February 26, 2024

Internal Revenue Service
CC:PA:LPD:PR (REG-117631-23)
Room 5203
P.O. Box 7604, Ben Franklin Station,
Washington, DC 20044

Re: REG-117631-23: Section 45V Credit for Production of Clean Hydrogen, Section 48(a)(15) Election to Treat Hydrogen Production Facilities as Energy Property

Proman USA, Inc. is an integrated energy company and a global leader in natural gas-derived products and services. The Company owns assets in the United States and internationally, and is headquartered in Switzerland. We are a global leader in methanol, fertilizer and other products such as melamine. We are committed to developing sustainable methanol and ammonia as cleaner alternatives to fossil fuels, offering a pathway to drastically cutting emissions in power generation, overland transportation, shipping and industry.

As clean hydrogen is a necessary and significant key building block to produce clean methanol, Proman USA, Inc. welcomes the opportunity to comment on the proposed regulations (the "Proposed Regulations") promulgated under sections 45V ("45V Credit") and 48(a)(15) of the Internal Revenue Code (the "Code"), which were enacted under the Inflation Reduction Act of 2022 ("IRA") to incentivize the production of clean hydrogen domestically.

Proman USA, Inc. congratulates the U.S. Department of Treasury and the Internal Revenue Services (the "Treasury" and the "IRS", respectively) for their hard work and efforts in drafting rules for the 45V Credit that will accelerate investments in clean hydrogen production.

The Company endorses the questions on this topic – attached to this letter - submitted by the Methanol Institute, a global trade association for the methanol industry. Proman USA, Inc. is also submitting additional questions not listed by the Methanol Institute. Such questions are also attached to this letter.

Proman USA, Inc. respectfully requests the IRS and Treasury to consider the comments outlined in this document. Please contact me at 713-943-2200 with any questions or comments.

Thank you for your consideration.

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Jarrod Hodson
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26 February 2024

Jarrod Hodson

Questions Submitted by the Methanol Institute and Endorsed by Proman USA, Inc.

I. Clarify that the definition of qualified clean hydrogen is inclusive of hydrogen produced in a gas stream, such as syngas, where such gas stream (i) is not solely composed of hydrogen and (ii) is held for sale or use as a valorized product (e.g., syngas used in the production of methanol).

II. Modify 45VH2-GREET 2023 to include the capability of modeling the utilization of captured CO2 in addition to sequestration.

III. Permit an EAC (as defined below) to meet the deliverability requirements, as stipulated under Prop. Treas. Reg. § 1.45V-4(d)(3)(iii), if the electricity is delivered from an electricity generating facility to a hydrogen production facility located in: (i) the same North American Electric Reliability Corporation ("NERC") region or (ii) an adjacent NERC region.

IV. Provide a grandfather rule and a longer transitional period through calendar year 2032 that deems an EAC satisfies the temporal matching requirement if: (i) the electricity generated before January 1, 2028 represented by an EAC is generated in the same calendar year the taxpayer's hydrogen production facility uses electricity to produce hydrogen ("annual matching") and (ii) the electricity generated on or after January 1, 2028 and before January 1, 2033 represented by an EAC is generated in the same month the taxpayer's hydrogen production facility uses electricity to produce hydrogen ("monthly matching").

V. Clarify that stored electricity in batteries has a time stamp that correlates to the time such electricity is used in the production of clean hydrogen rather than when the electricity was generated or stored and therefore the electricity from such batteries is eligible for taxpayers to utilize in satisfying the temporal matching requirements.

VI. Provide a transitional period for compliance with the EAC's incrementality requirement, provide transitional period for incrementality, and include alternative approaches to satisfying the incrementality requirement.

VII. Include a safe harbor for EACs purchased from existing minimal-emitting electricity generators located in a jurisdiction with clean energy renewable portfolio, emissions reduction standards, or other similar RPS or policies.

VIII. Clarify that the "emission through the point of production" (i.e., well-to-gate) means the aggregate lifecycle GHG emissions related to the amount of hydrogen produced by a taxpayer at a hydrogen production facility for purposes of claiming the 45V Credit, which is to be distinguished from including all hydrogen produced (and related emissions associated with such hydrogen) at such facility during a taxable year for purposes of measuring the aggregate lifecycle GHG emissions.

IX. Revise the definition of the "most recent GREET model" for purposes of determining the "lifecycle greenhouse gas emissions" under Section 45V(c)(1)(B) of the Code and Prop. Treas. Reg. § 1.45V-1(a)(8)(i) and (ii) to include a safe harbor where a taxpayer may rely on the GREET model publicly available (i) at the time the FID is made, (ii) at the time that the facility is placed in service, or (iii) on the first day or any day of the taxable year (but within such taxable year) of production that best computes the lifecycle GHG emissions rate based on the taxpayer's facts and circumstances.

X. Clarify under Section 45V(d)(4) of the Code that "modification of existing facilities" includes any modification so long as amounts paid or incurred with respect to such modification are properly chargeable to the capital account of the taxpayer.

XI. Clarify that hydrogen produced through a multiple step distribution channel may qualify as qualified clean hydrogen.

XII. Incorporate a book and claim provision for RNG.

XIII. Modify the GREET model to include a broad range of feedstocks used today for RNG and fugitive methane sources.

Please see below for a detailed summary of each comment.

I. MI respectfully requests that the IRS and the Treasury clarify that the definition of qualified clean hydrogen is inclusive of hydrogen produced in a gas stream, such as syngas, where such gas stream (i) is not solely composed of hydrogen and (ii) is held for sale or use as a valorized product (e.g., syngas used in the production of methanol).

The 45V Credit defines qualified clean hydrogen as hydrogen: (i) with a lifecycle GHG emissions rate of not more than 4.00 kilogram of carbon dioxide equivalent ("CO2e")/kilogram of hydrogen, (ii) produced – (A) in the United States (or a United States territory), (B) in the ordinary course of a trade or business of the taxpayer, and (C) for sale or use, and (iii) properly verified by an unrelated third-party.[1]

Code section 45V(c)(1)(A) provides that lifecycle GHG emissions has the same meaning given such term under section 211(o)(1)(H) of the Clean Air Act.[2] Specifically, the term "lifecycle greenhouse gas emissions" means the aggregate lifecycle GHG emissions related to hydrogen produced at a hydrogen production facility during the taxable year through the point of production (i.e., well-to-gate).[3]

The lifecycle GHG emissions rate is generally determined using the most recent Greenhouse gases, Regulated Emissions, and Energy use in Technologies ("GREET") model, and only if the relevant lifecycle GHG emissions rate has not been determined under the most recent GREET model, the taxpayer may request a provisional emissions rate.[4] The term "most recent GREET model" means the latest version of 45VH2-GREET developed by Argonne National Laboratory that is publicly available on the first day of the taxpayer's taxable year in which the qualified clean hydrogen for which the taxpayer is claiming the 45V Credit was produced.[5]

The most recent GREET model includes eight hydrogen production pathways, including: (i) steam methane reforming ("SMR") of natural gas with potential carbon capture and sequestration ("CCS"), (ii) autothermal reforming ("ATR") of natural gas with potential CCS, (iii) SMR of landfill gas with potential CCS, (iv) ATR of landfill gas with potential CCS, (v) coal gasification with potential CCS, (vi) biomass gasification with potential CCS, (vii) low-

[1] Code section 45V(c)(2)(A) and (B); *see also* Prop. Treas. Reg. §§ 1.45V-1(a)(9) and 1.45V-5.
[2] 42 U.S.C. 7545(o)(1).
[3] Code section 45V(c)(1)(B); *see also* Prop. Treas. Reg. § 1.45V-1(a)(8)(iii).
[4] *Id.*
[5] Prop. Treas. Reg. § 1.45V-1(a)(8)(ii).

temperature water electrolysis using electricity, and (viii) high-temperature water electrolysis using electricity and/or heat from nuclear power plants.[6] The Guidelines to Determine Well-to-Gate GHG Emissions of Hydrogen Production Pathways using 45VH2–GREET (the "GREET Manual") acknowledge that most pathways generate hydrogen and other chemical compounds (e.g., carbon dioxide ("CO2")), or may also generate co-products that may be valorized in conjunction with hydrogen.[7] For example, under the biomass gasification with potential CCS pathway the GREET manual states: "**this technology converts biomass feedstocks into synthetic gas**, using elevated temperatures and with controlled amounts of oxygen and/or steam. **The resulting synthetic gas contains hydrogen**, and potentially CO, CO2, and other trace gases and impurities (emphasis added)."[8] Furthermore, under the methane reforming pathway, the GREET manual provides: reforming facilities typically generate hydrogen and CO2 and may also generate co-products that may be valorized (sold by the hydrogen producer or otherwise productively used).[9]
The "Allocation Methods to Address Co-Product Effects" in the GREET Manual stipulate that: "For those co-products that have actually been valorized, 45VH2-GREET 2023 allows for users to account for **certain** co-products in the well-to-gate GHG emissions of the hydrogen production facility. Users may only account for a co-product if it has been valorized in a process downstream of the hydrogen production facility; co-products that were produced but not valorized may not be allocated emissions in the well-to-gate GHG emissions calculation of produced hydrogen (emphasis added)."[10]

The GREET Manual further explains that co-products that are actually valorized by users are allowed to use a "system expansion" approach (also known as the "displacement method") to co-product accounting.[11] The GREET Manual provides a table (See *Figure 1*) with three listed co-products that are afforded the system expansion accounting mechanism for measurement of emissions. These co-products are listed as steam, oxygen, and nitrogen. The GREET Manual further provides that this table may be updated in future versions of the GREET Manual as additional co-products are added to future versions of the GREET model.[12]

Table 4. Co-products in 45VH2-GREET 2023 and Accounting Mechanisms

Co-product	Accounting Mechanism
Steam	System Expansion
Oxygen	System Expansion
Nitrogen	System Expansion

Figure 1: Co-Products Included in the Current GREET Model and Accounting Mechanisms

[6] Preamble of Prop. Treas. Reg. § 1.45V, page 89225; *see also* Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2–GREET (December 2023). .https://www.energy.gov/sites/default/files/2023-12/greet-manual_2023-12-20.pdf.
[7] *Id.*
[8] *Id.*
[9] *See* Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2–GREET (December 2023).https://www.energy.gov/sites/default/files/2023-12/greet-manual_2023-12-20.pdf.
[10] *Id.;* The GREET Manual acknowledges that allocation of emissions to valorized co-products is standard practice in well-to-gate life cycle analysis, including in previously published GREET models and related publications.
[11] *Id.;* The displacement method is described further in the International Organization for Standardization ("ISO") 14044:2006. https://www.iso.org/standard/38498.html.
[12] *Id.*

Notwithstanding the clear guidance that co-products that are valorized in the production of hydrogen should be afforded the system expansion approach to the emissions allocation of those co-products, one major co-product in the production of hydrogen through a syngas pathway, carbon monoxide ("CO"), which is directly relevant to the SMR and ATR pathways in the production of hydrogen, is not included in the most current GREET model.

CO that is produced as a co-product in the production of hydrogen which is actually valorized by a user **(for instance if the co-product is used as a chemical feedstock in the production of a hydrogen carrier chemical)**[13] should be a listed co-product afforded system allocation treatment by the substance and logic of the GREET Manual and ISO system expansion principles.[14] However, the most current GREET model does not presently allow for such functionality.

The GREET model is rigid in its treatment of co-products in the function of the model under the SMR and ATR pathways. At present, the GREET model assumes that all CO produced as a co-product in the production of hydrogen is combusted inside the well-to-gate boundary at the point of hydrogen production, such as is the case in oil refining, referencing a U.S. Environmental Protection Agency ("EPA") study that supports this conclusion.[15] This point is made explicit in the following excerpt from the GREET Manual: "Additionally, to complete the accounting of carbon life cycle, 45VH2-GREET 2023 [the GREET model] assumes that any carbon-containing impurities in the gas stream will be eventually converted by the end user(s) to form CO2 emissions, and accounts for these CO2 emissions in the well-to-gate GHG emissions of hydrogen production. (The assumption that carbon containing impurities will be converted to CO2 is based on current practices at industrial facilities that consume hydrogen, such as petroleum refineries and ammonia plants, as well as expected practices at potential future industrial facilities such as iron and steel making plants.)"[16]

The assumption contained in the GREET Manual and the present functionality of the GREET model forces taxpayers to treat CO as an impurity that is combusted at the point of hydrogen production inside the well-to-gate. This assumption fails to distinguish between CO that is combusted at the point of hydrogen production, such as a refinery, and CO that is actually valorized by a user in the production of hydrogen carrier chemicals, such as methanol. While such treatment of CO may be appropriate where the CO is actually combusted at the point of production, extending that treatment to CO that is valorized in the production of methanol is contrary to the statutory language of Section 45V of the Code, the standard lifecycle analysis and emissions treatment of co-products, and common practice.

In fact, the EPA study cited by the Greet Manual to support the assumption in the GREET model that CO combusted at refineries at the point of production of hydrogen should be considered within the well-to-gate boundary supports the thesis that CO that is valorized should not be considered to be combusted. The EPA study provides: "For other hydrogen production plants, particularly those that use amine adsorption, the process CO2 stream recovered from the purification step is not returned to the SMR furnace. In this configuration, there are two separate emission stacks: the absorber (or purification system) off-gas, which is nearly pure CO2, and the SMR process heater flue gas. Several hydrogen plants with this design capture the process CO2 (absorber off-gas) for sale as a by-product."[17] The EPA study cited in the GREET Manual thus supports the conclusion that CO and CO2 that are subsequently valorized (such as process CO2

[13] *Id.*; "Hydrogen production processes may yield co-products that are also valorized (i.e., sold by the hydrogen producer or otherwise productively used)."
[14] In the case of syngas where there is a mixed stream of hydrogen and carbon monoxide a system allocation based on mass or energy allocation methods would be more appropriate than system expansion.
[15] US Environmental Protection Agency. (2015). Chapter 5.1: Petroleum Refining. In: AP 42, Compilation of Air Pollutant Emissions Factors, Volume 1, 5th Edition.
[16] *See* Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2–GREET (December 2023).https://www.energy.gov/sites/default/files/2023-12/greet-manual_2023-12-20.pdf.
[17] US Environmental Protection Agency. (2015). Chapter 5.1: Petroleum Refining. In: AP 42, Compilation of Air Pollutant Emissions Factors, Volume 1, 5th Edition at p. 8.

sold as a by-product) in the example should not be assumed to be combusted within the well-to-gate and should therefore be accounted for as a co-product.

Consistent with the EPA study, CO that is valorized in the production of methanol should be treated as a co-product and should not be treated as an impurity. Treating the CO as an impurity has the effect of incorporating the "well-to-grave" boundary in the "well-to-gate" lifecycle measurement of CO used to produce methanol, which is beyond the scope of the "well-to-gate" boundary analysis that is expressly stated in the 45V Credit. Accordingly, such a result is contradictory to the Code section 45V statute, and the system allocation methodologies embedded in ISO 14044:2006, and MI kindly requests the Treasury and the IRS to clarify that valorized CO should be treated as a co-product in the production of hydrogen.

II. MI requests that 45VH2-GREET 2023 include the capability of modeling the utilization of captured CO2 in addition to sequestration.

As analyzed in the prior comment, the preamble of the Proposed Regulations provides that 45H2-GREET 2023 allows users to input the quantity of valorized co-products (that is, co-products from the hydrogen production process that are productively utilized or sold) and allocates emissions to those co-products (rather than to the hydrogen production). The GREET Manual adds that the GREET model can be used to model thermal reformation and gasification pathways with and without CCS. However, within a footnote of the GREET manual, the DOE provides that the GREET model is only capable of modeling permanent sequestration of CO2, as in Class II or Class VI injection wells.[18] The GREET model does not model other forms of CO2 utilization (e.g., production of synthetic fuels).[19]

The current capabilities of the GREET model are limited and inconsistent with the Proposed Regulations, which includes measuring emissions reductions that result from carbon capture, utilization, and sequestration ("CCUS") as this is within the well-to-gate boundary. Accordingly, MI requests that the IRS and the Treasury consider an alternative to the system allocation approach, and rather than allocating emissions to valorized CO co-products, 45VH2-GREET could be altered such that all valorized or productively utilized COs that are not emitted in the well-to-gate scope are disregarded or otherwise treated the same as sequestered carbon for purposes of determining lifecycle GHG emissions. For clarity, to the extent CO is emitted, it would be included in the determination of lifecycle GHG emissions. However, because lifecycle GHG emissions are based on emissions through the point of production (well-to-gate), if COs are valorized or used productively and not emitted through the point of production (e.g., COs used in the production of synthetic fuels), for purposes of determining lifecycle GHG emissions, such CO should be treated in the same manner as sequestered carbon and not increase the lifecycle GHG emissions rate. Such a result will also encourage taxpayers to reduce their lifecycle GHG emissions rate for hydrogen production by utilizing captured CO2 in a valorized product or selling the captured CO2 to another taxpayer where such CO2 will be utilized in a valorized product.

III. MI kindly asks the Treasury and the IRS to permit an EAC to meet the deliverability requirements, as stipulated under Prop. Treas. Reg. § 1.45V-4(d)(3)(iii), if the electricity is delivered from an electricity generating facility to a hydrogen

[18] *See* Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2–GREET (December 2023).https://www.energy.gov/sites/default/files/2023-12/greet-manual_2023-12-20.pdf.
[19] *Id.*

production facility located in: (i) the same NERC region or (ii) an adjacent NERC region.

An energy attribute certificate ("EAC") meets the deliverability requirements if the electricity represented by the EAC is generated by a source that is in the same region (as defined in Prop. Treas. Reg. § 1.45V–4(d)(2)(vi)) as the relevant hydrogen production facility. Currently, the Proposed Regulations segregate the United States into 13 regions based on the U.S. Department of Energy's ("DOE") National Transmission Needs Study.[20] The purpose of the National Transmission Needs Study is to identify high-priority national electric transmission needs – specifically, to identify geographic areas where the bulk power grid would benefit from new, uprated, or graded transmission facilities.[21] In the study, the DOE evaluated the several different entities responsible for regional transmission planning, transmission system operations, and reliability and organized transmission need results by geographic region, to the extent possible (see *Figures 2 and 3*).[22]

Table III-1. Region names used throughout this report. The dominant power system entities that serve transmission planning, transmission system operations, and reliability functions in each geographic region are also presented.

Geographic Region	RTO/ISO	Transmission Planning	Reliability Entity
California	California Independent System Operator	California Independent System Operator	Western Electricity Coordinating Council
Northwest	–	Northern Grid	Western Electricity Coordinating Council
Mountain	–	Northern Grid & WestConnect	Western Electricity Coordinating Council
Southwest	–	WestConnect	Western Electricity Coordinating Council
Texas	Electric Reliability Council of Texas	Electric Reliability Council of Texas	Texas Reliability Entity
Plains	Southwest Power Pool	Southwest Power Pool	Midwest Reliability Organization
Midwest	Midcontinent Independent System Operator	Midcontinent Independent System Operator	Midwest Reliability Organization
Delta	Midcontinent Independent System Operator	Midcontinent Independent System Operator	SERC Reliability Corporation
Southeast	–	Southeastern Regional Transmission Planning & South Carolina Regional Transmission Planning	SERC Reliability Corporation
Florida	–	Florida Reliability Coordinating Council	SERC Reliability Corporation
Mid-Atlantic	PJM	PJM	Reliability First
New York	New York Independent System Operator	New York Independent System Operator	Northeast Power Coordinating Council
New England	ISO New England	ISO New England	Northeast Power Coordinating Council

Figure 2: The 13 Regions Identified in the National Transmission Needs Study

[20] DOE, National Transmission Needs Study, Oct. 2023, available at https://www.energy.gov/sites/default/files/2023-10/National_Transmission_Needs_Study_2023.pdf.
[21] *Id.*
[22] *Id.*

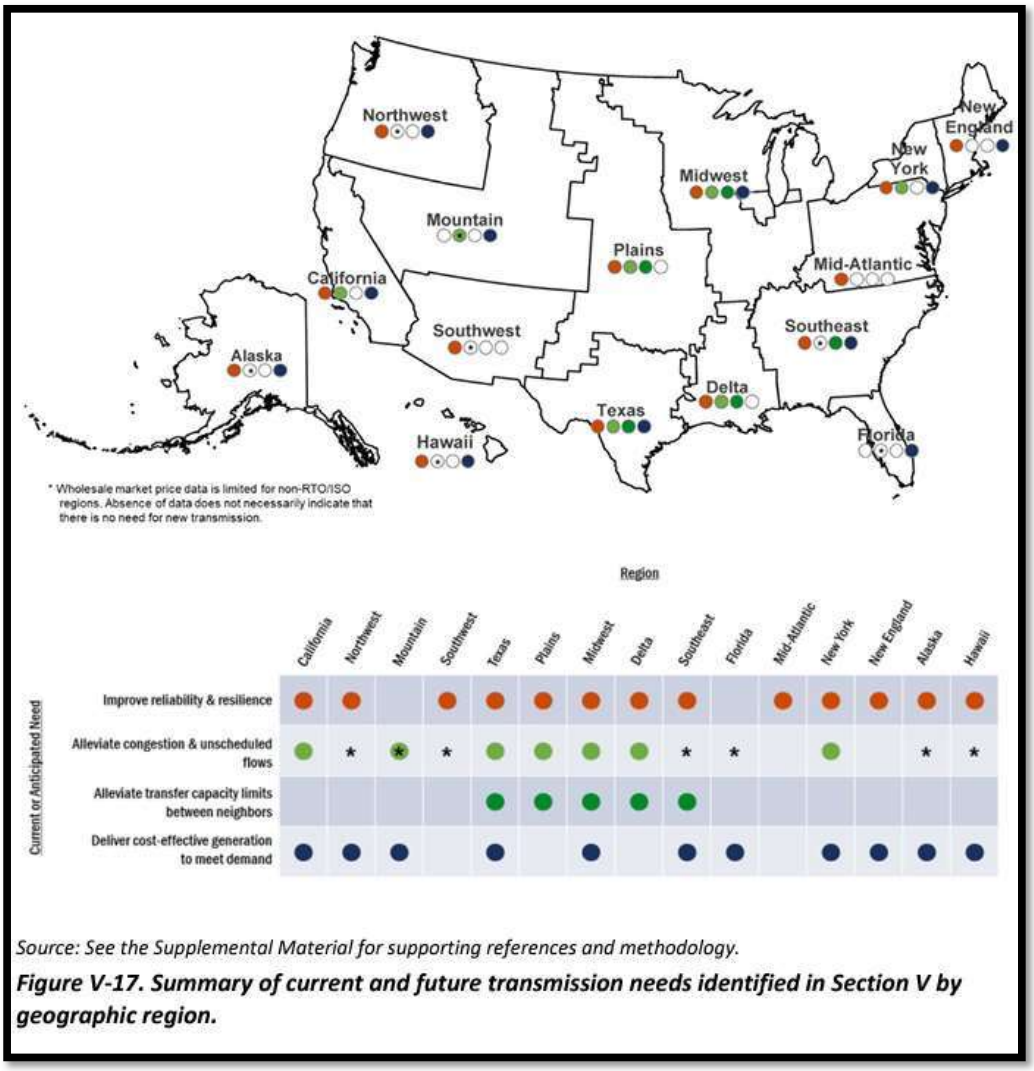

Figure 3: Summary of Current and Future Transmission Needs by Region

The Treasury and the IRS requested comments on whether there are additional ways to establish deliverability, such as circumstances indicating that electricity is actually deliverable from an electricity generating facility to a hydrogen production facility, even if the two are not located in the same region or if the clean electricity generator is located outside of the United States. MI respectfully responds to such solicitation for comment in the affirmative, there are additional and more effective ways to establish deliverability. MI recommends that the term "region" should mean the existing six NERC regions or a region adjacent to such NERC region in which the hydrogen production facility is located.

The GREET Manual clarifies in "Accounting for Electricity" in the GREET model, when specifying the source of electricity consumed, users may represent either (1) electricity from a specific generator or combination of generators that meets the EAC requirements or (2) the average annual grid mix in the NERC region that the hydrogen production facility is located in. Specifically, for hydrogen production facilities that do not source electricity from a specific generator or combination of generators, the GREET model assumes that the electricity has an

emissions profile that reflects the annual average emissions intensity of the electricity in the NERC region that the hydrogen producer is located in.

In comparison, the DOE's National Transmission Needs Study created 13 regions based on several subjective and objective factors, none of which considered the demand placed on each region by the addition of clean hydrogen production plants. Although the study provides value in identifying geographic areas where the bulk power grid would benefit from new, uprated, or graded transmission facilities, relying on the study to define "region" for the deliverability requirement creates a disparate treatment of clean hydrogen production facilities due to the variability in geographical location of clean electricity generating sources across the United States.

By increasing the geographical areas in which a clean hydrogen production facility may procure EACs, the Government will provide taxpayers with more predictable clean electricity sources and align the deliverability requirement with the development of the regional clean hydrogen hubs, a program to fund up to $7 billion to establish six to ten regional clean hydrogen hubs across the United States, enacted under the Infrastructure Investment and Jobs Act ("Bipartisan Infrastructure Law").[23] Furthermore, by redefining the term "region" to mean the existing six NERC regions, the Treasury and the IRS will provide consistency with the term "region" currently used in the GREET model for determining the lifecycle GHG emissions associated with the average annual grid mix in the NERC region for hydrogen production facilities that do not source electricity from a specific generator. Therefore, MI recommends that the Treasury and the IRS permit an EAC to meet the deliverability requirements if the electricity is delivered from an electricity generating facility to a hydrogen production facility located in: (i) the same NERC region or (ii) an adjacent NERC region.

IV. Provide a grandfather rule and a longer transitional period through calendar year 2032 that deems an EAC satisfies the temporal matching requirement if: (i) the electricity generated before January 1, 2028 represented by an EAC is generated in the same calendar year the taxpayer's hydrogen production facility uses electricity to produce hydrogen ("annual matching") and (ii) the electricity generated on or after January 1, 2028 and before January 1, 2033 represented by an EAC is generated in the same month the taxpayer's hydrogen production facility uses electricity to produce hydrogen ("monthly matching").

An EAC satisfies the temporal matching requirement if the electricity represented by the EAC is generated in the same hour that the taxpayer's hydrogen production facility uses electricity to produce hydrogen.[24] The Proposed Regulations provide a transition rule to allow an EAC that represents electricity generated before January 1, 2028 to satisfy the temporal matching requirements if the electricity represented by the EAC is generated in the same calendar year that the taxpayer's hydrogen production facility uses electricity to produce hydrogen.[25]

In the preamble of the Proposed Regulations, the Treasury and the IRS recognize that hourly tracking systems are not yet broadly available and will take some time to develop. Similar concerns exist in Europe for clean hydrogen production, where the European Commission

[23] Bipartisan Infrastructure Law, Public Law 117-58 (November 1, 2021).
[24] Prop. Treas. Reg. § 1.45V-4(d)(3)(ii)(A).
[25] *Id.*

adopted two Delegated Acts defining what constitutes renewable hydrogen, which includes a transition period for "temporal correlation" with power purchased from clean energy generation sources through a power purchase agreement, among other requirements.[26]

Due to the uncertainty on timing of when the technology may be available, investors and developers are concerned with satisfying the hourly temporal matching requirements by 2028. Accordingly, MI proposes two solutions. First, the Treasury and the IRS should bifurcate and extend the transition period through calendar year 2032 so that the final regulations deem an EAC satisfies the temporal matching requirement if (i) the electricity generated before January 1, 2028 represented by an EAC is generated in the same calendar year the taxpayer's hydrogen production facility uses electricity to produce hydrogen ("annual matching") and (ii) the electricity generated on or after January 1, 2028 and before January 1, 2033 represented by an EAC is generated in the same month the taxpayer's hydrogen production facility uses electricity to produce hydrogen ("monthly matching"). Second, the Treasury and the IRS should provide a temporal matching safe harbor that applies the temporal matching requirements in effect for the calendar year in which the clean hydrogen production facility that begins construction shall remain in effect for the full credit period (e.g., if construction begins before January 1, 2028, such taxpayer may rely on the annual temporal matching requirements).

V. Clarify that stored electricity in batteries has a time stamp that correlates to the time such electricity is used in the production of clean hydrogen rather than when the electricity was generated or stored and therefore the electricity from such batteries is eligible for taxpayers to utilize in satisfying the temporal matching requirements.

Successfully decarbonizing the power sector, which is currently responsible for one-third of domestic emissions, requires a transition from fossil-fuels-based generation assets to carbon-free power sources, such as renewables (e.g., wind, solar) and nuclear, among other low- and zero-emitting electricity generating sources.[27] Since variable renewables cannot be turned on and off to meet peak demand in the same manner as fossil-fuels-based generation assets, the grid will need a new way of providing flexibility and reliability.[28] Because a clean hydrogen production facility cannot operate based on the ebbs and flows of when a renewable electricity generating source is in operations, developers and investors will need assurance that electricity stored in batteries will satisfy the temporal matching requirements under Prop. Treas. Reg. § 1.45V-4(d)(3)(ii)(A). Therefore, MI seeks clarity that stored electricity in batteries has a time stamp that correlates to the time such electricity is used in the production of clean hydrogen rather than when the electricity was generated or stored.

VI. Provide a transitional period for compliance with the EAC's incrementality requirement provide transitional period for incrementality and include alternative approaches to satisfying the incrementality requirement.

[26] Article 27(3) of Renewable Energy Directive (RED II); The European Commission introduced a monthly tracking transitional period for compliance through 2030 and then requires hourly tracking in calendar year 2031.
[27] Department of Energy, "Pathways to Commercial Liftoff: Long Duration Energy Storage," March 2023. https://liftoff.energy.gov/wp-content/uploads/2023/10/Pathways-to-Commercial-Liftoff-LDES-May-5_UPDATED-v10.pdf.
[28] *Id.*

The incrementality requirement would require qualifying EACs to represent incremental source electricity, such as electricity from an electricity generating facility that has a recent commercial operations date ("COD") or uprate no more than 36 months before the hydrogen production facility for which the EAC is retired was placed in service.[29] Due to the 36-month COD and uprate rules (and challenges with satisfying the deliverability requirement discussed in more detail above), clean hydrogen production facilities will face challenges with sourcing clean electricity from an acceptable electricity generating facility within the 36-month time frame and in their respective region. This will especially penalize early movers in the hydrogen industry who have already identified suitable suppliers of clean electricity and EACs.

Therefore, MI recommends the addition of a transitional period where hydrogen production facilities who have begun construction before 2030 will be deemed to satisfy the incrementality requirements through entering into a long-term renewable power purchase agreement with an existing zero-emissions source. Such a transition period will support early scale-up of clean hydrogen projects and instill first movers with the confidence of satisfying the incremental requirement by entering into a long-term renewable power purchase agreements with existing zero-emissions sources. A transition period will also allow the US zero-emitting sources market to address the existing interconnection bottlenecks and accelerate and increase the penetration of renewables on the grid, without penalizing nascent clean hydrogen producers and hydrogen users thereby enabling the industry to grow.

Furthermore, in the preamble of the Proposed Regulations, the IRS and the Treasury recognized the impact of the incrementality rule on existing minimal-emitting electricity generators (e.g., wind, solar, nuclear, and hydropower), and therefore solicited comments on whether there are alternative approaches that would allow a clean hydrogen producer to satisfy the incrementality requirement even if such taxpayer sources electricity from an existing minimal-emitting electricity generator. MI supports and respectfully suggests that the IRS and the Treasury incorporate all alternatives introduced in the Proposed Regulations.

Regarding the formulaic approach, the IRS and the Treasury discuss a five percent allowance from existing minimal emitting sources placed in service before January 1, 2023 ("formulaic approach") based on average curtailment rates. We recommend increasing the threshold to 10 percent. Based on the generator's fleet in the region, the IRS and the Treasury should allow 10 percent of the existing zero-emitting power generating sources to be eligible and deemed incremental. Curtailment rates are on the rise across the U.S. and are expected to continue to increase, which is why a higher threshold of 10 percent would be appropriate. Including the 10 percent allowance will ensure that clean hydrogen projects can be developed across the country, without penalizing states that predominantly have hydropower and/or nuclear rather than wind and solar.

The development timeline of a minimal emitting or zero-emitting electricity generating facility can take several years, in addition to the delays faced by the interconnection queue, which is approximately five years.[30] It is crucial to the hydrogen industry that the IRS and the Treasury avoid placing excessive burdens on taxpayers, especially early movers who have started negotiating power purchase agreements as well as undertaking financing efforts. By providing

[29] Prop. Treas. Reg. § 1.45V-4(d)(3)(i)
[30] Department of Energy, National Transmission Needs Study, Oct. 2023, available at https://energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf.

alternatives for a clean hydrogen producer to satisfy the incrementality requirement, the IRS and the Treasury can remove uncertainty on a project's qualification and potential credit value, which will provide taxpayers with the predictability needed for financing a project.

VII. MI recommends that the IRS and the Treasury include a safe harbor for EACs purchased from existing minimal-emitting electricity generators located in a jurisdiction with clean energy renewable portfolio, emissions reduction standards, or other similar RPS or policies.

Many states and regions have proactively implemented grid decarbonization goals, which include certain programs and policies that restrict or monitor GHG emissions from electricity generating sources. The implementation of an incrementality requirement in such regions, however, may circumvent the existing policies and penalize the electricity generating sources and clean hydrogen producers located in such states. Accordingly, concerns were expressed by many states. For example, the State of California explained in its letter to the IRS and the Treasury in August 2023: "The argument for requiring additionality [i.e., incrementality], in the context of a state with an RPS and carbon neutral requirement, sets up an "either-or" at the project level when we need "both-and" at the system level to enable deep system wide decarbonization. For context, in California, to provide 100 percent clean electricity our state will need to build 148,000 MW of clean energy resources by 2045 – increasing our already robust clean electricity capacity by 400 percent over the next two decades. We believe these targets are achievable, but if hydrogen projects require additionality above and beyond our 100 percent RPS requirements, it will be impossible to interconnect them in a timely and cost-effect manner without disrupting our carefully calibrated energy system."[31]
Similarly, a consortium of states in the northeast, led by the New York State Energy & Research Development Authority, explained: "[We] do not support a strict requirement of "Additionality". As an initial point, in states with renewable portfolio standards (RPS) based on a percentage of load, by definition if an electrolyzer load is added to that grid, new renewables must be built to cover the percentage of obligation in place. An RPS enables the clean electricity sector to automatically adjust its renewables requirements for new clean load without putting this obligation onto the new electrolyzer load. Under current RPS implementation policies, no RPS requires additionality tied to individual heat pumps installed, electric vehicles connected to the grid, lithium-ion energy storage, nor any other decarbonization solution being deployed at scale to meet local, state or national climate and energy goals. It is unclear why a different approach should be applied to hydrogen." [32]

The State of Washington also believes that incrementality is unwarranted on an undifferentiated, nationwide basis: "The suggested additionality restrictions are not only unnecessary in a statutory clean energy state such as Washington, they would also complicate the development of electrolytic hydrogen production in such states. An additionality requirement would prevent the use of electricity from existing hydroelectric, wind, solar, or nuclear generating facilities even if those facilities are most suitable to serve a particular hydrogen production facility and even if state law ensures this use would not result in any increase in GHG emissions… Proponents of the additionality restriction argue that, if existing generating resources are shifted to hydrogen production, utilities will increase electric generation at existing fossil fuel power plants. There may

[31] California Alliance for Renewable Clean Hydrogen Energy Systems, RE: Notice 2022-58 – Response to Request for Comments on Credits for Clean Hydrogen (H2) and Clean Fuel Production, August 23, 2023.

[32] New York State Energy Research and Development Authority, Response to Request for Comments on Credits for Clean Hydrogen and Clean Fuel Production: Northeast Regional Clean Hydrogen Hub States, August 3, 2023.

be a reasonable concern in states without clean electricity and GHG cap laws, and if this occurred it would greatly reduce the climate benefits that Congress anticipated in enacting the § 45V PTC. However, that scenario is not credible in Washington and other states with clean electricity or GHG emission laws. Washington's clean electricity law would prevent utilities from back-filling their generating portfolio with fossil fuel generation. These factors are acknowledged in the analysis cited by advocates for the strict additionality requirement. **We believe that any additionality-based restriction of the § 45V tax credit should distinguish between states with these laws and states with no safeguards on increased generation from fossil fuel plants. (emphasis added)."**[33]

As demonstrated above, imposing an incrementality requirement in a region with existing decarbonization policies will create an inequitable result to clean hydrogen producers located in such regions. Therefore, MI respectfully requests that the IRS and the Treasury include a safe harbor that deems the incrementality requirement is satisfied for EACs purchased from existing minimal-emitting or zero-emitting electricity generators located in a jurisdiction with clean energy renewable portfolio, emissions reduction standards, or other similar renewable portfolio standards or policies.

VIII. Clarify that the "emission through the point of production" (i.e., well-to-gate) means the aggregate lifecycle GHG emissions related to the amount of hydrogen produced by a taxpayer at a hydrogen production facility for purposes of claiming the 45V Credit, which is to be distinguished from including all hydrogen produced (and related emissions associated with such hydrogen) at such facility during a taxable year for purposes of measuring the aggregate lifecycle GHG emissions.

In the GREET Manual's introduction, the DOE provides: "Certain parameters within 45VH2-GREET are fixed assumptions (i.e., 'background data') and may not be changed by the user.... All other parameters are 'foreground data' and must be input by the user. Examples of these parameters include feedstock type and quantity, the type and quantity of energy used for hydrogen production, the properties of feedstock and energy used, the type and quantity of valorized co-products, type and quantity of impurities, and the quantity of hydrogen produced **for which emissions are being evaluated** (emphasis added)."[34] The Greet Manual provides an example: "if characterizing well-to-gate GHG emissions of all hydrogen production over the course of a given year, users must input all energy and feedstock consumed in the respective year by the hydrogen production facility being evaluated and all hydrogen produced in that year by the respective facility. On this basis, 45VH2-GREET 2023 will calculate the well-to-gate GHG emissions of all hydrogen produced by the facility in that year."[35]

The GREET Manual does not require the input of all hydrogen produced annually at a hydrogen production facility as "foreground data" and specifies that taxpayers must input "the quantity of

[33] State of Washington Department of Commerce, Re: Notice 2022-58 Request for Comments on Credits for Clean Hydrogen and Clean Fuel Production, July 14, 2023.

[34] Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2–GREET (December 2023). .https://www.energy.gov/sites/default/files/2023-12/greet-manual_2023-12-20.pdf.; The EU Delegated Act on RFNBO GHG emission calculation allows for the submission of a certain quantity of hydrogen on a non-aggregated basis, as well; *see* Annex to the Commission Delegated Regulation (EU) supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and by specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and form recycled carbon fuels.

[35] *Id.*

hydrogen produced for which emissions are being evaluated." Therefore, MI respectfully requests that the IRS and the Treasury clarify that taxpayers are permitted to enter the quantity of hydrogen produced (e.g., all or a portion thereof) for which well-to-gate emissions are to be evaluated and used in computing the 45V Credit, and not "all hydrogen produced at a hydrogen production facility during the taxable year" as stipulated under Prop. Treas. Reg. Sec. 1.45V-4(a).

IX. Revise the definition of the "most recent GREET model" for purposes of determining the "lifecycle greenhouse gas emissions" under Section 45V(c)(1)(B) of the Code and Prop. Treas. Reg. § 1.45V-1(a)(8)(i) and (ii) to include a safe harbor where a taxpayer may rely on the GREET model publicly available (i) at the time the FID is made, (ii) at the time that the facility is placed in service, or (iii) any model made publicly available on the first day or any day of the taxable year (but within such taxable year) of production that best computes the lifecycle GHG emissions rate based on the taxpayer's facts and circumstances.

Under Section 45V(c)(1)(B) of the Code, the term "lifecycle greenhouse gas emissions" shall only include emissions through the point of production (well-to-gate), as determined under the most recent GREET model developed by Argonne National Laboratory, or a successor model (as determined by the Secretary). Prop. Treas. Reg §1.45V–1(a)(8)(ii) clarifies that the term "most recent GREET model" means the latest version of 45VH2–GREET developed by Argonne National Laboratory that is publicly available on the first day of the taxpayer's taxable year in which the qualified clean hydrogen for which the taxpayer is claiming the 45V Credit was produced.

By permitting annual updating of the GREET model, taxpayers will have uncertainty that a clean hydrogen production facility will qualify as the lifecycle GHG emissions rate for the full credit period may vary year-to-year. Such a rule that allows continuous updates to the GREET model is punitive and will likely prevent taxpayers from obtaining the level of certainty needed to reach FID when evaluating whether to construct clean hydrogen facilities; effectively, the uncertainty in the GREET model may make clean hydrogen production facilities un-financeable. To eliminate the uncertainty, MI recommends that taxpayers be provided the option to use the GREET model in place (i) at the time the FID is made, (ii) at the time that the facility is placed in service, or (iii) on the first day or any day of the taxable year (but within such taxable year) of production that best computes the lifecycle GHG emissions rate based on the taxpayer's facts and circumstances.

X. Clarify under Section 45V(d)(4) of the Code that "modification of existing facilities" includes any modification so long as amounts paid or incurred with respect to such modification are properly chargeable to the capital account of the taxpayer.

Under Section 45V(d)(4) of the Code, in the case of any facility which — (A) was originally placed in service before January 1, 2023, and, prior to the modification described in subparagraph (B), did not produce qualified clean hydrogen, and (B) after the date such facility was originally placed in service — (i) is modified to produce qualified clean hydrogen, and (ii) amounts paid or incurred with respect to such modification are properly chargeable to capital account of the taxpayer, such facility shall be deemed to have been originally placed in service as of the date that the property required to complete the modification described in subparagraph (B) is placed in service.[36]

[36] Section 45V(d)(4) of the Code.

Accordingly, a taxpayer may be eligible for the 45V Credit for qualified clean hydrogen produced at a modified clean hydrogen production facility for the full ten-year credit period beginning on the date the modifications are completed, rather than the original placed in service date of the facility. This provision applies only for modifications made on or after January 1, 2023, and only if the following three conditions are met: (1) the facility must have been placed in service before January 1, 2023, (2) the facility must be modified to produce "qualified clean hydrogen," and (3) the amounts paid or incurred by the taxpayer with respect to the modification must be chargeable to the taxpayer's capital account.

The statute does not define "an existing facility" as it is used in Section 45V(d)(4) of the Code. However, the Proposed Regulations provide clarity on the definition of the term "facility" for purposes of the 45V Credit, as well as additional guidance relating to the modification of existing facilities.

Prop. Reg. § 1.45V-1(a)(7)(i) defines a "facility" for purposes of Section 45V of the Code as a single production line that is used to produce qualified clean hydrogen. A single production line includes all components of property that function interdependently to produce the qualified clean hydrogen. Components of property function interdependently if the placing in service of each component is dependent upon the placing in service of each of the other components. The proposed regulations also provide that "multipurpose components," namely components that have a purpose in addition to the production of qualified clean hydrogen, may be part of a facility if such components function interdependently from other components to produce qualified clean hydrogen.

An example in the proposed regulations clarifies that, if a hydrogen production facility is equipped with carbon capture equipment to capture COs that would otherwise be emitted in the process of producing hydrogen (e.g., through natural gas reforming) and without which the facility would not be able to produce "qualified clean hydrogen" with sufficiently low CO2e emissions, then the carbon capture equipment is treated as part of the "facility" for purposes of Section 45V of the Code. The implication is that if a taxpayer modifies an existing hydrogen production facility by adding carbon capture equipment to reduce the greenhouse gas emissions rate so that the facility produces "qualified clean hydrogen" after the modification, then the facility would be a qualified clean hydrogen production facility for purposes of the 45V Credit.

The aforementioned regulatory example states that the carbon capture equipment is functionally interdependent with other components of property to produce "qualified clean hydrogen" without providing any further explanation for this assertion. Presumably, the carbon capture equipment is "functionally interdependent" because without it the other component of property could not produce hydrogen with sufficiently low emissions of greenhouse gases to be treated as "qualified clean hydrogen."

Treas. Prop. Reg. § 1.45V-6 contains additional guidance with respect to the modification to an existing facility. It confirms that a modification to an existing facility will not qualify unless the facility is incapable of producing "qualified clean hydrogen" with a sufficiently low emissions rate but for the modification. It also contains examples that confirm that the addition of equipment to an existing facility that is designed to capture greenhouse gases that would otherwise be emitted by the hydrogen production process is an eligible modification.

The preamble to the Proposed Regulations provides that changing fuel inputs to the hydrogen production process, such as switching from conventional natural gas to renewable natural gas ("RNG"), does not qualify as an eligible modification for purposes of the Prop. Treas. Reg. § 1.45V-6. This specific exclusion is not found anywhere in the text of the Proposed Regulations, and no further explanation is provided for such statement. Prop. Reg. § 1.45V-6(a)(1) simply reiterates the statutory requirements in Section 45V(d)(4) of the Code, namely (1) that the facility must be modified in a manner that enables it to produce "qualified clean hydrogen," and (2) that the amounts paid or incurred with respect to such modification must be properly chargeable to the taxpayer's capital account for the facility.

Prop. Reg. § 1.45V-6(a)(2) further clarifies that "if a taxpayer solely pays or incurs capital expenses to modify existing components of a hydrogen production facility that are not necessary for the production of hydrogen with a lifecycle GHG emissions rate that is less than or equal to 4 kilograms of CO2e per kilogram of hydrogen, such modification does not entitle the facility to a new placed in service date." Given that it is clear that the addition of carbon capture equipment is a modification that can result in an eligible facility modification and that carbon capture equipment is not necessary for the production of hydrogen gas, the additional components of property that modify an existing facility must be necessary for the production of hydrogen with a sufficiently low rate of greenhouse gas emissions to be "qualified clean hydrogen" in order to qualify. Thus, the addition of carbon capture equipment to a facility that currently produces hydrogen which does not meet the emissions requirement of Section 45V of the Code would be a qualifying modification if it lowers the emissions rate of the hydrogen production process so that the hydrogen produced by the facility becomes "qualifying clean hydrogen."

If the foregoing is true, it should logically follow that if, instead of incurring capital expenditures to add carbon capture equipment to an existing hydrogen production facility, the taxpayer incurs capital expenditures on equipment that produces RNG, which will then be used to produce hydrogen at an existing facility in a manner that lowers the GHG gas emissions rate of the production process below the statutory threshold for "qualified clean hydrogen," then the addition of that equipment should similarly result in satisfying Section 45V(d)(4) of the Code. Like carbon capture equipment, the additional components of property that produce RNG to serve as a feedstock for hydrogen production should be treated as functioning interdependently with the existing components of property to produce "qualified clean hydrogen" and should therefore be treated as part of the hydrogen production "facility."

In both instances, the additional components of property should meet the statutory requirement under Section 45V(d)(4) of the Code if a taxpayer modifies the existing facility in a manner that enables it to produce "qualified clean hydrogen," and the amounts paid or incurred by the taxpayer on such components of property are properly chargeable to the taxpayer's capital account.

Read in this context, the statement in the preamble to the Proposed Regulations that changing fuel inputs to the hydrogen production process, such as switching from conventional natural gas to RNG, would not qualify under Section 45V(d)(4) of the Code must refer to procuring a different feedstock fuel that produces lower emissions without necessarily having to make any capital improvements. That would fail the statutory requirements because it would not be an expenditure that is chargeable to the taxpayer's capital account with respect to the facility. However, this is completely different from a situation where the taxpayer incurs capital expenditures to erect components of property to produce an input to an existing hydrogen

production facility that enables the hydrogen produced at the facility to qualify as "qualified clean hydrogen" through a process that generates fewer greenhouse gas emissions.

MI kindly asks that the final regulations clarify that the foregoing is an accurate interpretation of the statute and remove any ambiguity around modifications that result in cleaner inputs to the hydrogen production process. If the policy goal of Section 45V of the Code is to encourage additional capital expenditures to increase the production of hydrogen in the United States in a manner that results in fewer greenhouse gas emissions, then it should not matter whether those modifications are made prior to the actual chemical reaction that results in hydrogen gas (by producing inputs that result in fewer undesirable byproducts) or after that chemical reaction (by removing such undesirable byproducts). If the end result is the same, namely hydrogen produced with fewer greenhouse gas emissions, rules that encourage the latter over the former will only serve to thwart that policy goal.

Hydrogen, which can be burned to produce energy without generating any greenhouse gas byproducts, is an important component in the journey towards "net zero" emissions because it will be necessary to decarbonize sectors of the economy that cannot easily be powered with renewable electricity. Promulgating clear rules that increase the availability of clean hydrogen, the production of which results in low greenhouse gas emissions, is crucial to the goal of reducing aggregate emissions rates and is consistent with the statutory language of Section 45V of the Code. Accordingly, MI asks the IRS and the Treasury to clarify that the facility must be modified to produce "qualified clean hydrogen" and the amounts paid or incurred by the taxpayer with respect to the modification must be chargeable to the taxpayer's capital account.

XI. Clarify that hydrogen produced through a multiple step distribution channel may qualify as qualified clean hydrogen.

We are pleased to see the IRS and the Treasury contemplating both the direct use and indirect use cases but recommend broader consideration of indirect use to apply to hydrogen carrier molecules. Methanol may be used as a hydrogen carrier to move hydrogen molecules in an energy dense format to be stripped, recovered, reformed, or otherwise separated into free hydrogen molecules for productive use. The Proposed Regulations do not provide any guidance on the use of hydrogen carriers that are beyond a one-step biogas-hydrogen or RNG-hydrogen or fugitive methane-hydrogen production process. For example, biogas reformation produces hydrogen rich syngas. The hydrogen syngas produces green methanol, which is sold to a customer who performs on-site reformation of the hydrogen so it can be used to fuel a vehicle. Therefore, MI asks that such the IRS and the Treasury clarify the production of hydrogen through a multiple step distribution channel may qualify as qualified clean hydrogen. In addition, we urge the IRS and the Treasury 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.

XII. Incorporate a book and claim provision for RNG.

The Proposed Regulations sought comments on whether or how a book and claim system could be applied to hydrogen producers using RNG. Such a system exists and is an established and successful market within regulatory frameworks, such as California's Low Carbon Fuel Standard and the EPA's RFS program. Accordingly, the IRS and the Treasury should look at the

precedents set by these frameworks and permit taxpayers to use the existing policies that are heavily audited and scrutinized through the regulatory agencies (e.g., EPA and California Air Resources Board) to substantiate the lifecycle GHG emissions rate of the RNG used for hydrogen production.

XIII. Modify the GREET model to include a broad range of feedstocks used today for RNG.

The GREET Manual currently allows users to model hydrogen production from RNG that is derived from landfill gas. However, RNG can be derived from a variety of other sources, including livestock farms. Accordingly, the IRS and the Treasury should ensure that a wider range of feedstocks that are used today to produce RNG, such as dairy, are included in the GREET model.

Additional Questions and Comments (not submitted by the Methanol Institute)

I. Allow flexibility of the 45VH2-GREET calculator to modify the Background Data Assumptions as it pertains to upstream methane leakage. This will incentivise feedstock users to seek out and feedstock suppliers to develop more efficient methods of natural gas production, leading to greater overall greenhouse gas reductions.

II. Clarify the regulatory approval process for Provisional Emissions Rate (PER). The additional details on the evaluation process of whether pathways (or new pathway) would qualify will minimise risk to new investors and encourage development of new and improved pathways to clean hydrogen production.

III. Allow the 45VH2-GREET 2023 calculation to cater for cases where the Auto-Thermal Reformer (ATR) operators import oxygen as a feedstock. The calculator currently assumes that the ATR is supplied by oxygen produced within the facility, as such does not fully encompass a well-to-gate evaluation for imported oxygen.