Research Insight Report

Balancing Clean Energy and Economic Viability:

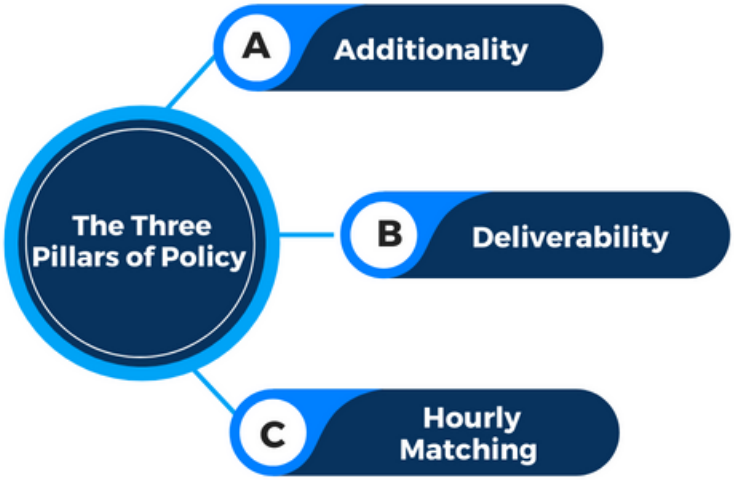
The Future of U.S. Clean Hydrogen Industry

Executive Summary

The U.S. clean hydrogen industry faces a critical decision on whether to support low-carbon production or risk increased emissions. Tens of billions in federal tax credits are at stake, sparking a heated debate. One side urges strict rules, demanding clean energy additionality, deliverability, and hourly matching for hydrogen production. The opposition argues for looser standards to avoid stifling the nascent industry. Striking the right balance is crucial to ensure economic viability and genuine emissions reduction in the hydrogen sector. This report delves into the pressing challenges surrounding hydrogen tax-credit rules and clean-energy accounting, aiming to find solutions that strike a balance between environmental objectives and economic feasibility.

Introduction

The United States finds itself at a pivotal moment in the evolution of its clean hydrogen industry. The Inflation Reduction Act has earmarked $400 billions of dollars in federal tax credits, which could either bolster a domestic clean-hydrogen sector that reduces carbon emissions or paradoxically increase them. This comprehensive insight report explores the complexities of the ongoing debate between proponents of stricter rules for hydrogen tax credits and those advocating for looser standards, aiming to shed light on the path to a cleaner and more sustainable energy future.



Stricter Rules vs. Looser Standards

The battle lines are drawn between two opposing camps. On one side, a coalition comprising climate scientists, energy analysts, environmental groups, and some hydrogen producers advocates for hydrogen production to be as close to zero carbon as possible. They emphasize the importance of setting strict rules for tax credits, demanding that hydrogen be made solely with electrolyzes powered by new sources of carbon-free electricity, delivered on an hourly basis. Failure to enforce such regulations could lead to increased carbon emissions from hydrogen projects, negating the intended environmental benefits.

Conversely, companies such as BP, Shell, NextEra Energy, and Plug Power, which have ambitious hydrogen plans, argue that overly restrictive rules may stifle a nascent and cost-uncompetitive industry. They advocate for tax credits to support hydrogen made from clean electricity sourced from across the grid, including controversial unbundled renewable energy credits. The debate has seen numerous comments submitted to the IRS and the U.S. Treasury Department, with draft rules expected to be issued soon.

Hydrogen Tax Credits Inflation Reduction Act Spurs Debate

Elevated Emphasis: How Have Tax Credits Increased for Hydrogen Tax Incentives?

The hydrogen tax incentives have gained prominence, aiming to encourage the development and utilization of hydrogen as a clean energy carrier. This comprehensive approach reflects a global commitment to combat climate change and create a more sustainable future. Understanding how energy tax credits work and the mechanisms behind hydrogen tax incentives is crucial for both the energy industry and consumers as they contribute to shaping the trajectory of clean energy adoption.

Increased Tax Credits and Their Implications

The ongoing debate over hydrogen production's future is further fueled by the Hydrogen Tax Credits Inflation Reduction Act. This act has prompted discussions about whether tax credits for clean hydrogen production should be increased to accelerate its adoption. While some advocate for boosting these credits to incentivize companies and drive innovation, others remain cautious about potential drawbacks.

Hourly Matching for Production and Consumption of Clean Power

Hourly matching of clean electricity generation and consumption is critical. Averaging clean energy credits annually can lead to hydrogen production using fossil-fuel-generated electricity during certain periods, offsetting emission reductions achieved during others. The three pillars of policy (additionality, deliverability, and hourly matching), as proposed by environmental groups and hydrogen companies, aim to address these concerns and promote competitive and clean hydrogen projects.

Impact of Enhanced Tax Credits

Amidst these deliberations, the question arises: How do energy tax credits work in the context of clean hydrogen? Hydrogen tax incentives have the potential to significantly reduce the cost of producing clean hydrogen, making it more economically competitive with traditional methods. The prospect of clean hydrogen investment tax credits and clean hydrogen production tax credits has drawn interest from a variety of stakeholders.

Navigating Renewable Energy Tax Credits

The conversation extends to exploring the synergy between green hydrogen tax credits and renewable energy tax credits. As the two concepts intersect, it becomes essential to consider how tax credits for hydrogen production align with broader renewable energy goals. Effectively utilizing such incentives requires comprehensive understanding and coordination. How these incentives align and interact could determine the pace and scope of the energy transition. Insights from IRA tax credits for hydrogen and investment tax credit for hydrogen storage underscore the intricate web of considerations.

Empowering Sustainable Hydrogen Growth Through Tax Incentives

Hydrogen Tax Credits: Powering Sustainable Growth

Tax credits have become a crucial driving force in the evolution of the hydrogen industry, particularly when it comes to advancing clean and carbon-free hydrogen production. Governments around the world have recognized the potential of hydrogen as a clean energy carrier, and as a result, hydrogen tax incentives have been put in place to encourage its production and utilization.

Clean Hydrogen Tax Credits: Fostering Carbon-Free Energy

One of the main focuses of these incentives is to promote the production of clean hydrogen derived from renewable energy sources. Governments are offering financial rewards to companies that produce hydrogen using clean power, such as solar, wind, and hydroelectric energy. These tax credits for hydrogen fuel cells serve a dual purpose: they not only drive the growth of the hydrogen industry but also contribute to the reduction of carbon emissions, aligning with global efforts to combat climate change.

Calculating the Benefits: How Much Tax Credits Can You Get?

The amount of tax credits that companies can receive for their hydrogen production varies based on factors such as the amount of clean hydrogen produced, the energy source used, and the specific tax regulations in each region. It's important to understand the intricacies of these incentives to maximize the financial benefits. Working with tax professionals who specialize in clean energy incentives can help companies accurately assess their eligibility and determine the potential value of these credits.

Incentivizing Renewable Energy: Exploring Renewable Energy Tax Credits

In addition to hydrogen-specific incentives, governments also provide a range of renewable energy tax credits that can indirectly support the growth of the hydrogen industry. These broader incentives are aimed at encouraging the adoption of renewable energy technologies across various sectors. By investing in renewable energy sources for hydrogen production, companies can tap into both hydrogen-specific incentives and general renewable energy incentives, further enhancing the overall financial viability of their projects.

Tax credits have indeed increased the attractiveness of hydrogen production, particularly when coupled with a focus on clean and sustainable methods. These hydrogen tax incentives prioritize the generation of clean hydrogen and support technologies like hydrogen fuel cells, contributing to the ongoing shift towards renewable energy. For those considering venturing into hydrogen production, understanding the potential benefits of these tax credits and staying up to date with the latest regulations is essential to make the most of these financial opportunities.

The Case for Ambitious Rules for Hydrogen Tax Credits

Demand for Additionality in Hydrogen Production

Crucial to the clean hydrogen industry's success is the use of new sources of clean energy, rather than merely diverting existing ones. By avoiding competition for clean electricity required to power buildings and transportation systems, hydrogen production can genuinely contribute to reducing carbon emissions. Hydrogen production reduces carbon emissions by using its own methods to create hydrogen, without relying on the clean electricity used for buildings and transportation. This helps cut down overall pollution.

Importance of Deliverability in Clean Power Usage

Clean power must be delivered efficiently to hydrogen production facilities, and the rules must prevent claiming credit for electricity generated far from the site of consumption. This ensures that the full environmental benefits of renewable energy are realized.

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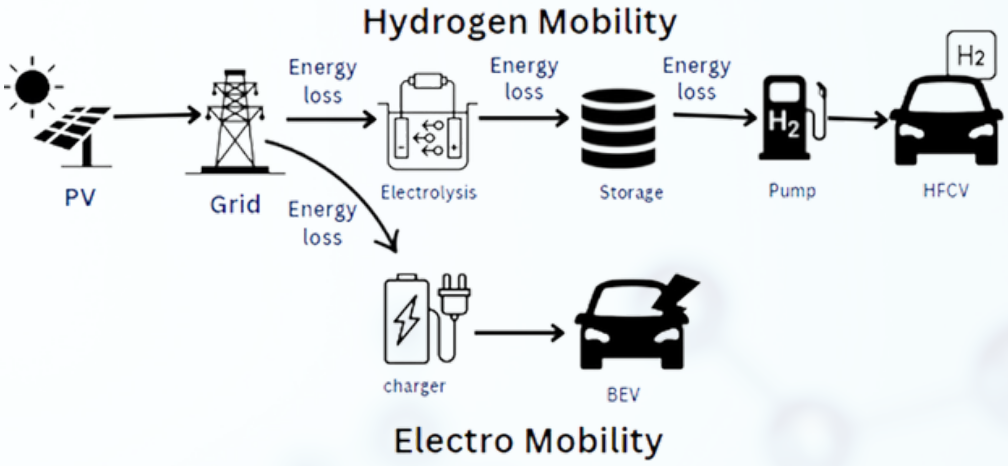
The Importance of Hourly Clean-Energy Matching

How Clean Hydrogen Production Can Increase Carbon Emissions

A thorough understanding of why hydrogen production using electricity can yield higher carbon emissions than fossil gas production requires consideration of power carbon intensity and energy losses during electrolysis. Hourly matching of clean electricity ensures that hydrogen is only produced when electricity from zero-carbon sources is available, avoiding inadvertent increases in carbon emissions.

Energy loss during hydrogen production using electricity.



Reduced CO2 emissions from hourly matching

The Need for Hourly Matching in Carbon Accounting

Existing annual renewable energy credit accounting is inadequate for clean hydrogen, as it doesn't accurately track the origin of clean electricity used in hydrogen production. Hourly matching ensures that credits correspond directly to electricity consumption and facilitates effective carbon accounting.

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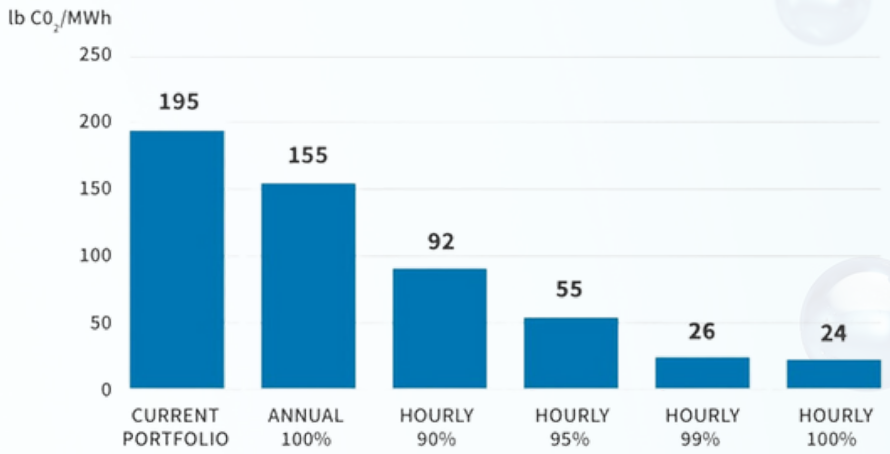
Challenges and Potential Solutions for Hourly Matching

Implementing hourly matching in carbon accounting presents challenges, but pilot projects and existing models show its feasibility. Collaborative efforts from federal agencies and international standards-setting groups are necessary to refine and establish a robust hourly matching framework.

Carbon Emissions



Based on the chart provided, we can conclude that carbon emissions decrease significantly during the hourly matching compared to the annual matching.

The Flaws in Existing Annual Renewable Energy Credit Accounting

Inadequacy of Annual REC Accounting for Clean Hydrogen

Annual renewable energy credit accounting falls short in ensuring genuinely clean hydrogen production, as it permits hydrogen production during periods of fossil fuel-based electricity generation.

Potential Increase in Carbon Emissions with Annual RECs

The use of unbundled Renewable Energy Certificates (Renewable Energy Certificates (RECs) are like special tokens that prove someone produced one megawatt-hour of electricity using renewable energy sources, such as solar or wind) can lead to higher carbon emissions if not utilized correctly. Producers may claim credits for clean electricity while using fossil-fuel-generated power during hydrogen production.

Imagine there is a company in Year 2 that emits 100 units of carbon dioxide (CO2) from its electricity use. To be more environmentally friendly, the company has decided to buy 50 units of clean energy through Renewable Energy Certificates (RECs). Now, the company can claim that it reduced its emissions by 50 units because of the RECs, making it look like they only emitted 50 units of CO2.

The 50 units of clean energy they purchased through RECs are still available on the grid and being used by others. So, in reality, the total emissions on the grid didn't change at all. Other consumers are now using the clean energy that the company bought certificates for.

As a result, the company's claim of reducing emissions by 50 units is not actually true. The total emissions on the grid are still the same as before, at 100 units of CO2. The company's use of RECs only shifted the emissions reduction to others who are now benefiting from clean energy.

In simple terms, the company bought certificates for clean energy and claimed a reduction in emissions, but the emissions didn't really go down overall. The clean energy they bought is still being used by others, and the total emissions on the grid remain the same. So, it's not a genuine reduction in carbon emissions for the whole system.

Limitations and Criticisms of Unbundled Renewable Energy Credits

Unbundled RECs face criticism for their potential to create a false impression of clean energy usage. Stricter accounting measures are needed to ensure the veracity of clean hydrogen claims.

The Threat of Using Clean Hydrogen Tax Credits Inefficiently

Energy Inefficiencies in Power-to-Hydrogen Processes
Hydrogen production processes can be energy-intensive, and utilizing tax credits without strict carbon accounting may lead to wasteful practices and inefficient energy usage.

Risks of Hydrogen-Washing and Wasteful Practices
Without proper oversight, hydrogen-washing (claiming hydrogen production from clean sources while using fossil fuels) could undermine the industry's credibility, harming long-term growth prospects.

Balancing Tax Credits and Effective Decarbonization
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The Threat of Using Clean Hydrogen Tax Credits Inefficiently

Economic Competitiveness of Electrolysis with Tax Credits
Tax credits significantly reduce the cost of clean hydrogen production using electrolysis, enhancing its economic competitiveness, and spurring investment.

Benefits of Extended Tax Credits for Clean Energy and Storage
Extended tax credits encourage the deployment of additional renewable energy projects and energy storage, ensuring a reliable supply of clean electricity for hydrogen production

Cost Considerations and Carbon Emissions Reductions
Well-structured tax credits combined with effective carbon accounting can pave the way for nearly emissions-free hydrogen, contributing to decarbonization efforts.

How companies handle carbon emissions.

01 **Understand the Rules**
Companies need to know and follow the rules related to carbon taxes in their area.

02 **Know Current Emissions**
They should measure and keep track of how much carbon dioxide they are currently producing.

03 **Reduce Emissions**
Companies should find ways to lower their carbon emissions, like using energy-efficient technology and renewable energy sources.

04 **Keep Track of Emissions**
They should regularly monitor their emissions and use tools to help them do that.

05 **Calculate Tax**
Based on their emissions, they can figure out how much carbon tax they owe.

06 **Consider Carbon Offsets**
Companies can support projects that reduce carbon emissions to help offset their own impact.

07 **Seek Expert Help**
It's a good idea to get advice from sustainability experts to handle carbon taxes properly.

08 **Be Transparent**
Companies should be honest and open about their carbon tax credits and emissions.

09 **Plan for the Future**
They should prepare for potential future changes in carbon tax rates.

10 **Aim for Balance**
Striving for carbon neutrality by offsetting emissions with carbon reduction efforts is essential.

Financial considerations in Clean Hydrogen Projects

Cost-Benefit Analysis: Companies should conduct a thorough cost-benefit analysis of investing in clean hydrogen projects with tax credits. This will help them assess the financial viability and potential returns on their investments.

Net Present Value (NPV): In the context of hydrogen projects, the NPV represents the difference between the present value of all expected future cash inflows (such as revenue from hydrogen sales, government incentives, tax credits, etc) and the present value of all cash outflows (capital investments, operating costs, etc.) associated with the project. A positive NPV indicates that the project is expected to generate more cash inflows than outflows, making it potentially profitable. Conversely, a negative NPV suggests that the project is not financially viable, as the expected returns are lower than the invested capital.

Internal Rate of Return (IRR): IRR is the discount rate that makes the NPV of an investment equal to zero. For hydrogen projects, the IRR indicates the project's rate of return, i.e., the annualized percentage return that the investment is expected to yield over its lifetime. A higher IRR suggests a more attractive investment opportunity, as it indicates a higher potential return on investment.

ROI: ROI for clean hydrogen projects tells us how financially successful the investment in producing or using clean hydrogen is. It looks at the money spent to set up and run the project and compares it to the money earned from selling clean hydrogen or using it for various purposes.

If the ROI is positive, it means the project is making more money than it costs to operate, and it's financially profitable. On the other hand, if the ROI is negative, it means the project is not making enough money to cover its expenses, and it's running at a loss.

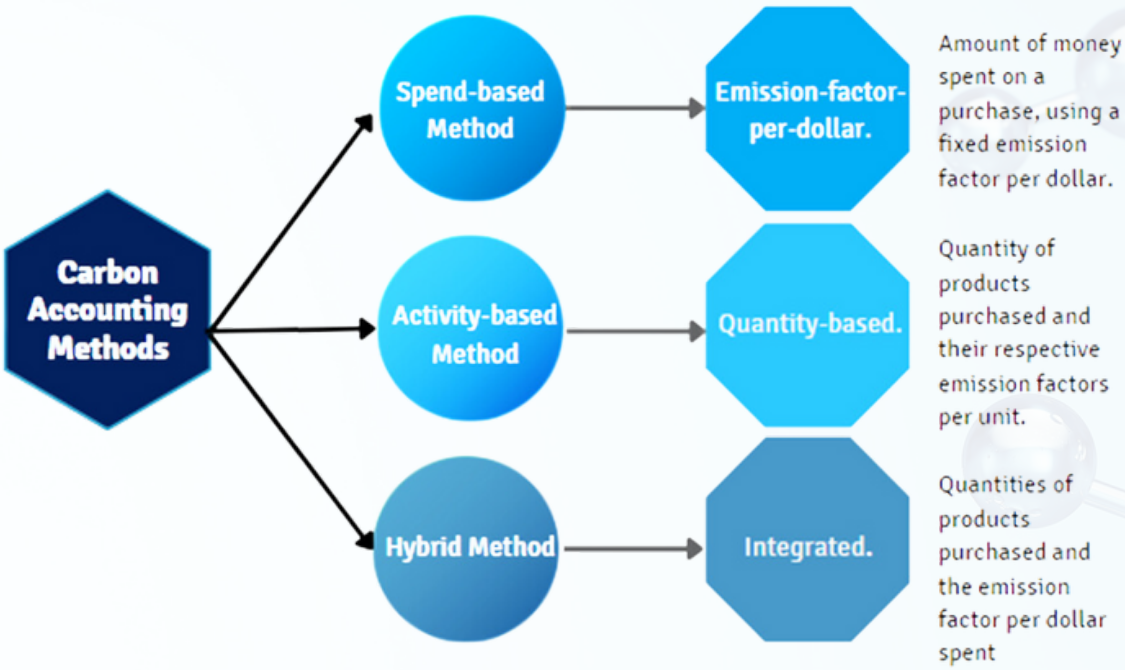
For example, if a company spends $10,000 to start a clean hydrogen production facility and earns $15,000 from selling clean hydrogen, the ROI would be positive because they made a profit of $5,000 ($15,000 - $10,000). But if they only earned $8,000, the ROI would be negative because they didn't make enough to cover their initial investment ($8,000 - $10,000 = -$2,000).

Accounting for carbon emissions

Methodology

Carbon accounting calculates an organization's greenhouse gas (GHG) emissions using two methodologies: spend-based and activity-based. The hybrid methodology combines spend-based and activity-based methods.

Types of Carbon Accounting Methods



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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.

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