ACP Green Hydrogen Framework

Proposal on the "Three Pillars" for Building a Green H2 Industry & Ensuring Climate Benefits Under the Clean Hydrogen Tax Credits

The American Clean Power Association (ACP) provides this consensus framework, negotiated amongst our "big tent" diverse membership, based on the shared goal of supporting the development of the new green hydrogen industry in the United States while at the same time providing robust guardrails to ensure that it is both clean and green. The implementation of the clean hydrogen tax credit has sparked an intense debate among stakeholders over how best to incentivize the development of a stable, long-term green hydrogen market that supports decarbonization goals. This compromise framework offers a roadmap for effectively balancing the dual priorities of supporting early-market development of green hydrogen with maintaining a rigorous and robust standard for ensuring clean production. The proposal is the result of considerable deliberation, analysis, and interaction with leading member companies in the clean power and green hydrogen industries, environmental organizations, and other stakeholders over the last several months.

Challenge: Driving Green Hydrogen While Reducing Emissions

Accelerating green hydrogen production through the Inflation Reduction Act's clean hydrogen tax credits can help propel decarbonization across the economy — an estimated 90-million-ton reduction in carbon emissions each year by 2030.[1] These large emissions reductions are due to the fact that green hydrogen is essential for decarbonizing key sectors of the U.S. economy that are difficult to abate through direct electricity usage — including heavy duty manufacturing, chemical production, and heavy-duty transportation.[2] Green hydrogen will also drive demand

[1] IEA, *Global Hydrogen Review* at 19, https://iea.blob.core.windows.net/assets/5bd46d7b-906a-4429-abda-e9c507a62341/GlobalHydrogenReview2021.pdf (detailing an estimate of mitigated emissions potential from green hydrogen production).
[2] Energy Innovation, *Smart Design Of 45V Hydrogen Production Tax Credit Will Reduce Emissions and Grow the Industr*y at 9-10 (discussing the numerous industrial applications for green hydrogen in otherwise difficult to decarbonize sectors).

for further investment in clean power[3] and create tens of thousands of new domestic jobs.[4]

The implementation of the clean hydrogen tax credit is key to ensuring this nascent industry successfully unlocks these benefits. Part of the challenge of effectively implementing this incentive rests in accounting for differences between known near-term realities and long-term uncertainties. While most view green hydrogen as a key ingredient to reducing carbon emissions over the long term, a rigorous debate exists as to how to incentivize the development of a stable, green hydrogen market in the near term while ensuring green hydrogen production does not exacerbate the current climate crisis.

At present, green hydrogen is objectively not cost competitive[5] with other forms of existing hydrogen production. There has been intense debate within ACP, as well as other stakeholders, on how to best encourage first movers in commercializing this new technology – while also ensuring emissions reductions. Early market entrants in the green hydrogen industry are concerned that overly restrictive near-term requirements will prevent the industry from competitively entering the domestic marketplace and producing a long-term, stable industry that drives down emissions. These stakeholders are seeking a glide path into a more restrictive regulatory requirement. On the other side, certain stakeholders are concerned that the demand from green hydrogen could pull existing clean power away from serving other loads without driving additional clean energy and, in turn, result in greater levels of carbon-intensive generation being dispatched. These groups are seeking highly restrictive qualification criteria to be put in place from the outset.

This dueling debate has centered on how the implementation of the clean hydrogen tax credit should define the "three pillars" for green hydrogen powered by clean power being pulled from the grid (through the procurement of credits): temporality (time matching), additionality, and regionality. With respect to time matching, there have been varying opinions on the necessary granularity of the timing between when grid-tied clean electricity used to power a green

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[3] *See* IEA, How much will renewable hydrogen production drive demand for new renewable energy capacity by 2027, https://www.iea.org/reports/how-much-will-renewable-hydrogen-production-drive-demand-for-new-renewable-energy-capacity-by-2027.

[4] *See* Department of Energy, *U.S. National Clean Hydrogen Strategy and Roadmap* at 1, https://www.hydrogen.energy.gov/pdfs/us-national-clean-hydrogen-strategy-roadmap.pdf (estimating that the buildout of hydrogen facilities and infrastructure could create over 100,000 direct and indirect jobs by 2030); *See also* Hydrogen Council, *Hydrogen scaling up: A sustainable pathway for the global energy transition* at 9, https://hydrogencouncil.com/wp-content/uploads/2017/11/Hydrogen-Scaling-up_Hydrogen-Council_2017.compressed.pdf (asserting that the green hydrogen economy could support 30 million jobs worldwide).

[5] *See* International Energy Agency (IEA) in partnership with Statistical Office of the European Communities (EUROSTAT), and International Renewable Energy Agency (IRENA), *Global Average Levelized Cost of Hydrogen Production by Energy Source and Technology, 2019 and 2050*, https://www.iea.org/data-and-statistics/charts/global-average-levelised-cost-of-hydrogen-production-by-energy-source-and-technology-2019-and-2050 (discussing the cost competitiveness of green hydrogen relative to other hydrogen production, such as steam methane reforming—gray hydrogen—the current dominant form of domestic hydrogen production for most industrial applications).

hydrogen facility is produced in relation to the hydrogen production. The focus on additionality has been on whether credits can come from existing zero-emission sources or only new sources of clean power. The regionality debate has concentrated on the appropriate geographic region of the United States in which credits can be generated in relation to the location of the green hydrogen facility. An outcome that is unnecessarily restrictive on any one of these three pillars could interrupt the development of this nascent technology; on the other hand, one that is too lax could compromise confidence in the ability of green hydrogen to reduce emissions.

Over the past several months, ACP has been working diligently to find consensus among the diverse range of views among our members and forge a collective position to help provide a constructive path forward on these issues. ACP's consensus framework (attached) is the outcome of that deliberation and combines elements from various sides of this debate with the shared goal of incentivizing new green hydrogen technology while ensuring near- and long-term climate benefits. Our proposal embraces significant new constraints related to the three pillars – in particular, adding greater emissions accounting rigor – going beyond what the association proposed in our previous comments to the Department of Treasury in December of last year.

As discussed further below, ACP's framework proposes that green hydrogen incentives should be limited to facilities that can demonstrate they are relying on "new" sources of clean power (additionality) and that they are sourced from within relatively close-knit and interconnected geographic boundaries (regionality). The proposal also requires green hydrogen facilities to embrace rigorous temporal requirements (time matching), ensuring that both the clean power and the green hydrogen are produced in the same hour, after a brief initial phase-in period allowing for annual rather an hourly matching basis. Under the proposal, only green hydrogen facilities that have started construction by the end of 2028 would receive greater latitude on this time-matching requirement. This is to ensure that there is sufficient clean power to cost-effectively drive new green hydrogen facilities in the near term.

ACP Framework: Consensus On The Three Pillars

Time Matching

Multiple parties have submitted comments to Treasury and other federal agencies regarding potential time-matching requirements for implementation of the clean hydrogen tax credits in the Inflation Reduction Act. The comments have largely been split along the lines of parties advocating for an annual time-matching requirement and those advocating for an hourly requirement.[6]

While moving to hourly time-matching at the outset would ensure a high degree of confidence that green hydrogen production will not result in an increase in near-term grid carbon

[6] For annual matching, a portfolio of clean energy is procured and built in a quantity equal to the annual energy demand of the electrolyzer. For hourly matching, hydrogen production is restricted based on the hourly quantity of clean energy available under the same portfolio.

emissions, the majority of studies conclude that green hydrogen projects cannot be competitive[7] on a wide scale basis under an hourly regime at the outset.[8] Of note, some studies have concluded that annual time-matching can decrease emissions over hourly time-matching in some regions.[9] Currently, green hydrogen is scarce and expensive, especially in comparison to conventional hydrogen—gray and blue—due in large part to the high capital costs inherent with a new market or technology.[10] Requiring strict hourly accounting rules out of the gate will further increase these costs, making it difficult for green hydrogen to compete.[11]

Hourly matching requires procuring clean electricity at all hours of operation or operating electrolyzers at low capacity factors.[12] Green hydrogen projects would thus be forced to significantly over-procure renewables and/or storage to ensure production equipment will not

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

[8] See, e.g., MIT Energy Initiative, *Producing Hydrogen from Electricity* at 5, https://energy.mit.edu/wp-content/uploads/2023/04/MITEI-WP-2023-02.pdf ("Our findings suggest that enforcing an hourly time-matching requirement in the near-term, when the risk of high emissions from annual time-matching is low, creates additional cost and implementation barriers for scaling up electrolytic H2 production") ("MIT Study"); Boston Consulting Group, *Green Hydrogen: An assessment of near-term power matching requirements* at 23, *https://media-publications.bcg.com/Green-Hydrogen-assessment-of-near-term-power-matching-requirements.pdf ("*On an aggregate annual basis, decarbonization potential under annual matching with and without conditions is likely larger than hourly given the lower cost and thus creates more economically viable demand to generate realized downstream decarbonization.") ("BCG Study"); Energy Futures Initiative, *The U.S. Hydrogen Demand Action Plan* at 17, https://subscriber.politicopro.com/eenews/f/eenews/?id=00000186-32b2-d681-ab8f-f3b6569b0001 (recommending "IRS could initially require annual estimates of life cycle emissions—allowing producers to combine multiple energy input types—and phase to daily or hourly data over time") ("EFI Study"); E3 and ACORE, *Analysis of Hourly & Annual GHG Emissions* at 44, https://acore.org/wp-content/uploads/2023/04/ACORE-and-E3-Analysis-of-Hourly-and-Annual-GHG-Emissions-Accounting-for-Hydrogen-Production.pdf ("An hourly matching requirement results in significantly higher costs for hydrogen production than an annual matching requirement with the same GHG intensity across a wide range of renewable energy and wholesale electricity market assumptions.") ("E3 and ACORE Study"); Wood Mackenzie, *Hydrogen Carbon Intensity Temporal Matching Analysis* at 5-8 ("Annual matching requirements for new IRA tax credits could kick-start economically competitive green hydrogen production.") ("WoodMac Study").

[9] *See, e.g.,* BCG Study at 19 (detailing that annual matching with conditions abates at least as much carbon emissions as hourly matching and 1900 times as much in some cases); WoodMac Study at 11 (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).

[10] Even studies that endorse hourly matching concede that hourly matching would result in lower utilization rates for electrolyzers and an increase in the LCOH for hydrogen produced. *See, e.g.,* Princeton Zero Labs, *Minimizing emissions from grid-based hydrogen production in the United States*, at 2, https://iopscience.iop.org/article/10.1088/1748-9326/acacb5.

[11] *See supra* note 10.

[12] *See* WoodMac Study at 5-8 (breaking down the comparative costs and emissions associated with hourly and annual regulatory regimes).

be idled during periods of low resource availability.[13] Under an hourly regime, if capacity factors cannot be met on a highly consistent basis, downstream sectors needing a continuous hydrogen stream to run effectively will likely not embrace green hydrogen.[14] Hydrogen storage facilities are potential solutions but come with added costs.[15] In short, an immediate hourly matching requirement would likely impose barriers that would severely limit the green hydrogen industry before it can get off the ground, limiting the role it can play to decarbonize our economy over the long term.

In light of these realities, ACP is proposing to phase in an hourly accounting system as the cost curve declines for green hydrogen upon greater scale and maturity. Specifically, to provide needed short-term certainty for early green hydrogen movers, the proposed framework enables investors to start the project development process under annual time-matching so long as projects begin construction before the end of 2028. The proposal transitions to hourly matching for projects commencing construction in 2029 and beyond. The current safe harbor requirement for hydrogen facilities requires a project to be placed in service within four years of when it begins construction.[16] As a result, all new green hydrogen facilities placed in service after 2032 would be under an hourly time-matching regime. The ACP proposal would grandfather in the early movers from the more stringent hourly regime as long as they start construction before January 1, 2029—thereby providing the confidence needed for private capital investment for these projects.

To address concerns over providing time-matching flexibility to first-mover projects, our proposal provides stringent requirements on the other two pillars—additionality and regionality. Those two conditions, plus a transition to a stricter accounting structure once the industry matures, will ensure that green hydrogen contributes to long-term decarbonization of the US economy.

[13] *Id.* at 13; E3 and ACORE Study at 34-38 (finding that under an annual matching requirement, 85% of the scenarios modeled produced incremental emissions less than 0.45 kg CO2e/kg hydrogen without any costly renewable overbuild).
[14] *See, e.g.,* Rhodium Group, *Scaling Green Hydrogen in a post-IRA World* at 6, https://rhg.com/research/scaling-clean-hydrogen-ira/ ("The industrial end uses we've highlighted as the current market for green hydrogen need a relatively constant supply of hydrogen.")
[15] MIT Study at 10 (discussing how annual matching reduces the need for additional costly battery in comparison to an hourly matching requirement).
[16] Dep't of Treasury, *Prevailing Wage and Apprenticeship Initial Guidance Under Section 45(b)(6)(B)(ii) and Other Substantially Similar Provisions,* 87 Federal Register 73580 at 73584 (Nov. 30, 2022), *https://www.govinfo.gov/content/pkg/FR-2022-11-30/pdf/2022-26108.pdf* (providing "for purposes of [§45V] . . . [t]axpayers may rely on the Continuity Safe Harbor provided the facility is placed in service no more than four calendar years after the calendar year during which construction began").

Additionality

Additionality is a key requirement to ensure that developers are offsetting the emissions of new load from grid-connected electrolyzers.[17] Under ACP's proposal, electrolyzers must procure "new" clean generation to match their demand in order to offset emissions linked to new grid power consumption. Absent additionality requirements, electrolyzers could offset grid emissions from clean power already built to serve other purposes and, in turn, not truly offset the emissions of the new load from grid-connected electrolyzers.[18]

While a strict additionality requirement could diminish early green hydrogen production,[19] it also serves as an opportunity to drive new clean energy deployment, utilize existing renewables that would otherwise have been curtailed, and reward the repowering of older facilities. A strict additionality requirement will accelerate renewable energy deployment and reduce the carbon intensity of the grid while imposing lower costs than a strict time-matching requirement.

ACP proposes three options to demonstrate additionality using "new" clean energy generation. First, electrolyzers should be able to purchase new clean energy from projects that are operational no earlier than 36 months prior to the green hydrogen facility becoming operational. As renewable energy takes time to build, permit, and interconnect, this would provide a time-bound grace period for new clean energy projects to come online to power green hydrogen facilities.

Second, green hydrogen facilities should be able to draw electricity from existing clean energy projects experiencing persistent congestion. A framework will need to be put in place to verify, based on a historical assessment, that the clean energy projects have been experiencing chronic curtailment and/or zero or negative real-time power prices absent demand from the green hydrogen project.[20] While transmission is the best long-term solution to address congestion and curtailment, this policy would help ensure that existing clean energy generation is not being wasted or underutilized while the grid is being expanded.

Third, renewable energy facilities that have a new placed-in-service date under the 80/20 rule[21] should be treated as newly built renewable electricity facilities, provided the repowering occurs

[17] See, e.g., Energy Innovation, *Smart Design Of 45V Hydrogen Production Tax Credit Will Reduce Emissions and Grow the Industry* at 18 ("Absent additionality, electrolyzers would unquestionably raise GHG emissions. Additionality is also the bedrock upon which the other two principles lie—without additionality, time-matching and deliverability do not avoid emissions as intended" ("Energy Innovation Study").
[18] *Id.*
[19] E3 and ACORE Study at 27 (arguing that additionality will increase the LCOH of hydrogen and consequently decrease the amount of green hydrogen deployed).
[20] ACP is currently working with members on producing a proposed framework and hopes to share further recommendations on this issue in the near future.
[21] *See* Dep't of Treasury, *Electricity Produced from Certain Renewable Resources*, Notice 2008-60, https://www.novoco.com/sites/default/files/atoms/files/notice_08-60_0.pdf ("A facility may qualify as originally

within 36 months of the green hydrogen facility being operational. This is consistent with tax law that treats repowered facilities as "new" facilities because they have a similar useful life as a newly built facility. These facilities also achieve efficiencies by reutilizing and not wasting certain property and equipment from the "old" facility.

Regionality

Regionality establishes a geographical boundary within which both the clean energy project that the electrolyzer is relying on and the electrolyzer must be located. The boundary can range from "anywhere" (i.e., no restrictions), to the same grid, to the same RTO, to the same interconnection node. ACP's proposal creates sufficient operational guardrails to ensure clean energy resources powering electrolyzer loads are located in a region that allows for an appropriate degree of electricity physical delivery. Specifically, our proposal uses the 66 U.S. "balancing authorities" that each operate a portion of the grid.[22] Most balancing authorities are individual utilities, while most of the total power flow is managed by seven larger regional entities (RTOs/ISOs) that perform the balancing function in their own footprints.[23]

Because transmission constraints can prevent procured renewable projects from physical delivery of electricity into the region/grid where the electrolyzer is located, our proposed geographic boundaries are drawn tight enough to decrease the risks of increased emissions due to transmission constraints, while also being large enough to provide access to areas with the best clean energy potential. In addition, since some balancing authorities are saturated with clean energy, our proposal would allow clean energy from connected balanced authorities to count, as long as a physical delivery[24] requirement is met.

Specifically, under ACP's proposal, the geographical correlation condition is met if at least one of the following criteria relating to the location of the electrolyzer is fulfilled: (1) the renewable energy facility is located, or was located at the time when it came into operation, in the same electrical balancing authority as the electrolyzer; or (2) the renewable energy facility is located in a different balancing authority than the electrolyzer, but there is sufficient physical delivery from the balancing authority in which the renewable facility is located into the balancing authority where the electrolyzer is situated.

placed in service even though it contains some used property, provided the fair market value of the used property is
not more than 20 percent of the facility's total value (the cost of the new property plus the value of the used property) (80/20 Rule)").

[22] *See* The U.S. Electricity System, *Overview of the U.S. Electricity System*, https://energyfreedomco.org/elec-system.php.

[23] *Id.*

[24] ACP is currently working with members to define physical delivery for these purposes and hopes to share further recommendations on this issue in the near future.

Comparison With Europe

In comparison to the European Union (EU) proposal, some elements in ACP's proposal are more flexible for first-mover projects while others are more restrictive.

- ***Time Matching*****:** The EU proposal transitions from annual to hourly in 2030, [25] whereas our proposal would not require that transition until 2032 and provides a ten-year grandfather period. Domestic green hydrogen facilities will be required to move to hourly time matching in accordance with the EU provisions in order to export to the EU.[26] A notable difference between the proposals is that the EU starts with monthly time matching while ACP starts with annual time matching. From an emissions perspective, there is not a meaningful difference between annual and monthly requirements. However, from an economic perspective, there is a significant difference, as annual is much more cost-effective than monthly. Certain renewables perform better seasonally and, therefore, monthly time matching would entail many of the same over-procurement challenges as hourly if imposed out of the gate. Overall, the EU proposal is stricter on time matching than the ACP proposal, but this is offset by differences in our additionality requirements.

- ***Additionality***: The EU proposal is less strict on additionality than the ACP proposal, which compensates for the fact that our proposal is more permissive on time matching. Under the EU proposal, additionality rules do not apply to facilities that come online before 2028, and those facilities are grandfathered for a decade thereafter. [27] The EU proposal contains a similar concept to the ACP proposal in terms of allowing existing but congested (redispatched) renewables to count as new.

- ***Regionality***: The EU proposal's use of bidding zones (which roughly track European country borders) is roughly analogous and equivalent in size to the use of planning authorities in our proposal. [28] In addition, the EU proposal allows for clean power that is interconnected to a bidding zone with an electrolyzer to count, which is similar to our allowance for physical delivery from one balancing authority to another. [29]

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[25] Delegated Regulation on Union methodology for RFNBOs of 10.2.2023, at 9-10, https://energy.ec.europa.eu/publications/delegated-regulation-union-methodology-rfnbos_en.
[26] *Id.*
[27] *Id.* at 9
[28] *Id.* at 10.
[29] *Id.*

Attachment

ACP Consensus Framework For The Three Pillars of GREEN H2

- **Time Matching:**
  - ***Transition***:
    - Projects that begin construction before 1/1/2029 are eligible for the full hydrogen PTC with annual matching for the life of the tax credit.
    - Transition from annual to hourly matching for green H2 projects that begin construction[30] after 12/31/2028.

- **Additionality:**
  - Green H2 projects would be required to adhere to the following additionality rules*:*
    - Electrolyzers would satisfy additionality rules if they source electricity from clean energy projects that are:
      - ***New*****:** Considered "new" if the clean energy project becomes operational no earlier than 36 months prior to the electrolyzer becoming operational.
      - ***Repowered*****:** A renewable energy project that meets the 80/20 repowering rule will be considered to be "new"—applying the 36-month rule.
      - ***Congested***: Green H2 facilities that draw electricity from renewable energy projects that experience persistent congestion shall be considered "new" facilities, provided a framework is put in place to verify that the renewable energy projects have been experiencing chronic curtailment and/or zero or negative real-time power prices, based on a historical assessment. (The details on this proposal will be provided in the near future).

- **Regionality:**
  - An electrolyzer must source clean energy from a project that is physically located in the same electrical balancing authority or the clean energy project must be physically delivered into the same electrical balancing authority as the electrolyzer if it is not physically located in the same balancing authority. (The details on this proposal will be provided in the near future).

As ACP is a national trade association that represents a broad and diverse range of entities, the views in this consensus framework do not necessarily reflect the position of each individual ACP member.

[30] Guidance to include begin construction qualifications consistent with existing renewable energy project guidance, including 5% safe harbor, off-site/on-site physical work, continuous efforts, and continuity safe harbor (four calendar years after calendar year construction begins).