

Research Insight Report

# Unleashing the Potential of Hydrogen

## Tax Credits and Clean Energy for Sustainable Progress

## Executive Summary

The debate over hydrogen tax credit rules has intensified as stakeholders grapple with the need to ensure truly carbon-free power while maintaining cost competitiveness. Clean-energy accounting plays a central role in this discussion, with proponents advocating for hourly tracking to match clean energy consumption with production, while opponents raise concerns about complexity and cost. This report delves into the debate over hydrogen tax credit rules and clean-energy accounting, focusing on the need to ensure truly carbon-free power while maintaining cost competitiveness. It explores the arguments for and against strict clean-energy accounting, as well as the benefits and challenges of adopting a phased-in approach. The report also highlights the importance of hourly tracking for green hydrogen production and the feasibility of implementing such a system. Additionally, it addresses conflicting views from various stakeholders, including fossil fuel companies and big corporate players. Furthermore, the report emphasizes the significance of accessing reliable hourly energy data and draws insights from Europe's example in adopting hourly matching for renewable hydrogen production. Overall, this comprehensive analysis aims to shed light on key considerations and provide valuable insights for fostering a sustainable and widespread hydrogen market.

## Introduction

The hydrogen industry is at a crossroads, with stakeholders debating the most effective path forward for maximizing carbon reduction while ensuring economic viability. Arguments for and against strong hydrogen tax credit rules have emerged, centering on the importance of clean-energy accounting and hourly tracking. This article delves into the various perspectives on the topic, exploring the need for truly carbon-free power, cost-competitiveness concerns, and the pros and cons of strict clean-energy accounting. Additionally, we examine the debate over a phased-in approach, learning from Europe's embrace of hourly matching, and addressing challenges in obtaining hourly energy data.



## Navigating Hydrogen Tax Credits and Clean Energy in the Path to Sustainability



In the evolving landscape of sustainable energy, the debate over Hydrogen Tax Credits is gaining momentum. Advocates emphasize the importance of producing hydrogen using clean power sources to ensure Carbon-Free Energy production. Stricter rules are seen as crucial to prevent reliance on fossil fuels and subsequent carbon emissions. This approach aligns with the ongoing shift towards a Clean Energy Transition, where the benefits of carbon-free power are harnessed for hydrogen production.

Research indicates that clean hydrogen can be Cost-Effective when compared to its fossil fuel counterparts. Notably, significant Financial Feasibility is enabled through tax credits, making Green Hydrogen an attractive option. The hydrogen industry stands at a crossroads, considering both Financial Viability and environmental sustainability.

An essential aspect of this discussion revolves around Hourly Clean-Energy Matching. By integrating renewable energy sources on an hourly basis, the production of hydrogen is tightly connected to clean energy consumption, addressing concerns about carbon emissions. This not only facilitates transparency but also ensures eligibility for Hydrogen Tax Credits, ultimately rewarding companies committed to carbon reduction.

As the Hydrogen Industry Growth continues, finding the balance between financial prosperity and environmental responsibility remains paramount. The journey to sustainable hydrogen production involves intricate decisions that shape the industry's future. By embracing the potential of clean energy and fostering a dialogue around tax credits, the path towards a cleaner energy future is paved.

## Embracing Clean Hydrogen: Catalyst for Sustainable Energy Transition and Industry Growth

### Unlocking the Advantages of Clean Hydrogen in the Clean Energy Transition

As the world races towards a more sustainable future, the benefits of clean hydrogen are garnering significant attention. In comparison to its counterpart, grey hydrogen, clean hydrogen offers a substantial edge in terms of environmental impact and sustainability. The ongoing shift towards a clean energy transition underscores the need for viable alternatives that can power industries and economies without compromising the environment.

## Comparing Green vs. Grey Hydrogen: The Sustainability Factor

When pitted against grey hydrogen, which is produced using fossil fuels and emits carbon dioxide during production, clean hydrogen shines as a beacon of sustainability. The production of clean hydrogen involves utilizing renewable energy integration sources such as solar, wind, and hydroelectric power, resulting in a process that emits little to no carbon emissions. This distinction is pivotal in achieving the goals set forth by the clean energy transition, as clean hydrogen aligns seamlessly with carbon reduction initiatives.



## Ensuring Sustainable Hydrogen Production and Financial Feasibility

Sustainable hydrogen production not only contributes to a cleaner environment but also aligns with financial feasibility. The hydrogen industry's growth potential lies in its ability to strike a balance between economic prosperity and environmental responsibility. This delicate equilibrium is crucial for encouraging investment, driving innovation, and fostering long-term growth within the sector.

## Embracing the Hydrogen Industry Growth Amid Clean Energy Transition

The rapid hydrogen industry growth is a testament to the global commitment towards sustainable energy solutions. Governments, corporations, and researchers are collaborating to refine hydrogen production processes, making them more efficient, cost-effective, and environmentally friendly. This collaborative spirit exemplifies the determination to drive the clean energy transition forward, with clean hydrogen serving as a cornerstone.

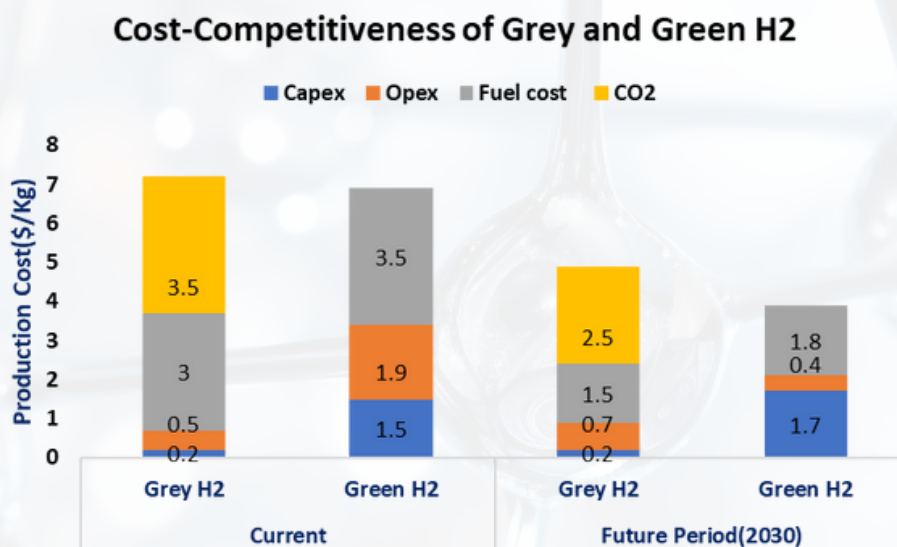
# Arguments for Strong Hydrogen Tax-Credit Rules:

## The Need for Truly Carbon-Free Power

As the world races towards a more sustainable future, the benefits of clean hydrogen are garnering significant attention. In comparison to its counterpart, grey hydrogen, clean hydrogen offers a substantial edge in terms of environmental impact and sustainability. The ongoing shift towards a clean energy transition underscores the need for viable alternatives that can power industries and economies without compromising the environment.

## Cost-Competitiveness with Fossil Fuels

When pitted against grey hydrogen, which is produced using fossil fuels and emits carbon dioxide during production, clean hydrogen shines as a beacon of sustainability. The production of clean hydrogen involves utilizing renewable energy integration sources such as solar, wind, and hydroelectric power, resulting in a process that emits little to no carbon emissions. This distinction is pivotal in achieving the goals set forth by the clean energy transition, as clean hydrogen aligns seamlessly with carbon reduction initiatives.



In the current period, grey hydrogen exhibits lower capital expenditure (Capex) and fuel costs compared to green hydrogen. However, green hydrogen has higher operational expenditure (Opex) due to its more advanced and sustainable production process. Despite the higher Opex, green hydrogen proves to be more environmentally friendly as it emits significantly lower CO2 during production compared to grey hydrogen.

Looking ahead to the future period (2030), both grey and green hydrogen see an increase in Capex, with green hydrogen experiencing a more significant rise. Nonetheless, green hydrogen maintains its advantage in fuel costs over grey hydrogen. Surprisingly, the situation reverses regarding Opex, with green hydrogen now boasting lower operational expenses than grey hydrogen. Moreover, green hydrogen further reduces its CO2 emissions during production, solidifying its position as the more sustainable choice for the future.

# Arguments Against Strict Clean-Energy Accounting:

## Cost and Competitiveness Concerns:

Companies that are against strict rules raise legitimate concerns about the possible effects of having to match clean energy production on an hourly basis. They worry that such requirements could result in significant cost increases for hydrogen production, making green hydrogen less competitive when compared to fossil fuel-based alternatives. These concerns underscore the importance of finding a balanced approach that considers both environmental objectives and economic feasibility in the growth of the hydrogen industry.

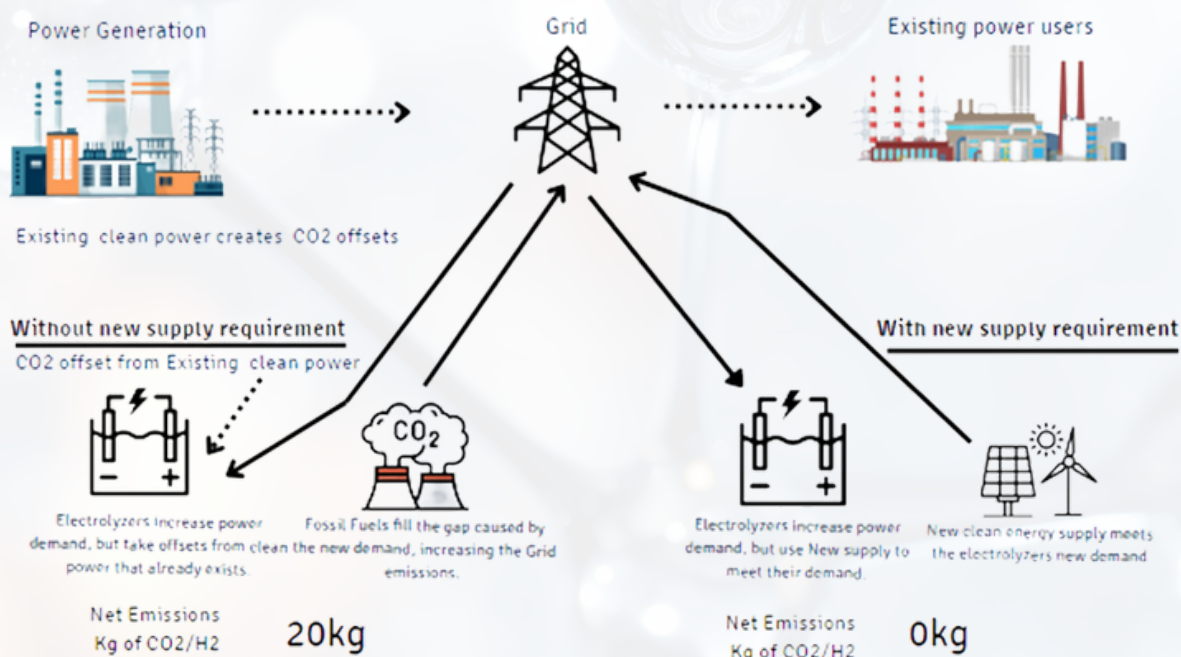
## Deliverability and Geography

Some opponents argue that hourly matching requirements might lead to an unfair advantage for regions with plentiful clean-energy sources. This could result in concentrated hydrogen production in specific areas, limiting the industry's expansion in other regions and hindering the country's overall goal of becoming a leader in affordable hydrogen production. To ensure a more fair and widespread development of the green hydrogen sector, it may be essential to explore strategies that encourage the integration of clean energy across different regions and promote a balanced distribution of hydrogen production capabilities. This way, the benefits of the hydrogen industry can be more evenly spread and contribute to the country's broader environmental and economic objectives.

## The Pros and Cons of Keeping Electrolyzers Running 24/7

If electrolyzers are compelled to reduce production when there is low availability of renewable energy, it could result in lower utilization rates and increased costs for hydrogen facilities. This situation could make it difficult for these facilities to stay economically sustainable.

### 45V New Supply Requirement:



## The Issues on Additionality and Round-the-Clock Production

The debate surrounding hydrogen projects centers on whether they should rely on existing carbon-free electricity sources or invest in building new clean energy infrastructure. Strict advocates argue that it is essential to prioritize "additionality," which means using new clean energy sources. This approach aims to ensure that the production of green hydrogen does not compromise the overall cleanliness and sustainability of the energy grid. By investing in new clean energy infrastructure, they believe we can avoid simply shifting existing clean energy resources from other uses to hydrogen production, thus supporting the growth of both the clean energy sector and the hydrogen industry.



## The Debate Over a Phased-In Approach

### Energy Futures Initiative's Proposal for a Phased Approach

Stakeholders suggest a gradual approach to the hydrogen industry, beginning with more lenient rules and gradually implementing stricter clean-energy requirements over time. This approach seeks to find a balance between promoting the initial growth of the hydrogen industry and achieving long-term decarbonization objectives. By allowing the industry to develop steadily and adapt to evolving technologies, it aims to ensure that the transition to a cleaner hydrogen sector aligns with the broader goals of reducing carbon emissions and fostering sustainable energy practices.

### Annual Clean-Energy Matching

Companies such as Plug Power propose a phased approach to clean-energy matching. They advocate for initially adopting broader annual clean energy matching requirements and gradually transitioning to stricter hourly accounting over time. This approach offers flexibility to hydrogen producers while still supporting the growth of the green hydrogen sector. By allowing companies to adapt and scale their operations gradually, they believe it will be easier for the industry to integrate clean energy sources effectively without compromising economic viability. As technology advances and clean energy becomes more accessible, stricter hourly accounting can be implemented to align with long-term sustainability goals.

## Warning of the Risk of Lock-In of Blue Hydrogen

Some analysts raise a warning that if the hydrogen industry encounters excessive challenges in its early years, there is a risk of over-relying on blue hydrogen. Blue hydrogen is produced from fossil fuels but with carbon capture technology to reduce emissions. If blue hydrogen becomes the dominant option due to initial obstacles faced by green hydrogen, it could impede the growth of a sustainable green hydrogen market. This is because the focus may shift away from developing and investing in cleaner, renewable energy sources for hydrogen production, leading to a less environmentally friendly outcome overall. To foster a truly sustainable hydrogen market, it is crucial to address the hurdles faced by green hydrogen and support its development in parallel with efforts to reduce emissions in the blue hydrogen production process.



## Clean-Energy Groups' Concerns About Looser Rules Lock-In

Clean-energy advocates emphasize the importance of any phased approach to guarantee that projects starting with looser rules eventually transition to stricter requirements as they become effective. Allowing projects to continue operating under looser rules for an extended period could undermine efforts to establish a hydrogen industry optimized for clean energy utilization. It is crucial to ensure a smooth and timely shift towards more stringent clean-energy standards to promote the growth of a truly sustainable and environmentally friendly hydrogen sector. This way, the industry can align with the broader goals of reducing carbon emissions and maximizing the use of renewable energy sources in hydrogen production.

## Empowering Change Through Comprehensive Clean Energy Initiatives

### Driving Change Through Clean Energy Initiatives

The global push towards a sustainable future has spurred a plethora of initiatives aimed at fostering a cleaner and greener planet. One such endeavor, the clean energy accounting project, is gaining momentum as it seeks to revolutionize the way we measure and manage our energy consumption. These actions are not limited to individuals alone; clean energy companies are at the forefront of innovation, contributing significantly to the paradigm shift towards sustainable practices.

## Renewable Energy Certificates Accounting Treatment: Paving the Way for Transparency

In the quest for cleaner energy, the importance of renewable energy certificates accounting treatment cannot be overstated. These certificates serve as tangible evidence of the origin of clean energy, ensuring transparency and accountability in energy transactions. By meticulously recording the issuance and usage of these certificates, businesses and individuals can accurately trace their clean energy footprint, a pivotal step towards a sustainable future.

## Unleashing the Potential: Clean Energy Fuel Earnings and Sustainability

The symbiotic relationship between clean energy fuel earnings and sustainability is becoming increasingly apparent. As companies invest in cleaner alternatives and transition away from fossil fuels, they not only contribute to the reduction of greenhouse gas emissions but also position themselves as leaders in sustainable practices. Clean energy fuel earnings are not merely financial gains; they represent a conscious effort to create a positive impact on both the environment and society.

## Accelerating Progress: Clean Energy and Sustainability Accelerator

A driving force behind the rapid evolution of sustainable practices is the clean energy and sustainability accelerator. This entity serves as a catalyst for innovation, providing the necessary resources and support for businesses and projects dedicated to clean energy advancement. By fostering collaboration, research, and implementation, these accelerators propel the transition to a cleaner and more sustainable energy landscape.

## Navigating the Landscape: Clean Energy Rule and Collective Action

Institutional frameworks, such as the clean energy rule, play a pivotal role in guiding societies towards cleaner energy consumption. These regulations set standards for industries, ensuring that they operate within environmentally responsible parameters. As governments and organizations collaborate to enforce clean energy rules, the collective impact of these actions becomes a powerful driver for change.

In summary, the journey towards a sustainable future is marked by collective efforts and dedicated initiatives aimed at reshaping our energy landscape. From innovative clean energy accounting projects to the committed actions of clean energy companies, the integration of renewable energy certificates accounting treatment, and the establishment of clean energy rules, each facet contributes to the grand narrative of change. With clean energy fuel earnings as a driving force and the presence of clean energy and sustainability accelerators, the transition towards sustainability is not only feasible but also an inevitable reality.



# The Importance of Hourly Accounting for Green Hydrogen

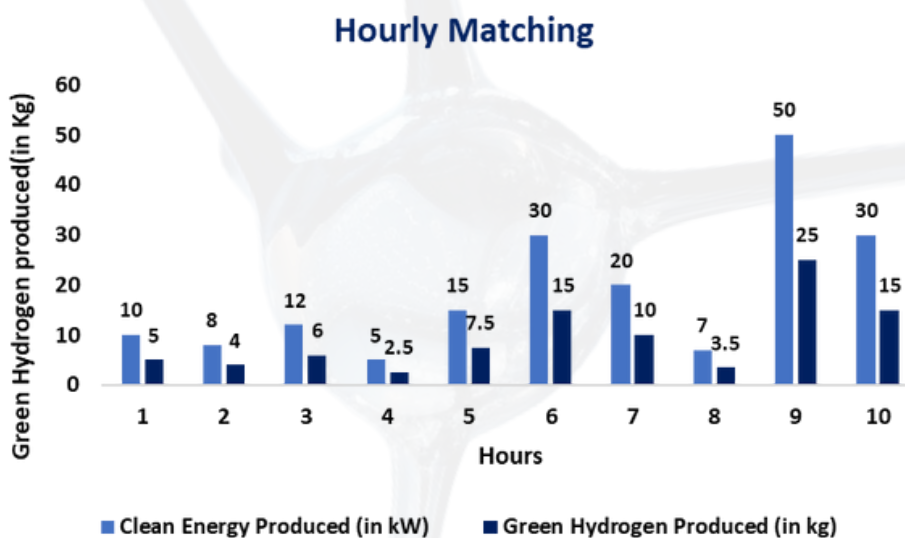
## Hourly Tracking for Corporate Clean Energy Purchases

Ben Gerber, CEO of the Midwest Renewable Energy Tracking System (M-RETS), highlights the value of hourly tracking for renewable energy certificates. This approach enables companies to match clean energy consumption to production every hour, facilitating the transition to 24/7 carbon-free energy use. Moreover, hourly matching is a critical factor in determining the eligibility of hydrogen producers for lucrative federal hydrogen production tax credits.

## Hourly Matching Calculations

The Midwest Renewable Energy Tracking System (M-RETS) has been at the forefront of providing a way to track renewable energy certificates hourly. This data is vital for companies like Google and Microsoft, striving to use 24/7 carbon-free energy, matching the clean energy they purchase with their energy consumption in real time. Beyond serving corporate buyers, hourly tracking is essential for ensuring that federal hydrogen production tax credits are awarded to projects not exacerbating climate change.

Hours	Clean Energy Produced (in kW)	Green Hydrogen Produced (in kg)
1	10	5
2	8	4
3	12	6
4	5	2.5
5	15	7.5
6	30	15
7	20	10
8	7	3.5
9	50	25
10	30	15



**Hourly matching** ensures clean energy use: The model shows that by matching the clean energy produced in each hour with the green hydrogen produced in the same hour, we are using clean energy to create green hydrogen. This is important because it means that the hydrogen production process is not contributing to carbon emissions or climate change.

**Consistency in clean energy usage:** Hourly matching helps maintain consistency in the use of clean energy. It ensures that the amount of clean energy used to produce green hydrogen is balanced with the amount of green hydrogen produced, hour by hour. This consistency is crucial for sustainable and efficient hydrogen production.

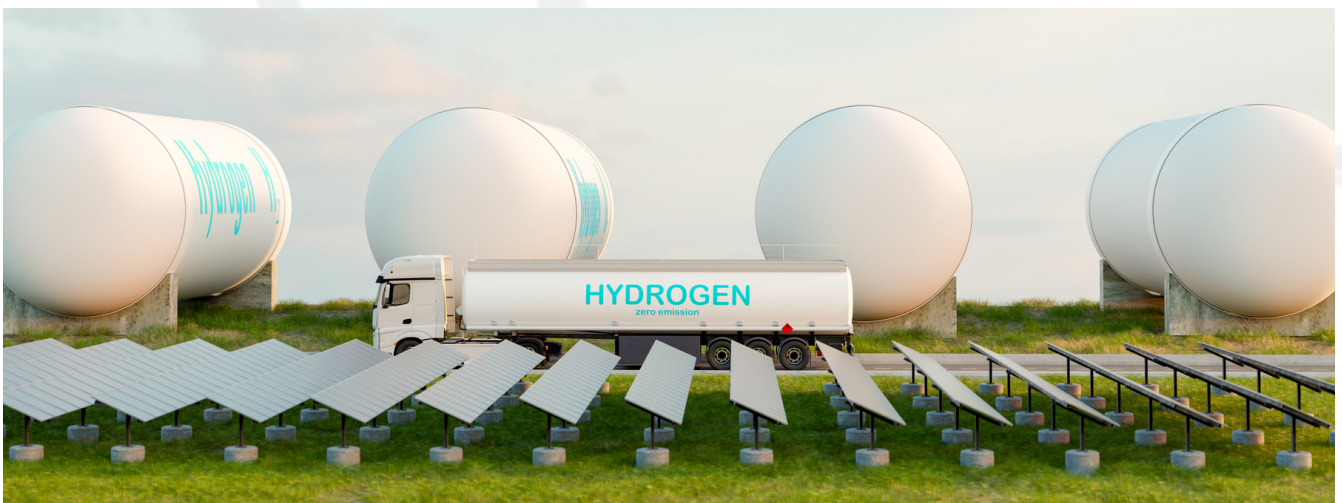
**Understanding hydrogen production efficiency:** The model's conversion rate of 0.5 (where 1 kW of clean energy produces 0.5 kg of green hydrogen) helps us understand the efficiency of the hydrogen production process. In real-world scenarios, this conversion rate would be determined by the technology and equipment used in the electrolysis process.

**Transparency and environmental benefits:** By tracking and matching clean energy production with green hydrogen creation on an hourly basis, we can be transparent about the environmental benefits of green hydrogen. This transparency is essential for verifying that hydrogen producers are indeed using clean energy sources.

Overall, the model demonstrates that hourly matching is a critical aspect of green hydrogen production. It ensures that hydrogen is made using clean energy, which aligns with our goals of reducing carbon emissions and combating climate change. Hourly matching also provides a reliable and transparent method to evaluate the environmental impact of green hydrogen production processes.

## Ensuring Proper Allocation of Hydrogen Production Tax Credits

Section 45V hydrogen production tax credits offer generous incentives for low-carbon hydrogen production. By requiring hourly matching for hydrogen projects, companies can substantiate their claims of clean production, ensuring that these incentives genuinely reduce carbon emissions and support the development of eco-friendly projects.



# Conflicting Views on Hourly Accounting

## Opposition from Fossil Fuel Companies

Fossil fuel companies argue that hourly accounting imposes significant costs and complexity on a nascent industry. On the other hand, proponents of stricter rules assert that the rapid progress in hourly clean-energy accounting renders it feasible. Industry participants and stakeholders have submitted mixed opinions in public comments to the IRS, underscoring the challenges in crafting regulations that incorporate hourly matching into clean-hydrogen accounting.

## Disagreements with Big Corporate Players

While proponents of hourly tracking advocate for its feasibility and the positive impact it can have on reducing carbon emissions, some big corporate players, including BP, NextEra Energy, and Plug Power, hold differing views. They argue that hourly matching, additionality, and deliverability are too complicated and burdensome to be incorporated into the government's hydrogen tax-credit regime. For instance, Plug Power, a fuel-cell company planning to build hydrogen electrolysis facilities across the U.S., aligns with the oil industry in advocating for annual clean energy accounting, rather than hourly. They believe that the Inflation Reduction Act does not grant the Treasury Department the authority to impose more stringent time or location accounting rules.



# Feasibility and Implementation of Hourly Tracking

## Progress in Hourly Clean-Energy Accounting

The progress of hourly tracking from pilot projects to real-world implementation is evident in M-RETS's system, which has over 120 million hourly renewable energy certificates. The adaptation of existing carbon-impact measurement structures, such as the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model, could allow for more accurate quantification of greenhouse gas emissions associated with hydrogen production.

## Adaptation of Existing Carbon-Impact Measurement Structures

To facilitate hourly tracking for green hydrogen, experts propose adapting existing carbon-impact measurement structures. The Inflation Reduction Act currently mandates the use of the GREET model, developed by the Department of Energy's Argonne National Laboratory, to quantify greenhouse gas emissions associated with hydrogen production. However, the model is currently designed to use average grid emissions figures rather than tracking contractual energy deliveries. The model could potentially be revamped to account for renewable energy certificates and other boundary conditions, including hourly clean-energy matching. This adaptation would enable accurate measurement and verification of the carbon impact of hydrogen production based on real-time data.

## Opposition from Fossil Fuel Companies

Fossil fuel companies argue that hourly accounting imposes significant costs and complexity on a nascent industry. On the other hand, proponents of stricter rules assert that the rapid progress in hourly clean-energy accounting renders it feasible. Industry participants and stakeholders have submitted mixed opinions in public comments to the IRS, underscoring the challenges in crafting regulations that incorporate hourly matching into clean-hydrogen accounting.

## Disagreements with Big Corporate Players



While proponents of hourly tracking advocate for its feasibility and the positive impact it can have on reducing carbon emissions, some big corporate players, including BP, NextEra Energy, and Plug Power, hold differing views. They argue that hourly matching, additionality, and deliverability are too complicated and burdensome to be incorporated into the government's hydrogen tax-credit regime. For instance, Plug Power, a fuel-cell company planning to build hydrogen electrolysis facilities across the U.S., aligns with the oil industry in advocating for annual clean energy accounting, rather than hourly. They believe that the Inflation Reduction Act does not grant the Treasury Department the authority to impose more stringent time or location accounting rules.

# Feasibility and Implementation of Hourly Tracking

## Progress in Hourly Clean-Energy Accounting

The progress of hourly tracking from pilot projects to real-world implementation is evident in M-RETS's system, which has over 120 million hourly renewable energy certificates. The adaptation of existing carbon-impact measurement structures, such as the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model, could allow for more accurate quantification of greenhouse gas emissions associated with hydrogen production.

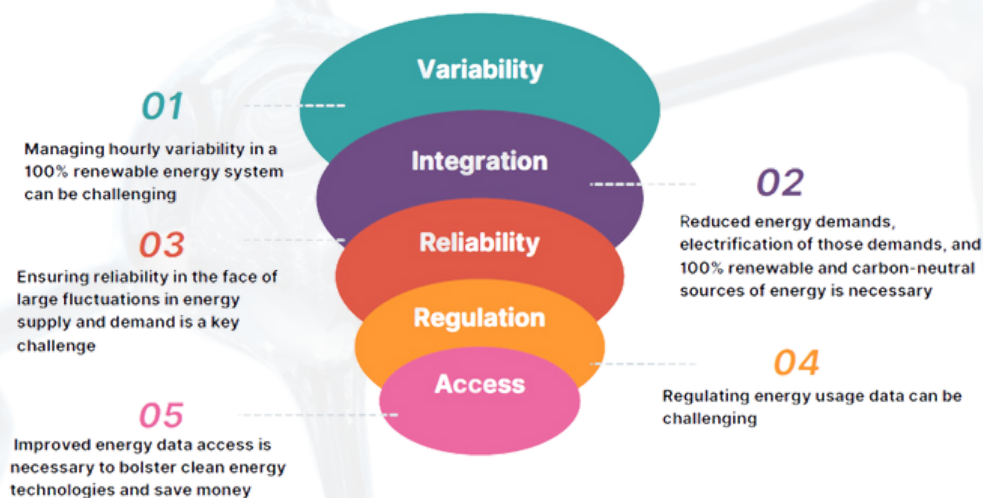
## Adaptation of Existing Carbon-Impact Measurement Structures

To facilitate hourly tracking for green hydrogen, experts propose adapting existing carbon-impact measurement structures. The Inflation Reduction Act currently mandates the use of the GREET model, developed by the Department of Energy's Argonne National Laboratory, to quantify greenhouse gas emissions associated with hydrogen production. However, the model is currently designed to use average grid emissions figures rather than tracking contractual energy deliveries. The model could potentially be revamped to account for renewable energy certificates and other boundary conditions, including hourly clean-energy matching. This adaptation would enable accurate measurement and verification of the carbon impact of hydrogen production based on real-time data.

## Challenges in Obtaining Hourly Energy Data

Access to reliable hourly energy data poses a crucial challenge. Data resides with vertically integrated utilities, independent power producers, and regional transmission organizations, creating disparities in data availability across different regions. While some regions have already made hourly energy-tracking data available, others may require regulatory intervention to cooperate.

### Challenges in obtaining Hourly Energy Data



## Learning from Europe's Example

Europe's recent adoption of hourly matching for renewable hydrogen production provides a valuable model for U.S. policymakers. By phasing in stricter requirements gradually, Europe aims to ensure a significant portion of hydrogen production is done with hourly matching by 2030. This approach aligns with Europe's ambitious renewable hydrogen goals without compromising on emissions reduction.

## In Summary

The debate over hydrogen tax credit rules and clean-energy accounting requires a balanced approach that addresses both environmental concerns and economic feasibility. A phased-in approach, as demonstrated by Europe, offers valuable insights into the U.S. hydrogen industry. Overcoming challenges in obtaining hourly energy data and reconciling conflicting views will pave the way for a sustainable and widespread hydrogen market. Embracing hourly tracking and clean-energy matching will play a pivotal role in realizing the potential of green hydrogen as a key driver in carbon reduction efforts.



**Karthikeyan V Raaj**  
**Founding Partner**

### **About the Author:**

Karthikeyan V Raaj has over 18 years of experience as a Senior Finance Executive and as a CFO business partner. He has championed strategic projects and helped transform finance functions to enable growth of his client organizations. Currently, he is the Founding Partner of ValueXPA, a Global technology-enabled Finance-as-a-Service Partner for Small and Mid-sized Businesses and Institutions. As a CFO Partner, he has advised and helped over 50 small and mid-sized businesses, start-ups and Not-for-profit Institutions - across areas like financial planning, tracking and managing their financial performance through systems, optimizing finance processes through automation and outsourcing.

His specialties include CFO Partnering on Strategic and Business Financial Advisory, Finance Transformation, Financial Modelling, Financial Planning and Analysis, Performance Management Reporting & Decision-support, Development of KPIs and Management Dashboards, Valuation and Analytical Process Automation using Low code/ No code tools. Earlier, he held leadership roles at Barclays and S&P Global. For Global Business Leaders/companies & Financial Institutions, he offered Financial Decision and Controller Solutions and also built & led Investment Research teams globally. He holds an MBA degree specializing in Finance and is also a qualified Engineer.

**For more information on business partnering  
please connect with us!**

Write to us at [info@valuexpa.com](mailto:info@valuexpa.com)

**XP&A | Advanced Analytics & Business Intelligence | Finance Processes Managed Services**

[www.valuexpa.com](http://www.valuexpa.com)

**Report Credits: Aniket Verma and Tanya Gupta**