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February 26, 2024

The Honorable Janet Yellen
Secretary
U.S. Department of the Treasury
1500 Pennsylvania Ave, NW
Washington, DC 20220

The Honorable Jennifer Granholm
Secretary
U.S. Department of Energy
1000 Independence Ave, SW
Washington, DC 20585

John Podesta
Senior Advisor to the President for Clean Energy Innovation and Implementation
The White House
1600 Pennsylvania Ave, NW
Washington, DC 20220

Re: Section 45V Credit for the Production of Clean Hydrogen
Notice of Proposed Rulemaking
REG-117631-23

Dear Secretary Yellen, Secretary Granholm, and Mr. Podesta:

Mitsubishi Power Americas, Inc. ("MPWA") headquartered in Lake Mary, Florida, employs more than 2,300 power generation, energy storage, and digital solutions experts and professionals. Our employees are focused on empowering customers to affordably and reliably combat climate change while also advancing human prosperity throughout the United States and the Americas. MPWA's power generation solutions include gas, steam, and aeroderivative turbines; power trains and power islands; geothermal systems; PV solar project development; environmental controls; and services. Energy storage solutions include green hydrogen, battery energy storage systems, and services. MPWA is the power solutions brand of Mitsubishi Heavy Industries, Ltd. ("MHI"), headquartered in Tokyo, Japan. MHI is one of the world's leading heavy machinery manufacturers with engineering and manufacturing businesses spanning energy, infrastructure, transport, aerospace, and defense.

The Biden Administration has set bold national decarbonization goals, including 100 percent carbon pollution-free electricity by 2035 and net-zero GHG emissions by 2050. To meet these goals, MPWA considers hydrogen co-firing and utilization to be an essential decarbonization tool for a wide range of sectors, especially for

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transportation and industrial operations that cannot be electrified. That is why MPWA is proud to partner with the U.S. Department of Energy ("DOE") to advance the domestic hydrogen economy. MPWA and DOE are invested in the success of a major hydrogen project in ACES Delta, which represents the DOE's first loan guarantee in over a decade. Additionally, MPWA is a grant subrecipient within two of DOE's hydrogen hubs, contributing thought leadership and project expertise in HyVelocity and PNWH2. MPWA fully supports the Biden Administration's strong commitment to accelerating the clean hydrogen economy.

The credit for the production of clean hydrogen found at Internal Revenue Code Section 45V is critical for MPWA. We therefore appreciate the opportunity to respond to the Notice of Proposed Rulemaking issued December 26, 2023.

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I. Background

A. Section 45V

Section 45V of the Internal Revenue Code,[1] as enacted by the Inflation Reduction Act,[2] provides a tax credit for the production of qualified clean hydrogen, the amount of which varies based on, *inter alia*, the lifecycle greenhouse gas ("LGHG") emissions rate of the production process.

Section 45V(c)(1)(A) defines "LGHG emissions" as having the same meaning as in the Clean Air Act,[3] subject to Section 45V(c)(1)(B). The Clean Air Act provides as follows:

> The term "[LGHG] emissions" means the aggregate quantity of greenhouse gas emissions (including direct emissions and ***significant indirect emissions such as significant emissions from land use changes***), as determined by the Administrator, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.[4]

Section 45V(c)(1)(B) limits this definition to "only include emissions through the point of production (well-to-gate), as determined under the most recent Greenhouse gases, Regulated Emissions, and Energy use in Transportation model (commonly referred to as the "GREET model") developed by Argonne National Laboratory, or a successor model (as determined by the Secretary)." In other words, Section 45V(c)(1)(B) requires the LGHG emissions to be determined using GREET.

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[1] All "Section" or "§" references herein are to the Internal Revenue Code of 1986, as amended, and the Treasury Regulations thereunder, unless otherwise noted.

[2] P.L. 117-169 (Aug. 16, 2022).

[3] Codified under Title 42 of the United States Code, Chapter 85.

[4] 42 U.S.C. § 7545(o)(1)(H) (emphasis added).

B. Proposed regulations under Section 45V

On December 26, 2023, the U.S. Department of the Treasury ("Treasury") and the Internal Revenue Service ("IRS") released proposed regulations regarding the production tax credit ("PTC") for qualified clean hydrogen under Section 45V.[5] The PTC under Section 45V provides a 10-year technology-neutral incentive of up to $3/kilogram of clean hydrogen based on carbon intensity ("CI"). The proposed regulations detail what is required of different hydrogen production pathways to access this incentive. Specifically, for electrolytic hydrogen using grid-connected electricity, the proposed regulations lay out three primary requirements for producers using energy attribute certificates ("EACs") to meet the LGHG analysis levels: incrementality, temporal matching, and deliverability.

In conjunction with the proposed regulations, DOE released an updated GREET model ("45VH2-GREET model") for determining the LGHG emissions of hydrogen production through a variety of pathways.

II. 45VH2-GREET model

To claim a Section 45V PTC, a taxpayer must determine the LGHG emissions rate for all hydrogen produced at a qualified clean hydrogen production facility during the taxable year.[6] If the hydrogen production technology or feedstock used by the taxpayer to produce hydrogen is addressed in the most recent 45VH2-GREET model, the taxpayer must use such 45VH2-GREET model to determine the emissions rate.[7]

A. Need for additional flexibility in the 45VH2-GREET model

We commend the work that Argonne National Laboratory has done to date to provide a 45VH2-GREET model targeted for the Section 45V PTC. That said, we request the following changes be implemented. First, additional flexibility should be built into the model such that taxpayer can input "actual" background data when available, rather than rely on values and assumptions built into the background data of a model.[8] For example, consider the scenario where the actual CI scores of different gases (*e.g.*, renewable natural gas ("RNG") or responsibly sourced natural gas) used by a taxpayer to produce hydrogen are lower than the background assumptions currently included in the 45VH2-GREET model. Under the proposed regulations, the taxpayer would have to use the background data in the 45VH2-GREET model. However, if such taxpayer were allowed to input actual background data (*i.e.*, actual pipeline distance from source to use point that can be verified by a third party) into the 45VH2-GREET model, then such taxpayer would be able to demonstrate a lower CI score than the model provides, using actual, verifiable values. This approach would incentivize investments

[5] 88 Fed. Reg. 89,220 (Dec. 26, 2023). Note that the proposed regulations are proposed to apply to taxable years beginning after December 26, 2023, however taxpayers may rely on these proposed regulations for taxable years beginning after December 31, 2022, and before the date the final regulations are published in the Federal Register if they follow the proposed regulations in their entirety and in a consistent manner.

[6] *See generally* Section 45V; *see also* Prop. Treas. Reg. § 1.45V-1(a)(8).

[7] Prop. Treas. Reg. § 1.45V-4(b). As discussed further below, if the hydrogen production technology or feedstock used by the taxpayer to produce hydrogen is not included in the most recent 45VH2–GREET model, the taxpayer must petition the Secretary for a provisional emissions rate ("PER").

[8] If such flexibility cannot be provided or is limited through the standardized 45VH2-GREET model, Treasury and the IRS should provide a broader path to seeking a PER (discussed below).

close to the natural gas production source and directly minimize GHG emissions from pipeline leakage. To require otherwise would result in taxpayers claiming the Section 45V PTC to be less motivated in taking all steps to lower the LGHG emissions of the hydrogen they produce.

Second, we urge Treasury and the IRS to clarify that all new hydrogen production methods are eligible for the Section 45V PTC if they meet the specified CI requirements. Third, we urge Treasury and the IRS to provide an option in the 45VH2-GREET model to select clean hydrogen as the source of power for autothermal reforming ("ATR") of natural gas and landfill gas. Specifically, we believe the use of clean hydrogen should be modeled similar to wind/solar, since zero LGHG emissions are produced when clean hydrogen is used to provide power generation. This production pathway is an important one and its inclusion will eliminate the need to seek a PER.

Also, while we recognize the need to update the 45VH2-GREET model in line with the inclusion of new pathways and improved lifecycle analysis ("LCA"), such improvements may introduce uncertainties with respect to CI calculations for the Section 45V PTC. For instance, annual updates to the 45VH2-GREET model are expected to include the representation of additional hydrogen production technologies (*i.e.*, as supporting analysis is completed by the Argonne National Laboratory) as well as updates to background data. Perhaps the biggest uncertainty would be in respect of clean hydrogen produced from natural gas which would conceivably create qualification challenges despite meeting low CI requirements (*e.g.*, due to how methane leakage rates can impact the final CI). Moreover, the uncertainty of future changes to a 45VH2-GREET model relied on by a taxpayer in making an investment decision for constructing a clean hydrogen facility may result in the inability to finance or develop the facility due to the potential impact of such uncertainty on a project's economics. Ultimately, while these uncertainties may complicate modeling and deter project investment, we urge Treasury and the IRS to strike a balance by grandfathering the model used (*e.g.*, within 12 months of construction commencing) in making investment decisions for the construction of a clean hydrogen facility. To address the above concern and to provide administrability, we request Treasury and IRS allow taxpayers to have the flexibility of choosing between:

(i) the latest version of 45VH2–GREET model 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 Section 45V PTC was produced, or

(ii) the 45VH2-GREET model available at the time the facility begins construction (*i.e.*, the model relied upon and used within 12 months from when the taxpayer begins constructing a facility).[9]

We also recommend Treasury and IRS adopt certain best practices for data accessibility which the 45VH2-GREET model currently does not take into account. For instance, if requiring regional matching, the best practice would be for taxpayers to look to regional (vs. national) emission rate averages and use such rates if

[9] The IRS has issued a number of notices on the beginning of construction requirements, which are also relevant for the Section 45V PTC. *See* Notice 2013-29, 2013-20 I.R.B. 1085, as modified and/or clarified by each of Notice 2013-60, 2013-44 I.R.B. 431, Notice 2014-46, 2014-36 I.R.B. 520, Notice 2015-25, 2015-13 I.R.B. 814, Notice 2016-31, 2016-23 I.R.B. 1025, Notice 2017-4, 2017-4 I.R.B. 541, Notice 2018-59, 2018-29 I.R.B. 196, Notice 2019-43, 2019-31 I.R.B. 487, Notice 2020-41, 2020-25 I.R.B. 954, Notice 2021-5, 2021-3 I.R.B. 479, Notice 2021-41, 2021-29 I.R.B. 17, and Notice 2022-61, 2022-52 I.R.B. 560.

preferred.

Finally, we note that the current GREET tools lack optionality when it comes to selecting a balancing authority. This is of particular relevance because, while the DOE mapped the U.S. balancing authorities to the regions defined in the National Transmission Needs Study,[10] this DOE map does not have a one-to-one relationship with the existing map for Regional Transmission Organizations ("RTOs") and Independent System Operators ("ISOs").[11] As such, we request that final guidance provide taxpayers with the flexibility in choice of map (*e.g.*, DOE map of U.S. balancing authorities or existing RTO and ISO maps).

B. Provisional Emissions Rate

Section 45V(c)(2)(C) provides that, in the case of any hydrogen for which a LGHG emissions rate has not been determined for purposes of the Section 45V PTC, a taxpayer producing such hydrogen may file a petition with the Secretary for a determination of the LGHG emissions rate with respect to such hydrogen, which is referred to as a "PER" in the proposed regulations.[12] The proposed regulations would provide that a taxpayer may not file a PER unless a LGHG emissions rate has not been determined under the most recent GREET model for hydrogen produced by the taxpayer at a hydrogen production facility.[13] The proposed regulations would further provide that a LGHG emissions rate has not been determined under the most recent GREET model with respect to hydrogen produced by the taxpayer at a hydrogen production facility if it uses a hydrogen production pathway that is not included in the most recent GREET model (*i.e.*, if either the feedstock used by such facility or the facility's hydrogen production technology is not included in the most recent GREET model).

We encourage Treasury and IRS to allow clean hydrogen producers to opt out of the standard pathway and have greater flexibility on certified and verified project inputs for their clean hydrogen production facilities and urge Treasury and IRS to allow such clean hydrogen producers to request a PER reflecting such certified and verified project inputs. Further, we request that Treasury and IRS allow clean hydrogen producers to use a single PER for like facilities, especially if they are part of the same project (*e.g.*, using the same production process an equipment), and request further clarity on a taxpayer's ability to rely on a PER in such cases (*e.g.*, for multiple facilities).

C. Differentiated natural gas

We note that differentiated natural gas is an area that the 45VH2-GREET model does not expressly address. This ambiguity could limit a taxpayer's ability to accurately reflect and be rewarded for the CI of the hydrogen produced. As such, we encourage Treasury and IRS to include certified lower CI RNG and responsibly sourced natural gas as foreground data in the 45VH2-GREET model. We also seek confirmation that it would be

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[10] *See* "The National Transmission Needs Study," (https://www.energy.gov/gdo/national-transmission-needs-study). This study is an assessment of existing data and current and near-term future transmission needs through 2040.

[11] *See e.g.*, the RTOs and ISOs map published by the Federal Energy Regulatory Commission (https://www.ferc.gov/power-sales-and-markets/rtos-and-isos), as last updated on January 17, 2024.

[12] Prop. Treas. Reg. § 1.45V-4(a).

[13] Prop. Treas. Reg. § 1.45V-4(c)(2)(i); *see also* Prop. Treas. Reg. § 1.45V-4(a)(8)(ii) (defining the "most recent GREET model" as the latest version of 45VH2–GREET developed by Argonne National Laboratory that is publicly available).

acceptable to blend RNG from a newly developed biomethane source with natural gas feedstock to steam methane reforming ("SMR") or ATR with carbon sequestration to produce clean hydrogen and achieve a CI level that would allow for a tax credit under Section 45V.

D. Steam co-products

The 45VH2-GREET model allows users to input the quantity of valorized co-products (*i.e.*, 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).[14] The DOE explained that the 45VH2-GREET model utilizes the "system expansion" approach for all co-products if possible, but restricts the amount of steam co-product that reformers can claim based on the quantity of steam that an optimally designed reformer is expected to be capable of producing based on modeling from the National Energy Technology Laboratory.[15] In the preamble to the proposed regulations, Treasury and IRS explain that this restriction is included within the model to avoid incentivizing generation or over-production of hydrogen co-products like steam to enable access to a higher tax credit value by artificially reducing the calculated carbon intensity of the hydrogen (*e.g.*, by combustion of fuel onsite that is unnecessary for hydrogen production).

We request that Treasury and IRS allow taxpayers to input excess steam as measured by meters for all pathways. We also request that co-product steam be treated as foreground data in the 45VH2-GREET model (like carbon capture efficiency and hydrogen yield) to best represent actual carbon intensity.

III. Interaction between Sections 45V and 45Q

Section 45V(d)(2) and the proposed regulations promulgated thereunder provide that no Section 45V PTC is allowed with respect to any qualified clean hydrogen produced at a facility that includes carbon capture and sequestration ("CCS") equipment for which a credit is allowed to any taxpayer as determined under Section 45Q for the taxable year or any prior taxable year.[16] The proposed regulations also provide an anti-abuse rule that would make the Section 45V PTC unavailable in extraordinary circumstances in which, based on a consideration of all the relevant facts and circumstances, the primary purpose of the production and sale or use of qualified clean hydrogen is to obtain the benefit of the Section 45V PTC in a manner that is wasteful, such as the production of qualified clean hydrogen that the taxpayer knows or has reason to know will be vented, flared, or used to produce hydrogen.[17]

CCS enabled fossil-based low carbon hydrogen is necessary to build the hydrogen economy and reduce emissions at the scale required for the U.S. to meet its decarbonization goals. While Section 45Q incentivizes the recapture, utilization, and storage of carbon dioxide ("CO_2") from industrial processes with high LGHG emissions, Section 45V incentivizes the most efficient hydrogen production technologies with an aim at reducing LGHG emission and mitigating climate change. From a CCS enabled fossil-based low carbon

[14] *See* "Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2–GREET 2023" (https://www.energy.gov/sites/default/files/2023-12/greet-manual_2023-12-20.pdf).
[15] "Comparison of Commercial, State-of-the-Art, Fossil-Based Hydrogen Production Technologies" (https://www.netl.doe.gov/energy-analysis/details?id=ed4825aa-8f04-4df7-abef-60e564f636c9).
[16] *See also* Prop. Treas. Reg. § 1.45V-2(a).
[17] Prop. Treas. Reg. § 1.45V-2(b)(1).

hydrogen perspective, Section 45Q encourages the recapture and utilization of storable CO_2 alongside hydrogen, whereas Section 45V encourages minimizing the CI of produced hydrogen.

Accordingly, MPWA recommends Treasury and the IRS remove the following policy barriers to CCS enabled fossil-based low carbon hydrogen projects claiming tax credits under Section 45V, which will result in the highest efficiency and lowest CI hydrogen production.

First, we urge Treasury and IRS to include language in the final guidance which provides that taxpayers with separate, independent production lines may be eligible for credits under Section 45V and Section 45Q, on a separate production line basis, even if the production lines are co-located in the same industrial complex and are interconnected via utility, power, or other systems. For instance, a facility may need to produce decarbonized electrical power (which could be eligible for a credit under Section 45Q), and then use that power to run an ATR-based ammonia plant (which could be eligible for a credit under Section 45V). Alternatively, a single site could have a green hydrogen plant that may be eligible for the Section 45V PTC as well as legacy blue hydrogen production with carbon capture and storage equipment that is eligible for a credit under Section 45Q.

Second, MPWA requests that Treasury and the IRS allow fugitive natural gas emissions to be tracked on a project-by-project basis to give a measured feedstock CI for natural gas used to create hydrogen. This tracking flexibility will incentivize the reduction of methane emissions and the production of lower carbon hydrogen compared to CCS enabled fossil based low carbon hydrogen projects, which utilize Section 45Q credits.

IV. Energy Attribute Certificates and the Three Pillars

Under the proposed regulations, taxpayers can treat a hydrogen production facility's use of grid-connected electricity as being from a specific electricity generation facility (or facilities) *only if* the taxpayer acquires and retires qualifying energy attribute certificates ("EACs") for each unit of electricity that the taxpayer claims from such source.[18] EACs are "qualifying EACs" only if they satisfy the three requirements (commonly referred to as the "three pillars") for "eligible EACs,"[19] and such requirements are verified by a qualified verifier.[20] MPWA opposes the three pillar requirements as proposed.

A. MPWA Modelling of the Three Pillars

MPWA has performed a modelling analysis of the proposed regulations to infer real world outcomes of the proposed incrementality, deliverability and temporal matching constraints. The model builds renewables thus using zero emissions electricity to power the green hydrogen production. MPWA finds the proposed rules result in a significant unnecessary system overbuild, leading to increased LGHG emissions and higher green hydrogen costs.

To determine the cumulative impact of the proposed rules, MPWA analyzed the impact caused by each of the

[18] Prop. Treas. Reg. § 1.45V-4(d)(1).
[19] Prop. Treas. Reg. §1.45V-4(d)(3)(i) thru (iii).
[20] Prop. Treas. Reg. § 1.45V-4(d)(2)(iv).

three constraints on total system cost and Levelized Cost of Hydrogen ("LCOH"). As per Section 45V, qualified green hydrogen facilities can avail $3/kg for 10 years. Based on a facility service life of 30 years and a discount rate of 8%, the levelized value of the Section 45V credit is $1.79/kg. Modeling efforts were conducted using publicly available information where applicable. The analysis was performed for three U.S. regional boundaries considered by Section 45V regulations; Mountain, Delta, and Texas.

Please note, while the information below is provided in summary fashion MPWA is open to future opportunities to share the full assumptions and results of the model at the request of Treasury and the IRS.

Combined Impact of Incrementality, Deliverability and Temporal Matching

When all three constraints - incrementality, deliverability and temporal matching - are applied in the MPWA chosen regions, the cumulative impact results in an increase in the LCOH ranging from $1.39/kg to $3.25/kg, meaning that in some regions the cost to implement the proposed rules can be more than $1.79/kg, thereby nullifying any benefits the Section 45V credit provides. If finalized as proposed, the rules will impede the utilization of green hydrogen in hard-to-abate sectors, thereby preventing the Administration from reaching its climate goals.

Along with LCOH, the analysis determined impacts the rules have on project build costs, electrolyzer operations, renewable capacities, and renewable curtailments. Notably, the impact of implementing all three constraints increased the requirement on wind and/or solar new build by more than 100%, leading to increased renewable curtailment which otherwise could have been used to produce hydrogen. In the meantime, increased electrolyzer capacity between 25%-75% results in a much lower capacity factor. Combined, the model results showed the three constraints would cause an increase a significant increase to a project's capital cost - anywhere from 50% to 110%.

Impact of Incrementality

The intent of the incrementality is to ensure green hydrogen facilities do not utilize renewable resources which are built to serve electric loads. Although well intentioned, incrementality inadvertently increases green hydrogen costs and GHG emissions because:

- Renewables serving electric loads have curtailments due to the mismatch between renewable availability and load. The mismatch can be on an hourly, daily, weekly, or seasonal basis. Model results found that implementing solely the incrementality constraint would result in an increase of curtailed renewables between 20%-33% throughout the three chosen MPWA regions.
- Instead of causing curtailments, the surplus renewable availability can be utilized by green hydrogen facilities. The surplus renewable availability is the lowest cost energy resource for green hydrogen facilities before new renewable capacity is added specifically for the facilities.
- Therefore, incrementality prevents utilization of surplus renewable availability. The impact on LCOH of independently implementing the incrementality constraint in the MPWA model ranges from an increase of $0.83/kg - $1.80/kg.

Impact of Deliverability

The intent of the deliverability is to ensure green hydrogen facilities do not cause upstream GHG emissions in other regions where the primary energy resource may be located. Although well intentioned, deliverability inadvertently increases green hydrogen costs and GHG emissions because:

- The quality and availability of renewable resources are highly regional. Local renewable resources near green hydrogen facilities might not be of high quality or may be available only in limited amounts due to land restrictions or other constraints.
- Instead of incurring additional costs in accessing limited local resources or terminating the project altogether, green hydrogen facilities can access higher quality, lower cost, and abundantly available renewable resources in other regions.
- Projects with an existing agreement or newly contracted agreement to procure renewable energy for hydrogen production should be exempt from the deliverability rules. This allows ongoing projects to continue their production and minimize existing contractual disruption, and to utilize the best renewable resources.
- Therefore, deliverability prevents access to better renewable resources. The impact of implementing only the deliverability constraint on a hydrogen production system in the MPWA model results in an additional cost between $0/kg - $0.71/kg.

Impact of Temporal Matching

The intent of the temporal matching is to ensure green hydrogen facilities utilize only renewable resources and not energy resources associated with CO_2 emissions such as coal and gas power. Although well intentioned, temporal matching inadvertently increases green hydrogen costs and GHG emissions because:

- CO2-free energy resources such as nuclear, hydro, and geothermal are available around-the-clock. There are several hours during a day, a week, and a year in which these resources have surplus availability after satisfactorily meeting electric loads.
- When renewable resources are unavailable, green hydrogen facilities can utilize nuclear, hydro, and geothermal energy to maintain continuous production. Without temporary supply from these CO2-free resources, green hydrogen facilities will have frequent starts and stops. All of MPWA modelled scenarios showed a decrease in annual operating hours and increase in daily starts throughout the year.
- Therefore, temporal matching prevents temporary supply of surplus availability from CO2-free resources. The impact of solely implementing the temporal matching constraint in the MPWA model results in the LCOH increasing between $0.24/kg - $0.68/kg.

B. ACES Delta Case Study

To illustrate the real-world impact of requiring incrementality, deliverability and temporal matching constraints we offer the following case study. ACES Delta, LLC ("ACES Delta") is a joint venture between MPWA and Magnum Development (now 100% owned by Chevron). Situated at the intersection of several major transmission lines in Utah, ACES Delta is building an electrolysis facility that, when paired with existing salt

cavern storage and additional potential salt cavern storage capacity, represents sufficient long-duration energy storage to power the entire U.S. western grid for multiple days.

The ACES Delta project highlights the uncertainty of implementing hourly EACs by 2028 due to dependency on local utility decisions, particularly in regulated service territory regions like Utah. Currently, EACs are only annually matched, creating risks for market participants and potential financial viability issues for projects. EACs are available from the regulated public utility under its Schedule 34 (often referred to as its "Green" Tariff). However, they are currently tagged with the year they are generated, not the hour. Accordingly, only annual matching is currently feasible through resources procured via a negotiated green tariff agreement.

As the proposed regulations acknowledged, hourly EACs are not currently available. A critical limitation for ACES Delta is that the choice to expend the resources and deploy the technology to make hourly EACs available by 2028 is something that is entirely outside ACES Delta's control and rather depends on whether the regional load serving entity commits to expend the resources to create a compliant green tariff option and is able to obtain regulatory approval to do so. Because ACES Delta has no means to comply with a temporal matching requirement, ACES Delta faces significant uncertainty about whether it would be able to qualify for the Section 45V PTCs if temporal matching is required in 2028.

Electrical interconnection queues are severely behind schedule. For example, the PJM Interconnection LLC ("PJM") RTO is not reviewing new applications until 2026, which would mean an interconnection service agreement ("ISA") would be awarded by the end of 2027 (at the earliest). Plus another 12 months (minimum) to get to commercial operation date ("COD") (depending on the type and scale of renewable project), which means a new project would come online at the end of 2028 (at the earliest).

Ultimately, the objective behind the Section 45V PTC is to encourage the production of as much clean hydrogen as possible. If electrolyzers are required to run at lower capacity factors, the industry will not be incentivized to produce the amount of hydrogen needed to secure offtake agreements. While moving to hourly time-matching at the outset could signal a certain degree of confidence that green hydrogen production will not result in an increase in near-term grid carbon emissions, the majority of studies conclude that green hydrogen projects cannot be competitive,[21] that is, on a wide scale basis under an hourly regime at the outset.[22]

Of note, some studies have concluded that annual time-matching can decrease emissions over hourly time-matching in some regions.[23] Currently, green hydrogen is scarce and expensive, especially in comparison to

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[21] *See* "Scaling Green Hydrogen in a post-IRA World" (https://rhg.com/research/scaling-cleanhydrogen-ira/) (detailing green hydrogen's cost competitiveness in the near term given potential ramifications from IRA subsidies).

[22] *See e.g.*, "Producing Hydrogen from Electricity" (https://energy.mit.edu/wpcontent/uploads/2023/04/MITEI-WP-2023-02.pdf); "Green Hydrogen: An assessment of near-term power matching requirements" (https://media-publications.bcg.com/Green-Hydrogen-assessment-of-near-term-power-matching-requirements.pdf) (the "BCG Study"); "The U.S. Hydrogen Demand Action Plan" (https://subscriber.politicopro.com/eenews/f/eenews/?id=00000186-32b2-d681-ab8ff3b6569b0001); "Analysis of Hourly & Annual GHG Emissions" (https://acore.org/wpcontent/uploads/2023/04/ACORE-and-E3-Analysis-of-Hourly-and-Annual-GHG-Emissions-Accounting-forHydrogen-Production.pdf); and "Hydrogen Carbon Intensity Temporal Matching Analysis" (https://www.woodmac.com/news/opinion/green-hydrogen-IRA-production-economics) (the "WoodMac Study").

[23] *See e.g.*, BCG Study *supra* (detailing that annual matching with conditions abates at least as much carbon emissions as hourly

conventional hydrogen (*e.g.,* gray) due in large part to the high capital costs inherent with a new market or technology.[24] Requiring strict hourly accounting rules out of the gate will further increase these costs, making it difficult for green hydrogen to compete. These price increases will dramatically reduce customer interest in clean hydrogen, meaning the U.S. clean hydrogen market will face significant challenges amid more restrictive temporal matching requirements. Finally, recent studies warn that overly stringent temporal matching would hinder the development of the clean hydrogen industry, holding back its critical role in long-term decarbonization of the U.S. economy. According to the Rhodium Group, "To reap the potential benefits of green hydrogen, the U.S. needs to develop an industry to build and install electrolyzers – something unlikely to happen if restrictive regulations constrain near-term electrolyzer deployment . . . the U.S. risks missing a key clean energy manufacturing opportunity absent supportive policies and robust domestic demand."[25]

C. Incrementality

The proposed regulations would provide that an EAC meets the incrementality requirement if the electricity generating facility that produced the unit of electricity to which the EAC relates has a COD that is no more than 36 months before the hydrogen production facility for which the EAC is retired was placed in service.[26]

As shown by the modelling, this requirement inadvertently increases clean hydrogen costs and LGHG emissions due to, *e.g.*, the mismatch between renewable energy availability and load commitments, which could in turn result in any surplus of renewable energy being subject to curtailment. Moreover, given this surplus of renewable energy is generally the lowest cost energy resource for clean hydrogen facilities, the incrementality requirements have the effect of causing clean hydrogen facilities to source renewable energy at a possible higher cost, rather than have access to the surplus of renewable energy already available.

Similar to the temporal matching requirements discussed below, we urge Treasury and IRS to postpone the incrementality requirement to 2032. Further, the final guidance should allow hydrogen projects with in-service dates before 2032 to be grandfathered and exempt from this requirement. If incrementality is not eliminated, the look-back period should be changed from 36 months to 60 months to provide more opportunities for existing clean electricity projects to provide energy to clean hydrogen projects.

Nationwide, many clean energy projects have waited five or more years to break ground. Other regions have abundant clean energy resources but cannot build transmission lines to access the renewable capacity. Accordingly, we request that Treasury and IRS provide guidance on the Section 45V PTC that takes into account that renewable resources and associated transmission interconnections will take time to construct. As

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matching and 1900 times as much in some cases); WoodMac Study *supra* (demonstrating that, in both 2025 and 2030, the carbon emissions associated with annual matching is 1.8% and 1.5% lower than hourly matching due to annual matching resulting in electrolyzers running at a higher capacity factor and the additional renewable build out from annual matching displacing conventional generators).

[24] Even studies that endorse hourly matching concede that hourly matching would result in lower utilization rates for electrolyzers and an increase in the levelized cost of hydrogen for hydrogen produced. *See e.g.*, "Minimizing emissions from grid-based hydrogen production in the United States" (https://iopscience.iop.org/article/10.1088/1748-9326/acacb5).

[25] "Scaling Green Hydrogen in a Post-IRA World" (https://rhg.com/research/scaling-clean-hydrogen-ira).

[26] Prop. Treas. Reg. § 1.45V-4(d)(3)(i)(A); *see also* Prop. Treas. Reg. § 1.45V-4(d)(2)(i).

renewables are added to the grid and transmission capacity increases, time-matching and regional requirements may become more restrictive, but incrementality should not be a requirement.

We also note that the lack of any incrementality language in the Section 45V statutory language makes clear that Congress did not intend that this be a requirement.[27] Further, Congress allowed clean hydrogen production facilities to be able to claim the Section 45V PTC even though a facility uses electricity produced from an existing nuclear power plant using the Section 45U PTC (another clear indication that incrementality does not align with congressional intent).

Perhaps a balance can be found in one of the alternative approaches to addressing incrementality that Treasury and IRS describe in the preamble to the proposed regulations – namely, the formulaic approach. Pursuant to such approach, five (or possibly up to ten) percent of the hourly generation from minimal-emitting electricity generators (*e.g.*, wind, solar, nuclear, and hydropower facilities) placed in service before January 1, 2023, are deemed to satisfying the incrementality requirement. In support of this approach, Treasury and IRS reference a variety of studies that show at least a five percent curtailment rate for power in general and renewable power in particular, along with a projected five percent of the existing nuclear fleet being at risk of retirement. This pathway may be appropriate because some circumstances (including periods of curtailment or times when generation from minimal-emitting electricity generation is on the margin) may make the resulting incremental generation difficult to anticipate or identify, or because the process for identifying the circumstances (such as avoided retirement risk or modeling of minimal-emissions) may be overly burdensome to evaluate for specific electricity generators or require data that is not available. Further, if incrementality is not eliminated, MPWA supports the formulaic approach, however, we believe the percentage should be set at 10% rather than the proposed 5%.

Also, as discussed in the preamble to the proposed regulations, some minimal-emitting electricity generators are at risk of retirement, including about five percent of the nuclear fleet according to the Energy Information Administration estimates.[28] Accordingly, we urge Treasury and the IRS to grant exceptions for existing electricity generation at risk of retirement, such as nuclear power plants, or to accept nuclear and hydroelectric resources that relicense.

Finally, so long as the temporal matching and deliverability requirements are met, we request that final guidance include a waiver for the incrementality requirement if power prices drop below $20 / MWh. As renewable energy penetration grows in power markets, there will be instances where energy is either valued at low clearing prices or in even some circumstances negative power clearing prices. During these periods, it is in the best interest of the grid and environmental stewardship to ensure that this excess energy is not wasted. As noted above, so long as the temporal matching and deliverability requirements are met, the incrementality requirement should be waived so that any low valued renewable energy (no matter when it is constructed) can be utilized to produce hydrogen. Having this waiver will help ensure that every green electron can be utilized

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[27] *See generally* Section 45V.

[28] *See* "Emissions and energy impacts of the Inflation Reduction Act," (https://www.science.org/doi/10.1126/science.adg3781); "Annual Energy Outlook 2023," (https://www.eia.gov/outlooks/aeo/tables_ref.php).

for productive use before curtailment occurs and that energy becomes wasted. We note that regulations in the European Union for determining a Renewable Fuel of Non-Biological Origin ("RFNBO") have granted similar waivers based on power prices below 20 euros per MWh, which shows there is precedent for this type of structure in other markets.

D. Deliverability

The deliverability requirement in the proposed regulations would require qualifying EACs to represent electricity that was produced by an electricity generating facility that is in the same region as the relevant hydrogen production facility.[29] The term "region" means one of the U.S. balancing authorities, as mapped out in the National Transmission Needs Study.[30] However, there are circumstances where existing physical interconnection of a hydrogen facility to a balancing authority outside of the proposed deliverability boundaries would render the facility ineligible for the Section 45V credit. For example, please consider part of ACES Delta's collaboration with the Intermountain Power Agency (IPA) to supply green hydrogen for their IPP Renewed project. The renewable energy powering ACES Delta's electrolyzers is set to be sourced by IPA through the Los Angeles Department of Water and Power (LADWP) system. Even though physically connected by multiple transmission lines the LADWP system would fall outside the proposed deliverability boundaries of ACES Delta, thus disabling this decarbonization project from being able to qualify for the Section 45V PTCs. Such a result is contrary to the intent of the Inflation Reduction Act.

As shown in the modelling, this requirement inadvertently increases green hydrogen costs and LGHG emissions due to, e.g., the quality and availability of renewable resources being highly regional. Moreover, local renewable resources near green hydrogen facilities may not be of high quality or may be available only in limited amounts due to land restrictions or other constraints. Instead of incurring additional costs in accessing limited local resources or terminating a project altogether, green hydrogen facilities should be able to access higher quality, lower cost, and abundantly available renewable resources in other regions.

For the reasons discussed above, we urge Treasury and the IRS to provide taxpayers with the flexibility in choice of map (e.g., DOE map of U.S. balancing authorities or existing RTO and ISO maps). This flexibility would enable existing market systems, which have been developed and refined over many years, to benefit from the Section 45V PTC. Such an approach would ensure that existing mature systems, with proven track records in implementation and problem-solving, can contribute effectively to the green hydrogen ecosystem. Not only would incorporating these established entities into Section 45V framework facilitate a smoother integration and adoption of green hydrogen technologies, but it would also reinforce the strong commitment to ongoing emissions reduction. This adjustment would better align the Section 45V guidelines more closely with the realities of current energy markets and infrastructure, thereby maximizing the potential impact of the tax credit in achieving the Biden Administration's decarbonization goals. With that in mind, we request that in its final guidance, Treasury and IRS require EACs to be generated within the same interconnection region (e.g., Eastern, Western, and ERCOT) as the electrolyzer load.[31]

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[29] Prop. Treas. Reg. § 1.45V-4(d)(3)(iii).

[30] Prop. Treas. Reg. § 1.45V-4(d)(2)(vi); *see also* "The National Transmission Needs Study," (https://www.energy.gov/gdo/national-transmission-needs-study).

[31] *See* "U.S. Grid Regions" (https://www.epa.gov/green-power-markets/us-grid-regions), as last updated on January 15, 2024.

E. Temporal Matching

The proposed regulations would provide the general rule that 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.[32] Further, the proposed regulations also would provide a transition rule to allow an EAC that represents electricity generated before January 1, 2028 to fall within the general rule (above) 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.[33]

We urge Treasury and the IRS to postpone the hourly matching requirement until 2032. Further, there should not be a requirement for hourly tracking without an hourly EAC tracking product broadly available on the market. A product with hourly EAC tracking would need to be available in the next 12 months to procure a power purchase agreement or EAC product with hourly tracking capability starting January 1, 2028. We request that the final guidance allow hydrogen projects with placed in service dates before 2032 to be grandfathered and exempt from this requirement. This request acknowledges the intermittent nature of predominant renewable sources, like solar and wind, necessitating over-procurement for consistent energy matching.

Further, given temporal matching will be determined on an hourly basis, we request Treasury and the IRS allow for Section 45V compliance to also be determined on an hourly basis. This will permit projects to benefit from a level of flexibility whereby they can have both Section 45V compliant and non-compliant hydrogen be produced from the same facility. For instance, if in a given hour a project meets the Section 45V criteria and claims a Section 45V tax credit for qualified clean hydrogen produced in that hour, then, for the next hour, the same project would now be free to consume grid power; however, because during the second hour the hydrogen produced by the project is not compliant with the Section 45V criteria, the project would forgo the Section 45V tax credit in respect of the hydrogen produced during the second hour. This flexibility would be helpful as it is yet to be determined how well electrolyzer technology can follow the intermittent nature of renewable energy. During any period where matching is on other than an hourly basis, we request a similar rule apply.

Consider the following impacts of the hourly matching requirements for an ATR for clean hydrogen. To reduce the CI of clean hydrogen, renewables could be considered for the electrical load of the ATR facility. These facilities are not as flexible or modular as electrolyzers and would impact the operations to the extent that they would drive consideration of another source of electricity, which would in turn likely increase the CI. This approach is counter to the congressional intent of the Section 45V PTC.

The lack of an available national accounting system currently, also presents challenges. We request Treasury and IRS establish a timeline for utilities and Regional Transmission Organizations ("RTOs") to adopt hourly matching, with transparent data sharing, to begin no early than January 1, 2032. Further, we recommend that Treasury and the IRS review the system with Congress prior to implementation. Treasury and IRS should also consider delaying the national implementation of the system if it is not available in all regions. The lack of ability for taxpayers to trade one hour against another presents additional challenges in that taxpayers either

[32] Prop. Treas. Reg. § 1.45V-4(d)(3)(ii)(A).
[33] Prop. Treas. Reg. § 1.45V-4(d)(3)(ii)(B).

sell their EAC in a defined hour or lose it, unless they, *e.g.*, contract with their own renewable supply. This challenge does not incentivize the growth of the domestic hydrogen industry.

As shown in the modelling, the hourly matching requirements would also give rise to significant cost increases. For example, electrolyzer technologies which are currently commercially available vary in both cost and in their ability to seamlessly work with intermittent renewables. For equipment that is less tolerant to fluctuations in electricity input, wear will increase, requiring significant maintenance and replacement costs. These costs are an important consideration for project developers.[34] Further, electrolyzers are the largest cost element of an electrolytic clean hydrogen plant and must be utilized at high levels to produce the volumes of hydrogen needed to make the sale of the hydrogen economic. Therefore, the hourly matching requirements may cause MPWA more difficulty in persuading banks to lend/finance projects until MPWA can demonstrate an ability to comply with hourly matching.

V. Renewable Natural Gas

Where RNG displaces fossil natural gas in the same natural gas system and such custody transfers are carefully tracked, the RNG industry should be allowed to rely on a "book-and-claim" accounting system. The displacement or mass/balance approach to custody transfers has a long history in the natural gas market, and "book-and-claim" approaches have been used in several regulatory programs without identified cases of fraud or double-counting. These systems have worked, and existing frameworks should continue to be available for hydrogen production facilities to show use of RNG as a feedstock or as process energy for electrolysis. Although we do not believe an electronic system is required, there is an electronic tracking system for RNG that is available today (*i.e.*, M-RETS), which could be available as an option for parties to utilize.

A. Temporal matching for RNG

Temporal matching need not be (and should not be) more frequent than monthly for RNG. Once injected into the gas grid, low-carbon gasses are freely storable and transmittable. Accordingly, we suggest that hydrogen producers should track their low-carbon gas procurement and match it to their hydrogen production over accounting periods which could be monthly, quarterly, or annual. Hourly time matching does not apply to the book-and-claim delivery of RNG, since RNG can be stored over long periods of time, making monthly or quarterly accounting periods appropriate.

In addition, unlike RNG, credits issued in different electricity programs, which are typically based on regional electricity grids, these electricity credits are typically issued by each state with different values and rules. Temporality rules have been created to account for these values, which can be significantly different. Where RNG is actually purchased by the hydrogen producer (not solely credits), this is not the case. Under the renewable fuel standard, for example, the credits or renewable identification numbers ("RINs") are nationally applicable, and the values do not differ based on the applicable state.

[34] Note that this will not be the case for electrolytic hydrogen produced with nuclear power generation as it is a 24/7 resource, so the electrolyzers can run in a constant mode of operation.

B. Deliverability for RNG

The natural gas pipeline system is an integrated North American system and any deliverability requirement can be met using the long-standing delivery of natural gas via displacement. Geographic restrictions on RNG are not necessary and may impose unnecessary restrictions, impacting the long-standing flow of natural gas throughout the U.S. A key benefit of RNG for accelerated deployment of clean hydrogen is that it can be distributed across country in existing infrastructure. It is not possible to physically segregate delivery of RNG once it is intermingled with fossil gas in the pipeline system and geographic limitations are therefore unnecessary and arbitrary. Until RNG volumes achieve more of a critical mass, with broad adoption displacing a significant share of fossil gas, RNG producers cannot change physical flow of the gas system significantly.

Imposing geographic restrictions could adversely impact supply. Establishing the entire natural gas pipeline system as the "geographic" scope for RNG will allow diverse downstream customers to create an aggregate demand that can be served by all RNG suppliers, regardless of geographic location, and thereby send a stronger market signal across the supply chain to all potential project developers to build the RNG resource in a rational way – starting with the most cost-effective projects.[35] Any geographic constraints would require RNG developers to try to change the dispatch of the gas system to match physical supply to the subset of gas load that is currently willing to procure RNG. This is not optimal and runs counter to the roadmap for promoting production of clean hydrogen, particularly through the use of hydrogen hubs that are likely going to include reliance on pipeline distribution.

Thank you again for the opportunity to provide comments. We look forward to addressing any questions you may have.

Sincerely,

Andrew C. Knapp
Senior Director, Government Relations

[35] Moving gas unnecessarily requires additional energy and emissions from compression stations and potential methane leakage.