August 8, 2023

EPA Docket No.: EPA-HQ-OAR-2023-0072

RE: Green Hydrogen Coalition's Response the Environmental Protection Agency's New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule

I. INTRODUCTION

The Green Hydrogen Coalition (GHC) appreciates the opportunity respond to the U.S. Environmental Protection Agency's (EPA) proposed actions under section 111 of the Clean Air Act.

The GHC[1] is an educational 501(c)(3) non-profit organization. GHC was formed in 2019 to recognize the game-changing potential of "green hydrogen"[2] to accelerate multisector decarbonization and combat climate change. GHC's mission is to facilitate policies and practices that advance green hydrogen production and use in all sectors of the economy to accelerate a carbon-free energy future. Our sponsors include foundations, renewable energy users and developers, utilities, and other supporters of a reliable, affordable green hydrogen fuel economy for all.

The GHC would first and foremost like to express our appreciation for the EPA's commitment to setting guidelines and standards to ensure greenhouse gas (GHG) reductions in the United States. Secondly, as it pertains to hydrogen, we recognize the EPA's extensive analysis on the role of hydrogen in fossil fuel-fired power plants and support the proposal to include hydrogen as a 'Best Source of Emission Reduction' (BSER) technology in its rulemaking to limit greenhouse gas emissions from new and existing fossil fuel-fired electric generation units (EGUs).

II. COMMENTS

In the following sections, we respond to the EPA's solicitation for comments on issues related to and advocate for the use of hydrogen as a BSER.

a) The GHC Supports the EPA's Proposal to Include Co-Firing Low-GHG Hydrogen as a BSER Pathway.

As indicated by the EPA's review of current co-firing hydrogen projects – Los Angeles Department of Water and Power's (LADWP) proposed Scattergood Modernization project, leadership in the

[1] https://www.ghcoalition.org/

[2] The Green Hydrogen Coalition (GHC) defines "green hydrogen" as hydrogen that is produced from non-fossil fuel feedstocks and has climate integrity. The GHC supports a well-to-gate carbon intensity framework consistent with the U.S. Department of Energy.

active conversion of the Intermountain Power Agency project (IPA) in Utah, and NextEra's project for natural gas-fired combustion turbines with electrolytic hydrogen in Florida – this technology is commercially proven and available.

We support the EPA's proposal to set the goal of "co-firing . . . 30 percent (by volume) low-GHG hydrogen by 2032 and ramping up to 96 percent by volume low-GHG hydrogen by 2038."[3] We believe this proposal is necessary to help jumpstart the clean hydrogen economy and accelerate progress towards reducing our reliance on fossil fuels. Additionally, we would like to highlight that co-firing hydrogen can be a pathway through which reliability can be achieved since it can help make up for the variations in energy supply from intermittent renewables (i.e., solar and wind).

To make this proposal as robust as possible, we recommend the EPA re-evaluate the targets for co-firing percentages by volume by 2032. The logic underpinning this suggestion is that various power producers – Siemen's Energy,[4] Mitsubishi Power,[5] and General Electric[6] - have not only recognized hydrogen's potential but are also actively implementing co-firing as a near-term pathway for reducing emissions in a cost-effective manner. The success of these power producers in co-firing clean hydrogen upwards of 30% (by volume) today, with 100% in the near future, suggests progress is occurring quickly. If innovation continues at a fast pace, we may need to make the targets more aggressive in the event we can achieve 100% co-firing of hydrogen sooner. Conversely, if sufficient hydrogen supply does not materialize, or equipment is not ready, the EPA may need to allow flexibility in regulatory compliance. It is therefore important the EPA monitors these developments and adjusts its targets accordingly prior to 2032.

Moreover, including hydrogen as a BSER provides EGU owners and operators with an additional option to meet the regulation's emission reduction goals. For instance, in some parts of the United States, the geologic formations required for carbon capture and sequestration (CCS) do not exist,[7]

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[3] U.S. Environmental Protection Agency, Office of Air and Radiation. "New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule" A proposed Rule by the EPA on 5/23/2023. Accessed online at EPA-HQ-OAR-2023-0072

[4] Siemens Energy has partnered with Constellation Energy and Electric Power Research Institute and successfully demonstrated blending nearly 40% H2 with natural gas at the Hillabee Generating Station without any increase in NOx emissions.
See: https://www.constellationenergy.com/newsroom/2023/Constellation-sets-industry-record-for-blending-hydrogen-with-natural-gas-to-further-reduce-emissions.html

[5] Mitsubishi has explicitly stated that it has already combusted 30% hydrogen blends and has the goal of reaching 100% hydrogen firing in the near future.
See: https://solutions.mhi.com/sites/default/files/assets/pdf/et-en/hydrogen_power-handbook.pdf

[6] General Electric, its gas turbines can already operate "on fuels with hydrogen content ranging from 5% (by volume) up to 100%."
See: https://www.ge.com/gas-power/future-of-energy/hydrogen-fueled-gas-turbines

[7] Geological formations are cataloged by the National Energy Technology Laboratory's "NATCARB/ATLAS" accessed online at https://www.netl.doe.gov/coal/carbon-storage/strategic-program-support/natcarb-atlas, a review of the geologic formations for storage indicate that large portions of the East and Great Plains lack immediate access to storage.

which would leave EGU owners and operators with two options as compliance alternatives: either plant closure or co-firing hydrogen in a combustion turbine. As the example demonstrates, hydrogen enables EGU owners and operators to meet the regulatory goals while keeping a generation asset in operation. This underlines the importance of including hydrogen as a BSER in the final rules. If left to a binary choice between CCS or retirement for EGUs covered by the rules, the nation's electric grid may be far less reliable.

Finally, the GHC's extensive analysis of two potential electrolytic green hydrogen hubs at scale in California and the Carolinas ("HyBuild Los Angeles" and "HyBuild Carolinas"[8]), identified clean firm dispatchable power as a key "scalable first-mover" application that can jump-start clean hydrogen hub development and needed infrastructure. The GHC's findings determined that the delivered cost of mass-scale, electrolytic green hydrogen is estimated to be <$1 per kilogram (post PTC at the pipeline) in Southern California and approximately $1.55 per kilogram delivered (post PTC at the pipeline) in the Carolinas. This indicates that not only is co-firing of clean hydrogen a form of very cost-effective long-duration and seasonal storage, but it is also commercially feasible as soon as 2030 at the percentages proposed by the EPA.

Importantly, co-firing is also strategically important to the rapid development of clean hydrogen hubs because, as a concentrated and scalable application in a targeted location, it can serve as an anchor from which it is possible to begin building and contracting for the needed high-volume production, transport, and storage infrastructure to achieve the forecasted low-delivered cost and supply availability. Visibility into the availability of mass-scale, low-delivered cost clean hydrogen will, in turn, accelerate fuel switching in adjacent nearby sectors that will not convert until a viable, reliable, and cost-effective alternative to fossil fuels becomes available, such as heavy-duty trucking. Given this, the EPA's inclusion of clean hydrogen as a BSER is a game-changer not only for reducing carbon emissions from the power sector but also for many other sectors that are poised and ready to decarbonize with clean hydrogen.

b) <u>The EPA Should Require Blending Clean Hydrogen with Natural Gas to Co-Fire in All New, Modified, Reconstructed, and Existing Fossil Fuel-Fired Combustion Turbines, including Low-Load, Intermediate and Baseload Categories.</u>

The GHC recommends the EPA include hydrogen co-firing in all categories of combustion turbines as a pathway to meet both the New Source Performance Standards for GHG Emissions from new, modified, and reconstructed fossil fuel-fired EGUs and existing fossil fuel-fired EGUs. The option to co-fire hydrogen in combustion turbines not only aligns with the EPA's intended goal of reducing emissions but also helps ensure grid stability and reliability with a commercially viable and scalable alternative zero-carbon fuel.

Moreover, we urge the EPA to require that any new combustion turbines installed be hydrogen capable. As stated by the EPA, "certain new models [of combustion turbines] can be constructed at present that will, in the near future, be able to install pre-planned upgrades that will align to

[8] The HyBuild Carolinas' final report will be issued in mid to late August. Our findings, however, indicated that the electric generation sector was essential to achieving an economy of scale for hydrogen as a clean fuel.

turbine compatibility and allow up to 100 percent hydrogen combustion."[9] Futureproofing any new combustion turbine infrastructure to be able to utilize clean and green hydrogen requires only a modest additional investment at the time of construction relative to the total capital expenditure; however, it provides a critical pathway to ensure that such investments are ready to utilize clean hydrogen when available. In turn, this would help reduce stranded fossil asset risk. Therefore, we believe it is both reasonable and efficient to require that all categories of new combustion turbines are designed to allow hydrogen combustion in the future. The GHC believes that doing so will require only a modest near-term additional cost and will provide valuable futureproofing needed for our gas turbine fleet. It will also send an important signal to utilities, Original Equipment Manufacturers, and clean hydrogen producers to begin taking steps to invest appropriately and establish a robust clean hydrogen supply and appropriate transport and storage infrastructure.

Some stakeholders may be concerned that in 2022 low-carbon hydrogen represented less than 2% of total global hydrogen supply.[10] It is exactly for this reason that the EPA's leadership and proposed guidelines regarding clean and green hydrogen as a BSER are so urgent and critical: it serves as an important and needed market signal for the private sector investment to begin scaling clean hydrogen infrastructure, building on the DOE's Clean Hydrogen Earthshot efforts already well underway. Clean hydrogen producers as well as transport and storage infrastructure providers will need time to develop adequate supply and related infrastructure. Additionally, EGU owners and operators will also need flexibility to procure, test, and implement firing EGUs with blended clean hydrogen fuel.

We encourage EPA to incorporate a go-no-go mechanism to determine if adequate clean hydrogen supply exists and if an EGU owner/operator – and the grid it serves – are prepared for a year-over-year higher co-firing rate. EPA should also consider including in this mechanism a requirement to demonstrate the ability or inability to comply through a regular review process to enable course corrections that ensure longer-term decarbonization goals are achieved. We also encourage EPA to directly align compliance timing to hydrogen hub and infrastructure development. Alternatively, another approach EPA could take to encourage compliance flexibility is through a trading mechanism as described in (f), below.

Ultimately, the GHC believes it is imperative to begin co-firing with a clean hydrogen blend now to reach the EPA's 2032 goal. Doing so will enable adequate market development, help preserve and increase grid reliability, and decrease greenhouse gas emissions not only for the power sector but also for many adjacent hard-to-abate sectors.

c) <u>To Meet the Decarbonization Goals for Hydrogen Outlined in This Rulemaking, The GHC Recommends that the EPA Coordinate Closely with other Federal Agencies to</u>

[9] U.S. Environmental Protection Agency, Office of Air and Radiation. "Hydrogen in Combustion Turbine Electric Generating Units: Technical Support Document" Docket ID No. EPA-HQ-OAR-2023-0072. May 23, 2023. Pg. 4. https://www.epa.gov/system/files/documents/2023-05/TSD%20-%20Hydrogen%20in%20Combustion%20Turbine%20EGUs.pdf,

[10] Bermudez, Jose M., Evangelopoulou, Stavroula, Pavan, Francisco. "Hydrogen Findings: Tracking Hydrogen FAQ - 'Energy section'" International Energy Agency, Last Updated July, 2023 https://www.iea.org/energy-system/low-emission-fuels/hydrogen

Accelerate Needed Interstate and Regional Infrastructure to Supply Clean to Ultimately Achieve 100% Clean Hydrogen Cofiring in Power Plants.

In the GHC's analysis of Los Angeles and the Carolinas, it was found that, "shared, scaled infrastructure – namely, a dedicated GH_2 pipeline connected to a geologic salt cavern storage resource – is essential to achieving low delivered cost and widespread GH_2 adoption."[11] Based on these findings, the GHC contends that, in the long term, 100% dedicated pipelines will be required to meet the demand for decarbonizing power plants, which is in alignment with the ambitious goals outlined in this rulemaking. To achieve this vision, the GHC emphasizes the importance of collaboration between the EPA and other relevant federal agencies to facilitate rapid implementation of needed clean hydrogen production, transport, and storage infrastructure to serve EGUs. By working together, these agencies can collectively prioritize and expedite the establishment of dedicated pipelines, ultimately ensuring the uninterrupted flow of clean hydrogen to power plants nationwide.

In the near term, transitioning to a 100% dedicated clean hydrogen pipeline system is paramount for maximizing the environmental benefits and emission reductions associated with clean hydrogen usage in the power sector. A dedicated hydrogen pipeline system is essential to fully achieving the maximum benefits of clean hydrogen in turbines, as is envisioned by the EPA in the draft rules. The GHC acknowledges that near-term co-firing of clean hydrogen by blending it with natural gas in turbines is an effective interim solution and supports increasing the ultimate objective from 96% to 100% clean hydrogen combustion. And, at that scale, the widespread adoption of dedicated clean hydrogen pipelines is essential. These pipelines guarantee the efficient transport of hydrogen, enabling power plants to fully leverage the potential of hydrogen as a carbon-free, reliable energy and capacity resource.

The ambitious goal set by EPA for greenhouse gas reduction necessitates a substantial quantity of hydrogen, making it crucial to address transport and storage challenges for the needed supply of clean hydrogen. As such, the proposed policy's effectiveness in promoting the scalability of clean hydrogen co-firing at power plants largely depends on the successful establishment of a dedicated regional interstate and ultimately national clean hydrogen pipeline network to ensure that each region across the country has access to geologic storage of clean hydrogen to balance season fluctuations in supply and demand, similar to how natural gas is currently inventoried in underground chambers. This is also similar to the case of CCS, where not every region in the country has local geological salt formations suitable for clean hydrogen storage.[12] Consequently, the transportation of hydrogen from bulk storage facilities, such as salt domes, to end-users will require the development of specialized regional and interstate infrastructure.

Given this fact, the GHC recommends that the EPA coordinate closely with the Pipeline and Hazardous Materials Safety Administration, which is the current agency overseeing interstate hydrogen transportation as an industrial commodity. Additionally, the GHC also recommends close

[11] "HyBuild Los Angeles Phase 2 Report: Architecting the Green Hydrogen Ecosystem Vision for a Deeply Decarbonized LA"
[12] Ibid at 7

collaboration with the Federal Energy Regulatory Commission (FERC), which the GHC respectfully recommends as the appropriate agency to regulate interstate pipeline transport of clean hydrogen as a fuel. Greater clarity on FERC's role, and its ability to utilize its vast powers granted through the Gas Act, will dramatically accelerate private sector investment by establishing needed regulatory certainty

By advocating for this infrastructure, the GHC underscores its commitment to an economy-wide sustainable energy future and demonstrates the essential role that clean hydrogen plays in achieving multi-sectoral decarbonization goals. A robust dedicated pipeline system connected with mass-scale geologic storage of clean hydrogen will provide the critical system infrastructure needed to achieve low delivered cost, which is a necessary requirement to ensure affordability and accelerate fuel switching in other sectors. In summary, the EPA's proposed rule helps jump start the development of this infrastructure by provided needed regulatory certainty to attract private investment, propelling the nation towards a cleaner and more resilient energy landscape with greater fuel diversity and energy independence.

Safety concerns related to hydrogen transportation can also be effectively addressed through interagency collaboration. By sharing expertise and best practices already established from many decades of hydrogen production, transport, and use as an industrial feedstock, federal agencies can build on existing protocols and, where needed for new applications, develop comprehensive safety protocols and standards that instill public and stakeholder confidence in the viability and safety of clean hydrogen as a widespread fuel option.

Overall, the GHC calls for a coordinated effort among federal agencies, spearheaded by the EPA, to advocate for and support the development of dedicated pipelines for clean hydrogen supply to power plants. This collaborative approach will enable the efficient and uninterrupted transport of clean hydrogen, maximize environmental benefits, and accelerate the nation's progress toward a sustainable and decarbonized energy future. Through strategic partnerships and a clear commitment to hydrogen infrastructure, the United States can lead the way in realizing the full potential of clean hydrogen as a transformative clean energy solution.

d) <u>To Meet the Decarbonization Goals Outlined in This Rulemaking Especially Related to the Use of Clean Hydrogen, the GHC Recommends that the EPA Proactively Engage with Communities to Ensure that Community Goals/Interests and Concerns are Prioritized.</u>

Many communities across the nation, particularly those in low-income and communities of color, have shouldered the burdens of our historical dependence on fossil fuels to drive our economy. The advent of clean hydrogen presents an unparalleled opportunity to envision a revamped energy ecosystem and collaborate with these communities to effect transformative change. Specifically, the utilization of clean hydrogen for reliable and sustainable power generation marks a novel application that has sparked pertinent queries and apprehensions within communities. Concerns encompass aspects such as safety measures and the consequential emissions of nitrogen oxides (NOx).

Within this context, the GHC advocates for the decarbonization of the power sector by incorporating clean hydrogen into thermal electric generation processes. However, it is crucial that any such proposal, whether it involves repurposing existing systems or developing new hydrogen-capable turbines, adheres to all pertinent safety benchmarks, including the most rigorous standards for NOx emissions.

These apprehensions necessitate a transparent and candid dialogue, underscored by an impartial assessment of associated risks, costs, advantages, and feasible alternatives. This assessment should encompass a diverse array of power sector decarbonization options, including enhanced energy efficiency, demand response strategies, renewable energy integration, and the integration of distributed clean energy resources. Additionally, it should entail an evaluation of the risks entailed in perpetuating the widespread utilization of fossil fuels.

The GHC stands firmly in favor of the EPA's stance as outlined in its preliminary regulations, which stipulate continuous monitoring of clean hydrogen leakage and NOx emissions stemming from hydrogen combustion to guarantee both safety and environmental preservation. This necessitates the allocation of resources to bolster current measurement and monitoring initiatives.

e) <u>The GHC Supports the Implementation of Specific Mechanisms to Ensure Low-CI Hydrogen, Climate Integrity, and Near-Term Commercial Progress for Clean Hydrogen.</u>

In the section of the draft rule titled "Mechanisms To Ensure Use of Actual Low-GHG Hydrogen," EPA states that it is "soliciting comment on appropriate mechanisms to ensure that the low-GHG hydrogen used by EGUs is actually low-GHG, and guard against EGU use of hydrogen that is falsely claimed to be low-GHG hydrogen."[13] The GHC would like to express our appreciation for the EPA flagging this important issue. We believe that, for hydrogen to reach its potential as a decarbonization tool, it is critical to verify that the hydrogen employed has climate integrity and that "greenwashing" – or falsely identifying hydrogen that is carbon-intensive as "clean" hydrogen - cannot occur. Accordingly, the GHC has the following three specific recommendations for the EPA:

i. Require Independent Third-Party Verification to Ensure Hydrogen an EGU Uses for Compliance Purposes Is Low-GHG Hydrogen.

The GHC agrees with the EPA's suggestion of using a third-party verifier to confirm that the hydrogen employed is, in fact, low GHG. Specifically, we agree with the EPA's suggestion that said verifier should "hold an active accreditation from an accrediting body, such as the California Air Resources Board's Low-GHG Fuels Standards Program." While California's LCFS program is specific to transportation, it has nevertheless been critical in helping California reduce emissions by approximately 50 percent as of 2019 and increase the use of low-carbon fuels.[14] Given the LCFS program's success, we believe that employing a third-party verifier with LCFS accreditation

[13] EPA-HQ-OAR-2023-0072
[14] https://www.law.berkeley.edu/wp-content/uploads/2019/12/Fact-Sheet-LCFS.pdf

could be valuable by providing best practices and ensuring that the hydrogen used is verifiably low-GHG.

ii. Require Alignment with the with Department of Energy's Clean Hydrogen Production Standard (CHPS) and limit co-firing to only hydrogen that meets CHPS definition of "Clean".

To further ensure the hydrogen employed by EGUs is low-GHG, the GHC suggests requiring alignment with Department of Energy's Clean Hydrogen Production Standard (CHPS).[15] The CHPS "establishes a target of 4.0 kgCO2e/kgH2 for lifecycle (i.e., "well-to-gate") greenhouse emissions associated with hydrogen production, accounting for multiple requirements within the Infrastructure Investment and Jobs Act provision as well as incentives in the Inflation Reduction Act."[16] The GHC believes that, by aligning with these federal standards and legislative definitions, the EPA can help streamline the process and limit concern or uncertainty. In this way, we appreciate the inclusion of co-firing hydrogen, but note that such projects should not exceed what is allowed in the well-to-gate carbon intensity ceiling of 4 kilograms that has been set for Clean Hydrogen eligibility at the federal level.

iii. *Implement "3 Pillars" Guidance to Ensure That Grid-Connected Electrolyzers Are Powered by Low-GHG Electricity.*

The GHC further suggests the inclusion of policy mechanisms to ensure that hydrogen produced from grid-connected electrolyzers is low-GHG. Since deep decarbonization of our economy will require a broad portfolio approach,[17] it is important to ensure that we maximize the number of production pathways for low-GHG hydrogen. Electrolysis is a commercially viable and scalable pathway for the production of clean hydrogen.[18] While electrolyzers can produce virtually zero greenhouse gas and criteria pollutant emissions when powered by renewable energy, they can generate emissions when connected to the grid.[19] Therefore, the GHC maintains that the EPA should adopt the three pillars – additionality, time matching, and geographic correlation – to ensure that grid-connected electrolyzers produce hydrogen that is low-GHG. The GHC offers the following recommendations on how the pillars can be implemented:

1) **ADDITIONALITY:** Additionality serves as the foundation for the environmental credibility of grid-connected electrolytic green hydrogen production. Starting January 1, 2028, we believe that additionality requirement be met through conformance with one or more of the following rules:

[15] https://www.hydrogen.energy.gov/pdfs/clean-hydrogen-production-standard-guidance.pdf
[16] Ibid.
[17] https://deepdecarbon.ucsd.edu/policy-and-tech/energy-portfolio.html
[18] U.S. Department of Energy, Hydrogen and Fuel Cell Technologies Office. "Hydrogen Production: Electrolysis". Accessed online at, https://www.energy.gov/eere/fuelcells/hydrogen-production-electrolysis
[19] It is estimated that 60% of the U.S. power grid (February 2023) is powered from fossil fuels (U.S. Energy Information Administration)

- ***New Clean Energy Projects:*** Electrolytic green hydrogen projects should source electricity from clean energy projects that were placed into service no more than 36 months prior to when the electrolyzer is placed in service. This encourages the utilization of recently established renewable energy sources for green hydrogen production.

- ***Repowered Clean Energy Projects:*** GHC also considers renewable energy projects "new" if they meet the 80/20 repowering rule[20] within the 36-month framework outlined above. This promotes the modernization and upgrading of existing renewable energy infrastructure for green hydrogen production.

- ***Use of Low-Value Renewable Grid Electricity to Mitigate Curtailment:*** As renewable energy becomes more abundant on the electrical grid, it is expected that during low demand periods of time, electricity clearing prices could be very low or even negative. In those situations, it may result in curtailed renewable energy. To limit wasted renewable energy, the GHC believes that the proposed additionality rules should not apply to hydrogen produced utilizing grid power when clearing prices are less than $20 per MWh. Since renewable energy resources have very low variable cost, it is presumed that in the future low power pricing will likely be caused by an abundance of renewable power generation. A simple approach to equate low value grid pricing as renewable power generation is an appropriate and needed method to provide the clarity required for hydrogen producers to utilize excess renewable power. This viewpoint is also in alignment with other key markets, including the European Union.[21]

  Additionally, any electricity that would otherwise be curtailed should be considered additional for meeting this requirement, regardless of whether the curtailed energy comes from a renewable generating source that has been operational for more than 36 months prior to the Commercial Operation Date (COD) of the electrolysis facility.

- ***Grandfathering Requirement:*** To ensure a smooth transition, only projects with an existing agreement to procure energy in place prior to January 1, 2028, should be grandfathered and exempt from the additionality rules. This allows ongoing projects to continue their grid-connected electrolytic clean hydrogen production and minimize existing contractual disruption.

2) **TIME MATCHING:** Since optimizing renewable energy utilization is essential to minimize carbon impact, grid-connected electrolyzers should ultimately align their electricity consumption with renewable electricity production through time matching. The GHC believes that from January 1, 2028, onwards, the time matching requirement for grid-connected electrolytic green hydrogen production should utilize electricity from the grid during the same

[20] To re-qualify an existing asset, owners must invest 80% of the fair market value (FMV) of the asset, achieved through repowering or retrofitting.
[21] https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2023)747085

hour as renewable energy production. Until January 1, 2028, a **flexible** quarterly correlation that accommodates the use of renewable energy credits for the renewable electricity supplied should be acceptable.

Until January 1, 2028, the quarterly approach should be implemented as follows: time matching for renewable electricity can be achieved through the purchase and retirement of renewable electricity certificates, which can be 'banked' for up to three quarters. This approach, which is currently adopted in California's Low Carbon Fuel Standard (LCFS),[22] works as follows: if a given quantity of renewable electricity is supplied to the grid in the first calendar quarter (Q1), the corresponding amount claimed for reporting must be used for electrolytic hydrogen production no later than the end of the third calendar quarter (Q3).

Figure 1. Three Quarter Limit for Time Matching Accounting

<table>
<tr><th>Q1</th><th>Q2</th><th>Q3</th><th>Q4</th></tr>
<tr><td>"X" MWh electricity generated</td><td></td><td></td><td></td></tr>
<tr><td>"X" RECs listed in tracking system for "X" MWh</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">"X" RECs can be retired and matched with electricity supplied and reported for Q1</td><td>Q1 "X" RECs cannot be claimed</td></tr>
</table>

- ***Grandfathering Requirement:*** No grandfathering will be allowed for the time matching requirement. All grid-connected electrolyzers should achieve hourly time matching criteria by January 1, 2028.

3) **GEOGRAPHIC CORRELATION:** Efficient resource allocation and regional sustainability are paramount in grid-connected electrolytic green hydrogen projects. To achieve this goal, the source of the renewable electricity and the electrolytic production must be linked to a common regional interconnection area (e.g., WECC, SeRC, ERCOT, etc.). By requiring a common regional interconnection, physical deliverability is ensured.

[22] Low Carbon Fuel Standard (LCFS) Guidance 19-01: Book-and-Claim Accounting for Low-CI Electricity. p. 2.

Importance of a Phased Approach: Recommended Timing

One key aspect of our suggested approach is that it allows the pillars to be implemented over time. The logic behind this approach is that – by establishing an on-ramp towards full implementation of the pillars – it becomes possible to foster market development while also ensuring climate integrity. Specifically, we believe our proposed approach will foster faster near-term progress, scale, and ultimate achievement of tighter restrictions beginning January 1, 2028, as summarized in the table below:

Pillar	Near-term (Present - December 31, 2027)	Longer-term (January 1, 2028 - onwards)
Additionality	*Not required*	Required
Time-Matching	Quarterly (with the ability to 'bank' renewable energy credits for up to three quarters)	Hourly
Geographic Correlation	Required	Required

The rationale for this phased approach is based on existing research, which warns that immediate implementation of the additionality and hourly time matching requirements may increase costs and thereby restrict the market.[23] Since the hydrogen market is nascent, overly restrictive requirements at the outset would likely limit market participants, hampering the market's ability to scale and achieve rapid cost reduction throughout the supply chain and thereby hamstring its development. Should market growth be hindered, green hydrogen will not be able to provide the important and urgent climate benefits needed.

By establishing a deadline in the near future for full implementation (i.e., January 1, 2028), we believe the requirements will be flexible enough in the early years to incentivize participants to enter the market while also ensuring climate integrity. Given the fact that a similar phase-in approach has already been implemented in the European Union[24] and incorporated in legislation passed in Colorado,[25] we believe this is a reasonable approach that will help the United States not only set guidelines for the production of clean hydrogen domestically but also establish alignment internationally.

[23] See research from Wood Mackenzie and The Rhodium Group.
[24] https://energy.ec.europa.eu/news/renewable-hydrogen-production-new-rules-formally-adopted-2023-06-20_en
[25] https://leg.colorado.gov/bills/hb23-1281

f.) <u>The EPA should Develop an Adaptable and Pragmatic Approach for Compliance for Power Plants That Are Unable to Meet Hydrogen Co firing Requirements Due to Supply or Local Configuration/Space Constraints.</u>

The EPA should adopt a pragmatic and flexible programmatic approach when dealing with power plants that are unable to meet their hydrogen co-firing requirements either due to local physical constraints (e.g., not all existing power plants have sufficient space for clean hydrogen combustion upgrades) or insufficient access to clean hydrogen supply, particularly since appropriate hydrogen production, transport and storage infrastructure development may not coincide with all new hydrogen ready powerplants under the compliance timing proposed.

The GHC would like to respectfully offer two proposed solutions to address this challenge. First, we recommend a phased implementation approach. Specifically, we maintain that power plants should start with lower hydrogen co-firing ratios, gradually increasing them as hydrogen supply improves. This would allow power plants to adapt and invest in necessary infrastructure at a manageable pace, facilitating a smoother transition. Secondly, we recommend the EPA also introduce mechanisms that enable power plants to comply virtually. For example, we recommend the EPA allow power plants to earn credits for successful hydrogen co-firing and then allow these credits to be traded and used to offset compliance obligations for non-collocated power plants. This approach would be similar to how carbon credits are produced, banked and sold today. Another mechanism the EPA could employ is a hydrogen banking system, which would enable power plants to store excess hydrogen co-firing credits achieved during periods of surplus supply for use during times of scarcity. Such a program will enable a 'market efficient' approach to achieving compliance on a fleet basis.

Collaboration and networking are crucial to ensuring regulatory goals. The EPA should promote partnerships between power plants, hydrogen producers, and distributors to ensure a stable hydrogen supply. Stakeholders must be fully aware of new clean hydrogen infrastructure development pursuant to the many programs in the DOE's Clean Hydrogen Earthshot program. Long-term contracts or joint ventures should be explored to secure consistent clean hydrogen availability. Information sharing among power plants, detailing best practices and lessons learned, could assist struggling plants in refining their co-firing processes.

To ensure ongoing progress, the EPA should regularly review the clean hydrogen program's effectiveness. Adjustments to co-firing requirements and program approaches should be made based on the evolving clean hydrogen market and technological advancements. Public engagement should also be prioritized through awareness campaigns to foster an understanding of the challenges faced by power plants and the benefits of clean hydrogen co firing. By adopting this flexible approach, the EPA can encourage power plants to transition to hydrogen co firing while considering very real plant and equipment limitations as well as near term clean supply limitations and supporting sustainable energy goals.

III. CONCLUSION

The GHC appreciates the opportunity to comment on this effort to reduce greenhouse gas emissions from the electric generation sector. We look forward to future collaboration on this effort.

Respectfully submitted,

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