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Oberon Fuels Response to Request for Comments on § 45V Credit for Production of Clean Hydrogen

Background:

Oberon Fuels, Inc. is an innovative company founded 13 years ago with a focus on decarbonizing the global LPG/propane industry while laying the foundation for renewable hydrogen. We accomplish this by producing renewable dimethyl ether (DME). DME can be made from upgrading biomethane from various organic waste streams (*e.g.,* agricultural and food waste such as manure) and can reduce the carbon footprint of transportation fuels when used as a hydrogen carrier to power the growing fuel-cell electric vehicle market.

Responses to Section IX. Renewable Natural Gas and Fugitive Sources of Methane

"The Treasury Department and the IRS intend to provide rules addressing hydrogen production pathways that use renewable natural gas (RNG) or other fugitive sources of methane (for example, from coal mine operations) for purposes of the section 45V credit. In the context of this guidance, the term RNG refers to biogas that has been upgraded to be equivalent in nature to fossil natural gas. Fugitive methane refers to the release of methane through, for example, equipment leaks, or venting during the extraction, processing, transformation, and delivery of fossil fuels to the point of final use, such as coal mine methane or coal bed methane. Such rules would apply to all RNG used for the purposes of the section 45V credit and would provide conditions that must be met before certificates for RNG or fugitive methane (representations of the environmental attributes of the methane) and the GHG emissions benefits they are meant to represent may be taken into account in determining lifecycle GHG emissions rates for purposes of the section 45V credit."

We are grateful to see Treasury and IRS moving forward with rules for hydrogen production from RNG and fugitive sources of methane. We suggest final guidance provide additional clarity on fugitive sources. While the language in the proposal is appropriately broad by

providing examples but not limitations on sources of fugitive methane, it would benefit from inclusive language on biomass fugitive methane sources.

The Treasury Department and the IRS anticipate requiring that for purposes of the section 45V credit, for biogas or biogas-based RNG to receive an emissions value consistent with that gas (and not standard natural gas), the RNG used during the hydrogen production process must originate from the first productive use of the relevant methane. For any specific source of biogas, productive use is generally defined as any valuable application of biogas (including to provide heat or cooling, generate electricity, or upgraded to RNG), and specifically excludes venting to the atmosphere or capture and flaring. The Treasury Department and the IRS further propose to define "first productive use" of the relevant methane as the time when a producer of that gas first begins using or selling it for productive use in the same taxable year as (or after) the relevant hydrogen production facility was placed in service. The implication of this proposal is that biogas from any source that had been productively used in a taxable year prior to taxable year in which the relevant hydrogen production facility was placed in service would not receive an emission value consistent with biogas-based RNG but would instead receive a value consistent with natural gas in the determination of the emissions value for that specific hydrogen production pathway. This proposal would limit emissions associated with the diversion of biogas or RNG from other pre-existing productive uses.

Oberon strongly objects to the proposal requiring that the RNG (and presumably other biogas or other fugitive methane feedstock) must have hydrogen production as its first productive use.

As discussed in the response to Question 6 and 8 in the next section below, the 'first productive use' requirement is an incorrect approach to implementing the statute. This requirement relies on Treasury and IRS making huge unsupported assumptions, creating new legal fictions, and asserting a vast expertise and accurate foresight into all future permutations of the biogas, RNG, and fugitive methane markets.

We strongly urge Treasury and IRS to reverse course. To do otherwise is to entirely undercut the frank purpose of the law and willfully kill the industry whilst still in the cradle.

Oberon does not object to the definition of 'productive use' but we note flares are often required as a safety and emissions hazard reducer to be used in case of emergency, accidental release, start-up and shut-down procedures, and other occurrences. For digesters and gas upgrading, processing, or reforming equipment the presence of a flare may be required by local or state safety or environmental regulations. The presence or use of such a flare in appropriate circumstances should not disqualify a facility from eligibility. Treasury and IRS are at risk of applying a purity of ideals to commercial operations that must comply with mandatory but potentially conflicting federal, state, and local regulatory requirements.

The proposal fails the commercial feasibility test. It requires time matching of biogas and RNG projects to H2 projects. Biogas projects are likely to be owned and developed by farmers and commercial operators in other industries (food processing for example) who are not hydrogen technology companies, hydrogen distribution companies, hydrogen marketers, or

hydrogen consumers. The biogas and hydrogen markets have a small nexus currently and radically different project timelines, permitting requirements, capital structures, sales terms, and other commercial attributes. Artificially forcing pre-commercial alignment between new digesters and hydrogen offtakers will totally freeze and shut down the ability of the market to match these parties at commercially viable points in time.

Both digester developers and hydrogen developers carry substantial risk. The proposal is forcibly stacking all of the pre-operational risks (financing risk, permitting risk, construction risk, technology risk) from each industry together creating project-on-project risk. Normally, this is dealt with by hydrogen producers seeking feedstock from existing operators but the proposal would disallow those existing entities from qualifying.

In current market structures, for project development and the lifecycle analysis, feedstock specific information is needed and hydrogen producers will have to have their biogas or RNG source identified by general category in the development phase to estimate their emissions, feedstock costs, and volumes. Treasury and IRS are requiring that instead, hydrogen producers have to lock in contractually with a unicorn – a *planned* digester that meets all emissions, cost, and volume requirements and will be operational co-incidental with the hydrogen facility – and to have done so months in advance of submission of a PER application that may or may not be accepted or result in the desired outcome. This is not realistic nor desirable and will have the unintended consequence of hindering renewable project development in the first place.

Even if a company were to successfully find a match, should the RNG project advance too quickly it will have an economic imperative to operate and sell RNG to non-hydrogen markets while waiting for its paired project to advance. This would then disqualify them from future participation in the hydrogen market. Conversely, the hydrogen facilities cannot move ahead of the RNG project or risk installing idle capital. With no other viable feedstock source or ability to find RNG on the market from an uncommitted new digester, these projects will collapse and undercut the lagging digester projects too.

Treasury and IRS should not tie themselves to the 'three pillars' they have laid out for electrolytic hydrogen. They do not apply directly to the biogas and RNG markets. They are not drawn from statutory requirements. They are structurally unsound for the purpose Treasury and IRS are applying them to.

Consider the concept of incrementality. Why is incrementality being required and what does it have to do with the biogas industry? Unlike the electricity markets where unlimited new power demand can be met by unlimited new construction, biogas and RNG are about capturing the opportunity only at existing waste sites or maintaining those abatement technologies. To incentivize only new facilities does risk a perverse creation of new waste sites when the industry is focused on abating existing sites.

Treasury and IRS are setting the industry up for failure. In doing so they also lose the potential to achieve huge near-term reductions of fugitive methane.

Any fugitive sources of methane would be treated in the same fashion as described above for RNG.

As the proposal notes, the draft requirements apply to RNG and other fugitive sources. Our comments also apply to all fugitive source feedstocks. While fugitive sources are less likely than RNG to have existing facilities and therefore less challenged to meet the 'first productive use' requirement, the mismatching of project development and construction timelines and the extreme deviation from the IRA statute make this commercially non-viable and legally challengeable.

Direct use would involve the production of hydrogen with a direct exclusive pipeline connection to a facility that generates RNG or from which fugitive methane is being sourced, while non-direct use would involve producing hydrogen using RNG or fugitive methane sourced from a commercial or common-carrier natural gas pipeline.

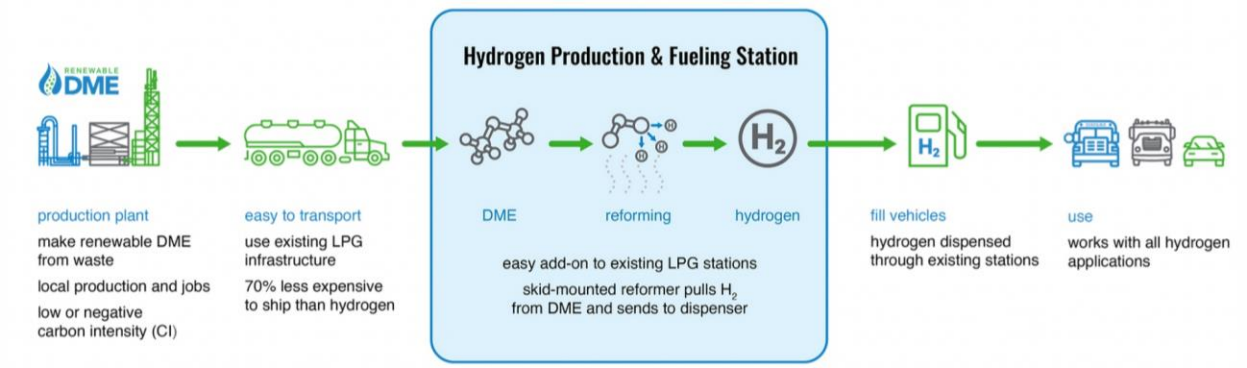
We are pleased to see Treasury and IRS contemplating both the direct use and indirect use cases but recommend broader consideration of indirect use to apply to hydrogen carrier molecules.

Hydrogen carriers help move hydrogen molecules in an energy dense format to be stripped, recovered, reformed or otherwise separated into free H2 for productive use.

The draft proposal does not provide any guidance on the use of hydrogen carriers that are beyond a one-step biogas-H2 or RNG-H2 or fugitive methane-H2 production process. The proposal does not request any comment on potential hydrogen carrier production pathways. We urge Treasury and IRS to publish supplementary guidance or request comment on implementation of 45V for hydrogen produced via a one, two, or multiple step distribution channel that may involve hydrogen carriers such as DME, methanol, ammonia, or other technologies.

We do note that the PER process provides a structure for applicants to provide and for DOE to evaluate such feedstock-process-distribution-production pathways. We strongly support this approach as a good enabling framework but believe Treasury and IRS should explicitly address the topic.

The US DOE and commercial markets are actively developing hydrogen carrier projects. For Oberon, we believe DME is an excellent hydrogen carrier and are currently working with Los Alamos National Laboratory on a DME-H2 project. The value chain looks like this, starting with biogas/RNG/fugitive methane from waste:



Oberon anticipates hydrogen production (1) via steam methane reformation as part of the biogas-to-DME process at the production plant and separately, (2) at a fueling station, fuel cell grade hydrogen production via small modular DME-H2 reformation.

In case (1), both direct and indirect use of biogas and RNG is possible. In case (2) the hydrogen production is based on the carrier DME molecule with a non-direct source back to the original fugitive methane.

The draft proposal does not explicitly address the use of carrier molecules such as DME, methanol, ammonia, or other emerging technologies. With all the techniques developed for compliance with the RFS, LCFS, non-governmental certifications, and those rules contemplated by the draft proposal for 45V, an auditable, verifiable PER and hydrogen production for a well-to-gate pathway using a hydrogen carrier molecule is easily achievable.

Carrier molecules also open the door to potential sequential 45V credit generation. For Oberon, and many other alternative fuel producers whose products may be used as hydrogen carriers, intermediate hydrogen production is also required. That is, biogas or RNG may be reformed to hydrogen and used in DME, methanol, ammonia, or other fuel synthesis. Then the carrier molecules may move to market via a third party and be reformed at a hydrogen fueling station or end-user site. That reforming equipment would also be a qualified clean hydrogen production facility, likely owned by an independent party.

We recognize that carrier molecules add complexity to the rules Treasury and IRS are envisioning. However, they are a core component of the Administration's vision for a hydrogen economy and are allowable under a plain reading of the IRA statute. Treasury and IRS should proactively support what may become the most common form of hydrogen delivery by providing clear guidelines.

We urge Treasury to propose and invite comment on draft regulations for 45V credits when hydrogen carriers other than RNG are utilized. Consider the following issues that may arise:

If qualifying hydrogen is produced at and consumed in a biofuel production facility, and the facility produces a 45Z eligible biofuel that is used as a hydrogen carrier, what considerations should be given to claiming 45V credit for the hydrogen and 45Z credit for the finished biofuel? The IRA is explicit in disallowing 45Z credit for facilities that take 45V credit

[45Z(d)(4)(B)(i)], thus if 45Z is taken, the original hydrogen production at the biofuel facility would be ineligible for 45V. As such, sequential generation of 45V/45Z credits is not possible.

However, if the biofuel facility does not elect to take 45Z credit, is the intermediate hydrogen production eligible and the final reformed hydrogen eligible: a sequential generation of 45V/45V by different owners at different facilities for different end-uses as the molecules move through the economy?

The biofuel facility may send fuel to various markets such as direct combustion for transportation or heating, use for renewable chemicals production, or to a hydrogen reformer. If the facility does not take 45V for the intermediate hydrogen production, but then takes 45Z for the biofuel and the biofuel is subsequently sold for use as hydrogen carrier and converted into pure hydrogen, it appears separate 45V credit is applicable. In other words, there is sequential generation of 45Z credits for the biofuel carrier molecule and 45V credits for the final hydrogen at the reformer facility. While extensive consideration is given to the interactions of 45V, 45Z, 45Q, and other credits, this 45Z/45V sequence is not prohibited in the statute, and in fact it is the type of market innovation that the IRA is designed to spur.

These structures would benefit from further guidance from Treasury and IRS.

Regarding fugitive methane, the Treasury Department and the IRS request comment on the appropriate lifecycle analysis considerations associated with specific fugitive methane sources, such as counterfactual scenarios, to account for direct and significant indirect emissions, and also the manner in which to assess methane from these sources if the current practice is flaring. These comments may inform future versions of 45VH2-GREET.

We appreciate Treasury and IRS requesting comment on this critical point. As we noted in our December 2022 comment letter to IRS-2022-0058, well-to-gate emissions includes accounting for feedstock production (i.e. the "well" or source of the material used to produce the finished product). For feedstocks that are fugitive methane, whether they are sourced from an originally fossil or renewable material, the key issue is setting their emissions starting point and then calculating any associated energy inputs to collect and process that feedstock.

When a specific source of fugitive emissions is currently unabated, the implementation of abatement generates avoided emissions relative to the current practice. This is commonly utilized by the biogas industry. Consider the example of manure. Manure releases methane, a greenhouse gas twenty times more potent than carbon dioxide. When left in lagoons or in fields to decompose, manure produces a terrible environmental impact. When waste manure is captured for use the methane-driven greenhouse gas emission impact is eliminated. The quantification of that impact is then subtracted from the "well" analysis. Avoided emissions accounting is well established in Argonne National Laboratory's GREET and in the general practice of lifecycle assessment. Avoided emissions are both auditable and verifiable. They are also tremendously important because they value the immediate and significant avoidance of methane greenhouse gas emissions that threaten to lock-in large warming impacts relative to similar quantities of CO_2.

Treasury and IRS must ensure that avoided emissions crediting is allowable for fugitive methane feedstocks. In most instances counterfactuals are not necessary as these are not hypothetical emissions but measurable real world fugitives and valuing abatement is straightforward. There is no need to set an arbitrary universal 'base case' but rather allow each project to model their emissions based on site conditions. If a base case is needed it should be 'venting' or uncontrolled release of 100% of the methane potential of the feedstock to atmosphere.

With avoided emissions, biogas, RNG, and fugitive projects will be able to positively contribute to the hydrogen economy.

Without avoided emissions or with counterfactuals that assume flaring when no flaring was occurring, none of these projects are likely to achieve the on-paper outcomes necessary to be eligible for credit, while the environmentally positive, large real-world provable benefit will be lost. Please put science and data first and allow projects to provide their own baselines based on verifiable current practice prior to project implementation.

(2) What conditions for the use of biogas and RNG would ensure that emissions accounting for purposes of the section 45V credit reflects and reduces the risk of indirect emissions effects from hydrogen production using biogas and RNG? How can taxpayers verify that they have met these requirements?

Per the comments above, provide allowance for avoided methane emissions from fugitive and biogas sources. Pre-construction site visits by qualified verifiers may provide verification of current practice to set a modeling baseline of flaring, venting, or other use circumstances.

(5) What are the emissions associated with different methods of transporting RNG or fugitive methane to hydrogen producers (for example, vehicular transport, pipeline)?

Emissions will vary pathway to pathway. In the case of DME-H2 for example, transport will be from the biofuel production facility to the DME-H2 reformer via truck or railcar or a combination of the two, and over distances from 50 miles to 2,500 miles. The GREET model has standard factors for truck and rail shipping and makes this analysis easy. Transport emissions are verifiable via shipping and transaction records.

(6) How can the section 45V regulations reflect and mitigate indirect emissions effects from the diversion of biogas or RNG or fugitive methane from potential future productive uses? What other new uses of biogas or RNG or fugitive methane could be affected in the future if more gas from new capture and productive use of methane from these sources is used in the hydrogen production process?

The short answer to Question 6 is everything new and existing would be impacted because the gas is fungible, with impacts in unknowable ways both positive and negative to the cost, direct and indirect emissions, and availability of the gas.

Treasury and IRS are incorrect to pursue this line of regulation. No part of the 45V statute suggests that the feedstock for hydrogen needs to be diverted to or from any specific use. It is irrelevant to the plain text and clear intent of the statute.

It is far beyond the bounds of statute or the appropriate purpose of any implementing guidance for Treasury and IRS to contemplate what new uses of biogas could be affected if more biogas is used in hydrogen. Guidance should be limited to enabling users to apply for and receive that which they are legally entitled to under the statute.

To apply indirect emissions effects from "potential future productive uses" is an illogical construct and any such effort must by necessity be gross estimations of a hypothetical future that are unprovable.

It is also not the responsibility of Treasury and IRS to *mitigate* any direct or indirect emissions – it is only necessary to measure and account for them in the LCA.

It is not the role of Treasury and IRS to choose the highest and best use of biogas or RNG or fugitive methane. It is not the role of Treasury and IRS to forcibly exclude existing RNG assets from supporting the growing hydrogen economy. This is being invented with no reference to the statute and clearly undercuts the intent of the credit and the broader agenda of the IRA.

For the proposed rule to imply that hydrogen is not the highest and best use for biogas is nonsensical – there is no moral value associated with hydrogen production or any other potential biogas use. The market will dictate where the biogas will go and the purpose of the 45V credit is to provide an incentive for directing biogas to the hydrogen market. Treasury and IRS are interpreting the creation of the credit backwards – if the only reason to create a hydrogen production tax credit is to incentive hydrogen production, why are Treasury and IRS explicitly trying to push biogas and RNG feedstocks away from hydrogen production?

Equally nonsensical is suggesting that a biogas source has the same emissions factor as a fossil gas source because the biogas source has been in service for more than a single calendar year.

In this the proposal is creating a slew of counterproductive, unsubstantiated legal fictions to the detriment of the IRA enterprise.

(7) How can the potential for the generation of additional emissions from the production of additional waste, waste diversion from lower-emitting disposal methods, and changes in waste management practices be limited through emissions accounting or rules for biogas and RNG use established for purposes of the section 45V credit?

Waste diversion from lower-emitting disposal methods can be avoided by documentation of current practice at facilities prior to the placed in-service date of new digester or capture

equipment. Feedstock and physical plant changes are determinable by in-person audits from verification bodies and can be included in annual verification reports.

The proposed structure for annual third-party verification should be sufficient to address changes in waste management via comparison of actuals to the claimed emissions rate. It is not however the role of Treasury and IRS to attempt to limit total waste generation within the confines of the 45V credit. Waste sources may grow or shrink in response to a vast array of market forces. As long as the appropriate emissions factor is applied via the 45VH2-GREET model and confirmed by the verification body, Treasury and IRS should be indifferent to generation of additional waste.

(8) To limit the additional production of waste, should the final regulations limit eligibility to methane sources that existed as of a certain date or waste or waste streams that were produced before a certain date, such as the date that the IRA was enacted? If so, how can that be documented or verified? How should any changes in volumes of waste and waste capacity at existing methane sources be documented and treated for purposes of the section 45V credit? How should additional capture of existing waste or waste streams be documented and treated?

Treasury and IRS should not be using the 45V credit to limit external market forces that may increase or reduce the amount of waste available. If Treasury and IRS do attempt to limit waste, limiting eligibility to methane sources based on vintage is not the appropriate method.

If IRS is concerned a "new" source is extra, additional waste that results from a perverse incentive then they may consider that such "new facility" may result from the closure and replacement of older, less efficient facilities that are not otherwise being tracked. In reality, "new" sources will continually become available through the basic economic forces of supply and demand and creative destruction. Limiting their eligibility is to trap and limit the ability of the credit to incentivize new, clean, efficient hydrogen production. Doing so will require creating a web of arbitrary rules not based in the statute to control a non-existent problem that cannot be accurately documented in the first place.

The solution to the overwhelming complexity and confining requirements Treasury and IRS are contemplating is to implement the statute in a clean, targeted manner aligned with the goal of incentivizing clean hydrogen production.

(9) Are geographic or temporal deliverability requirements needed to reflect and reduce the risk of indirect emissions effects from biogas and RNG or fugitive methane use in the hydrogen production process? If so, what should these requirements be and are electronic tracking systems able to capture these details?

No, geographic deliverability requirements are not necessary beyond the current standard book-and-claim practice of physical connection to the pipeline network.

Temporal deliverability requirements are necessary within the tax year to ensure overall alignment between purchase, use, production, and crediting. Temporal deliverability

requirements on a quarterly, monthly, weekly, daily, hourly, or minute basis are unnecessary for biogas, RNG, and other fugitive methane. Biogas, RNG, and fugitive methane production are not weather dependent on a minute, hourly, daily, weekly, monthly or quarterly basis. Their use or non-use is not time dependent as these facilities strive for operation as close to 100% of the time as possible and thus there are no indirect effects from temporal variability.

The most restrictive temporal requirements for biogas and RNG that Treasury and IRS should consider would be annual matching.

(11) What counterfactual assumptions and data should be used to assess the lifecycle GHG emissions of hydrogen production pathways that rely on RNG? Is venting an appropriate counterfactual assumption for some pathways? If not, what other factors should be considered?

To the extent a counterfactual is necessary, venting, or non-abatement, is an appropriate baseline counterfactual for biogas, RNG, and other fugitive methane.

However, the current practice for waste management significantly impacts the quantity of methane that may be vented. For example, animal manure left in pasture, collected in dry bedding, or flushed into lagoons all produce dramatically different amounts of free, vented methane. In Oberon's experience organic waste sites either have capture or no capture. For sites that have no capture prior to construction of the 45V facility and related facilities venting is the appropriate baseline.

In the organics industry (unlike fossil fuel vented methane at a well head) it is extremely unlikely a facility would have a digester operating to capture and flare the methane and not achieve any economic recovery of the biogas. Facilities that do have pre-existing digesters that only capture and flare their biogas are exceptions and not an appropriate baseline.

As such, venting is the appropriate baseline for organics and biogas.

(12) What criteria should be used in assessing biogas and RNG-based PERs? What practices should be put in place to reduce the risk of unintended consequences (for example, gaming)? Should conservative default parameters and counterfactuals be used unless proven otherwise by a third party?

As discussed above, biogas and RNG based PERs should be assessed on the basis of a GREET well-to-gate analysis providing for any avoided emissions relative to a vented or unabated baseline.

Clarification Request on SMR and Hydrogen Purity

Oberon requests clarity on the applicability of the 45V credit to hydrogen produced in a steam methane reformer (SMR) and used in an industrial application such as renewable chemicals production. We note that neither the statute or draft guidance contains any purity

requirements for the H2 or the gas stream it is contained within. Consider the following fact pattern and questions:

A hydrogen facility consists of a methane input to a SMR, an SMR, and an SMR outlet. The SMR produces a mix of gaseous H2, CO2, CO, H20, and other trace chemicals. This gas stream continues to a cleaning stage where the water is removed. The gas stream is now 68 mol% H2 as it leaves the hydrogen facility and enters the next step in processing to methanol. Methanol synthesis combines the free H2 molecules with the free CO2 molecules to produce methanol molecules. For the process to work free H2 molecules are a required input. Absent the connected SMR, methanol production would require purchasing of H2 from an external supplier. The H2 can be measured at the hydrogen facility at the SMR outlet by a flow meter and an analyzer to determine exact H2 content by weight percent on a 15 minute interval, by a sealed meter and accessible for third party verification.

- Is this hydrogen production eligible for 45V
- Are there specific metering requirements Treasury and IRS are considering?

The statute does not specify that the H2 production must be isolated or that the gas stream containing the H2 achieve a certain threshold H2 content to be eligible for credit, rather that it meets the appropriate lifecycle greenhouse gas emissions rate.

- Will Treasury and IRS require H2 to achieve a certain purity?
- Will Treasury and IRS require gas streams containing H2 that is considered for credit to have a threshold composition of H2, i.e. a measurable gas stream detailing all constituent molecules and demonstrating greater than 50% H2?
- Will Treasury and IRS require or recommend industrial users such as renewable chemical producers separate H2 streams from mixed SMR output streams for separate measurement even if those streams will be immediately recombined for productive use?
- Will the CO2 and CO in the gas stream be considered valorized coproducts if they are also productively used in renewable chemical production process and not vented, flared, or captured and sequestered?

Thank you for consideration of our comments. Please do not hesitate to contact me with any questions at david.h.mann@hklaw.com.

Sincerely,

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Holland & Knight

On Behalf of Oberon Fuels, Inc.