-and-claim pathways would directly support, sustain, and speed implementation of the Scoping Plan's strategies for achieving success in fuels as discussed more fully in the Draft 2002 Scoping Plan Update.[3]

Consider the example of hydrogen. As discussed above, rDME has unique value as a hydrogen carrier. One potential pathway to increase the amount of feedstock (and thus delivered renewable hydrogen), which Oberon can bring to market quickly would be to use RNG and book-and-claim accounting. Figure 1 demonstrates this value chain. Here, book-and-claim is the key enabling tool to leverage existing infrastructure and repurpose industrial capacity to decarbonize fuels.

[3] Draft 2022 Scoping Plan Update, Page 154.

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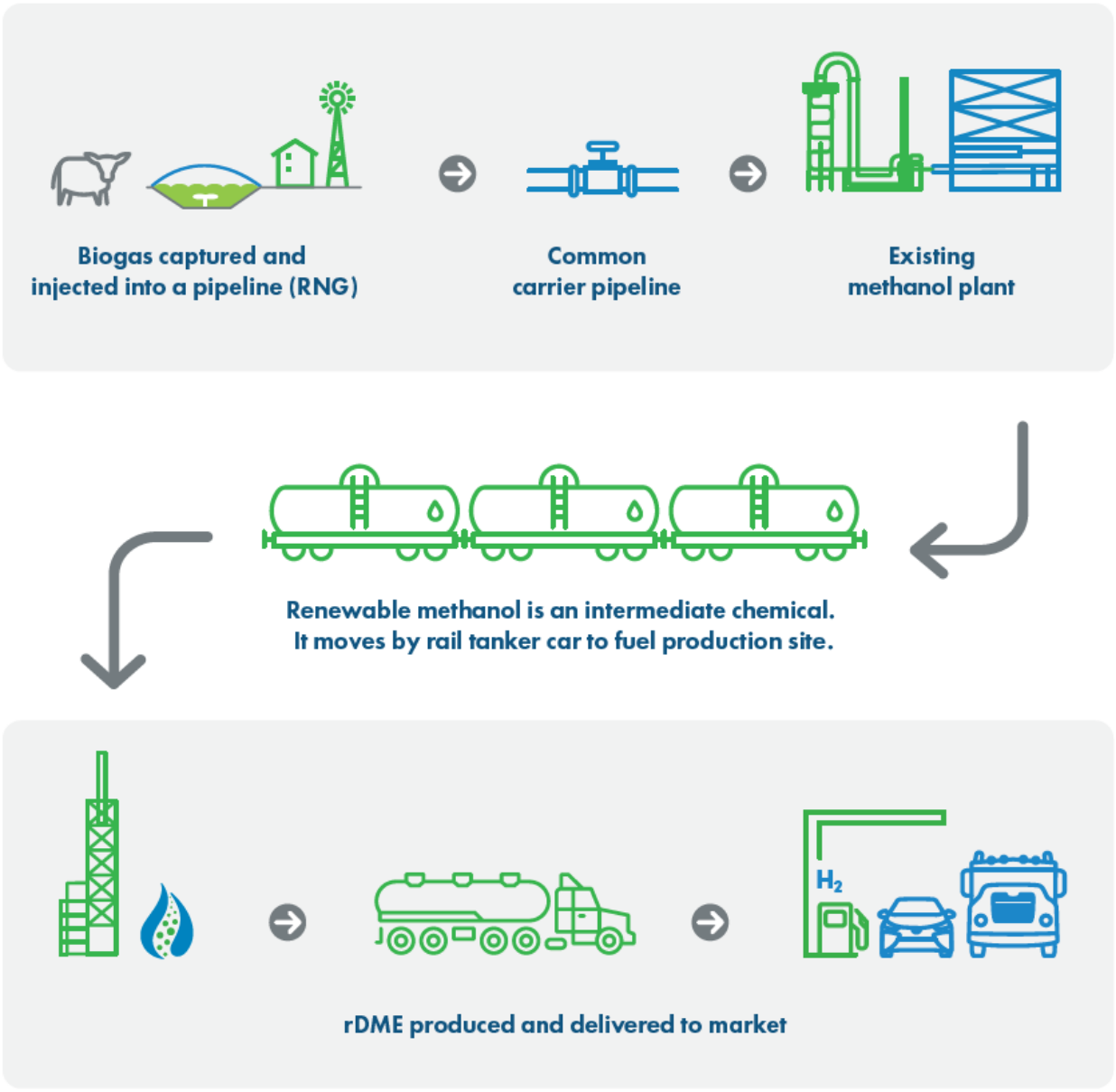
Figure 1: RNG-Methanol-DME-H2 Value Chain



We likewise encourage CARB to expand book-and-claim opportunities for renewable/low-CI electricity. Under the existing program, renewable or low-CI electricity generated offsite from the fuel producer or distributor can be claimed in support only of low-CI electricity supplied as a transportation fuel (i.e., for EV charging) or applied to hydrogen produced via electrolysis (similar to the exception noted above for biogas). We believe that other fuels merit the opportunity to lower their CI score by applying renewable energy credits (RECs) or similar proof of ownership of renewable/low-CI energy attributes. At a minimum, we ask that

CARB consider extending the opportunity to fuels like rDME which, as noted above, will serve many of the same policy objectives that CARB wished to promote when it recognized book-and-claim accounting options for hydrogen producers.

There is an analogy to the use of RECs to reduce carbon intensity the use of book-and-claim RNG to reduce the carbon intensity of a wide variety of fuels by displacing fossil natural gas used as process energy. We urge CARB to treat these as separate and distinct areas of policy and move ahead with speed where the ability to regulate and verify is most mature while initiating discussions where certification or robust third-party audits are not as developed.

Given the ambitious climate goals set by the State of California and CARB, along with the successful precedent set by CNG and hydrogen, we urge the agency to proactively invite broader use of book-and-claim transactions.

Low-Carbon Fuels in Hard to Decarbonize Sectors

We support the recognition of low-carbon fuels as a tool to help decarbonize transportation, as well as all other fuel uses, including heating, agricultural, industrial, and power generation. We note that the success of the LCFS in reducing fossil fuel use in transportation is a function of strong financial incentives. We suggest CARB apply or adapt the LCFS structure to help facilitate decarbonization of other gasoline-, diesel-, fossil natural gas-, and propane-fueled applications. Oberon believes that allowing users to receive credit for reducing the carbon intensity while using in-service equipment will help facilitate quicker emissions reductions, fossil fuel displacement, and market transformation. This credit could be provided through either targeted incentive programs or by broadening applicability of the LCFS fuel pools for both credit and deficit generators.

LCFS and Short-Lived Climate Pollutants Program Nexus

There exists an interplay between the Short-Lived Climate Pollutants Program (SLCPP) regulations for dairy methane and the LCFS. These two programs can complement each other to incentivize the fastest, most economic, and equitable environmental outcomes.

To the maximum extent possible, CARB should harmonize the SLCPP's regulations to support further use of the LCFS to reduce dairy methane emissions. However, CARB notes in a guidance document, "Credit Generation for Reduction of Methane Emissions from Manure Management Operations (September 2020)", that "projects developed after the Regulation's emission reduction requirements are in effect would not be eligible for compliance offset credits or an LCFS carbon intensity that reflects avoided methane emissions, as the methane reductions associated with

those projects would not be additional to the Regulation..."[4] We urge CARB to consider regulatory approaches that would render ineligible future innovative biogas projects.

The LCFS can provide a market signal to help facilitate the long lead times necessary to build physical infrastructure in hard-to-decarbonize regions throughout California. Conversely, a regulatory structure that cuts off new projects in 2024 will severely hinder deployment, send the wrong signals to critical private capital, and halt future innovation of business models that support both farmers and clean transportation.

Currently, the market signals derived from the LCFS are resulting in huge improvements in manure management around the country, thereby facilitating economic and environmental win-wins. CARB and California benefit from the broadest possible scope of influence as widespread deployment reduces costs, pollution, and emissions. Because of the power of its market signal and flexible program design, CARB is able to incentivize voluntary emission reductions and in so doing expand available low carbon fuel access in-state and beyond. However, CARB risks nullifying the continuation of such beneficial activities by regulating emissions in a way that negates the LCFS incentive. Instead, the emission reductions achieved via the LCFS incentive should be part of the solution the SLCPP regulations will seek to address.

Conclusion

Oberon appreciates CARB's transparency in sharing with stakeholders concepts under consideration for future changes to the LCFS program and encourages CARB to continue to outline its thinking in subsequent public presentations.

The LCFS has proven itself a successful market catalyst in a subsection of the fuels market; it is a good time to consider applying these common-sense rules to other niches which will also reduce leakage and attract many new deficit generators into the program to help support a strong credit price.

Of the comments above, Oberon stresses the importance of CARB removing any ambiguity in the current regulations that may restrain avoided emissions projects and strongly urges CARB to make full use of its regulatory discretion and the Tier 2 pathway process to evaluate and approve novel feedstocks and pathways.

As a California-based project developer and innovative clean fuel producer, Oberon can unequivocally state that CARB's actions will have real, dramatic, and near-

[4] Credit Generation for Reduction of Methane Emissions from Manure Management Operations

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term impacts that can unlock long-term investment by leveraging the robust market signal of the LCFS. 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