

April 12, 2023

The Honorable Janet Yellen  
Secretary  
U.S. Department of the Treasury  
1500 Pennsylvania Avenue, N.W.  
Washington, D.C. 20220

The Honorable Jennifer Granholm  
Secretary  
U.S. Department of Energy  
1000 Independence Avenue, S.W.  
Washington, D.C. 20585

The Honorable John Podesta  
Senior Advisor to the President for Clean Energy Innovation and Implementation  
The White House  
1600 Pennsylvania Avenue, N.W.  
Washington, D.C. 20220

**Re: How annual matching for the Inflation Reduction Act's (IRA) 45V clean hydrogen tax credit can accelerate progress towards the Biden administration's decarbonization and clean hydrogen goals**

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

The 45V<sup>i</sup> Production Tax Credit (PTC) for clean hydrogen has the potential to accelerate the decarbonization of numerous sectors, including agriculture, heavy industry, maritime shipping, long-haul road transport, aviation, and the power sector. We write to urge you to implement the pragmatic policies needed to achieve the PTC's goal to establish an affordable clean hydrogen economy across the United States. The undersigned companies represent diverse sectors and range from industry-leading firms to innovative start-ups; we are the companies that, with effective policy implementation, will be producing, transporting, and consuming clean fuels at scale in this country. We stand united by our wholehearted support of the Biden administration's emissions reduction, decarbonization and clean energy growth goals and our strongly held belief that nurturing the nascent clean hydrogen industry is essential to realizing these goals.

Specifically, we support the use of "annual matching" for hydrogen producers to qualify for the section 45V tax credit. Under annual matching, renewable power generation is matched to the electricity consumed for hydrogen production on an annual basis. With only 12.4% of U.S. primary energy consumption coming from renewables,<sup>ii</sup> annual matching is an effective method to jumpstart the clean hydrogen economy in a climate-responsible way. By replacing high-carbon-intensity fuels in downstream applications, hydrogen produced through annual matching can be both clean and cost effective. In contrast, hourly matching would increase the price of clean hydrogen to effectively negate the economic and decarbonization benefits of the hydrogen PTC.

**Annual Matching Produces Excellent Decarbonization and Clean Energy Outcomes**

- Using annual matching with renewable electricity yields near-zero carbon intensity hydrogen.<sup>iii</sup> Across the United States, the newly built renewable power, driven by the IRA's clean energy incentives and supporting large-scale hydrogen production, will displace fossil fuels during periods of high wind and solar resource availability, offsetting the incremental power needed during periods of low resource availability. With only a fraction of today's utility electricity production made from renewables,<sup>iv</sup> Wood Mackenzie found that, "annual matching is an effective strategy to kick-start the deployment of low-carbon H2 and support grid [carbon intensity] reduction."
- The clean hydrogen that will be produced as a result of pragmatic implementation of section 45V will have tremendous climate benefits. The use of clean hydrogen to replace diesel fuel, kerosene, marine bunker fuel, and pet coke will help to displace significant quantities of carbon dioxide emissions and other harmful pollutants, such as sulfur oxides (SOx) and particulate matter. Annual matching will deliver these substantial benefits, especially to traditionally underserved and disadvantaged communities that have

been disproportionately affected, helping to achieve the environmental justice goals of the Biden administration. These downstream benefits have been overlooked by advocates of more restrictive temporal matching.<sup>v</sup>

- The Department of Energy estimates that ensuring price competitiveness of clean hydrogen will trigger 10 million tons of new production by 2030,<sup>vi</sup> equivalent to taking 22 million gas powered cars off the road.<sup>vii</sup>

#### **Annual Matching Will Create Tremendous Economic Investment:**

- With annual matching, the PTC makes clean hydrogen cost competitive with conventional hydrogen, giving customers the option to decarbonize without higher costs and to use clean hydrogen at scale.
- In its recent *Pathways to Commercial Liftoff: Clean Hydrogen* report, the DOE notes that \$85-\$215 billion in cumulative investment will be needed to produce 10 million tons of clean hydrogen by 2030, and that \$800 billion-\$1.1 trillion will be needed to produce 50 million tons by 2050. This investment will be spread across the value chain, including production, midstream infrastructure, and downstream applications. Moreover, the DOE projects that the clean hydrogen industry could create nearly a quarter of a million direct and indirect jobs in 2030,<sup>viii</sup> aligned with the August 2022 White House Fact Sheet noting that President Biden “made a promise to re-energize American manufacturing ... by incentivizing domestic production in clean energy technologies like solar, wind, carbon capture, and clean hydrogen.”<sup>ix</sup>
- Policies that ensure clean hydrogen is cost competitive will drive innovation in clean hydrogen production technologies to improve efficiency, as well as investment in the large-scale manufacturing systems required to drive down production costs. U.S. investment will make clean hydrogen production more affordable over the long term, reducing the need for incentives over time.

#### **Restrictive Hourly Match Would Delay Adoption and Negate the PTC’s Decarbonization and Economic Benefits**

- More restrictive temporal matching means that production equipment is idled during periods of low renewable resource, an approach that reduces clean hydrogen production, contrary to the PTC’s goal. Wood Mackenzie’s case studies confirm that this idle capital is devastating to the economics of clean hydrogen production, driving a 68% cost increase in Texas and a 175% increase in Arizona in 2030. 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.
- By offsetting the benefit of the PTC, hourly matching would severely affect the number of jobs supporting green hydrogen. Investments in electrolyzer manufacturing and innovation would be disincentivized, and the U.S. would lose the opportunity to be a global hydrogen production leader.
- In fact, 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 US needs to develop an industry to build and install electrolyzers—something unlikely to happen if restrictive regulations constrain near-term electrolyzer deployment ... the US risks missing a key clean energy manufacturing opportunity absent supportive policies and robust domestic demand.”<sup>x</sup>

#### **Hourly Matching Is Not Compatible with Industrial Operations:**

- Beyond any climate- or economic-focused arguments, the simple truth is intermittent hydrogen production does not work for the downstream sectors that will be the early adopters of clean hydrogen. Nearly all major industrial processes that would utilize clean hydrogen (including fertilizers, building materials, fuels and plastics) need a continuous hydrogen stream to run effectively. Generally operating at high temperature, these processes cannot simply shut down whenever renewables are unavailable.
- Both battery and hydrogen storage currently are very expensive and are not yet viable for most industrial processes. Until a network of hydrogen pipelines and storage systems is operational, annual matching will be an essential enabler of the clean hydrogen economy. Note that today in the United States, there are nearly 2000x more miles of pipelines carrying natural gas compared to those carrying hydrogen.<sup>xi</sup>

**Annual Matching Is Consistent with the Statute:**

- Annual matching is consistent with the statute, but an hourly matching requirement for clean hydrogen production may be inconsistent with the Administrative Procedure Act<sup>xii</sup> because it “arbitrarily” singles out one technology from the IRA but does not apply to other technologies included in the IRA, such as electric vehicles and direct air capture.
- Annual matching is aligned with Congress’ efforts to create a pragmatic approach to implementing the clean hydrogen PTC. A senate colloquy unambiguously expressed support for a “book and claim” accounting mechanism, in which a producer of clean electricity “books” an amount of electricity produced, and this clean electricity is then “claimed” by the hydrogen producer.<sup>xiii</sup>

The *U.S. Hydrogen Demand Action Plan*, published by the Energy Futures Initiative (EFI) in February 2023, recommended that “the Internal Revenue Service should work with DOE and EPA to develop a pragmatic, and timely, phased approach to issuing 45V guidance.” Led by former Secretary of Energy Ernest Moniz, EFI recommends that “initially, projects should be allowed to calculate emissions on an annual basis and be given the expectation that daily, and possibly, hourly units of measurement will be required in the future.”<sup>xiv</sup> We agree, and we are open to a more prescriptive requirement if an economically competitive alternative is developed before 2032 or when the extension of the 45V PTC is considered. We also agree that an effective policy must employ a clear and consistent approach to 45V qualification, e.g., grandfathering of early movers, to provide the confidence needed for private capital investment.

A closing analogy: over 10% of all vehicles sold globally were electric vehicles (EVs) in 2022,<sup>xv</sup> and, although these cars charge from the grid, they help displace fossil fuels and position the global economy to achieve zero-emissions. Now imagine how many fewer EVs would be on the road today if they could only charge using hourly-matched renewables. Analogous to the billions of dollars invested in EV’s, clean hydrogen can supercharge the industrial, agricultural, and commercial transport sectors, but only with a more flexible initial implementation of the section 45V PTC.

The undersigned companies stand ready to execute the Biden administration’s vision of a clean hydrogen future. We will hire the people, buy the materials and equipment, and build the systems to help show how “President Biden is delivering on his promise to build an economy that works for working families.”<sup>xvi</sup> This is a critical time to ensure that the United States becomes a world leader in the production of clean hydrogen. If we act prudently to create and implement policies that will foster innovation and investment in this vital technology, the United States has the opportunity to become the global leader in clean hydrogen production and advance the energy transition in the fight against climate change.

Sincerely,

AGRU America, Inc.

BrainDrip, LLC

AIR COMPANY

Carbon Sink, LLC

Air Liquide USA LLC

CF Industries

Alto Ingredients, Inc.

Clearway Energy Group LLC

Ambient Fuels, LLC

Cummins Inc

AMMPower Corporation

Eaton Corporation plc

Apex Clean Energy

Entergy Corporation

AVANGRID, Inc.

Ferreira Construction, Inc.

Black & Veatch Corporation

GE Vernova

bp America Inc.

Great Lakes Water Authority

Highly Innovative Fuels Global LLC  
Infinium, Inc.  
Invenergy, LLC  
Kiewit Corporation  
LanzaTech, Inc.  
Linde, Inc.  
LSB Industries, Inc.  
Mainspring Energy, Inc.  
Mitsubishi Power Americas, Inc.  
Moda Midstream, LLC  
Monolith Materials, Inc.  
National Grid  
NextEra Energy, Inc.

Nutrien  
OCI N.V.  
Plug Power Inc.  
POET, LLC  
Proman USA, Inc.  
Quanta Services, Inc.  
Sempra  
Siemens Energy, Inc.  
Steelhead Composites, Inc.  
VERBIO North America  
Verde Clean Fuels, Inc.  
Woodside Energy

Cc:

The Honorable Michael Regan  
Administrator  
U.S. Environmental Protection Agency

The Honorable Ali Zaidi  
Assistant to the President and National  
Climate Advisor  
The White House

The Honorable Lily Batchelder  
Assistant Secretary for Tax Policy  
U.S. Department of the Treasury

Mr. David Crane  
Director  
Office of Clean Energy Demonstrations  
U.S. Department of Energy

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<sup>i</sup> All section references are to the Internal Revenue Code of 1986, as amended, unless otherwise specified.

<sup>ii</sup> According to the U.S. Energy Information Administration (EIA), renewable energy sources accounted for about 12.4% of total U.S. primary energy consumption in 2021.

<https://www.eia.gov/tools/faqs/faq.php?id=92&t=4#:~:text=How%20much%20of%20U.S.%20energy,total%20U.S.%20primary%20energy%20consumption.>

<sup>iii</sup> Wood Mackenzie’s *Hydrogen Carbon Intensity Temporal Matching Analysis* (2023, March 14) confirms that annual matching has an overall favorable carbon intensity benefit for case studies in Arizona and Texas in 2025 and 2030 (full report at <https://www.woodmac.com/news/opinion/green-hydrogen-IRA-production-economics/>).

<sup>iv</sup> According to the EIA, renewable sources accounted for ~19.8% of total utility-scale electricity generation in 2021 <https://www.eia.gov/tools/faqs/faq.php?id=92&t=4#:~:text=How%20much%20of%20U.S.%20energy,total%20U.S.%20primary%20energy%20consumption.>

<sup>v</sup> Notably, the Princeton University ZERO Lab’s September 2022 memo exclusively considered the hydrogen’s “embodied emissions” and neglected to quantify benefits from displaced diesel, marine bunker fuel or other applications.

<sup>vi</sup> U.S. Department of Energy. (2022, September). *DOE National Clean Hydrogen Strategy and Roadmap (Draft)*. <https://www.hydrogen.energy.gov/clean-hydrogen-strategy-roadmap.html>.

<sup>vii</sup> Environmental Protection Agency. <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=typical%20passenger%20vehicle%3F-A%20typical%20passenger%20emits%20about%204.6%20metric%20tons%20of,8%20C887%20grams%20of%20CO2.>

<sup>viii</sup> U.S. Department of Energy. (2023, March). *Pathways to Commercial Liftoff: Clean Hydrogen*. <https://liftoff.energy.gov/wp-content/uploads/2023/03/20230320-Liftoff-Clean-H2-vPUB.pdf>

<sup>ix</sup> The White House. (2022, August 19). *Fact Sheet: The Inflation Reduction Act Supports Workers and Families*. <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/19/fact-sheet-the-inflation-reduction-act-supports-workers-and-families/>

<sup>x</sup> King, B., Hiltbrand, G., Tamba, M., Herndon, W., & Larsen, J. (2023, March 16). *Scaling Green Hydrogen in a Post-IRA World*. Rhodium Group. <https://rhg.com/research/scaling-clean-hydrogen-ira>

<sup>xi</sup> U.S. Department of Energy reports that there are 3 million miles of natural gas pipelines and 1,600 miles of hydrogen pipelines. <https://www.energy.gov/eere/fuelcells/hyblend-opportunities-hydrogen-blending-natural-gas-pipelines#:~:text=The%20United%20States%20has%20an,miles%20of%20dedicated%20hydrogen%20pipeline.>

<sup>xii</sup> Section 706(2)(A) of the Administrative Procedure Act directs a court reviewing regulation to, “(2) hold unlawful and set aside agency action, findings, and conclusions found to be (A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”

<sup>xiii</sup> U.S. Congressional Record, Vol. 168, No. 133, pp. S4165-S4166 (Aug. 6, 2022)

<sup>xiv</sup> Energy Futures Initiative. (2023, February 10). *The U.S. Hydrogen Demand Action Plan*. <https://energyfuturesinitiative.org/reports/the-u-s-hydrogen-demand-action-plan-2/>

<sup>xv</sup> Boston, W. (2023, March 3). *EVs made up 10% of all new cars sold last year*. The Wall Street Journal. <https://www.wsj.com/articles/evs-made-up-10-of-all-new-cars-sold-last-year-11673818385>

<sup>xvi</sup> The White House. (2022, August 19). *Fact Sheet: The Inflation Reduction Act Supports Workers and Families*. <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/19/fact-sheet-the-inflation-reduction-act-supports-workers-and-families/>